UNIVERSITY SYSTEM of MARYLAND
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Board of Regents ~ Committee on Education Policy and Student Life and Safety

Friday, April 12, 2024 ~ 10:00 a.m.

Zoom Details to be Provided to Committee
Public Listen-Only Access: 443-353-0686 ~ Conference ID: 597 024 570

Public Session Agenda

Action Items

1. Academic Program Proposals:
    a. Salisbury University: B.S. Engineering Physics
    b. Salisbury University: Music Therapy Program
    c. Towson University: B.S. Biophysics
    d. Towson University: B.S. Interdisciplinary Physics
    e. University of Baltimore: M.S. Artificial Intelligence for Business
    f. University of Maryland, College Park: B.A./B.S. International Relations
        i. B.A.
        ii. B.S.
    g. University of Maryland, College Park: M.S. Quantum Computing
    h. University of Maryland Eastern Shore: B.S. Aviation Maintenance Management

Information Items

2. Results of Periodic (7-Year) Reviews of Academic Programs
3. Enrollment: New Program 5-Year Enrollment Review

Action Item

4. Motion to Adjourn and Reconvene in Closed Session

UNIVERSITY SYSTEM of MARYLAND

BOARD OF REGENTS
SUMMARY OF ITEM FOR ACTION,
INFORMATION, OR DISCUSSION

TOPIC: *Salisbury University Bachelor of Science (B.S.) in Engineering Physics*

COMMITTEE: Education Policy and Student Life and Safety

DATE OF COMMITTEE MEETING: April 12, 2024

SUMMARY: The B.S. Engineering Physics program prepares students to apply physics principles to tackle modern engineering challenges and to apply engineering to address cutting-edge questions in physics. It is a cross-functional major that bridges the gap between applied science and practical engineering. Students will learn to use their knowledge of physics to solve real-world problems and to develop new technologies and applications.

Students will complete a full suite of courses including calculus, differential equations, two full years of physics principles, and fundamental concepts in electricity, magnetism, and mechanics. Additionally, students will choose from a list of electives that includes dynamics, thermodynamics, fluid mechanics, semiconductor physics, analog and digital electronics, and computer architecture. Finally, students will engage in a capstone seminar and a research project of their own design, providing a summative experience for the program.

A degree in Engineering Physics is a highly employable major according to data provided by the National Association of Colleges and Employers, and graduates will have an opportunity to explore numerous employment options in engineering-related career fields, including aerospace and defense, automotive, biomedical, computer electronics, energy, materials science, nanotechnology, optics and photonics, semiconductor manufacturing, and telecommunications.

ALTERNATIVE(S): The Regents may not approve the program or may request further information.

FISCAL IMPACT: No additional funds are required. The program can be supported by the projected tuition and fee revenue.

CHANCELLOR'S RECOMMENDATION: That the Education Policy and Student Life and Safety Committee recommend that the Board of Regents approve the proposal from Salisbury University to offer a B.S. in Engineering Physics.

COMMITTEE RECOMMENDATION:	DATE:
BOARD ACTION:	DATE:
SUBMITTED BY: Alison M. Wrynn 301-445-1992	awrynn@usmd.edu

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Make Tomorrow Yours

March 15, 2024

Dr. Jay A. Perman, Chancellor
University System of Maryland
3300 Metzerott Rd.
Adelphi, MD 20783

Dear Chancellor Perman:

On behalf of President Carolyn Lepre, the faculty, and the entire Salisbury University (SU) community, I am pleased to submit a request for approval for a new Bachelor of Science in Engineering Physics. The B.S. Engineering Physics program prepares students to apply physics principles to tackle modern engineering challenges, and to apply engineering to address cutting-edge questions in physics. Graduates will have an opportunity to explore numerous employment options in engineering-related career fields, including: aerospace and defense, automotive, biomedical, computer electronics, energy, materials science, nanotechnology, optics and photonics, semiconductor manufacturing, and telecommunications.

SU's Engineering Physics graduates will possess skills that are highly transferable and applicable in a wide range of engineering applications.

The proposal, fully endorsed by Salisbury University, is attached for your review.

Thank you for your consideration.

Sincerely,

Laurie L. Couch

Laurie Couch, Ph.D.
Provost and Senior Vice President of Academic Affairs

ecc: Dr. Candace Caraco, Associate Vice Chancellor for Academic Affairs, USM

UNIVERSITY SYSTEM OF MARYLAND INSTITUTION PROPOSAL FOR

X New Instructional Program
___ Substantial Expansion/Major Modification
___ Cooperative Degree Program
X Within Existing Resources, or
___ Requiring New Resources

Salisbury University
Institution Submitting Proposal

Bachelor of Science in Engineering Physics
Title of Proposed Program

Bachelor of Science	**Fall 2024**
Award to be Offered	Projected Implementation Date
190201	14.1201
Proposed HEGIS Code	Proposed CIP Code
Physics	Dr. Mark Muller
Department in which program will be located	Department Contact
410-677-0023	mwmuller@salisbury.edu
Contact Phone Number	Contact E-Mail Address
Lamie L. Cone	3/15/2024
Signature of President or Designee	Date

A. Centrality to Institutional Mission and Planning Priorities

1. Program Description

The Richard A. Henson School of Science and Technology at Salisbury University (SU) is pleased to submit a proposal for a new Bachelor of Science degree in Engineering Physics. The B.S. Engineering Physics program prepares students to apply physics principles to tackle modern engineering challenges, and to apply engineering to address cutting-edge questions in physics. It is a cross-functional major that bridges the gap between applied science and practical engineering. It is both experimental and theoretical as it emphasizes research and development while also focusing on the design and analysis of complex problems. The program will combine a strong foundation in physics and mathematics with coursework in engineering principles and design. Students will learn to use their knowledge of physics to solve real-world problems, and to develop new technologies and applications.

Students will complete a full suite of courses including calculus, differential equations, two full years of physics principles, and fundamental concepts in electricity, magnetism, and mechanics. Additionally, students will choose from a list of electives that includes dynamics, thermodynamics, fluid mechanics, semiconductor physics, analog and digital electronics, and computer architecture. Finally, students will engage in a capstone seminar and a research project of their own design, providing a summative experience for the program.

The B.S. Engineering Physics program provides the fundamentals for students to adequately prepare for the National Council of Examiners for Engineering and Surveying (NCEES) Fundamentals of Engineering (FE) exam. The FE exam is a prerequisite for engineering licensure. Passing the FE exam prior to graduation can lead to more early-career opportunities for advancement, and helps differentiate engineering graduates from their peers. Once the FE exam is passed, the records are maintained by the Maryland Board of Professional Engineers and remain valid nationwide. Passing the FE exam allows a graduate to be listed in the Maryland Board of Professional Engineers database of Engineers-in-Training (EITs), which is accessible to any company seeking entry-level engineers. Passing the FE exam verifies the graduate's aptitude for advanced engineering work and eventual professional licensure.

A degree in Engineering Physics is a highly employable major according to data provided by the National Association of Colleges and Employers, and graduates will have an opportunity to explore numerous employment options in engineering-related career fields. Students are sought after by employers in a wide range of industries, including: aerospace and defense, automotive, biomedical, computer electronics, energy, materials science, nanotechnology, optics and photonics, semiconductor manufacturing, and telecommunications. SU's Engineering Physics graduates will possess skills that are highly transferable and applicable in a wide range of engineering applications.

This degree program, once approved, will be available to students beginning in August 2024 and most students will be able to complete the Bachelor of Science in Engineering Physics degree in four years.

2. How Proposed Program Supports Institution's Strategic Goals

The proposed B.S. Engineering Physics program supports Salisbury University's mission to "empower our students with the knowledge, skills, and core values that contribute to active citizenship, gainful employment, and life-long learning in a democratic society and interdependent world" and to "actively contribute to the local Eastern Shore community and the educational, economic, cultural, and social needs of our State and nation" (SU's Mission and Values, 2019). The B.S. Engineering Physics program provides students with a multidisciplinary background in science, technology, engineering, and mathematics to prepare them for the demands of Engineering Physics career fields.

While its administrative home will be in the Henson School of Science and Technology's Physics Department, the program utilizes a multi-disciplinary approach to allow students to pursue "a broad array of ideas and perspectives" within the field of Engineering Physics as promoted in the University's mission. This approach will help students achieve excellence, envision their future as engineers, grow intellectually, and pursue career, leadership, and graduate school opportunities.

Further, the proposed program aligns with several of SU's Strategic Plan objectives including: 1.1: Continue to support and develop our wide range of exceptional and challenging academic programs and experiences; 4.3: Enhance and expand local and regional partnerships and strategic alliances with private, public, and nonprofit organizations; and 5.1 Serve as a leader in our region in providing educational opportunities that enhance social, environmental, and economic sustainability.

3. Brief Narrative Describing Adequate Financing of Program

Currently, SU offers an Area of Concentration (AoC) in Engineering Physics in the existing BS Physics program. Therefore, all of the courses needed to offer a new BS program in Engineering Physics are already being taught by current faculty. There will be no need for additional funding at the outset. However, creating a stand-alone BS degree will allow us to seek ABET accreditation for the program and therefore drive enrollment growth. If successful, that could necessitate additional faculty and administrative support. Similarly, as the program evolves, additional funding may be required for space and equipment upgrades. Advising support will be critical to the success of this program and that capacity is currently available within our Academic Advising Center. If the program were to grow significantly, more advising support would be necessary. For more details, see section L below.

4. Commitment to Adequate Continued Support

The proposed program is expected to attract a new set of students who are interested in Engineering Physics and pursuing careers which require engineering licensure. The uniqueness of the program will draw students from the region and beyond. Salisbury University is committed to providing additional administrative, financial, and technical support to meet the growing student demand. The university has established administrative structures to support the new program, as demonstrated by the thorough vetting and approval process involving the Chair of the Department, the Henson School Curriculum Committee, the Dean of the Henson School, the Undergraduate Curriculum Committee, and the Provost. SU also guarantees the provision of appropriate support to ensure the successful completion of the degree for all students enrolled in the program. In the unlikely event of a program suspension or discontinuation, SU will implement a plan to allow all enrolled students the opportunity to complete their degree. For more financial details, see section K below.

B. Critical and Compelling Regional or Statewide Need as Identified in the State Plan

1. Demonstrate Demand and Need for the Program

Maryland has more demand for engineers than its universities have the capacity to educate them. The Maryland Department of Labor estimates that there will be approximately 1,000 new engineering jobs by 2030. SU's Engineering Physics degree plays a pivotal role in meeting this demand, driving advancement and fostering the evolution of knowledge. The students we envision serving with this program are undergraduate students from both Maryland and the Mid-Atlantic region. Local students from Maryland's Eastern Shore should be particularly attracted to this program since there are several well-known pathways to internships and entry-level jobs at local technically focused companies and engineering firms. Transfer students from community colleges will be welcomed to this program, as much of the foundational curriculum is taught at the first- and second-year level.

2. Consistency with Maryland State Plan for Postsecondary Education

The State directs its postsecondary institutions to "respond nimbly to changes in industries, and programs must support student development in critical thinking, problem-solving, and communication skills throughout the curriculum," as indicated in Goal #5 of the Maryland State Plan for Postsecondary Education (2017-2021).[1] The B.S. Engineering Physics degree will advance this goal by providing a unique high-quality program that facilitates "lifelong learning, preparing students to enter the workforce and advance in their careers, fostering cultural understanding, emphasizing ethical principles and practices in personal and professional interactions, and conveying the importance of contributing to the common good as a citizen of the local, national, and global communities."[2] The program prepares students to be effective engineers who can be competitive in an area of expanding demand.

C. Quantifiable and Reliable Evidence and Documentation of Market Supply and Demand in the Region and State

The US Bureau of Labor Statistics (BLS) estimates there are currently 5,240 employed civil engineers with an annual median wage of $82,190. The Maryland Department of Labor estimates the profession will add 515 new positions requiring a bachelor's degree statewide by 2030, a growth of 6.72%. In the electrical engineering industry, the US Bureau of Labor Statistics (BLS) estimates there are 4,520 electrical engineers with an annual median wage of $111,660. The Maryland Department of Labor estimates there are currently 6,484 electrical engineering positions statewide. They believe the profession will add 375 new positions requiring a bachelor's degree statewide by 2030, a growth of 5.72%. In the mechanical engineering industry, the US Bureau of Labor Statistics (BLS) estimates there are 5,290 mechanical engineers with an annual median wage of $104,250. The Maryland Department of Labor estimates there are currently 6,137 mechanical engineering positions statewide. They believe the profession will add 158 new positions requiring a bachelor's degree statewide by 2030, a growth of 2.64%. A indeed.com search on October 6, 2023, yielded the following:

- 1,176 current open electrical engineering positions.

[1] https://bit.ly/2GgJnw8, pg 51
[2] https://bit.ly/32Dzvpx, pg 19

- 754 current open civil engineering positions.
- 466 current open electrical engineering positions.

D. Reasonableness of program duplication

Engineering is a high-demand discipline, and SU believes that offering a degree in Engineering Physics will not burden other schools in Maryland. Salisbury University is one of only two USM institutions that serve the residents of the Eastern Shore of Maryland and the other, the University of Maryland Eastern Shore, does not offer an undergraduate degree in Physics generally or Engineering Physics specifically.

Regarding Engineering more generally, eleven universities operating in the State of Maryland offer some form of engineering curriculum (Capitol Technology University, Frostburg State University, Goucher College, Johns Hopkins University, Loyola University, Morgan State University, Stevenson University, US Naval Academy, University of Maryland Baltimore County, University of Maryland College Park, and University of Maryland Eastern Shore). Most of these programs have a number of particular specializations or concentrations, but only one (Morgan) is specifically focused on physics principles with engineering applications.

Capitol Technology University, a private, doctoral-granting university in Laurel, Maryland, offers bachelor's degrees in aeronautical engineering, computer engineering, electrical engineering, electronics engineering technology and computer engineering technology. In the 2021-2022 academic year, they graduated 27 students from all engineering and engineering technology programs. Their engineering curriculum focuses on traditional engineering foundations specific to the specialized focus areas. The core curriculum includes only three semesters of physics content. CTU does not focus on physics concepts applied to engineering problems and does not offer a degree in engineering physics.

Frostburg State University, a regional comprehensive master's-level university in Frostburg, Maryland, offers a bachelor's degree in engineering with concentrations in electrical and materials engineering and a degree in mechanical engineering with a collaborative agreement with University of Maryland College Park. In the 2021-2022 academic year, they graduated 19 students with an engineering degree. Their engineering curriculum focuses on traditional engineering foundations specific to the specialized focus areas and only includes three semesters of Physics. Frostburg does not offer a degree in engineering physics but it does have an Engineering track within its BS Physics program. This track is largely similar to our proposed BS Engineering Physics program but is not a standalone major. Frostburg graduated one person with a degree in Physics in the 2021-2022 academic year.

Goucher College, a private liberal arts college in Baltimore, Maryland, offers a bachelor's degree in engineering science with tracks in environmental systems, chemical systems, and physical systems. In the 2021-2022 academic year, they graduated no students from this program. This interdisciplinary curriculum is quite different than our proposed Engineering Physics degree. Per their website, this is a non-traditional curriculum designed to combine "…a foundation of core principles from the physical sciences and mathematics with broad skills-based preparation for solving real-world problems." Goucher seems to no longer offer a Physics major.

Johns Hopkins University, a private doctoral-granting, research -intensive university in Baltimore, Maryland, offers a bachelor's degrees in eleven specialties of engineering including biomedical, chemical, electrical, environmental, and mechanical engineering. In the 2021-2022 academic year, they graduated 295 students with an engineering degree. The only degree program that might compare to the proposed program is the General Engineering degree but that is liberal arts degree and is not ABET accredited. JHU also has a robust BS in Physics program, graduating 10 students in 2021-2022. There does not seem to be, however, a degree program that attempts to address both advanced physics content with an eye toward applying those principles to engineering concepts. The listed areas of excellence in the Department of Physics are astrophysics, condensed matter physics, elementary particle physics, and plasma physics.

Loyola University, a private large master's-level university in Baltimore, Maryland, offers a bachelor's degree in engineering with concentrations in computer, electrical, materials, and mechanical engineering. In the 2021-2022 academic year, they graduated 31 students with an engineering degree. Their engineering curriculum focuses on traditional engineering foundations specific to the specialized focus areas and only includes three semesters of Physics. Loyola does not offer a degree in engineering physics, but it does have a five-year, dual degree physics and engineering degree. This program is somewhat similar to our proposed BS Engineering Physics program but is takes an additional year to complete and is focused on delivering a mechanical engineering concentration. Loyola graduated one person with a degree in Physics in the 2021-2022 academic year.

Stevenson University, a private large master's-level university in Stevenson, Maryland, offers a bachelor's degree in biomedical engineering. In the 2021-2022 academic year, they graduated no students with an engineering degree. Their engineering curriculum focuses on solving human health-related problems by applying engineering principles. Stevenson does not offer a degree in physics.

The US Naval Academy, a military service academy in Annapolis, Maryland, offers bachelor's degrees in nine different specialties of engineering including aeronautical, electrical, mechanical, and nuclear engineering. In the 2021-2022 academic year, they graduated 378 students with an engineering degree. The engineering concentration most similar to the proposed program is the general engineering major, which focuses on traditional engineering foundations but allows midshipmen to take electives in additional physics concepts. According to their website, the Naval Academy considers general engineering to be for students who have found "…one of the other engineering majors to be more demanding or more narrowly focused than expected." The Naval Academy does not offer a degree in engineering physics, but it does have a BS Physics program. While comprehensive in its exploration of physics principles, this program lacks a track for students to explore engineering concepts. USNA graduated 20 students with a degree in Physics in the 2021-2022 academic year.

University of Maryland Baltimore County, a doctoral-granting, research-intensive university in Baltimore, Maryland, offers three different bachelor's degrees in engineering – chemical, computer, and mechanical engineering. In the 2021-2022 academic year, they graduated 198 students with an engineering degree. Their engineering curriculum focuses on traditional engineering foundations specific to the specialized focus areas and only includes two semesters of Physics. UMBC does not offer a degree in engineering physics, but it does have a BS Physics program. It seems possible that students could choose to add additional engineering electives to craft a program similar to what is proposed. UMBC graduated 21 students with a degree in Physics in the 2021-2022 academic year.

University of Maryland College Park is a doctoral-granting, research-intensive university in College Park, Maryland and the flagship university of the University System of Maryland. They offer bachelor's degrees in eleven different specialties of engineering including aerospace, biocomputational, chemical, civil, electrical, and mechanical engineering. In the 2021-2022 academic year, they graduated 1,088 students with an engineering degree. Each degree within engineering contains multiple concentrations/tracks although none seem to focus on physics principles. UMCP does not offer a degree in engineering physics. Their BS Physics program does not seem to make engineering courses available as electives. UMCP graduated 66 students with a degree in Physics in the 2021-2022 academic year.

University of Maryland Eastern Shore, a doctoral-granting research university in Princess Anne, Maryland, offers a bachelor's degree in engineering with specializations in aerospace, computer, electrical and mechanical engineering. In the 2021-2022 academic year, they graduated 12 students with an engineering degree. Their engineering curriculum focuses on traditional engineering foundations specific to the specialized focus areas and includes three semesters of Physics. UMES does not offer a degree in physics.

Notably, the proliferation of engineering-related programs indicates a strong need for workforce training in this critical area. However, we have proposed Engineering Physics especially to both avoid program duplication and lean into the strength of the Salisbury University faculty's competencies.

The only Maryland institution currently offering an undergraduate degree in Engineering Physics is Morgan State University. Morgan's Engineering Physics curriculum is very typical for these programs, with a full complement of mathematics and chemistry prerequisites and 45 credits of core Physics content including Physics 1, Physics 2, Modern Physics, Mathematical Physics, Electricity & Magnetism, Thermodynamics, etc. However, in Morgan's program, students can choose from three different tracks (Electronics/Circuits, Engineering Science, or Engineering Design). In the most recent data available from the Department of Education (2021-2022), Morgan had 2 graduates with a BS in Engineering Physics.

While on the surface, it may seem as if Morgan and Salisbury's programs would be duplicative, Morgan's program serves a completely dissimilar area of the state of Maryland and enrolls a very different cohort of students than those at Salisbury. Morgan is a Public Urban Research University located in northeast Baltimore. It is located about 120 miles, or a 2.5-hour drive away, from Salisbury University, a regional comprehensive, master's level, small city/rural institution. From 2017 to 2021 (the latest data available[3]), the BS Engineering Physics program admitted 43 students. Female students made up 37% of the incoming cohorts. A significant majority (84%) of admitted students identified themselves as Black. For the University overall in 2021, 44% of students come from outside Maryland. In comparison, during the same time period, the Engineering Physics concentration in the BS Physics program at Salisbury University admitted 40 students. Female students made up 15% of the incoming cohorts. Only 3 students (7.5%) identified as Black. For SU overall, only 17% of students come from outside Maryland.

However, to support and strengthen the relationship between SU and Morgan, we have proposed creating a preferred pathway between graduates of the BS Engineering Physics program and Morgan's recently approved doctoral program in Integrated Materials Science. This pathway will encourage students to seek their graduate degree at Morgan upon completion of their degree program at SU. This cooperative agreement establishing this preferred pathway is currently being negotiated and would take effect once the BS in Engineering Physics at SU was established.

By creating a pathway, SU's program can address a statewide need to: (1) answer students career trajectory demands by providing long-term graduate educational opportunities as outlined in the latest

[3] https://www.morgan.edu/office-of-institutional-research/interactive-dashboards/fall-cohorts

Maryland State Plan for Postsecondary Education and (2) provide educational opportunities and choices for minority students at institutions of higher education as required by Maryland's COMAR 13B.02.03.05.

E. Relevance to High-demand Programs at Historically Black Institutions (HBIs)

The proposed program will not negatively impact high-demand programs at HBIs, including Morgan where an Engineering Physics degree is offered. Morgan has a well-regarded, burgeoning School of Engineering, offering BS, MS, and PhD degrees in Civil, Electrical, Industrial, & Transportation Engineering. These programs generated 178 graduates in 2022, demonstrating considerably higher demand than Engineering Physics with its 2 graduates in the same period.

SU is committed to serving minority communities, which is evident through our current Physics/Engineering program partnership with The University of Maryland, Eastern Shore. UMES has significant offerings in Engineering, with concentrations in aerospace, computer, electrical, mechanical, and biomedical engineering. While being engineering-focused, SU's proposed Engineering Physics program is a degree in Physics and will be primarily taught by faculty in the Department of Physics. UMES does not offer any Physics degree programs.

F. Relevance to the identity of Historically Black Institutions (HBIs)

As noted above, the proposed program will not negatively impact high-demand programs or the identity of HBIs. Morgan University, the only school in the State to offer Engineering Physics and an HBI, has a strong and growing presence in the education of Maryland's engineering workforce. It does not, however, seem to regard Physics as an area of emphasis critical to its identity.

G. Adequacy of curriculum design and delivery to related learning outcome.

<u>1. How the Proposed Program was Established; Faculty Oversight</u>

A full course listing with course titles and descriptions is provided in Appendix A. These courses were chosen to include stated industry needs of mathematics, engineering, and various science disciplines. The unique design of this program combines a breadth of knowledge developed from a group of fundamental courses and specialized Engineering Physics courses. By integrating the specific science disciplines, students in the program will better develop an array of critical thinking, communication, and leadership aptitudes, which are broadly applicable in a rapidly changing technological environment and interdependent society.

The Engineering Physics major will be housed in the Henson School of Science and Technology's Physics Department and will generally be managed by the Physics Department's Engineering Coordinator. The chairs of departments with courses included in the Engineering Physics curriculum will be consulted as necessary: Dr. Matthew Bailey, Physics; Dr. Stephen Habay, Chemistry; Dr. Veera Holdai, Mathematics; Dr. Dan Harris, Geography and Geosciences.

The B.S. Engineering Physics program requires 43 credits of general education courses, 15 of which are fulfilled in the core courses, 59 credits of engineering core courses, 27 credits of required major courses, and 6 credits of electives.

2. Educational Objectives and Learning Outcomes

The B.S. Engineering Physics program follows a student-centered learning approach that is the hallmark of Salisbury University[4] and focuses on principles, models and techniques that engineers use to perform their jobs effectively and support a broad array of applications.

Program objectives for graduates of the B.S. in Engineering Physics are: 1) demonstrate the knowledge and skills central to the field of Engineering Physics; 2) use formal techniques and methodologies of abstraction to create methods to solve real-world problems; 3) apply acquired knowledge to cross-disciplinary problems as part of a project team; and 4) effectively and competitively pursue careers to meet the growing demand for engineers. SU's University Analysis, Reporting and Assessment (UARA) provides official student data and facilitates the collection and presentation of data for Academic Program Reports (APR) on a seven-year cycle. These APRs formalize the assessment of student learning outcomes to drive programmatic decision-making. At the end of each academic year, the program will assess the extent to which learning outcomes are achieved by each student in the program. Modifications to classes or other adjustments may be made in response to areas where learning outcomes are not consistently achieved. Assessment and Documentation of Student Learning Outcomes: see Section L below.

3. List of Courses with Credit Hours and Course Descriptions

Overall Accounting of Credits

Courses	# of Credits
General Education (Not fulfilled by major)	28
Major Core	65

[4] https://www.salisbury.edu/discover-su/mission-values.aspx

Major Electives	15-16
Electives	11-12
TOTAL	**120 credits**

Core Courses: Required courses include the following (see Appendix A for course descriptions).

Complete the following:

CHEM 121 – General Chemistry I	4
CHEM 122 – General Chemistry I	4
COSC 118 – Introductory Scientific Programming	4
ENGR 100 – Introduction to Engineering Design	3
ENGR 110 – Statics	3
MATH 201 – Calculus I	4
MATH 202 – Calculus II	4
MATH 310 – Calculus III	4
MATH 311 – Differential Equations I	4
PHYS 221 – Physics I	4
PHYS 223 – Physics II	4
PHYS 225 – Physics III	3
PHYS 309 – Mathematical Physics	3
PHYS 311 – Electrical Circuits and Electronics	4
PHYS 313 – Introduction to Modern Physics	3
PHYS 314 – Mechanics	3
PHYS 315 – Electricity and Magnetism	3
PHYS 470 – Senior Seminar	1
ENGR 490 – Engineering Capstone Experience	3
OR	
PHYS 490 – Physics and Astronomy Capstone Experience	3

Engineering Physics Elective Courses: Complete five (5) courses include the following (see Appendix A for course descriptions).

ENGR 220 – Mechanics of Materials	3
ENGR 221 – Dynamics	3
ENGR 232 – Thermodynamics	3
ENGR 331 – Fluid Mechanics	3
ENGR 332 – Heat Transfer	3
ENGR 361 – Vibrations, Control, and Optimization	3
ENGR 409 – Acoustics	3
PHYS 318 – Semiconductor Physics	3
PHYS 321 – Analog Electronics	3
PHYS 322 – Digital Electronics	4
PHYS 413 – Computer Architecture and Interfacing	3

Total Credits (Core + Major) 80-81 credit hours

General Education Courses:

SU Signature Outcomes: Must complete at least 3 credits in each of the following areas:

- Civic and Community Engagement

- Diversity and Inclusion
- Environmental Sustainability

Approved courses in the above areas may also include General Education requirements below.
Approved courses in the above areas may also include major coursework.
If a student does not complete a course in all three areas above within their General Education or major coursework, an additional course(s) must be completed in order to fulfill these requirements.

First Year Seminar: Academic preparation, skills and expectations for educational and professional success through exploration of a topic or issue.
SLOs: Critical Thinking and Reasoning, Effective Reading, Information Literacy, Oral Communication, Written Communication, Intellectual Curiosity

Communicating Through Writing: Effective reading, writing, and information usage.
SLOs: Effective Reading, Information Literacy, Written Communication

Quantitative Analysis: Numerical, analytical, statistical, and problem-solving skills. **Fulfilled by Major**
SLOs: Quantitative Reasoning

Human Expression: Exploration of the different ways individuals and societies have and continue to express themselves and communicate the human experience.
SLOs: Knowledge of Human Experience, Intellectual Curiosity, Ethical Reasoning

Humanity in Context: Critical and comparative analysis of humanity, emphasizing the role of history, culture, and/or language in human issues.
SLOs: Critical Thinking and Reasoning, Understanding the Human World, Effective Reading, Knowledge of Human Experience, Intercultural Competence

Social Configurations: Quantitative and/or qualitative analysis of human behavior and/or societies.
SLOs: Understanding the Human World, Knowledge of Human Experience, Emerging and Enduring Global Issues, Intercultural Competence

Social Issues: Applied social science, with an emphasis on understanding and solving problems in the social or behavioral sciences.
SLOs: Quantitative Reasoning, Knowledge of Human Experience, Emerging and Enduring Global Issues, Ethical Reasoning

Hands-on Science: Experiential laboratory-based science. **Fulfilled by Major**
SLOs: Quantitative Reasoning, Scientific Reasoning, Knowledge of the Physical World

Solutions Through Science: Applied science, with an emphasis on understanding and solving problems in the natural, physical, and technological sciences (may or may not include a lab). **Fulfilled by Major**
SLOs: Critical Thinking & Reasoning, Quantitative Reasoning, Scientific Reasoning

Personal Wellness: Interconnected dimensions of wellness, including physical, emotional, and financial, to live a healthy, successful life.
SLOs: Personal Health and Wellness

Experiential Learning: Apply knowledge and competencies from General Education through internship, study abroad/away, research, senior project, or other relevant experience. **Fulfilled by Major**
SLOs: Critical Thinking and Reasoning, Information Literacy, Oral Communication, Written Communication, Ethical Reasoning, Intellectual Curiosity

Total Credits **43 credit hours**

4. Specialized accreditation or graduate certification requirements:
There are no specialized accreditation or graduate certification requirements for this program.

5. Contracting with another institution or non-collegiate organization.

There are no contracts with other institutions or organizations.

6. Assurance that SU provides clear, complete and timely information to students

Salisbury University, the Henson School, and the Physics Department are committed to and will provide clear, complete and timely information pertinent to all Engineering Physics students through official communication channels.

Upon approval, the program's academic requirements are clearly articulated on designated program pages that are located with the university's catalog. Each undergraduate program provides students with a suggested 4-year course of study (aka Curriculum Guide) that is easily accessible within the program page. Students will have access to degree audits that are located in their student portal within Peoplesoft. Additionally, students will have access to professional academic advisors who will support the student in academic support.

Each course offered within the program will provide the student with a syllabus that outlines the expectations for faculty/student interaction, technical equipment requirements, and the learning management system. In addition, approval of the program will be communicated in a timely manner to the appropriate offices on campus. Information regarding financial aid resources and cost of payments policies are clearly communicated on the Accounts Receivable & Cashiers Office and Office of Financial Aid & Scholarships' webpages.

The Academic Advising Center prepares all advisors to assist incoming students with all academic programs; furthermore, the Academic Advising Center dedicates one of their advisors as a liaison to the Department of Physics, the home of the proposed degree. Our catalog and website make available all pertinent information to prospective and current students regarding academic and student support, SU’s learning management system, financial aid resources and costs and payment policies.

7. Assurance that advertising, recruiting and admission material are clear and accurate

All publications, including marketing, catalog and website admissions pages are vetted by the Marketing and Communications Department at SU, which fact-checks all submissions.

H. Adequacy of Articulation: See Appendix C

I. Adequacy of Faculty Resources as outlined in COMAR 13B.02.03.11.

1. Narrative of Faculty Demonstrating Quality of Program Faculty

The science, mathematics, and engineering courses will be taught by SU's faculty from the Henson School of Science and Technology. Collectively, these faculty have decades of experience teaching undergraduates.

Table of Faculty Resources. (note: all faculty are regular state employees, not contractual)

	Faculty Member	Terminal Degree	Field	Degree-granting Institution	Academic Rank	Full- or Part-Time	Courses overseen
Chemistry	Stephen Habay	Ph.D.	Chemistry	Univ of Pittsburgh	Professor and Chair of Chemistry	FT	CHEM 121 & 122
Computer Science	Xiaohong Wang	Ph.D.	Computer Science	Univ of Victoria	Professor and Chair of Computer Science	FT	COSC 118
Mathematics	Veera Holdai	Ph.D.	Mathematics and Statistics	Wayne State Univ	Professor and Chair of Mathematics	FT	All MATH courses
Physics	Matthew Bailey	Ph.D.	Physics	Utah State Univ	Associate Professor and Chair of Physics	FT	All ENGR and PHYS courses
Physics	Mark W. Muller	Ph.D.	Mechanical Engineering (Grad. Cert. Coastal Engineering)	Univ of Hawai'i (Old Dominion Univ)	Professor	FT	Program Coordinator

2. Demonstrate Pedagogical Training for Faculty

The Center for the Advancement of Faculty Excellence (CAFE) supports faculty in the areas of teaching, research, professional development and personal wellness and the office of Instructional Design & Delivery (ID&D) provides professional development for effective pedagogical practices and instructional support for faculty engaged in teaching and learning of online, hybrid and traditional courses. Collaboratively, these offices provide various webinars, workshops, faculty learning communities and initiatives around andragogical and pedagogical best practices (such as

Universal Design for Learning; Diversity, Equity & Inclusion; High Impact Practices; Problem-Based Learning; Open Pedagogy, Open Educational Resources, etc.). Additional opportunities are provided through the Faculty Development Committee and our Faculty Learning Communities such as the Distance Education FLC and the Scholarship of Teaching and Learning FLC. Finally, the institution hosts two annual faculty development events – one in August at the beginning of the semester (our most recent focused on Effective Teaching Strategies) and a Teaching & Learning conference in the Spring where faculty present on evidence-based practices and their experiences at SU. ID&D provides support for the campus learning management system (Canvas) and other instructional software (such as lecture capture, audience response systems) through workshops, video tips, and how-to instructions.

3. Evidence-based practices for distance education, if distance education is offered.

The Engineering program will not be offered 100% via distanced education

J. Adequacy of Library Resources as outlined in COMAR 13B.02.03.12.

Salisbury University Libraries have existing resources to support the new Engineering Physics major. In relation to journal and newspaper articles, SU has a number of relevant titles through electronic access via our online database subscriptions, including (but not limited to): Academic Search Complete; Business Source Premier; EconLit; JSTOR; ProQuest Newspapers; Science Direct; and Web of Science. In regards to monographic titles, SU has a significant number of titles that would support this major and is frequently adding more. SU's online catalog provides direct access and borrowing privileges to approximately eleven million items in the libraries of the University System of Maryland and Affiliated Institution libraries (USMAI). In sum, no new library resources are directly required to support the Engineering Physics major.

K. Adequacy of Physical Facilities, Infrastructure and Instructional Resources as outlined in COMAR 13B.02.03.13.

Currently, SU can deliver the program in our existing space and with the current equipment resources. We predict that 17 of the current BS Physics majors will transition to BS Engineering Physics majors in Year 1. Approximately 8 students will enroll in the program in its first year, 9 new students in Year 2, and 10 new students a year going forward, yielding a total program headcount at maturity of about 33 students, producing 7 graduates per year. We anticipate maintain an 85% first year retention rate, aligning with our BS Physics program. At that rate of growth, and to maintain the 30 students per full-time faculty member, we would need to add additional adjunct/contractual teaching support.

SU an institutional electronic mailing system. All students and faculty are given an SU email to utilize for all university correspondence. The university's IT HelpDesk provides technical support to students who need assistance accessing e-mail.

Instructional Design & Delivery provides support for the campus supported learning management system (Canvas) and other instructional software (such as lecture capture, audience response system) through various methods (e.g. workshops, video tips, how-to instructions).

L. Adequacy of Financial Resources as outlined in COMAR 13B.02.03.14.

TABLE 1: RESOURCES for the Engineering Physics B.S. at Salisbury University					
Resources Categories	(Year 1 - FY25)	(Year 2 -FY26)	(Year 3 -FY27)	(Year 4 -FY28)	(Year 5 -FY29)
1.Reallocated Funds	$0	$0	$0	$0	$0
2. Tuition/Fee Revenue (c+g below)	$262,192	$289,137	$305,988	$345,975	$375,924
a. #F.T. Students	24	26	27	30	32
b. Annual Tuition/Fee Rate (FY23 Resident rate)*	$10,638	$10,851	$11,068	$11,289	$11,515
c. Annual Full Time Revenue (a x b)	$255,312	$282,120	$298,830	$338,674	$368,477
d. # Part Time Students	1	1	1	1	1
e. Credit Hour Rate*	$430	$439	$447	$456	$465
f. Annual Credit Hours	16	16	16	16	16
g. Total Part Time Revenue (d x e x f)	$6,880	$7,018	$7,158	$7,301	$7,447
3. Grants, Contracts, & Other External Sources	$0	$0	$0	$0	$0
4. Other Sources	$0	$0	$0	$0	$0
TOTAL (Add 1 - 4)	$262,192	$289,137	$305,988	$345,975	$375,924

*Figured with a 2% Annual Increase

TABLE 2: EXPENDITURES – for the Engineering Physics B.S. at Salisbury University					
Expenditure Categories	(Year 1 - FY25)	(Year 2 - FY26)	(Year 3 - FY27)	(Year 4 - FY28)	(Year 5 - FY29)
1. Total Faculty Expenses (b + c below)	$100,785	$110,883	$117,730	$133,688	$142,923
a. # FTE	0.69	0.74	0.77	0.86	0.90
b. Total Salary (plus 2% increase each year)	$75,778	$83,371	$88,519	$100,517	$107,461
c. Total Benefits (33% of salary)	$25,007	$27,512	$29,211	$33,171	$35,462
2. Total Administrative Staff Expenses (b + c below)	$19,950	$20,349	$20,756	$21,171	$21,595
a. # FTE	0.125	0.125	0.125	0.125	0.125
b. Total Salary	$15,000	$15,300	$15,606	$15,918	$16,236
c. Total Benefits	$4,950	$5,049	$5,150	$5,253	$5,358
3. Total Support Staff Expenses (b + c below)	$9,576	$10,562	$11,227	$12,787	$13,687
a. # FTE	0.16	0.17	0.18	0.20	0.21
b. Total Salary	$7,200	$7,941	$8,441	$9,614	$10,291
c. Total Benefits	$2,376	$2,621	$2,786	$3,173	$3,396
4. Equipment	$0	$0	$0	$0	$0
5. Library	$0	$0	$0	$0	$0
6. New or Renovated Space	$0	$0	$0	$0	$0
7. Other Expenses	$0	$0	$0	$0	$0
TOTAL (Add 1 - 7)	$130,311	$141,794	$149,713	$167,645	$178,204

M. Adequacy of provisions for evaluation of program as outlined in COMAR 13B.02.03.15.

The Henson School of Science and Technology has a long tradition of assessment and accreditation. Within the Henson School's Departments of Mathematics and Computer Science, Biological Sciences, Geography and Geosciences, Chemistry, and Physics, all faculty members are evaluated every year by their department chairs and degree programs undergo comprehensive review every seven years. With guidance from SU's University Analysis, Reporting, and Assessment, course and program-based assessments are being developed at the start. Thus, the curriculum, program faculty and other resources, and student learning outcomes will be routinely evaluated through the annual and periodic review assessment cycles. In addition, once the B.S. Engineering Physics program is launched, the program and courses will be evaluated using student surveys and program committee reviews on a regular basis. The program may seek ABET accreditation after its initial launch which will require continuous assessment and evaluation.

N. Consistency with the State's minority student achievement goals as outlined in COMAR 13B.02.03.05 and in the State Plan for Postsecondary Education.

Any student meeting the SU admissions requirements can choose to pursue the B.S. in Engineering Physics. The program will work to help all accepted students improve their workplace competitiveness and reach their professional goals, an aim consistent with the State's minority student achievement goals.

More specifically, Strategy 7 of the Maryland State Plan for Postsecondary Education (2017-2021) calls on universities to enhance career advising and planning services and integrate them explicitly into academic advising and planning.[5] The program will reach out to undeclared undergraduate students at Salisbury University to inform them of the educational and career opportunities available with the Engineering Physics major.

Strategy 8 of the State plan calls on universities to "develop new partnerships between colleges and businesses to support workforce development and improve workforce readiness."[6] As the only undergraduate program of its kind in the USM, the B.S. Engineering Physics program will result in new public-private partnerships for students in this program. The program requires that students complete a senior capstone project, and the project can be completed through collaborations with local, state, federal, and private sectors.

[5] https://bit.ly/2GgJnw8, pg 60
[6] https://bit.ly/2GgJnw8, pg 66

O. Relationship to low productivity programs identified by the Commission: The proposed program is not directly related to an identified low productivity program.

P. Adequacy of Distance Education Programs as outlined in COMAR 13B.02.03.22: No distance learning is proposed at this time.

Appendix A
B.S. Engineering Physics - Salisbury University
Course Descriptions

Major Courses

CHEM 121 - GENERAL CHEMISTRY I (4 credit hours)
Study of fundamental laws of chemistry and atomic structure emphasizing quantitative relationships. Prerequisite: Two years high school algebra and chemistry, or CHEM 100. Three hours lecture, one three-hour laboratory per week. Prerequisites: This course assumes an understanding of high school chemistry and algebra.

CHEM 122 - GENERAL CHEMISTRY II (4 credit hours)
Continuation of CHEM 121, including chemical equilibrium, electrochemistry and organic chemistry. Prerequisite: C or better in CHEM 121. Three hours lecture, three hours laboratory per week.

COSC 118 – INTRODUCTORY SCIENTIFIC PROGRAMMING (4 credit hours)
Introduction to program design and development. Programs focus on development of applications for science including applications related to GIS. The object-oriented approach is emphasized throughout. No previous programming experience is required. Three hours lecture, two hours lab per week.

ENGR 100 - INTRODUCTION TO ENGINEERING DESIGN (3 credit hours)
Introduction to the art and science of engineering design. Students work in teams to design, manufacture, assemble and test a product. Examples of products include a postal scale, solar cooker and human-powered water pumping systems. CAD and modeling software will also be used.
Four hours lecture/ activity per week. Pre or Corequisites ENGL 103 and either PHYS 121 or PHYS 221.

ENGR 110 - STATICS (3 credit hours)
The equilibrium of stationary bodies under the influence of various kinds of forces. Forces, moments, couples, equilibrium, trusses, frames and machines, centroids, moment of inertia, beams and friction. Vector and scalar methods used to solve problems. Prerequisite: PHYS 221. Prerequisite/Corequisite: MATH 202. Three hours per week.

ENGR 220 - MECHANICS OF MATERIALS (3 credit hours)
Study stress and deformation of beams, shafts, columns, tanks and other structural, machine and vehicle members. Topics include stress transformation using Mohr's circle, centroids and moments of inertia, shear and bending moment diagrams, derivation of elastic curves, and Euler's buckling formula. Complete design project related to the material.
Three hours per week. Prerequisites: ENGR 110, MATH 202.

ENGR 221 – DYNAMICS (3 credit hours)
Systems of heavy particles and rigid bodies at rest and in motion. Force acceleration, work energy and impulse momentum relationships. Motion of one body relative to another in a plane and in space.
Three hours per week. Prerequisites: ENGR 110, MATH 202.

ENGR 232 – THERMODYNAMICS (3 credit hours)
Introduction to the principles of thermodynamics and thermodynamic properties of matter. Topics include the first and second laws of thermodynamics, heat, work, temperature, entropy, enthalpy, cycles, reactions, mixtures, energy balances, and mass balances. A design project related to the material is given.
Three hours per week. Prerequisites: C or better in ENGR 110, MATH 202, PHYS 225.

ENGR 331 - FLUID MECHANICS (3 credit hours)

Introduction to the principles of fluid mechanics. Topics include mass, momentum and energy conservation, hydrostatics, control volume analysis, internal and external flow, boundary layers, and modern measurement techniques. A design project related to the material is given.
Four hours lecture/activity per week. Prerequisites: C or better in ENGR 221, MATH 310 and PHYS 225.

ENGR 332 – HEAT TRANSFER (3 credit hours)
Introduction to the principal concepts and methods of heat transfer. The objectives of this integrated subject are to develop the fundamental principles and laws of heat transfer and to explore the implications of these principles for system behavior; to formulate the models necessary to study, analyze and design heat transfer systems through the application of these principles; and to develop the problem-solving skills essential to good engineering practice of heat transfer in real-world applications. Topics include conduction in solids, convection, radiation and modern measurement techniques. Four hours lecture/activity per week. Prerequisites: ENGR 232.

ENGR 361 – VIBRATIONS, CONTROL, AND OPTIMIZATION (3 credit hours)
Introduction to modeling, analysis and simulation techniques for the design of vibratory systems. Identification and prevention of unwanted oscillations or engineering of the desired oscillations in mechanical systems, civil structures, biomechanical systems and microelectromechanical systems. Topics include modeling of vibratory systems; single degree-of-freedom systems: governing equations, free response, periodic excitations and transient excitation; and multiple degree-of-freedom systems: natural frequencies, mode shapes and forced oscillations. Three hours lecture/activity per week. Prerequisites: ENGR 220, ENGR 221, MATH 311.

ENGR 409 – ACOUSTICS (3 credit hours)
Introduction to the principles of acoustics. Topics include the physics of sound, aeroacoustics, hydroacoustics, passive and active sonar systems, biosonar, architectural acoustics, sound isolation chambers, sound absorption, sound reflection, noise cancellation, underwater communication, cavitation, rectified diffusion, supersonics, and hypersonics. Three hours lecture/activity per week. Prerequisites: C or better in PHYS 225.

ENGR 490 - ENGINEERING CAPSTONE EXPERIENCE (3 credit hours)
Research project in engineering chose, designed and carried out by student with the advice and approval of a faculty member. Actual work may be carried out at off-campus sites. Written report, seminar presentation required. Prerequisites: PHYS 470, 40 credits of physics/engineering (or senior standing), department chair approval. Six hours per week.

MATH 201: CALCULUS I (4 credit hours)
Introduction to analytic geometry, limits, continuity, derivatives of elementary functions, applications of the derivatives. May not receive credit for both MATH 198 and MATH 201. Prerequisite: MATH 140 or equivalent. Four hours per week.

MATH 202 - CALCULUS II (4 credit hours)
Introduction to integrals, infinite series, applications and techniques of integration.
Four hours per week. Prerequisites: C or better in MATH 198 or MATH 201 or equivalent.

MATH 310 - CALCULUS III (4 credit hours)
Arc length, indeterminate forms, Euclidean spaces, functions of several variables, partial differentiation, multiple integrals. Four hours per week. Prerequisites: C or better in MATH 202.

MATH 311 - DIFFERENTIAL EQUATIONS I (4 credit hours)
Solutions of first and second order equations and their applications: separable, exact, homogeneous, linear. Numerical and series solutions of ordinary and partial differential equations.
Four hours per week. Prerequisites: C or better in MATH 202.

PHYS 221 - PHYSICS I (4 credit hours)
Introduction to calculus-based Newtonian mechanics for students majoring in physics, engineering and chemistry. Prerequisite or Corequisite: MATH 201. Six hours lecture/activity per week.

PHYS 223 - PHYSICS II (4 credit hours)
Continuation of introductory physics. Topics include: electrostatics, current and resistance, DC and AC circuit analysis, magnetic fields, induction, electromagnetic waves and geometrical and wave optics.
Six hours lecture/ activity per week. Prerequisites: PHYS 221. Pre or Corequisites: MATH 202.

PHYS 225 - PHYSICS III (3 credit hours)
Continuation of introductory calculus-based physics. Topics include: static equilibrium and elasticity, fluid mechanics, wave motion and thermodynamics. Four hours lecture/ activity per week.
Prerequisites: PHYS 221. Pre or Corequisites: MATH 202.

PHYS 309 – MATHEMATICAL PHYSICS (3 credit hours)
Survey of many important mathematical tools of classical physics. Topics include: coordinate systems, complex algebra, linear algebra, Fourier series, special functions, differential equations and vector calculus. Computer algebra system software is used. Four hours lecture/ activity per week. Prerequisites: PHYS 223, PHYS 313. Pre or Corequisites: MATH 311.

PHYS 311 – ELECTRICAL CIRCUITS AND ELECTRONICS (4 credit hours)
Survey of basic principles of electric circuits and modern electronics. Topics include AC and DC circuits, Thevenin's and Norton's theorems, transient analysis, power supplies, diodes and transistors, operational amplifiers and an introduction to circuit simulation programs. Three hours lecture, three hours laboratory per week. Prerequisites: PHYS 311, PHYS 309

PHYS 313 – INTRODUCTION TO MODERN PHYSICS (3 credit hours)
Survey of physics concepts developed since 1880. Topics include blackbody radiation, photoelectric effect, special relativity, quantization, uncertainty principle and introductory atomic, nuclear and solid state physics. Four hours lecture/ activity per week. Prerequisites: PHYS 225. Pre or Corequisites: MATH 310, PHYS 223.

PHYS 314 – MECHANICS (3 credit hours)
Theory and application of Newtonian mechanics with an introduction to the Lagrange formalism. Major topics include kinematics and dynamics of single particles and systems of particles, rigid bodies, non-inertial reference frames and the simple harmonic oscillator. Four hours lecture/ activity per week. Prerequisites: PHYS 309, PHYS 313.

PHYS 315 – ELECTRICITY AND MAGNETISM (3 credit hours)
Study of electricity and magnetism. Topics include Coulomb's law, electric and magnetic fields, electromagnetic induction, Maxwell's equations and an introduction to electromagnetic waves. Four hours lecture/ activity per week. Prerequisites: PHYS 309, PHYS 313.

PHYS 318 – SEMICONDUCTOR PHYSICS (3 credit hours)
Mathematical treatment of the theory of conduction in solids with particular attention to semiconductors. Topics include band theory of solids, conduction in metals and crystals, intrinsic and extrinsic semiconductors, two-terminal and three-terminal devices. Four hours lecture/ activity per week. Prerequisites: PHYS 309, PHYS 313, MATH 311, CHEM 121.

PHYS 321 – ANALOG ELECTRONICS (3 credit hours)
Study of analog electronic devices and systems. Topics include operational amplifiers, active filters, oscillators and function generators, linear integrated circuits. Four hours lecture/ activity per week. Prerequisites: PHYS 311.

PHYS 322 – DIGITAL ELECTRONICS (4 credit hours)

Study of the basic concepts of digital electronics, with emphasis on modern TTL and CMOS integrated circuits. Topics include gates, combinational and sequential logic circuits, flip-flops, counters, shift registers, multiplexers, decoders and multivibrators. Three hours lecture, three hours laboratory per week. Prerequisites: PHYS 223.

PHYS 413 – COMPUTER ARCHITECTURE AND INTERFACING (3 credit hours)
Architecture, programming and interfacing of one or two representative processors. Instruction sets and assembly language programming. Interfacing of memory and support chips such as USART. Programmable controllers, timers and peripheral I/O devices. Serial and parallel port interfacing. Four hours lecture/ activity per week. Prerequisites: PHYS 311, PHYS 322.

PHYS 470 – SENIOR SEMINAR (1 credit hour)
Senior seminar for physics majors. Introduction to research practices. Preparation for PHYS 490 projects. One hour per week. Prerequisites: 30 credits of physics and/or engineering, or departmental approval.

PHYS 490 – PHYSICS AND ASTRONOMY CAPSTONE EXPERIENCE (3 credit hours)
Research project in one of the areas of physics chosen, designed and carried out by student with the advice and approval of a faculty member. Actual work may be carried out at off-campus sites. Written report, seminar presentation required. Six hours per week. Prerequisites: PHYS 470, 40 credits of physics/engineering (or senior standing), departmental chair approval.

Appendix B

B.S. Engineering Physics - Salisbury University
Curriculum Guide

First Year

Fall Semester (16 credits)	Spring Semester (15 credits)
PHYS 221 (4)	PHYS 223 (4)
MATH 201 (4)	MATH 202 (4)
Communication Through Writing (4)	ENGR 100 (3)
Personal Wellness (4)	First Year Seminar (4)

Second Year

Fall Semester (14 credits)	Spring Semester (14 credits)
PHYS 225 (3)	PHYS 313 (3)
MATH 310 (4)	MATH 311 (4)
ENGR 110 (3)	ENGR/PHYS 1 of 5 (3)
COSC 118 (4)	Human Expression (4)

Third Year

Fall Semester (14 credits)	Spring Semester (17 credits)
CHEM 121 (4)	CHEM 122 (4)
PHYS 309 (3)	PHYS 314 (3)
PHYS 311 (4)	PHYS 315 (3)
ENGR/PHYS 2 of 5 (3)	ENGR/PHYS 3 of 5 (3)
	Humanity in Context (4)

Fourth Year

Fall Semester (14 credits)	Spring Semester (16 credits)
ENGR/PHYS 4 of 5 (3)	ENGR/PHYS 5 of 5 (3)
PHYS 470 (1)	ENGR/PHYS 490 (3)
Social Configurations (4)	Social Issues (4)
Elective (3)	Elective (3)
Elective (3)	Elective (3)

Appendix C
Articulation

PROGRAM ARTICULATION AGREEMENT

Between

Wor-Wic Community College and

Salisbury University

Associate of Science in STEM Transfer, Engineering Concentration to

Bachelor of Science in Engineering Physics

August 2024 through July 2029

This Program Articulation Agreement ("Agreement"), effective this 1st day of August 2024 ("Effective Date"), is by and between Wor-Wic Community College, a community college located in Salisbury, Maryland, and Salisbury University, a constituent institution of the University System of Maryland, an agency of the state of Maryland (hereinafter sometimes referred to individually as a "Party" or "Institution" and collectively as the "Parties" or "Institutions"). This Agreement sets forth the joint curricula and program requirements for the completion of the Associate of Science in STEM Transfer, Engineering Concentration from Wor-Wic Community College and the Bachelor of Science in Engineering Physics at Salisbury University.

RECITALS

Whereas, Wor-Wic Community College and Salisbury University are committed to partnering to expand the educational opportunities and collaborative academic programming of their respective institutions; and

Whereas, the Institutions are committed to providing a smooth transition for students wishing to earn an associate of arts degree and a baccalaureate degree; and

Whereas, the intent of the Institutions is to avoid duplication of curricula, where appropriate, within articulated programs of studies; and

Whereas, the Institutions agree that the educational growth of students and the economic development of the community is better served through cooperative educational planning and optimal utilization of community resources.

Therefore, this Agreement commits the Parties to full support of an articulation process to deliver coursework for students, resulting in the associate of arts degree from Wor-Wic Community College and credit toward the Bachelor of Science in Engineering Physics at Salisbury University. The Parties agree to the following:

I. ACADEMIC REQUIREMENTS

A. The Institutions agree to follow the joint program curriculum and course by course articulation delineated in Appendix 1, which is attached hereto and made a part of this Agreement.
B. Both Institutions will cooperate toward developing, disseminating, and presenting the articulated program information to students.

C. Students who have graduated from Wor-Wic Community College program must first apply to Salisbury University. Once a completed application is received, Wor-Wic Community College graduates who have completed the associate's degree program in Associate of Science in STEM Transfer, Engineering Concentration, with a cumulative grade point average of 2.0 or higher will be granted admission to Salisbury University as an Engineering Physics major.

D. All articulated course credits applied towards satisfying Bachelor of Science in Engineering Physics major requirements earned with a C or better will be accepted for transfer according to the articulation matrix in Appendix 1.

E. Salisbury University shall provide a Checklist for students as a planning tool for completing coursework required for the Bachelor of Science in Engineering Physics major in Appendix 2, attached hereto and made a part of this Agreement.

F. Students intending to transfer are recommended to apply for admission by the priority deadline for the semester for which they intend to enroll.

G. Students are subject to all specific policies pertaining to students admitted to the Salisbury University baccalaureate degree program in Bachelor of Science in Engineering Physics and all other Salisbury University admissions policies and procedures.

II. TERM AND TERMINATION

A. The term of this Agreement commences as of the Effective Date listed herein. This Agreement is based on the present curricula contained herein and in all appendices, and is effective for five (5) years from August 2024 to July 2029.

B. Either Party may terminate this Agreement with notice to the other Party, pursuant to Section III.G below. Upon termination or expiration of this Agreement, the Parties shall develop a process that will reasonably allow students already admitted to and enrolled in joint programming to continue their studies. Neither Party will terminate this Agreement at a time that would deter a "cohort-in-progress" from completing graduation within the originally designated timeframe.

III. GENERAL PROVISIONS

A. Each Institution is responsible for the administration of its respective courses, including content, requirements, faculty, and student services (to include, but not limited to, admissions, financial aid, class registration, etc.).

B. When enrolled in a Salisbury University course, the student is subject to all policies and procedures applicable to Salisbury University students. When enrolled in a Wor-Wic Community College course, a student is subject to all policies and procedures applicable to Wor-Wic Community College students. Additional joint policies and procedures may be adopted and implemented at the discretion of both Parties.

C. The Parties recognize that course scheduling beyond the associate's degree level resides exclusively with Salisbury University and will be coordinated with Wor-Wic Community College by the designated Salisbury University representative. Where academic calendars differ, the Parties will work together to coordinate class offerings and class schedules.

D. The disclosure of information about individual students is limited by the federal Family Educational Rights and Privacy Act (FERPA). The Parties agree that release of student educational records to each other is conditioned upon the submission of a signed agreement by the student authorizing such release.

E. The Parties agree not to release student information to any third-party without the written consent of the other Party and in compliance with FERPA and any other federal or state of Maryland laws, rules, and regulations, and policies of the Parties.

F. The Parties shall publicize any joint offerings in their respective catalogs, website, and other materials as appropriate. Notwithstanding the foregoing, neither Party may use the names or marks of the other without the prior written approval of the other Party.

G. The Parties shall inform students in their respective programs of the complementary program opportunities available at each other's respective institution, support each other's marketing efforts toward the same, and encourage students to apply to programs consistent with an individual student's interests.

H. Notwithstanding anything in this Agreement to the contrary, both Parties retain full authority over their respective courses, programs, and requirements. Both Parties reserve the right to make changes to their respective courses, programs, and requirements. However, each Party shall give to the other reasonable notice and details of changes to this Agreement and other changes in its courses, programs, and requirements that may affect this Agreement. In the event such changes affect the terms of this Agreement, this Agreement and any of its appendices shall be updated as needed to reflect such changes.

I. The Parties designate the following persons as their respective representatives to coordinate and manage the activities under this Agreement:

Wor-Wic Community College
Kristin Mallory, VP for Academic Affairs
32000 Campus Drive Salisbury,
Maryland 21804

kmallory@worwic.edu (410) 334-
2813

Salisbury University
Michael Scott, Dean
Richard A. Henson School of Science and Technology
1101 Camden Avenue
Salisbury, Maryland 21801
msscott@salisbury.edu
(410) 543-6489

J. The designated representatives shall meet as needed, at a mutually agreeable time and location, to discuss various collaborations and other topics of interest to either Institution. A Party may change its representative by giving notice to the other Party.

K. Either Institution may at any time recommend changes to this Agreement. Both Institutions reserve the right to modify the programs as deemed necessary and agree to inform the appropriate representatives of the other Institution of recommended changes. This Agreement may be modified only in writing signed by both Parties.

L. All notices under this Agreement must be in writing; delivered in person, by U.S. mail or by email to the representatives listed above in this Section III.

M. Nothing in this Agreement is intended to form a joint venture between the Parties. Nothing in this MOU is intended to create rights or benefits for any person or entity other than the Parties.

N. This Agreement integrates the entire agreement of the Parties and supersedes any and all prior and/or contemporaneous agreements between the Parties, written or oral, with respect to the subject matter of this Agreement.

IN WITNESS WHEREOF, the Parties have caused this Agreement to be executed by their duly authorized representatives.

Wor-Wic Community College

____
Deborah Casey, PhD
President

Date: _______________________

Salisbury University

____
Laurie L. Couch, PhD
Provost and Senior Vice President of Academic Affairs

Date: _______________________

UNIVERSITY SYSTEM of MARYLAND

BOARD OF REGENTS
SUMMARY OF ITEM FOR ACTION,
INFORMATION, OR DISCUSSION

TOPIC: *Salisbury University Bachelor of Arts (BA) in Music Therapy*

COMMITTEE: Education Policy and Student Life and Safety Committee

DATE OF COMMITTEE MEETING: April 12, 2024

SUMMARY: The Music Therapy program is designed for students who wish to pursue careers as board-certified music therapists in clinical settings. The curriculum is designed to impart entry-level competencies in three main areas: Musical Foundations, Clinical Foundations, and Music Therapy Foundations as specified in the AMTA Professional Competencies. Study includes practical application of music therapy procedures and techniques learned in the classroom through required fieldwork in facilities serving individuals with disabilities in the community and/or on-campus clinics. Students learn to assess the needs of clients, develop and implement treatment plans, and evaluate and document clinical changes.

This is a comprehensive program that also emphasizes music skills required of music therapists, including accompaniment, improvisation, and performance proficiencies in piano, guitar, and voice. Students complete the same music core courses as our other music programs, including sequences in Music Theory, Music Perception, and Music History. Music Therapy students are also asked to take one-on-one applied lessons and participate in ensembles for six semesters.

To achieve clinical competencies, students complete a variety of supporting psychology and biology courses, including Fundamentals of Human Anatomy and Physiology, Developmental Psychology, and Abnormal Psychology. During their academic career, music therapy majors must complete 1,200 clinical hours, including a six-month internship at an AMTA-approved site.

ALTERNATIVE(S): The Regents may not approve the program or may request further information.

FISCAL IMPACT: No additional funds are required. The program can be supported by the projected tuition and fee revenue.

CHANCELLOR'S RECOMMENDATION: That the Education Policy and Student Life and Safety Committee recommend that the Board of Regents approve the proposal from Salisbury University for a Bachelor of Arts in Music Therapy.

COMMITTEE RECOMMENDATION:	DATE:
BOARD ACTION:	DATE:
SUBMITTED BY: Alison M. Wrynn 301-445-1992	awrynn@usmd.edu

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Salisbury UNIVERSITY
Make Tomorrow Yours

March 15, 2024

Dr. Jay A. Perman, Chancellor
University System of Maryland
3300 Metzerott Rd.
Adelphi, MD 20783

Dear Chancellor Perman:

On behalf of President Carolyn Lepre, the faculty, and the entire Salisbury University (SU) community, I am pleased to submit a request for approval for a new Bachelor of Arts in Music Therapy. The Music Therapy program is designed for students who wish to pursue careers as board-certified music therapists in clinical settings. The curriculum is designed to impart entry level competencies in three main areas: Musical Foundations, Clinical Foundations, and Music Therapy Foundations as specified in the AMTA Professional Competencies.

The proposal, fully endorsed by Salisbury University, is attached for your review.

Thank you for your consideration.

Sincerely,

Laurie Couch, Ph.D.
Provost and Senior Vice President of Academic Affairs

ecc: Dr. Candace Caraco, Associate Vice Chancellor for Academic Affairs, USM

UNIVERSITY SYSTEM OF MARYLAND INSTITUTION PROPOSAL FOR

X New Instructional Program

___ Substantial Expansion/Major Modification

___ Cooperative Degree Program

X Within Existing Resources, or

___ Requiring New Resources

Salisbury University

Institution Submitting Proposal

Music Therapy

Title of Proposed Program

Bachelor of Arts	**Fall 2024**
Award to be Offered	Projected Implementation Date
129908	512305
Proposed HEGIS Code	Proposed CIP Code
Music, Theatre and Dance	Prof. Colleen Clark
Department in which program will be located	Department Contact
410-543-6383	cmclark@salisbury.edu
Contact Phone Number	Contact E-Mail Address
	3/15/2024
Signature of President or Designee	Date

A. Centrality to Institutional Mission and Planning Priorities:

1. **Provide a description of the program, including each area of concentration (if applicable), and how it relates to the institution's approved mission.**

   The Music Therapy program is designed for students who wish to pursue careers as board-certified music therapists in clinical settings. The curriculum is designed to impart entry level competencies in three main areas: Musical Foundations, Clinical Foundations, and Music Therapy Foundations as specified in the American Music Therapy Association (AMTA) Professional Competencies. Entry level study includes practical application of music therapy procedures and techniques learned in the classroom through required fieldwork in facilities serving individuals with disabilities in the community and/or on-campus clinics. Students learn to assess the needs of clients, develop and implement treatment plans, and evaluate and document clinical changes.

   This is a comprehensive program that emphasizes music skills required of music therapists, including accompaniment, improvisation, and performance proficiencies in piano, guitar, and voice. Students complete a variety of psychology and biology courses, as well as several clinical experiences and a rigorous internship at an AMTA- approved site. To complete their degree, students must sit for the Certification Board of Music Therapy (CBMT) exam.

   Once approved at the state level, SU will pursue program accreditation with both the National Association of Schools of Music (NASM) and the American Music Therapy Association (AMTA).

   Providing MD students with another option for Music Therapy education certainly supports our mission of **"offering excellent, affordable education."** The tuition of the only current AMTA-approved program in the state is more than twice that of Salisbury University's in-state rate.

   We believe this program would also **"empower our students with the knowledge, skills, and core values that contribute to active citizenship, gainful employment, and life-long learning in a democratic society and interdependent world."** We have intentionally designed the program to prepare students for professional certification in an allied health profession, ultimately leading to gainful employment in a growing field. The field of music therapy naturally promotes life-long learning, as certified therapists are required to regularly self-assess and take part in continuing education to maintain their credentials.

   This program reinforces the tenet that **"learning and service are vital components of civic life."** Indeed, music therapists address the physical, emotional, cognitive, and social needs of other individuals. In our program, students will work in clinical settings to prepare for a profession in which they will provide important therapeutic and rehabilitative services in their communities. Not only will we **"foster an environment where individuals prepare for career and life, including their social, physical, occupational, emotional, and intellectual well-being,"** but we will also teach students to promote this well-being in others.

2. **Explain how the proposed program supports the institution's strategic goals and provide evidence that affirms it is an institutional priority.***

   Our Music Therapy program supports SU's objective of **developing new academic programs that align with emerging trends among our students and the surrounding region**. Arts therapies are increasingly being used to treat brain conditions including PTSD, depression, Parkinson's and Alzheimer's, as well as other physical ailments. Indeed, our local hospital is currently advertising *three* open Music Therapist positions: two full-time and one part-time. We have seen an increase in interest among our students in this field. At our last “Music Major for a Day” event for prospective students, over 40% of the registered participants indicated an interest in Music Therapy.

The Music Therapy program will also be ripe with **student opportunities for clinical experiences**. Over the course of their academic career, music therapy majors must complete 1200 clinical hours, and we have distributed this over a series of field studies courses (eight semesters) in which students will gradually move from observation to practice under supervision. After completing coursework, students will embark on an internship at an AMTA-approved site where they will continue to develop their skills in a professional environment.

These practicum and internship opportunities will help **enhance and expand local and regional partnerships with private, public, and nonprofit organizations**. We have already been in contact with many local health care partners that are excited to forge relationships with our music therapy students and faculty. These organizations include but are not limited to TidalHealth Peninsula Regional Hospital, Stories Love Music, Chesapeake Music Therapy, and the Stockley Center.

This program also aligns with the Salisbury Seven institutional priorities by **providing innovative, high-impact practices for our students** and **preparing them for a lifetime of civic leadership and community service** within the allied health field.

3. **Provide a brief narrative of how the proposed program will be adequately funded for at least the first five years of program implementation. (Additional related information is required in section L).***

The Music Therapy program will fall under the Peter & Judy Jackson Music Program within the Department of Music, Theatre & Dance. The Music Therapy Coordinator is an existing tenure-track faculty member, and start-up costs should be minimal as music therapy students will use existing facilities, technology, and equipment in their courses. The Music Program will include a small music therapy allotment in their overall budget requests each year, and they will also adjust for any adjunct hires that may be needed as the program grows.

Other possible costs that may arise in the first five years include:

- IT costs related to arranging a secure database for client documentation.
- An additional full-time faculty member should student enrollments warrant one

We are confident that these costs could be covered using existing budgets.

4. **Provide a description of the institution’s commitment to:**
    a. **Ongoing administrative, financial, and technical support of the proposed program** *
    b. **Continuation of the program for a period of time sufficient to allow enrolled students to complete the program.***

The Music Program at Salisbury University has been accredited with the National Association of Schools of Music since 2006. We are committed to its growth and success, and we view this new Music Therapy program as a mechanism for expansion and evolution. Ongoing administrative, financial, and technical support will be provided through the same avenues used by our existing five tracks. It is our hope that this program will continue indefinitely, and we believe that we have the human and financial resources to support it as needed.

B. Critical and Compelling Regional or Statewide Need as Identified in the State Plan:

1. **Demonstrate demand and need for the program in terms of meeting present and future needs of the region and the State in general based on one or more of the following:**
    a. **The need for the advancement and evolution of knowledge** *

As mentioned above, arts therapies are playing an increasingly prominent role in the treatment of physical, mental, and social disorders; however, there is still a significant need for evidence-based studies to analyze their effectiveness. The American Music Therapy Association (AMTA) has designated "research" as a strategic priority that emphasizes the integral relationship between research findings, music therapy practice, and music therapy advocacy. Higher education Music Therapy programs will promote the pursuit of evidence-based research by both students and faculty and, in turn, help advocate for this important branch of the allied health field.

    b. **Societal needs, including expanding educational opportunities and choices for minority and educationally disadvantaged students at institutions of higher education** *

According to the American Music Therapy Association (AMTA), the only AMTA-approved institution in the state of Maryland is Washington Adventist University in Takoma Park. No UMD institutions currently offer a BA in Music Therapy, making Salisbury University the first public institution to offer a BA in Music Therapy in the state. Furthermore, there are no AMTA-approved Music Therapy programs offered in Delaware and only two in Virginia (Radford and Shenandoah). We would be the only program on the Delmarva peninsula and would help meet a growing workforce need in our area.

There are currently 176 board-certified music therapists in Maryland and only nine within a fifty-mile radius of Salisbury University. One music therapist who was interviewed stated she and her employees serve roughly 500 people per week and have an active waitlist. Local music therapists and potential affiliates (including the local hospital) are in support of a music therapy program at Salisbury University. There is a clear desire for locally-trained music therapists who will remain in the area and help alleviate the current waitlist for music therapy services, as well as spur growth and expansion into new areas of practice.

2. **Provide evidence that the perceived need is consistent with the Maryland State Plan for Postsecondary Education.***

A new Music Therapy program at Salisbury University would align well with the State Plan's emphasis on Innovation. Indeed, it would directly "develop new partnerships between colleges and businesses to support workforce development and improve workforce readiness." As described above, there is a significant need for music therapy services in this part of the state, and our program would work to ensure that graduates are prepared to enter the workforce. We have already started to "identify and create preferred partnerships" with local allied health organizations to provide future students with clinical experiences and internship opportunities. In addition, by requiring that students attempt the CBMT exam in order to complete their degree, we are "supporting business-driven credentials."

C. Quantifiable and Reliable Evidence and Documentation of Market Supply and Demand in the Region and State:

1. **Describe potential industry or industries, employment opportunities, and expected level of entry (ex: mid-level management) for graduates of the proposed program.***

   As stated by the American Music Therapy Association:
   "Music therapists are employed in many settings including general and psychiatric hospitals, physical rehabilitation centers, nursing homes, mental health agencies, public and private schools, substance abuse programs, forensic facilities, hospice programs, day care facilities, etc. Typically, fulltime therapists work a standard 40-hour workweek. Some prefer part-time work and choose to develop contracts with specific agencies, providing music therapy services for an hourly or contractual fee. A growing number of clinicians choose private practice in music therapy to benefit from opportunities provided through self-employment."

2. **Present data and analysis projecting market demand and the availability of openings in a job market to be served by the new program.***

   According to recruiter.com:
   "The overall job outlook for Music Therapy careers has been positive since 2004. Vacancies for this career have increased by 32.76 percent nationwide in that time, with an average growth of 2.05 percent per year. Demand for Music Therapists is expected to go up, with an expected 26,660 new jobs filled by 2029. This represents an annual increase of 27.58 percent over the next few years."

3. **Discuss and provide evidence of market surveys that clearly provide quantifiable and reliable data on the educational and training needs and the anticipated number of vacancies expected over the next 5 years.***

   From learn.org:
   "The U.S. Bureau of Labor Statistics reports that the projected growth rate for recreational therapists, which includes music therapists, is 10% (as fast as average) between 2020 and 2030. According to the American Medical Association, the field of alternative health is growing, and music therapy jobs are seeing an increase in openings and opportunities (*www.ama-assn.org*)."

   These vacancies must be filled by board-certified music therapists, and in order to be eligible for the certification exam, an individual must have completed coursework at an AMTA-approved degree program as well as 1200 clinical hours. Therefore, these vacancies are directly dependent on AMTA-approved degree program such as the one we are proposing.

4. **Provide data showing the current and projected supply of prospective graduates.***

   We currently have 2-5 music majors who have expressed an interest in switching to Music Therapy should the program be approved. Moving forward, we anticipate that the program enrollment would be similar to our Music Education track- perhaps starting at 2-3 graduates in 2030 and increasing to 5-6 graduates per year shortly thereafter. The number of graduates in each of our music tracks over the last five years is provided below.

	Traditional	Music Education	Vocal Performance	Instrumental Performance	Music Technology	Totals
Fall 2023	1	1	1	1	2	4
AY 22-23	2				1	3
AY 21-22	1	2			2	5
AY 20-21	2	9	1		2	14
AY 19-20	1	2			3	6

D. Reasonableness of Program Duplication:

1. **Identify similar programs in the State and/or same geographical area. Discuss similarities and differences between the proposed program and others in the same degree to be awarded.***

   According to the American Music Therapy Association (AMTA), the only AMTA-approved institution in the state of Maryland is Washington Adventist University in Takoma Park (private institution). There is no program on the Delmarva Peninsula. We hope to provide the only Music Therapy option in our geographical area and also provide a public option in the state of Maryland.

   Our colleagues at Towson University are currently developing a Post-Baccalaureate Certificate in Music Therapy, but we do not foresee any conflict between our institutions. Not only are we proposing a full Bachelor of Arts undergraduate degree, but we are also located in a vastly different geographic and demographic setting. Our institutions would attract very different individuals at very different points in their education.

2. **Provide justification for the proposed program.***

   There is a genuine lack of Music Therapy education opportunities in the state of Maryland and on the Delmarva Peninsula. There is also a demand for music therapy services as mentioned above. This program would help fill academic program gaps as well as meet the needs of our surrounding communities, and it would do so without interfering with other MD institutions of higher education.

E. Relevance to High-demand Programs at Historically Black Institutions (HBIs)

1. **Discuss the program's potential impact on the implementation or maintenance of high-demand programs at HBI's.***
   No HBIs in the state of Maryland currently offer a Music Therapy degree.

F. Relevance to the identity of Historically Black Institutions (HBIs)

1. **Discuss the program's potential impact on the uniqueness and institutional identities and missions of HBIs.***

No HBIs in the state of Maryland currently offer a Music Therapy degree.

G. Adequacy of Curriculum Design, Program Modality, and Related Learning Outcomes (as outlined in COMAR 13B.02.03.10):

1. **Describe how the proposed program was established, and also describe the faculty who will oversee the program.***

   The proposed program was primarily designed by Dr. Linda Cockey (music faculty, now retired) in collaboration with Dr. William Folger, Dr. Louise Anderson, and Prof. Colleen Clark (music faculty members). This group has a deep understanding of National Association of Schools of Music (NASM) accreditation standards and used these standards to develop the program through backward design.

   In Fall 2023, we welcomed Prof. Jan Schreibman, MT-BC, to the faculty. She will serve as the Music Therapy Coordinator and has been instrumental in reviewing and revising our program as needed throughout the curriculum approval process. Prof. Schreibman's professional experience as well as her role in developing the AMTA-approved Music Therapy program at the University of Indianapolis has been invaluable to us.

2. **Describe educational objectives and learning outcomes appropriate to the rigor, breadth, and (modality) of the program.***

   This program is designed to align with the AMTA Professional Competencies (available here), and these competencies serve as objectives and learning outcomes. The competencies are divided into three areas: Musical Foundations, Clinical Foundations, and Music Therapy Foundations. See Appendix A for full list of AMTA Professional Competencies.

3. **Explain how the institution will:**
   a. **Provide for assessment of student achievement of learning outcomes in the program***

   Students' progress towards the professional competencies are assessed in several ways throughout the degree program.
   1. Relevant AMTA Professional Competencies are listed in each course syllabus and are integrated in the grading scale on a course level.
   2. Piano, voice, and guitar proficiency exams are administered at various points in the program.
   3. Clinical competencies are evaluated in field placements each semester using a Clinical Competency Log. This log is completed by supervisors.
   4. All students in the program must attempt the CBMT Certification Exam before receiving their degree. Performance on this exam is another metric used to measure achievement of SLOs.

   b. **Document student achievement of learning outcomes in the program***

   All course grades, proficiency exam results, clinical competency logs, and CMBT certification exam results will become part of a student's record. (All music students have a physical file in the department office, as well as a digital file in our Navigate system.) This data can be used to assess the program's success in terms of SLOs over time.

4. **Provide a list of courses with title, semester credit hours and course descriptions, along with a description of program requirements***

   See Appendix B for a complete list of program requirements. This program requires a total of 140 credits, which are broken down into the categories below. Balancing AMTA requirements and

NASM accreditation guidelines has necessitated the high credit count, which includes a six-month internship after four years of coursework are completed. In addition, NASM accreditation guidelines for a Baccalaureate Degree in Music Therapy indicate that the general studies portion of the curriculum should not make up more than 25% of the total credit count.

General Education	26	General Studies 24%
Foreign Language Requirement	8	
Music Core (includes 1 GenEd course)	26	Music 39%
Supportive Music	29	
Music Therapy Core (includes 1 GenEd course)	35	Music Therapy 37%
Supportive Non-Music (BIOL & PSYC) (includes 2 Gen Ed courses)	16	
Total:	140	100%

MUTH 110 – Introduction to Music Therapy (3 credits)

An introduction to the general practice of music therapy, including a historical overview. Explore the clinical population served by music therapy and the responsibilities of a music therapist, including the adherence to a code of ethics, developing observations and assessments, and building a rapport with clients. Learn career skills and ways to develop community engagements in the field of music therapy.

MUTH 111 – Foundations of Music Therapy (2 credits)

Build basic knowledge of music therapy processes, as well as the musical expectations, time management and organizational skills used in therapy sessions. Review different approaches to utilizing music therapy and philosophies that influence research in the field, as well as the proper handling of musical instruments and use of technology in music therapy settings.

MUTH 120 – Field Studies I (1 credit)

Combine weekly experiences in an on-campus music therapy clinic with a more traditional lecture class. Observe and assist a music therapist, as well as meet once a week as a class to discuss relevant topics that arise in their field studies.

MUTH 121 – Field Studies II (1 credit)

Combines weekly experiences in an on-campus music therapy clinic with a more traditional lecture class. Observe and assist a music therapist, as well as plan, co-lead and lead sessions. Meet once a week as a class to discuss relevant topics that arise in field studies.

MUTH 210 – Music Therapy Techniques I (3 credits)

Treatment planning (assessment, evaluation and selection of treatment techniques) for children and adults in non-medical settings. Design therapeutic applications for home-based treatments and early intervention, school, day or residential facilities. Music therapy for autism spectrum disorder, intellectual/developmental disabilities and sensory loss are discussed, as well as early childhood music therapy and music therapy for older adults.

MUTH 211 – Music Therapy Techniques II (3 credits)

Treatment planning (assessment, evaluation and selection of treatment techniques) for children and adults in medical settings and those with mental health concerns. Design therapeutic applications for individuals and groups in hospitals, hospice facilities and outpatient settings. Music therapy for neonatal intensive care, pediatric and adult medicine, rehabilitation, and hospice and palliative care is discussed, as well as childhood and adult mental health.

MUTH 220 – Field Studies III (1 credit)

Provides weekly experiences in an on-campus music therapy clinic, as well as field placements in the community with various populations. Builds upon 100-level field experiences.

MUTH 221 – Field Studies IV (1 credit)

Provides weekly experiences in an on-campus clinic in addition to field placements in the community with various populations. Builds upon 100-level field experiences. Explores the practical use of multiple theories (cognitive-behavioral, humanistic or neurological) of music therapy.

MUTH 310 – Psychology of Music (3 credits)

Explores the neurological, psychological and physiological processes involved in hearing, perceiving and performing music. Topics include musical preference, ability and music learning, as well as the social psychology of musical activities. Study how both music perception and music performance can influence the human brain and how this influence can be used as a tool in human health and wellness fields.

MUTH 320 – Upper-Level Field Studies I (1 credit)

Continue weekly experiences in an on-campus clinic with continual and advancing responsibilities. Work with adults and troubled teens in an off-campus setting. Take an increasingly independent role in working with clients both on and off campus. Client documentation, assessment, session planning, execution and evaluation are addressed.

MUTH 321 – Upper-Level Field Studies II (1 credit)

Continue weekly experiences in an on-campus clinic with continual and advancing responsibilities. Work with adults and troubled teens in an off-campus setting. Take an increasingly independent role in working with clients both on and off campus. Client documentation, assessment, session planning, execution and evaluation are addressed.

MUTH 400 – Research Methods in Clinical Practice (3 credits)

Explore the historical and current research methodologies used in the field of music therapy. Analyze both qualitative and quantitative data in a variety of contexts. Ethical considerations of related research also are explored. This is a writing-intensive course that includes the completion of an original research proposal.

MUTH 402 – Professional Foundations of Music Therapy I (2 credits)

Gain an in-depth study of professional issues in the field of music therapy. The American Music Therapy Association (AMTA) Code of Ethics and Standards of Clinical Practice is examined, as well as confidentiality agreements and procedures for health care billing and reimbursement. Develop your own personal philosophies and creative identities to guide your professional career.

MUTH 403 – Professional Foundations of Music Therapy II (2 credits)

Designed to prepare music therapy majors for their internship, board certification exam and professional practice. Develop and revise your resumes, research potential internship sites, and work through several practice certification exams. Review of previous coursework is offered as needed to prepare for the CBMT exam.

MUTH 420 – Upper-Level Field Studies III (2 credits)

Provides opportunities to lead and co-lead music therapy sessions in a variety of off-campus psychiatric, medical and rehabilitative settings, including hospitals, rehabilitation centers, substance abuse programs and targeted support groups. Take an increasingly independent role in working with clients. Client documentation, assessment, session planning, execution and evaluation are addressed.

MUTH 421 – Upper-Level Field Studies IV (2 credits)

Provides opportunities to lead and co-lead music therapy sessions in a variety of off-campus psychiatric, medical and rehabilitative settings, including hospitals, rehabilitation centers, substance abuse programs and targeted support groups. Prepare for a music therapy internship by developing the confidence and independence needed to plan, implement and evaluate music therapy sessions independently. Client documentation, assessment, session planning, execution and evaluation are addressed.

MUTH 498 – Internship in Music Therapy (Variable credit)

A capstone experience for the Bachelor of Arts in music therapy. Students must be continually enrolled for a total of 900 hours of on-site clinical practice (4 credits) at an AMTA national roster internship site or approved Salisbury University affiliated site. Credits may be distributed differently across terms, but students must complete all four credits before they are eligible to receive their degree and sit for the Board Certification Exam. Internships must be completed within two years of completing course work.

5. **Discuss how general education requirements will be met, if applicable***

SU will launch a new General Education curriculum in the fall of 2024. This new program will follow the new General Education curriculum as it is rolled out. We are anticipating that four required courses for the program will also fulfill General Education requirements; however, these courses are currently in various stages of approval for the new General Education program.

- MUSC 305 (Music History I) will fulfill “Human Expression” category.
- PSYC 101 (General Psychology) will fulfill “Social Configurations” category.
- BIOL 205 (Human Anatomy & Physiology) will fulfill “Hands-On Science” category.
- MUTH 498 (Internship in Music Therapy) will fulfill “Experiential Learning” category.

All additional General Education courses will be completed on top of the major requirements.

6. **Identify any specialized accreditation or graduate certification requirements for this program and its students.***

Once approved by the state of Maryland, we will be pursuing approval with the American Music Therapy Association (AMTA). This is a crucial element as students must receive a degree from an AMTA-approved program in order to become board certified. We will also apply for plan approval and (eventual) accreditation with the National Association of Schools of Music (NASM).

7. **If contracting with another institution or non-collegiate organization, provide a copy of the written contract.***

N/A

8. Provide assurance and any appropriate evidence that the proposed program will provide students with clear, complete, and timely information on the curriculum, course and degree requirements, nature of faculty/student interaction, assumptions about technology competence and skills, technical equipment requirements, learning management system, availability of academic support services and financial aid resources, and costs and payment policies.

Upon approval, the program's academic requirements are clearly articulated on designated program pages that are located with the university's catalog. Each undergraduate program provides students with a suggested 4-year course of study (aka Curriculum Guide) that is easily accessible within the program page. Students will also have access to degree audits that are located in their student portal within Peoplesoft. Additionally, students will have access to professional academic advisors who will support the student in academic support.

Each course offered within the program will provide the student with a syllabus that outlines the expectations for faculty/student interaction, technical equipment requirements, and the learning management system. In addition, approval of the program will be communicated in a timely manner to the appropriate offices on campus. Information regarding financial aid resources and cost of payments policies are clearly communicated on the Accounts Receivable & Cashiers Office and Office of Financial Aid & Scholarships' webpages.

9**. Provide assurance and any appropriate evidence that advertising, recruiting, and admissions materials will clearly and accurately represent the proposed program and the services available.***

Upon approval, the program will be listed on the SU website under the Department of Music, Theatre & Dance and added to all relevant recruiting/admissions publications. These postings and publications will be approved by our Music Program Chair, as well as the Office of Web Development and the Office of Marketing and Communications.

H. Adequacy of Articulation

1. **A proposal for a new bachelor's program or a substantial modification must include a proposed articulation agreement or sound reasoning why one is not applicable.***

   At this time an articulation agreement is not reasonable. SU's proposed Music Therapy program is only the second in the state. The majority of music courses from community colleges transfer in as elective credit. This would require students to complete more than half of their required course work after transfer. SU is committed to accepting transfer credit for core music courses and will continue to waive all general education requirements for students who have earned an Associate of Arts (A.A.), Associate of Arts in Teaching (A.A.T.) or an Associate of Science (A.S.) from a Maryland community college.

I. Adequacy of Faculty Resources

1. **Provide a brief narrative demonstrating the quality of program faculty***

Jan Schreibman is a board-certified music therapist (MT-BC) who has worked as a clinician for more than thirty years. She is co-chair of the American Music Therapy Association Ethics Board and has served the field of music therapy on state, regional, and national levels. She established the music therapy degree at the University of Indianapolis in 2017 and served as their Director of Music Therapy for six years. She joined the faculty at SU in the Fall of 2023. Jan holds a Master's in Music Therapy (terminal degree) and is currently completing a Ph.D. in Expressive Therapies.

Department	Faculty Name	Terminal Degree	Academic Rank	Full- or Part-Time	Courses Overseen
MTD	Jan Schreibman	Master’s (ABD for PhD)	Assistant Professor	Full	All MUTH courses
MTD	William Folger	DMA	Full Professor	Full	Intro MUTH Piano I-IV
MTD	Eric Shuster	MM	Lecturer	Full	Music History
MTD	Jerry Tabor	DMA	Full Professor	Full	Music Theory
MTD	Danielle Cumming	DMA	Associate Professor	Full	Guitar I-II

As the program builds, Jan Schreibman will be teaching Music Therapy content and supervising clinical work. We also have several contacts for potential adjunct instruction as enrollment increases, all of whom are board-certified music therapists holding a Master’s degree or higher.

Music core courses, applied lessons, and ensembles will be covered by existing music faculty, all of whom have been reviewed by our accrediting body (NASM).

2. Demonstrate how the institution will provide ongoing pedagogy training for faculty in evidenced-based best practices, including training in:

a. Pedagogy that meets the needs of the students.

The Center for the Advancement of Faculty Excellence (CAFE) supports faculty in the areas of teaching, research, professional development and personal wellness and the office of Instructional Design & Delivery (ID&D) provides professional development for effective pedagogical practices and instructional support for faculty engaged in teaching and learning of online, hybrid and traditional courses. Collaboratively, these offices provide various webinars, workshops, faculty learning communities and initiatives around andragogical and pedagogical best practices (such as Universal Design for Learning; Diversity, Equity & Inclusion; High Impact Practices; Problem-Based Learning; Open Pedagogy, Open Educational Resources, etc.).

b. The learning management system.

Instructional Design & Delivery provides support for the campus supported learning management system (Canvas) and other instructional software (such as lecture capture, audience response system) through various methods (e.g. workshops, video tips, how-to instructions).

c. **Evidenced-based best practices for distance education, if distance education is offered.**

SU does not intend to offer this program via distance education.

J. Adequacy of Library Resources (as outlined in COMAR 13B.02.03.12).

1. **Describe the library resources available and/or the measures to be taken to ensure resources are adequate to support the proposed program.**

   SU Libraries currently provides access to hundreds of periodicals and ebooks, numerous databases, and a steadily growing number of streaming videos. Students contact library staff via chat, emails, and/or phone. SU librarians and library staff answer chat questions whenever the Service Desk is open. SU Libraries' resources include extensive book, document, and periodical holdings, as well as a wide array of electronic resources and databases. The online catalog provides direct access and borrowing privileges to approximately eleven million items in the libraries of the University System of Maryland and Affiliated Institution libraries (USMAI).

K. Adequacy of Physical Facilities, Infrastructure and Instructional Equipment (as outlined in COMAR 13B.02.03.13)

1. **Provide an assurance that physical facilities, infrastructure and instruction equipment are adequate to initiate the program, particularly as related to spaces for classrooms, staff and faculty offices, and laboratories for studies in the technologies and sciences.** *

   Students in the Music Therapy program will utilize existing classrooms, rehearsal halls, practice rooms, and studios. We are confident that our current facilities can accommodate the anticipated enrollment increase. The musical instruments and supplies used for Music Therapy coursework overlap significantly with those used in Music Education, so we are lucky to already have a healthy inventory. Any additional supplies that are necessary will be purchased through our department budget.

2. Provide assurance and any appropriate evidence that the institution will ensure students enrolled in and faculty teaching in distance education will have adequate access to:
   a. **An institutional electronic mailing system.**

      SU an institutional electronic mailing system. All students and faculty are given an SU email to utilize for all university correspondence. The university's IT HelpDesk provides technical support to students who need assistance accessing e-mail.

   b. **A learning management system that provides the necessary technological support for distance education.**

      Instructional Design & Delivery provides support for the campus supported learning management system (Canvas) and other instructional software (such as lecture capture, audience response system) through various methods (e.g. workshops, video tips, how-to instructions).

L. Adequacy of Financial Resources with Documentation (as outlined in COMAR 13B.02.03.14)

1. **Complete Table 1: Resources and Narrative Rationale.** *

This program is not expected to generate any resources other than tuition/fee revenue. Enrollment projection is based on idea that we expect Music Therapy enrollment to be similar to our Music Education track in 5 years.

Resource Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1. Reallocated Funds	0	0	0	0	0
2. Tuition/Fee Revenue (c + g below)	**$63,996**	**$109,005**	**$155,960**	**$227,710**	**$279,264**
a. Number of F/T Students	3	5	7	10	12
b. Annual Tuition/Fee Rate	$21,332	$21,801	$22,280	$22,771	$23,272
c. Total F/T Revenue (a x b)	$63,996	$109,005	$155,960	$227,710	$279,264
d. Number of P/T Students	0	0	0	0	0
e. Credit Hour Rate	0	0	0	0	0
f. Annual Credit Hour Rate	0	0	0	0	0
g. Total P/T Revenue (d x e x f)	0	0	0	0	0
3. Grants, Contracts & Other External Sources	0	0	0	0	0
4. Other Sources (Course Fees)	0	0	0	0	0
TOTAL (Add 1 – 4)	**$63,996**	**$109,005**	**$155,960**	**$227,710**	**$279,264**

2. **Complete Table 2: Program Expenditures and Narrative Rationale.** *

Faculty salary estimates in years 3, 4, and 5 have been increased in anticipation of needing adjunct help. This program will use existing administration and support staff. Other expenses include a small annual budget for music therapy supplies and professional development support for full-time faculty.

Expenditure Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1. Faculty (b + c below)	**$104,000**	**$112,200**	**$134,444**	**$136,732**	**$139,067**
a. Number of FTE	1	1	1.5	1.5	1.5
b. Total Salary	$68,000	$69,360	$90,747	$92,162	$93,605
c. Total Benefits	$42,000	$42,840	$43,697	$44,570	$45,462
2. Admin. Staff (b + c below)	0	0	0	0	0
a. Number of FTE	0	0	0	0	0
b. Total Salary	0	0	0	0	0
c. Total Benefits	0	0	0	0	0
3. Support Staff (b + c below)	0	0	0	0	0
a. Number of FTE	0	0	0	0	0
b. Total Salary	0	0	0	0	0

Expenditure Categories	Year 1	Year 2	Year 3	Year 4	Year 5
c. Total Benefits	0	0	0	0	0
4. Technical Support and Equipment	0	0	0	0	0
5. Library	0	0	0	0	0
6. New or Renovated Space	0	0	0	0	0
7. Other Expenses	**$2,500**	**$2,500**	**$2,500**	**$2,500**	**$2,500**
TOTAL (Add 1 – 7)	**$106,500**	**$114,700**	**$136,944**	**$139,232**	**$141,567**

M. Adequacy of Provisions for Evaluation of Program (as outlined in COMAR 13B.02.03.15).

1. **Discuss procedures for evaluating courses, faculty and student learning outcomes.**

   Course evaluations are completed by students at the end of each semester, which are used in annual faculty evaluation as well as in the tenure and promotions procedures to assess teaching. In addition, these evaluations are used from promotion of adjunct faculty. Salisbury University faculty are evaluated every year by their department chair/directors using the online management system, Faculty Success.

2. **Explain how the institution will evaluate the proposed program's educational effectiveness, including assessments of student learning outcomes, student retention, student and faculty satisfaction, and cost-effectiveness.**

   Salisbury University follows an annual schedule for review of existing academic programs set by the University System of Maryland. Each new academic program is fully evaluated 5 years after the first enrollment; after that, programs are evaluated on a 7-year basis by an external reviewer as part of the Academic Program Review process. SU's University Analysis, Reporting & Assessment Office (UARA), provides a mid-point check-in with departments to assess their readiness to complete their Academic Program Review.

N. Consistency with the State's Minority Student Achievement Goals (as outlined in COMAR 13B.02.03.05).

1. **Discuss how the proposed program addresses minority student access & success, and the institution's cultural diversity goals and initiatives.***

   If approved, SU would be the first public University in the state to offer a Music Therapy program. There is currently one existing program at a private University, and their tuition is roughly twice our in-state tuition rate. We believe that offering a more affordable public option will help diversify the pool of students in this field and promote diversity, equity, and inclusion in the future workforce.

   In addition, the American Music Therapy Association emphasizes DEI concepts in their professional competencies. Students in this program must:

   - Demonstrate knowledge of and respect for diverse cultural backgrounds.

- Treat all persons with dignity and respect, regardless of differences in race, ethnicity, language, religion, marital status, gender, gender identity or expression, sexual orientation, age, ability, socioeconomic status, or political affiliation.
- Demonstrate skill in working with culturally diverse populations.

We believe this program will both diversify the student body at our institution and graduate individuals who uphold SU's values regarding diversity, equity, and inclusion.

O. Relationship to Low Productivity Programs Identified by the Commission:

1. **If the proposed program is directly related to an identified low productivity program, discuss how the fiscal resources (including faculty, administration, library resources and general operating expenses) may be redistributed to this program.***

   This program is not associated with a low productivity program.

P. Provide assurance and any appropriate evidence that the institution complies with the C-RAC guidelines, particularly as it relates to the proposed program.*

SU does not intend to offer this program via distanced education.

APPENDIX A

American Music Therapy Association
Professional Competencies

Preamble to AMTA Professional Competencies

The American Music Therapy Association has established competency-based standards for ensuring the quality of education and clinical training in the field of music therapy. As the clinical and research activities of music therapy provide new information, the competency requirements need to be reevaluated regularly to ensure consistency with current trends and needs of the profession and to reflect the growth of the knowledge base of the profession. The Association updates these competencies based on what knowledge, skills, and abilities are needed to perform the various levels and types of responsibilities to practice at a professional level.

In November 2005 the AMTA Assembly of Delegates adopted the Advisory on Levels of Practice in Music Therapy. This Advisory, which was developed by the Education and Training Advisory Board, distinguishes two Levels of Practice within the music therapy profession: Professional Level of Practice and Advanced Level of Practice. This Advisory describes the Professional Level of Practice as follows:

A music therapist at the Professional Level of Practice has a Bachelor's degree or its equivalent in music therapy and a current professional designation or credential in music therapy (i.e., ACMT, CMT, MT-BC, or RMT). At this level, the therapist has the ability to assume a supportive role in treating clients, collaborating within an interdisciplinary team to contribute to the client's overall treatment plan.

The AMTA Professional Competencies are based on music therapy competencies authored for the former American Association for Music Therapy (AAMT) by Bruscia, Hesser, and Boxill (1981). The former National Association for Music Therapy (NAMT) in turn adapted these competencies as the NAMT Professional Competencies revised in 1996. In its final report the Commission on Education and Clinical Training recommended the use of these competencies, and this recommendation was approved by the AMTA Assembly of Delegates in November 1999. The AMTA Professional Competencies has had several minor revisions since its adoption in 1999.

A. MUSIC FOUNDATIONS

1. Music Theory and History

  1.1 Recognize standard works in the literature.

  1.2 Identify the elemental, structural, and stylistic characteristics of music from various periods and cultures.

  1.3 Sight-sing melodies of both diatonic and chromatic makeup.

  1.4 Take aural dictation of melodies, rhythms, and chord progressions.

  1.5 Transpose simple compositions.

2. Composition and Arranging Skills

  2.1 Compose songs with simple accompaniment.

2.2 Adapt, arrange, transpose, and simplify music compositions for small vocal and nonsymphonic instrumental ensembles.

3. Major Performance Medium Skills

3.1 Perform appropriate undergraduate repertoire; demonstrate musicianship, technical proficiency, and interpretive understanding on a principal instrument/voice.

3.2 Perform in small and large ensembles.

4. Functional Music Skills

4.1 Demonstrate a basic foundation on voice, piano, guitar, and percussion.

4.1.1 Lead and accompany proficiently on instruments including, but not limited to, voice, piano, guitar, and percussion.

4.1.2 Play basic chord progressions in several major and minor keys with varied accompaniment patterns.

4.1.3 Play and sing a basic repertoire of traditional, folk, and popular songs with and without printed music.

4.1.4 Sing in tune with a pleasing quality and adequate volume both with accompaniment and a capella.

4.1.5 Sight-read simple compositions and song accompaniments.

4.1.6 Harmonize and transpose simple compositions in several keys.

4.1.7 Tune stringed instruments using standard and other tunings.

4.1.8 Utilize basic percussion techniques on several standard and ethnic instruments.

4.2 Develop original melodies, simple accompaniments, and short pieces extemporaneously in a variety of moods and styles, vocally and instrumentally.

4.3 Improvise on pitched and unpitched instruments, and vocally in a variety of settings including individual, dyad, small or large group.

4.4 Care for and maintain instruments.

5. Conducting Skills

5.1 Conduct basic patterns with technical accuracy.

5.2 Conduct small and large vocal and instrumental ensembles.

6. Movement Skills

6.1 Direct structured and improvisatory movement experiences.

6.2 Move in a structured and/or improvisatory manner for expressive purposes.

B. CLINICAL FOUNDATIONS

7. Therapeutic Applications

7.1 Demonstrate basic knowledge of the potential, limitations, and problems of populations specified in the Standards of Clinical Practice.

7.2 Demonstrate basic knowledge of the causes, symptoms of, and basic terminology used in medical, mental health, and educational classifications.

7.3 Demonstrate basic knowledge of typical and atypical human systems and development (e.g., anatomical, physiological, psychological, social.)

7.4 Demonstrate basic understanding of the primary neurological processes of the brain.

8. Therapeutic Principles

8.1 Demonstrate basic knowledge of the dynamics and processes of a therapist-client relationship.

8.2 Demonstrate basic knowledge of the dynamics and processes of therapy groups.

8.3 Demonstrate basic knowledge of accepted methods of major therapeutic approaches.

9. The Therapeutic Relationship

9.1 Recognize the impact of one's own feelings, attitudes, and actions on the client and the therapy process.

9.2 Establish and maintain interpersonal relationships with clients and team members that are appropriate and conducive to therapy.

9.3 Use oneself effectively in the therapist role in both individual and group therapy, e.g., appropriate self-disclosure, authenticity, empathy, etc. toward affecting desired therapeutic outcomes.

9.4 Utilize the dynamics and processes of groups to achieve therapeutic goals

9.5 Demonstrate awareness of the influence of race, ethnicity, language, religion, marital status, gender, gender identity or expression, sexual orientation, age, ability, socioeconomic status, or political affiliation on the therapeutic process.

C. MUSIC THERAPY

10. Foundations and Principles
Apply basic knowledge of:

10.1 Existing music therapy methods, techniques, materials, and equipment with their appropriate applications.

10.2 Principles and methods of music therapy assessment, treatment, evaluation, and termination for the populations specified in the Standards of Clinical Practice.

10.3 The psychological aspects of musical behavior and experience including, but not limited to, perception, cognition, affective response, learning, development, preference, and creativity.

10.4 The physiological aspects of the musical experience including, but not limited to, central nervous system, peripheral nervous system, and psychomotor responses.

10.5 Philosophical, psychological, physiological, and sociological basis of music as therapy.

10.6 Use of current technologies in music therapy assessment, treatment, evaluation, and termination.

11. Client Assessment

11.1 Select and implement effective culturally-based methods for assessing the client's strengths, needs, musical preferences, level of musical functioning, and development.

11.2 Observe and record accurately the client's responses to assessment.

11.3 Identify the client's functional and dysfunctional behaviors.

11.4 Identify the client's therapeutic needs through an analysis and interpretation of assessment data.

11.5 Communicate assessment findings and recommendations in written and verbal forms.

12. Treatment Planning

12.1 Select or create music therapy experiences that meet the client's objectives.

12.2 Formulate goals and objectives for individual and group therapy based upon assessment findings.

12.3 Identify the client's primary treatment needs in music therapy.

12.4 Provide preliminary estimates of frequency and duration of treatment.

12.5 Select and adapt music, musical instruments, and equipment consistent with the strengths and needs of the client.

12.6 Formulate music therapy strategies for individuals and groups based upon the goals and objectives adopted.

12.7 Create a physical environment (e.g., arrangement of space, furniture, equipment, and instruments that is conducive to therapy).

12.8 Plan and sequence music therapy sessions.

12.9 Determine the client's appropriate music therapy group and/or individual placement.

12.10 Coordinate treatment plan with other professionals.

13. Therapy Implementation

13.1 Recognize, interpret, and respond appropriately to significant events in music therapy sessions as they occur.

13.2 Provide music therapy experiences that address assessed goals and objectives for populations specified in the Standards of Clinical Practice.

13.3 Provide verbal and nonverbal directions and cues necessary for successful client participation.

13.4 Provide models for and communicate expectations of behavior to clients.

13.5 Utilize therapeutic verbal skills in music therapy sessions.

13.6 Provide feedback on, reflect, rephrase, and translate the client's communications.

13.7 Assist the client in communicating more effectively.

13.8 Sequence and pace music experiences within a session according to the client's needs and situational factors.

13.9 Conduct or facilitate group and individual music therapy.

13.10 Implement music therapy program according to treatment plan.

13.11 Promote a sense of group cohesiveness and/or a feeling of group membership.

13.12 Develop and maintain a repertoire of music for age, culture, and stylistic differences.

13.13 Recognize and respond appropriately to effects of the client's medications.

13.14 Maintain a working knowledge of new technologies and implement as needed to support client progress towards treatment goals and objectives.

14. Therapy Evaluation

14.1 Design and implement methods for evaluating and measuring client progress and the effectiveness of therapeutic strategies.

14.2 Establish and work within realistic time frames for evaluating the effects of therapy.

14.3 Recognize significant changes and patterns in the client's response to therapy.

14.4 Recognize and respond appropriately to situations in which there are clear and present dangers to the client and/or others.

14.5 Modify treatment approaches based on the client's response to therapy.

14.6 Review and revise treatment plan as needed.

15. Documentation

15.1 Produce documentation that accurately reflects client outcomes and meet the requirements of internal and external legal, regulatory, and reimbursement bodies.

15.2 Document clinical data.

15.3 Write professional reports describing the client throughout all phases of the music therapy process in an accurate, concise, and objective manner.

15.4 Effectively communicate orally and in writing with the client and client's team members.

15.5 Document and revise the treatment plan and document changes to the treatment plan.

15.6 Develop and use data-gathering techniques during all phases of the clinical process including assessment, treatment, evaluation, and termination.

16. Termination/Discharge Planning

16.1 Assess potential benefits/detriments of termination of music therapy.

16.2 Develop and implement a music therapy termination plan.

16.3 Integrate music therapy termination plan with plans for the client's discharge from the facility.

16.4 Inform and prepare the client for approaching termination from music therapy.

16.5 Establish closure of music therapy services by time of termination/discharge.

17. Professional Role/Ethics

17.1 Interpret and adhere to the AMTA Code of Ethics.

17.2 Adhere to the Standards of Clinical Practice.

17.3 Demonstrate dependability: follow through with all tasks regarding education and professional training.

17.4 Accept criticism/feedback with willingness and follow through in a productive manner.

17.5 Resolve conflicts in a positive and constructive manner.

17.6 Meet deadlines without prompting.

17.7 Express thoughts and personal feelings in a consistently constructive manner.

17.8 Demonstrate critical self-awareness of strengths and weaknesses.

17.9 Demonstrate knowledge of and respect for diverse cultural backgrounds.

17.10 Treat all persons with dignity and respect, regardless of differences in race, ethnicity, language, religion, marital status, gender, gender identity or expression, sexual orientation, age, ability, socioeconomic status, or political affiliation.

17.11 Demonstrate skill in working with culturally diverse populations.

17.12 Adhere to all laws and regulations regarding the human rights of clients, including confidentiality.

17.13 Demonstrate the ability to locate information on regulatory issues and to respond to calls for action affecting music therapy practice.

17.14 Demonstrate basic knowledge of professional music therapy organizations and how these organizations influence clinical practice.

17.15 Demonstrate basic knowledge of music therapy service reimbursement and financing sources (e.g., Medicare, Medicaid, Private Health Insurance, State and Local Health and/or Education Agencies, Grants).

17.16 Adhere to clinical and ethical standards and laws when utilizing technology in any professional capacity.

18. Interprofessional Collaboration

18.1 Demonstrate a basic understanding of professional roles and duties and develop working relationships with other disciplines in client treatment programs.

18.2 Communicate to other departments and staff the rationale for music therapy services and the role of the music therapist.

18.3 Define the role of music therapy in the client's total treatment program.

18.4 Collaborate with team members in designing and implementing interdisciplinary treatment programs.

19. Supervision and Administration

19.1 Participate in and benefit from multiple forms of supervision (e.g., peer, clinical).

19.2 Manage and maintain music therapy equipment and supplies.

19.3 Perform administrative duties usually required of clinicians (e.g., scheduling therapy, programmatic budgeting, maintaining record files).

19.4 Write proposals to create new and/or maintain existing music therapy programs.

20. Research Methods

20.1 Interpret information in the professional research literature.

20.2 Demonstrate basic knowledge of the purpose and methodology of historical, quantitative, and qualitative research.

20.3 Perform a data-based literature search.

20.4 Integrate the best available research, music therapists' expertise, and the needs, values, and preferences of the individual(s) served.

Appendix B

Music Therapy, B.A.

General Education Requirements
See which courses fulfill specific General Education requirements: General Education Courses
Please Note: There may be courses required for your major or minor that also satisfy a requirement below.

SU Signature Outcomes Requirements (3 Courses)
These courses may also meet additional General Education and/or major requirements.

Complete 1 Course In Each Of The Following Areas (3 Courses):
GENE CCE - Civic and Community Engagement **3-4 Hour(s) Credit**
GENE DI - Diversity and Inclusion **3-4 Hour(s) Credit**
GENE ES - Environmental Sustainability **3-4 Hour(s) Credit**

Additional General Education Requirements (11 Courses)
These courses may also meet SU Signature Outcomes and/or major requirements.
* To be taken in the first 24 credit hours of courses

Complete 1 Course In Each Of The Following (3 Courses):
GENE FYS - First Year Seminar **4 Hour(s) Credit**
GENE CTW - Communicating Through Writing **3-4 Hour(s) Credit** *
GENE QA - Quantitative Analysis **3-4 Hour(s) Credit** *

Complete 1 Course In Each Of The Following - Must Be From Different Content Areas (2Courses):
GENE HE - Human Expression **3-4 Hour(s) Credit**
GENE HIC - Humanity In Context **3-4 Hour(s) Credit**

Complete 1 Course In Each Of The Following - Must Be From Different Content Areas (2Courses):
GENE SC - Social Configurations **3-4 Hour(s) Credit**
GENE SI - Social Issues **3-4 Hour(s) Credit**

Complete 1 Course In Each Of The Following - Must Be From Different Content Areas (2Courses):
GENE HOS - Hands-On Science **4 Hour(s) Credit**
GENE STS - Solutions Through Science **3-4 Hour(s) Credit**

Complete 1 Course In Each Of The Following (2 Courses):
GENE PW - Personal Wellness **4 Hour(s) Credit**
GENE EL - Experiential Learning **Min. of 3 Hour(s) Credit**

Major Requirements

Music Core
Complete the Following:
* Piano majors may substitute MUSA 390 for MUSA 205 and/or MUSA 206
MUSC 203 - Theory I **3 Hour(s) Credit**
MUSC 311 - Music Perception I **1 Hour(s) Credit**
MUSC 204 - Theory II **3 Hour(s) Credit**

MUSC 312 - Music Perception II **1 Hour(s) Credit**
MUSC 303 - Theory III **3 Hour(s) Credit**
MUSC 313 - Music Perception III **1 Hour(s) Credit**
MUSC 304 - Theory IV **3 Hour(s) Credit**
MUSC 314 - Music Perception IV **1 Hour(s) Credit**
MUSC 305 - Music History I **3 Hour(s) Credit**
MUSC 306 - Music History II **3 Hour(s) Credit**
MUSC 425 - Musical Form and Analysis **2 Hour(s) Credit**
MUSA 205 - Class Piano I **1 Hour(s) Credit** *
MUSA 206 - Class Piano II **1 Hour(s) Credit** *
Piano Proficiency Exam

Ensembles
Complete 4 Semesters of the Following:
Keyboard majors must complete at least two instances of MUSA 131
MUSA 100 - University Chorale **1 Hour(s) Credit**
MUSA 102 - Jazz Ensemble and Improvisation **1 Hour(s) Credit**
MUSA 104 - Musical Theatre Workshop **1 Hour(s) Credit**
MUSA 105 - Symphony Orchestra **1 Hour(s) Credit**
MUSA 106 - Chamber Choir **1 Hour(s) Credit**
MUSA 107 - Concert Band **1 Hour(s) Credit**
MUSA 131 - Accompanying **1 Hour(s) Credit**

Complete 2 Semesters of the Following:
MUSA 102 - Jazz Ensemble and Improvisation **1 Hour(s) Credit**
MUSA 103 - Chamber Music Ensembles **1 Hour(s) Credit**

Applied Study
NOTE: All applied study must be taken for 2 credits. Each semester of applied study must be taken in conjunction with MUSA391
MUSA 138 - Applied Music I **1-2 Hour(s) Credit**
MUSA 139 - Applied Music II **1-2 Hour(s) Credit**
MUSA 238 - Applied Music III **1-2 Hour(s) Credit**
MUSA 239 - Applied Music IV **1-2 Hour(s) Credit**
MUSA 338 - Applied Music V **1-2 Hour(s) Credit**
MUSA 339 - Applied Music VI **1-2 Hour(s) Credit**

Jury Examinations
Juries are conducted after each semester of applied study to determine if a student can proceed to next level of applied study.

Music Therapy Requirements

Music Therapy Courses
Complete the Following:
MUTH 110 - Introduction to Music Therapy **3 Hour(s) Credit**
MUTH 111 - Foundations of Music Therapy **2 Hour(s) Credit**
MUTH 120 - Field Studies I **1 Hour(s) Credit**
MUTH 121 - Field Studies II **1 Hour(s) Credit**
MUTH 210 - Music Therapy Techniques I **3 Hour(s) Credit**
MUTH 211 - Music Therapy Techniques II **3 Hour(s) Credit**

MUTH 220 - Field Studies III **1 Hour(s) Credit**
MUTH 221 - Field Studies IV **1 Hour(s) Credit**
MUTH 310 - Psychology of Music **3 Hour(s) Credit**
MUTH 320 - Upper-Level Field Studies I **1 Hour(s) Credit**
MUTH 321 - Upper-Level Field Studies II **1 Hour(s) Credit**
MUTH 400 - Research Methods in Clinical Practice **3 Hour(s) Credit**
MUTH 402 - Professional Foundations of Music Therapy I **2 Hour(s) Credit**
MUTH 403 - Professional Foundations of Music Therapy II **2 Hour(s) Credit**
MUTH 420 - Upper-Level Field Studies III **2 Hour(s) Credit**
MUTH 421 - Upper-Level Field Studies IV **2 Hour(s) Credit**

Supportive Music Courses
Complete the Following:
* Voice majors may substitute MUSA 213 and MUSA 214 for MUSA 108/MUSA 109.
** Guitar majors may substitute MUSA 390 for MUSA 209/MUSA 210.
MUSA 108 - Class Voice I **1 Hour(s) Credit** *
MUSA 109 - Class Voice II **1 Hour(s) Credit** *
Voice Proficiency Exam
MUSA 207 - Class Piano III **1 Hour(s) Credit**
MUSA 208 - Class Piano IV **1 Hour(s) Credit**
Advanced Piano Proficiency Exam
MUSA 209 - Class Guitar I **2 Hour(s) Credit** **
MUSA 210 - Class Guitar II **2 Hour(s) Credit** **
Guitar Proficiency Exam
MUSC 216 - Instrumental Techniques - Percussion **1 Hour(s) Credit**
MUSC 310 - Conducting and Score Reading **1 Hour(s) Credit**
MUSC 426 - Arranging for Voices and Instruments **2 Hour(s) Credit**

Supportive Science Courses
Complete the Following:
BIOL 205 - Fundamentals of Human Anatomy and Physiology **4 Hour(s) Credit**
PSYC 101 - General Psychology **4 Hour(s) Credit**
PSYC 200 - Developmental Psychology **4 Hour(s) Credit**
PSYC 302 - Abnormal Psychology **4 Hour(s) Credit**

Internship
Students must complete 4 credits of MUTH 498. Credits may be distributed differently across several terms.
MUTH 498 - Internship in Music Therapy **1-3 Hour(s) Credit**

CBMT Certification Exam
Students must attempt the Certification Board for Music Therapists (CBMT) certification exam before degree will be awarded.

UNIVERSITY SYSTEM of MARYLAND

BOARD OF REGENTS
SUMMARY OF ITEM FOR ACTION,
INFORMATION, OR DISCUSSION

TOPIC: *Towson University Bachelor of Science (B.S.) in Biophysics*

COMMITTEE: Education Policy and Student Life and Safety

DATE OF COMMITTEE MEETING: April 12, 2024

SUMMARY: Towson University (TU) seeks to establish a new Bachelor of Science (B.S.) in Biophysics. This B.S. degree, which will be housed in the Department of Physics, Astronomy, and Geosciences (PAGS), will complement TU's existing B.S. in Physics major. It will provide students with a strong foundation in fundamental physics paired with a coherent academic program in chemistry and biology.

The curriculum consists of 28 credits in physics courses and 59 credits in chemistry, biology, and electives. In adopting an interdisciplinary approach and drawing upon TU faculty expertise from across the Fisher College of Science and Mathematics (FCSM), the proposed Biophysics program is well-aligned with TU's mission of preparing students as leaders in high-demand careers through interdisciplinary study and research.

The program leverages the strength and expertise of current PAGS and FCSM faculty. All courses in the program can be taught by existing faculty, and existing facilities are sufficient to support the program. The program will be financially self-sustaining.

ALTERNATIVE(S): The Regents may not approve the program or may request further information.

FISCAL IMPACT: No additional funds are required. The program can be supported by the projected tuition and fee revenue.

CHANCELLOR'S RECOMMENDATION: That the Education Policy and Student Life and Safety Committee recommend that the Board of Regents approve the proposal from Towson University to offer a BS in Biophysics.

COMMITTEE RECOMMENDATION:	DATE:
BOARD ACTION:	DATE:
SUBMITTED BY: Alison M. Wrynn 301-445-1992	awrynn@usmd.edu

TOWSON.EDU

TOWSON UNIVERSITY

Mark R. Ginsberg, Ph.D.
Interim President

Office of the President
8000 York Road
Towson, MD 21252-0001

March 15, 2024

Jay Perman, M.D.
Chancellor
University System of Maryland
3300 Metzerott Road
Adelphi, MD 20783

Dear Chancellor Perman:

In accordance with the Code of Maryland Regulation (COMAR) 13B.02.03.06, Towson University seeks your review and approval to offer a **Bachelor of Science in Biophysics**.

The proposed program will complement TU's existing Bachelor of Science in Physics major and will provide students with a strong foundation in fundamental physics paired with a coherent academic program in chemistry and biology.

Please note that TU intends to submit this proposal to MHEC on April 1, 2024, along with a signed articulation agreement with a community college partner.

If you have any questions or require additional information, please contact Rhodri Evans, Assistant Provost for Assessment, Accreditation and Compliance, at rhodrievans@towson.edu or by phone at 410-704-3312.

Thank you in advance for your review.

Sincerely,

Mark Ginsberg, Ph.D.
President

MG/rjme

cc: Dr. Candace Caraco, Associate Vice Chancellor for Academic Affairs, USM
Dr. Melanie L. Perreault, Provost and Executive Vice President for Academic Affairs
Dr. Clare N. Muhoro, Associate Provost for Academic Affairs
Dr. Matthew Nugent, Dean, Fisher College of Science and Mathematics

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UNIVERSITY SYSTEM OF MARYLAND INSTITUTION PROPOSAL FOR

X	New Instructional Program
	Substantial Expansion/Major Modification
	Cooperative Degree Program
X	Within Existing Resources, or
	Requiring New Resources

Towson University
Institution Submitting Proposal

Biophysics
Title of Proposed Program

Bachelor of Science	**Fall 2024**
Award to be Offered	Projected Implementation Date
1902.02	**40.0801**
Proposed HEGIS Code	Proposed CIP Code
Physics, Astronomy & Geosciences	**Dr. Jennifer E. Scott**
Department in which program will be located	Department Contact
410-704-2220	**jescott@towson.edu**
Contact Phone Number	Contact E-Mail Address
	March 15, 2024
Signature of President or Designee	Date

Proposal for a Bachelor of Science in Biophysics at Towson University

A. **Centrality to Institutional Mission Statement and Planning Priorities**

A1. Program Description and Alignment with Institutional Mission

Towson University (TU) proposes a new major in the Department of Physics, Astronomy, and Geosciences (PAGS): a Bachelor of Science (B.S.) in Biophysics. This Biophysics major will provide students with a strong foundation in fundamental physics paired with a coherent academic program of study in chemistry and biology. The program will prepare students to contribute to scientific advancement in a growing field and to economic development in our region and nation.

This new major is distinct from TU's current B.S. in Physics, as it requires 11 fewer credits in upper-level physics courses, affording students freedom to take courses in other disciplines. The General Physics, Applied Physics, and Astrophysics concentrations within TU's existing B.S. in Physics are heavily physics-focused, requiring over 30 credits of 300- or 400- level physics or astrophysics courses that emphasize theoretical concepts and mathematical rigor. In particular, the Applied Physics concentration is designed for students interested in engineering and physics subdisciplines such as materials science. Because of the number of upper-level physics requirements, the B.S. in Physics is not a suitable pathway for students who are interested in the applications of physics to other disciplines.

The Biophysics curriculum consists of 28 credits in physics courses and 59 credits in chemistry, biology, and electives. Thus, the Biophysics program will draw on TU faculty expertise from across the Fisher College of Science and Mathematics (FCSM). The proposed Biophysics program is well-aligned with Towson University's mission of preparing students as leaders in high demand careers through interdisciplinary study and research.

A2. Strategic Goals Alignment and Affirmation of Institutional Priority

The proposed program in Biophysics aligns with Towson University's 2020-2030 Strategic Plan. Specifically, the program will:

- Educate with an "innovative student-centered curriculum emphasizing engaged learning, in-demand academic programs, and new approaches to instruction and learning."
- Innovate through research experiences with TU faculty, who are "leaders in scholarship and creative activities."
- Engage by "extending the talents of our students, faculty and staff beyond our campus boundaries" with experiential learning.
- Support students' intellectual growth with a "campus experience that reflects the educational values of Towson University and produces graduates prepared for careers or advanced education."

A3. Five-year Funding Plan

The proposed new bachelor's degree program will be funded with reallocated support from across FCSM, as this program is built on existing undergraduate courses and faculty expertise. One new faculty will be hired as part of the existing hiring plan for the PAGS department to support and enhance the program. TU's central administration has committed funds to assist program implementation. Resources and expenditures anticipated for the first five years are presented in Section L**, Tables 6 and 7**.

A4. Institutional Commitment

The proposed bachelor's degree program is aligned with the university's new research- and innovation-oriented mission and strategic plan.
Beyond the currently anticipated addition of new faculty, the new program will require minimal financial commitment and no new funding allocations for administration or infrastructure (see Section L for further details). There are currently over 40 faculty from across FCSM who will contribute to this program as part of their existing instructional load (see Section I1 and Appendix C a detailed listing). See Section K for more details about physical facilities and infrastructure available to support the program.

TU's Office of Technology Services will provide support for general computing needs. More specialized technical support will come directly from the relevant colleges involved in the program, which have dedicated staff for computer technology needs, classroom support, and website development. This program will benefit from the laboratory and analytical facilities of TU's Science Complex and access to several software packages and utilities available to students through university, FCSM, or PAGS licenses: Capstone, DataStudio, Tracker, LabVIEW, MultiSim, Mathematica, Origin, SigmaPlot, MatLab, OSLO EDU, and Acrobat Creative Cloud.

TU is committed to student success. Students in the Biophysics program will receive academic advising from PAGS faculty who will assist them in designing degree completion plans, completing the degree requirements, choosing elective courses, and finding and applying for internship opportunities. The Biophysics major requirements are designed to be completed in the four-year duration of an undergraduate degree. Required courses and a typical four-year plan of study are outlined in Appendix A and Appendix B.

B. Critical and Compelling Regional or Statewide Need as Identified in the State Plan

B1. Program Demand and Need

Physics is a foundational science. Increasingly, the most interesting problems and exciting opportunities are at the intersections of physics and other fields. Many of these interdisciplinary fields are at the forefront of scientific advancement, e.g., neuroscience, medical physics, and biomedical engineering, including tissue engineering, wearable devices, and nanotechnology.

B2. Alignment with Maryland State Plan for Higher Education

The proposed B.S. in Biophysics aligns with the Student Success and Innovation goals in the 2022 Maryland State Plan for Higher Education. TU faculty are committed to high quality instruction (Priority 5). The proposed program will provide students with knowledge and training through integrated curricula that emphasize synthesis of ideas and provide opportunities to earn credit through real world research experiences.

The Biophysics degree is designed for students who wish to study physics as it is applied to biological systems, in a less theoretical context than the existing B.S. in Physics offered at TU. The proposed Biophysics curriculum gives students flexibility to fulfill requirements and develop a course of study that allows them to explore interests within a well-defined structure.

The Biophysics degree will also provide students who matriculate at TU as physics or other science majors an alternative pathway for completing a bachelor's degree in a timely manner and, through articulation agreements with Maryland's community colleges, will facilitate enrollment and graduation of transfer students (Priority 6). The nature of the Biophysics degree will foster a culture of risk–taking (Priority 8) by encouraging students to take intellectual risks in exploring new and emerging fields.

C. Quantifiable and Reliable Evidence and Documentation of Market Supply and Demand in the Region and State

C1. Pipeline and Employment Opportunities

Students with physics backgrounds are problem-solvers, and those with interdisciplinary backgrounds are well situated for the job market.[1] Overall, physics bachelor's degree holders enter the workforce and postgraduate study at about the same rate and have low rates of unemployment one year after graduation (**Figure 1**).[2] About 60 percent of the graduates entering the workforce are in the private sector, and among these graduates in the private sector, over 90 percent are in STEM-related positions or positions in which they regularly solve technical problems (**Figure** 2).

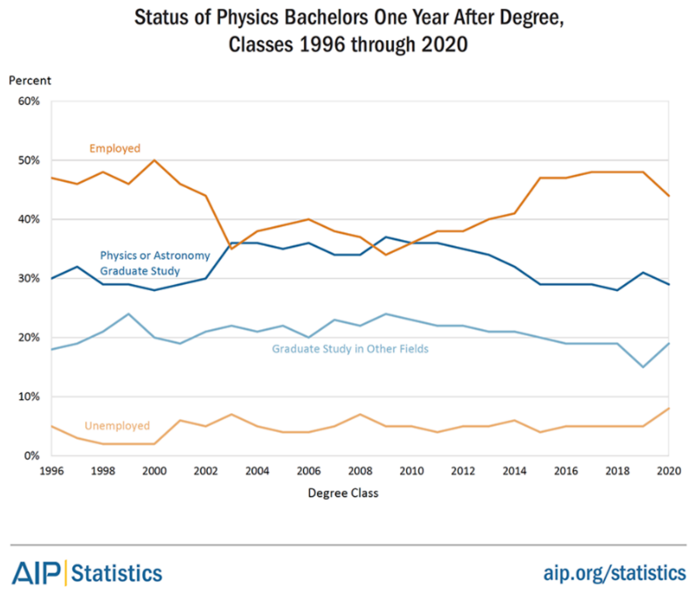
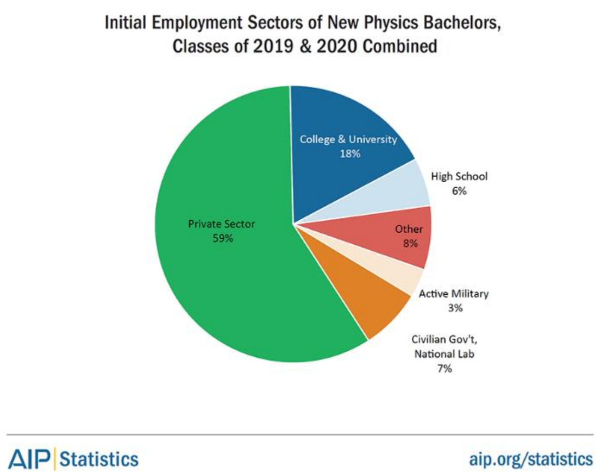
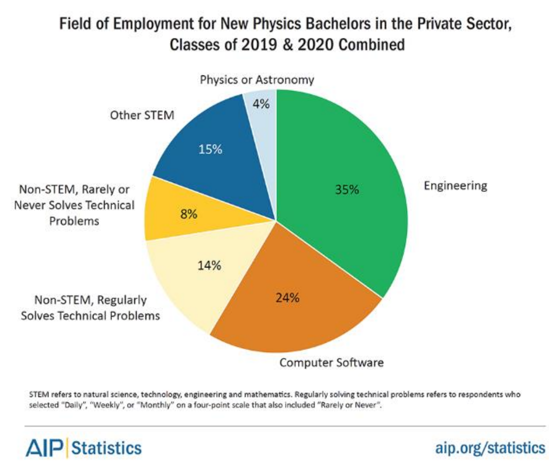


Figure 1. Physics Bachelors One Year After Degree





[1] Phys-21 Preparing Students for 21st Century Careers. Joint Task Force on Undergraduate Physics Programs: https://www.compadre.org/JTUPP/docs/J-Tupp_Report.pdf.

[2] AIP Report, Initial Employment of Physics Bachelors and PhDs, Classes 2019 and 2020: https://www.aip.org/statistics/resources/initial-employment-physics-bachelors-and-phds-classes-2019-and-2020.

Figure 2. (a) Initial Employment Sectors of Physics Bachelors. (b) Fields of Employment for New Physics Bachelors in the Private Sector.

The flexibility of the Biophysics program will make this a good choice for students interested in postgraduate programs in bio/medical physics and engineering. This program is also a good option for pre-med and pre-vet students. Physics students, especially those with a background in biophysics, perform higher than average on the MCAT.[3] An increasing job market demand in biophysics related fields is projected over the next decade, according to the Maryland Department of Labor and U.S. Bureau of Labor Statistics (**Table 1**).

C2. Market Demand

According to the Biophysical Society,[4] "Students with training in biophysics have unlimited career opportunities, possibilities, and pathways, including traditional academic research, working in industry from small tech start-ups to large biotechnology companies, intellectual property law, science writing, or science policy." The Maryland Department of Labor and the U. S. Department of Labor projections reported in the following section further indicate ample employment opportunities for graduates of Biophysics program.

C3. Anticipated Vacancies and Training Needs

According to the Maryland Department of Labor, the occupational projections growth in job titles most closely related to biophysics is between 2.7 percent and 12 percent for the period 2020-2030, while the U.S. Bureau of Labor Statistics projects growth between 5 and nearly 10 percent nationwide for the period 2022-2032 (**Table 1**).

Table 1. Biophysics-Related Occupational Projections			
Maryland Department of Labor (2020-2030)			
Title	**Projected Change**	**Projected annual openings**	**Education value**
Biochemists and Biophysicists	2.7%	829	Doctoral/professional
Biomedical Engineer	4.4%	887	Bachelor's
Medical Scientists, Except Epidemiologists	12.0%	6,682	Doctoral/professional
U. S. Bureau of Labor Statistics (2022-2032)			
Biophysicists and Biochemists	6.7%	36,800	Doctoral/professional
Bioengineers and Biomedical Engineers	5.1%	20,700	Bachelor's
Medical Scientists, Except Epidemiologists	9.8%	130,700	Doctoral/professional

A market study commissioned by TU and conducted by EAB reports that top skills in regional and national job postings in interdisciplinary physics fields, of which biophysics is an example, include physics and additional disciplines included in the proposed Biophysics program: chemistry, computer programming and simulations, mathematics, biology, etc. (**Figures 3** and **4**).

[3] AIP Report. How Well Do Physics Bachelor's Degree Recipients Perform on the MCAT and LSAT? https://www.aip.org/statistics/reports/how-well-do-physics-bachelor%E2%80%99s-degree-recipients-perform-mcat-and-lsat-2022.

[4] Becoming a Biophysicist https://www.biophysics.org/becoming-a-biophysicist.

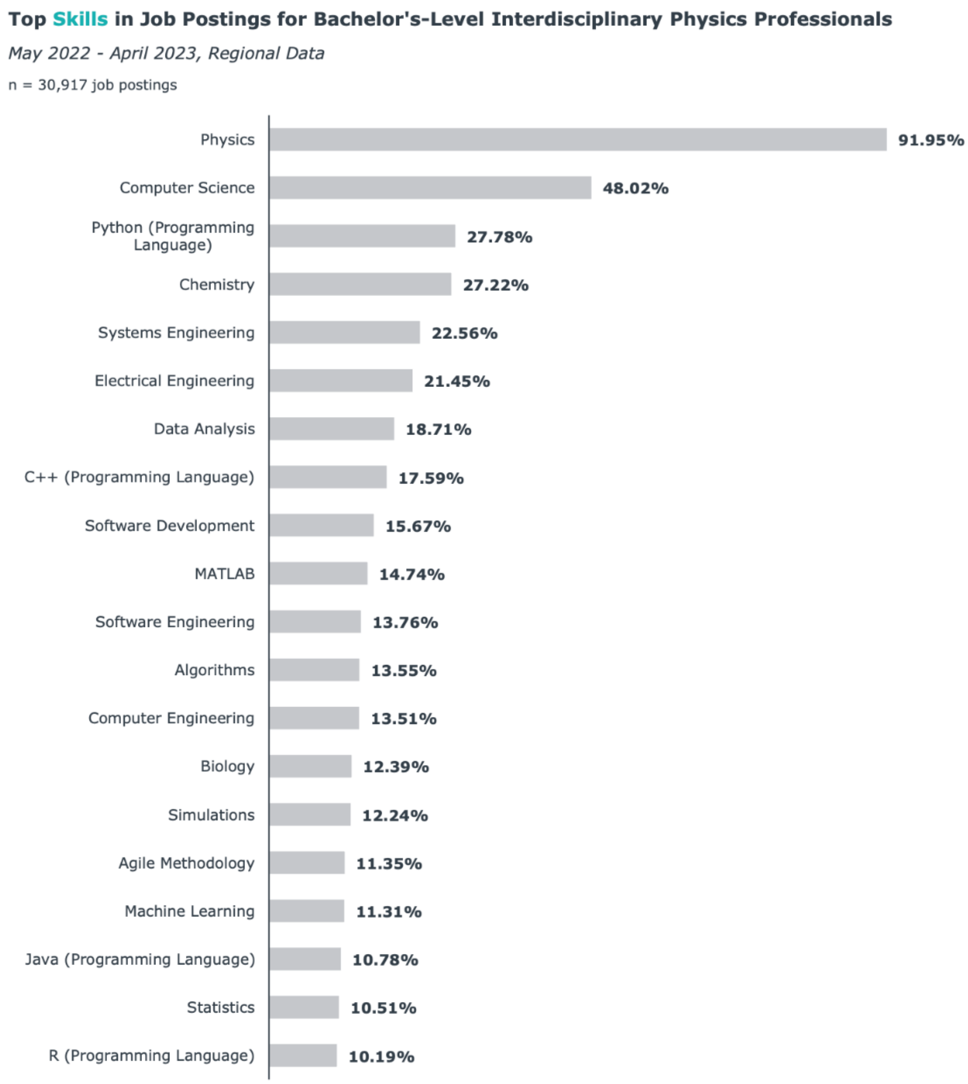


Figure 3. Top Skills in Regional Job Postings for Bachelor's Level Interdisciplinary Physics Professionals – EAB Report

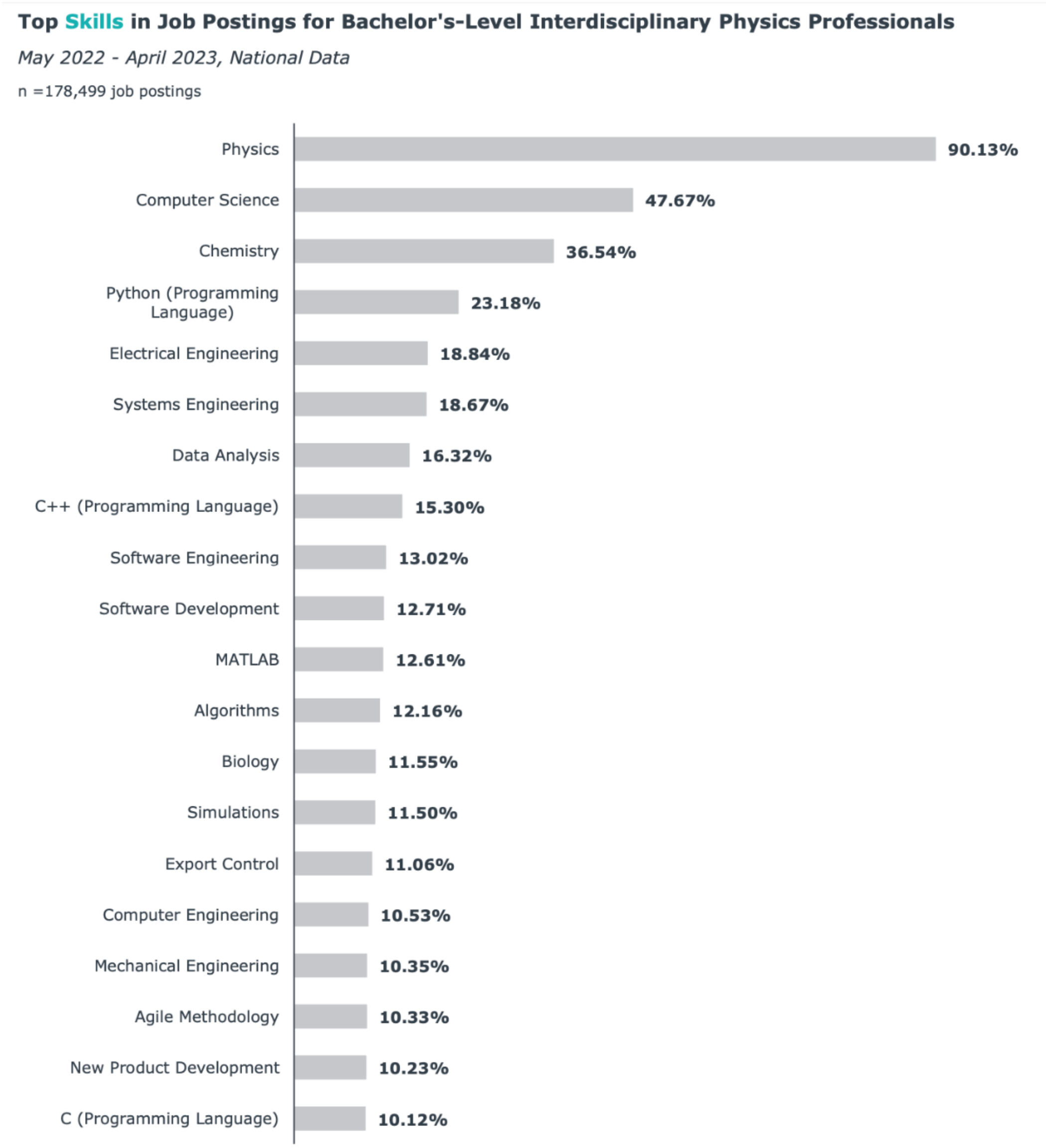


Figure 4. Top Skills in National Job Postings for Bachelor's Level Interdisciplinary Physics Professionals – EAB Report

C4. Projected Supply of Prospective Graduates

TU's proposed Biophysics program will complement existing physics-related programs and is expected to attract students from a variety of STEM backgrounds who want to pursue opportunities at the intersection of physics and biological sciences.

The number of students enrolled in these programs and the number of degree completions for the period 2018-2020, as reported by MHEC, is summarized in **Table 2**.[5] The number of physics and physics-related degrees awarded statewide has remained relatively stable over the past five years, with fluctuations of about 10 percent. Because of its interdisciplinary nature, the proposed program is expected to attract students who would have majored in other STEM fields, including some

[5] Maryland Higher Education Commission, Trends in Degrees and Certificates by Program, Maryland Higher Education Institutions 2014-2021, March 2022 https://mhec.maryland.gov/publications/Documents/Research/AnnualReports/2021DegreesByProgram.pdf.

engineering-related programs. Thus, **Table 2** also tabulates the number of TU degree completions in Biology. Finally, **Table 2** includes the number of potential students who may be drawn to the program from two-year institutions, including those who complete associate's degrees in engineering science.

Table 2. Enrollment Trends in Physics, Biophysics, and Related Programs at Two- and Four-Year institutions[6]						
Comparable Programs in Maryland						
Program	**Institution**	**Enrollment**				
		2018	**2019**	**2020**	**2021**	**2022**
Physics	Frostburg State University	10	7	8	4	7
Engineering Science	Goucher College	0	0	0	5	7
Physics	Johns Hopkins University	54	40	40	41	48
Biophysics	Johns Hopkins University	69	85	95	75	48
Biomedical Engineering	Johns Hopkins University	459	478	444	451	455
Physics	Loyola University Maryland	9	4	7	6	9
Physics (Engineering)	Loyola University Maryland	2	1	3	5	4
Physics	McDaniel College	7	4	8	11	8
Biomedical Science	McDaniel College	N/A	N/A	6	16	19
Physics	Morgan State University	10	12	13	7	11
Engineering Physics	Morgan State University	28	27	23	23	19
Interdisciplinary Sciences	Morgan State University	N/A	N/A	N/A	N/A	3
Physics	Notre Dame of Maryland University	11	8	8	4	3
Physics	Salisbury University	84	80	60	44	56
Integrated Science	Salisbury University	N/A	N/A	N/A	3	11
Biomedical Engineering	Stevenson University	N/A	6	18	19	21
Physics	St. Mary's College of Maryland	29	21	22	25	31
Physics	University of Maryland, Baltimore County	128	133	114	102	88
Physics	University of Maryland, College Park	324	301	321	288	269
Physical Sciences	University of Maryland, College Park	0	1	0	0	0
Physics	Washington College	29	28	16	13	8
		Bachelor's Degree Completions				
		2018	**2019**	**2020**	**2021**	**2022**
Physics	Frostburg State University	2	4	2	2	1
Engineering Science	Goucher College	0	0	0	0	0
Physics	Johns Hopkins University	22	21	14	15	10
Biophysics	Johns Hopkins University	17	26	16	26	38

[6] N/A indicates program was not yet operational for the year listed.

Biomedical Engineering	Johns Hopkins University	115	99	130	114	100
Physics	Loyola University Maryland	2	1	3	2	1
Physics	McDaniel College	7	4	1	1	3
Biomedical Science	McDaniel College	N/A	N/A	0	1	3
Physics	Morgan State University	0	1	4	1	0
Engineering Physics	Morgan State University	1	2	2	0	2
Interdisciplinary Engineering, Information, and Computational Sciences	Morgan State University	N/A	N/A	N/A	N/A	N/A
Interdisciplinary Sciences	Morgan State University	N/A	N/A	N/A	N/A	N/A
Physics	Notre Dame of Maryland University	1	2	4	1	1
Physics	Salisbury University	30	12	20	14	9
Integrated Science	Salisbury University	N/A	N/A	N/A	1	1
Biomedical Engineering	Stevenson University	N/A	N/A	N/A	N/A	0
Physics	St. Mary’s College of Maryland	4	10	8	5	6
Physics	University of Maryland, Baltimore County	20	12	24	16	21
Physics	University of Maryland, College Park	62	73	71	76	66
Physical Sciences	University of Maryland, College Park	3	0	0	1	0
Physics	Washington College	4	8	11	7	8

Internal TU Student Migration						
TU Program (transfer from)		**Enrollment**				
		2018	**2019**	**2020**	**2021**	**2022**
Physics	Towson University	106	99	93	68	57
Biology	Towson University	1,155	1,155	1,055	1,030	888
		Bachelor’s Degree Completions				
		2018	**2019**	**2020**	**2021**	**2022**
Physics	Towson University	14	19	24	12	13
Biology	Towson University	173	194	204	231	214

External Feeder or Transfer Programs						
Program	**Institution**	**Enrollment**				
Arts & Sciences Transfer	Baltimore City Community College	350	239	198	187	120
Biotechnology	Baltimore City Community College	57	55	38	34	19
Mathematics & Science	College of Southern Maryland	179	144	150	153	125
Science	Community College of Baltimore County	575	555	484	428	382
Physical Science	Carroll Community College	2	12	8	9	18
Physics	Cecil Community College	1	4	3	2	3
Engineering Science	Hagerstown Community College	42	37	40	44	44
Arts & Sciences Transfer	Harford Community College	855	796	721	705	671
Arts & Sciences Transfer	Howard Community College	1,334	1,411	1,391	1,258	1,151
Science	Montgomery College	1,283	1,078	1,053	820	838
Engineering Science	Montgomery College	1,110	895	801	713	660
		Associate's Degree Completions				
		2018	**2019**	**2020**	**2021**	**2022**
Arts & Sciences Transfer	Baltimore City Community College	47	25	20	13	31
Biotechnology	Baltimore City Community College	17	14	12	7	7
Mathematics & Science	College of Southern Maryland	6	6	3	7	5
Science	Community College of Baltimore County	55	65	48	40	40
Physical Science	Carroll Community College	0	1	3	2	2
Physics	Cecil Community College	2	4	4	1	1
Engineering Science	Hagerstown Community College	9	11	5	5	6
Arts & Sciences Transfer	Harford Community College	217	195	167	167	169
Arts & Sciences Transfer	Howard Community College	238	225	221	203	188
Science	Montgomery College	148	193	170	164	178
Engineering Science	Montgomery College	108	122	106	115	92

D. Reasonableness of Program Duplication

D1. Similar Programs

As detailed in **Table 2**, there are a number of institutions of higher education in Maryland that offer undergraduate degrees in physics and related fields. Most of these programs are “traditional” physics degrees, similar to TU’s existing B.S. in Physics and distinct from the proposed Biophysics major, with its incorporation of biology and chemistry coursework alongside foundational physics content. The Maryland colleges and universities that offer biophysics or biophysics-related programs specifically include:

McDaniel College: Biomedical Science
Johns Hopkins University: Biophysics
Johns Hopkins University: Biomedical Engineering
Loyola University Maryland: Physics and Biology

Loyola University Maryland: Minor in Biomedical Physics
Stevenson University: Biomedical Engineering
University of Maryland, Baltimore County: Biotechnology/Bioengineering track within the B.S. in Chemical Engineering

Except for the Johns Hopkins University (JHU) Biophysics program and the Loyola University Maryland (Loyola) joint major in Physics and Biology, the other programs available across the state are geared towards engineering and/or medical applications. TU's Biophysics major will prepare students to enter biomedical fields but will also be focused on the fundamental science, with requirements in physics, chemistry, and biology. Unlike TU's proposed Biophysics program and the JHU Biophysics program, Loyola's Physics and Biology curriculum does not include a course in biophysics. Whereas JHU and Loyola are both private universities, the proposed TU program would be the only biophysics program offering at a Maryland public university, thereby serving a different target student population and fulfilling an institutional mission and vision that is much more regionally focused.

Current interdisciplinary programs at Maryland institutions of higher education include:

Morgan State University: Interdisciplinary Sciences
Salisbury University: Integrated Science

The Morgan State University (MSU) program was approved in 2021 and is one of eight interdisciplinary bachelor's degrees offered within its College of Interdisciplinary and Continuing Studies. The MSU program has a broad interdisciplinary scope, allowing students to take coursework in a wide range of subject areas that are not available to TU students in the proposed Biophysics major, such as psychology, sociology and anthropology, nutritional sciences, public health, nursing, and education etc.

The Salisbury University Integrated Science degree is also a general interdisciplinary program that allows students to combine areas of study across disciplines. Biomedical engineering is listed as one option for this degree, but there is no course in biophysics listed in the undergraduate catalog and there are no other options for Integrated Science that correspond to TU's proposed Biophysics program.

D2. Program Justification
Approximately 9,000 physics bachelor's degrees are awarded each year in the U.S. About one half of those degree recipients will enter the workforce in a STEM-related field. Students expect their degrees to confer skills that will help them succeed in the modern economy, which is increasingly technical and interdisciplinary. Thus, it will be highly beneficial for students to obtain a degree with a strong physics foundation combined with courses in other scientific fields. The EAB market study found that "...projected growth in employer demand and rising student demand" suggests a favorable outlook for a bachelor's-level interdisciplinary physics program such as the proposed Biophysics degree. The data presented in sections C.2 and C.3 show the market demand and anticipated vacancies for students possessing skills conferred by the proposed Biophysics degree program.

E. Relevance to High-demand Programs at Historically Black Institutions (HBIs)
While Morgan State University does offer undergraduate degree programs that have some curricular overlap with TU's proposed degree, section D.1 highlights how TU's proposed Biophysics program differs substantively from MSU's programs. The other three HBIs in the University System of Maryland (USM), Bowie State University, Coppin State University, and University of Maryland Eastern Shore, do not offer physics-related programs.

Interested and qualified students who graduate from TU with a bachelor's degree in Biophysics may pursue programs such as the master's in Integrated Sciences or the master's in Applied Neuroscience at Morgan State University, so this new bachelor's program may provide a pathway for Towson University undergraduate degree holders to pursue graduate education at a nearby HBI.

F. Relevance to the Identity of Historically Black Institutions (HBIs)
Given the specialized subject areas of the proposed degree, TU does not anticipate that its implementation will impact the uniqueness and institutional identities and missions of HBIs.

G. Adequacy of Curriculum Design, Program Modality, and Related Learning Outcomes
G1 Program Development and Faculty Oversight
The curriculum for the B.S. in Biophysics was developed primarily by faculty with expertise in physics within the Department of Physics, Astronomy, and Geosciences, in consultation with TU faculty in the Department of Biological Sciences. Faculty members who will oversee the program are identified in Section I1; they are tenured and tenure-track faculty with diverse research and pedagogical expertise in physics and all the related program disciplines.

G2. Educational Objectives and Learning Outcomes
The Biophysics program has three overarching student learning outcomes (SLOs). Upon successful completion of the degree, students will be able to:

1. Demonstrate an understanding of fundamental principles of physics and major concepts and be able to apply these principles to solve quantitative problems.
2. Communicate scientific information effectively in both oral and written formats.
3. Demonstrate an understanding of the interdisciplinary nature of scientific research and theory as they apply to the fields of biology, chemistry, and physics.

These SLOs address the Middle States Commission on Higher Education requirement in the following ways:

SLO 1: Scientific and quantitative reasoning, critical analysis and reasoning, technical competency, and information literacy.

SLO 2: Oral and written communication, information literacy.

SLO 3: Scientific and quantitative reasoning, critical analysis and reasoning, technical competency, and information literacy.

Table 3 shows the alignment of the core physics requirements in the Biophysics curriculum with the program's SLOs. Yellow shading indicates courses used for SLO measures. All courses used for SLO measures are also shaded in Section G4 Program Requirements and in the Example Program of Study included in Appendix B.

Table 3. Curricular Alignment with Student Learning Outcomes			
Physics Core Requirements	**SLO 1**	**SLO 2**	**SLO 3**
PHYS 185 Introductory Seminar in Physics	x	x	

PHYS 241 General Physics I Calculus-based or PHYS 211 General Physics I non-Calculus-based	x	x	x
PHYS 242 General Physics II Calculus-based	x	x	x
PHYS 243 General Physics III	x	x	x
PHYS 305 Computers in Physics	x	x	x
PHYS 311 Modern Physics I	x	x	
PHYS 320 Biophysics	x	x	x
PHYS 341 Intermediate Physics Laboratory	x	x	x
PHYS 385 Physics Seminar	x	x	x
PHYS 486 Physics Seminar II	x	x	

Descriptions of all required courses in the major are included in Appendix A.

G3. Assessment and Documentation of Student Learning Outcomes
Each core SLO has two measures. Performance data are collected each time the courses are taught. Descriptions of the measures are summarized in **Table 4**.

Table 4. Brief Descriptions of Measures

	Measure 1	**Measure 2**
Outcome 1	The Force Concept Inventory will be administered to all PHYS 241 or PHYS 211 students as a pre/post exam. This exam, developed using physics education research, is a standard test used across the country and allows comparison of TU student results with other institutions.	The Concepts Survey in Electricity and Magnetism (CSEM) exam will be administered to all PHYS 242 students as a pre/post exam. This exam, developed using physics education research, is a standard test used across the country and allows comparison of TU student results with other institutions.
Outcome 2	Students are required to submit written reports for the experiments performed in PHYS 341. One report will be chosen to assess the ability of students to communicate in written form. The "Introduction" and "Conclusion" sections will be evaluated to assess this outcome.	Students will be assessed on oral presentations given in the PHYS 385 Physics Seminar course.
Outcome 3	Students in PHYS 320 will be required to write a paper on their career goals which explicitly discusses the interdisciplinary nature of the area of interest in biophysics.	Students in PHYS 385 will be required to give a presentation on a topic related to biophysics.

G4. Program Requirements
The curriculum of the Biophysics major provides students with a strong foundation in physics along with a coherent academic program in chemistry and biology for development of knowledge and skills

sought by today's employers. The PHYS 320 Biophysics course explicitly integrates physics with the other disciplines.

All Biophysics course requirements are listed in **Table 5**. Yellow shading indicates courses used for SLO measures described in the previous section. Descriptions of all courses are included in Appendix A.

Table 5. Required Courses for B.S. in Biophysics **Required Physics Courses**		
Course number	**Title**	**Credits**
PHYS 185	Introductory Seminar in Physics	1
PHYS 241 or 211*	General Physics I (Calculus or non-Calculus-based)	4
PHYS 242	General Physics II Calculus-based	4
PHYS 243	General Physics III	4
PHYS 305	Computers in Physics	4
PHYS 311	Modern Physics	3
PHYS 320	Biophysics	3
PHYS 341	Intermediate Physics Laboratory I	3
PHYS 385	Physics Seminar	1
PHYS 486	Physics Seminar II	1
Subtotal		**28**
Required non-Physics Courses		
Course number	**Title**	**Credits**
MATH 273	Calculus I	4
MATH 274	Calculus II	4
CHEM 131/131L	General Chemistry I	4
CHEM 132/132L	General Chemistry II	4
CHEM 333/333L*	Essentials of Organic Chemistry	5
CHEM 351	Biochemistry I	3
BIOL 200/200L	Biology I: Introduction to Cellular Biology & Genetics	4
BIOL 206/206L	Biology II: Introduction to Ecology & Evolution	4
BIOL 309	Genetics	4
BIOL 408	Cell Biology	4
Upper-level electives in PHYS, CHEM, BIOL, or MATH		12
General Electives		7
Subtotal		**59**
Total Physics + non-Physics		**87**
TOTAL for B.S. Degree		**120**

**A grade of B or better in PHYS 211 is required to substitute for PHYS 241.*

G5. General Education Requirements

TU's Core Curriculum, comprising fourteen categories within four themes (43-46 credits in total), satisfies the general education requirements mandated by the State of Maryland (COMAR

13B.06.01.03) and educational effectiveness standards held by the university's accrediting body, the Middle States Commission on Higher Education.

The Biophysics curriculum will allow students to satisfy TU's Core Curriculum requirements in Mathematics (Core 3) and Biological & Physical Sciences (Core 7 and 8), while also completing the Biophysics major requirements.

All other TU Core Curriculum requirements will be fulfilled through additional credits as described in the table above and in Appendix B. The proposed major allows students to fulfil major and TU Core Curriculum requirements in 120 total credits.

G6. Specialized Accreditation and Certification
Not applicable.

G7. Outside Contracts
Not applicable.

G8. Program Information Assurances
All TU undergraduate students are required to meet with an academic advisor each semester. In the first meeting with an advisee, the academic advisor develops a Four-Year Degree Completion Plan for the student, according to the academic requirements for the major and the schedule of course offerings. During subsequent advising meetings, the advisor reviews the student's progress towards their degree and helps the student plan courses for the next semester. The advisor may help the student modify the degree completion plan, if necessary. Advisors and students will also discuss the student's plans for employment or postgraduate education. Academic advisors often provide information about internships and other opportunities to help students achieve those goals.

Academic advising for students in the Biophysics program will be particularly important for helping students choose a set of elective courses that forms a coherent curriculum aligned with the student's interests. Faculty advisors will be assigned so that they are knowledgeable about their advisee's academic interests and career goals.

Students in the Biophysics program will be expected to develop technical competencies throughout the duration of the program, but there are no specific requirements to enter the program other than admission to TU. Students will have access to the same academic support that all TU students have, such as tutoring, coaching, and workshops available through the TU Tutoring and Learning Center.

Biophysics students will pay regular TU undergraduate tuition and fees and will have the same opportunities for scholarships and research experiences as students in the existing Physics degree program, including the Fisher Scholarship, the Maryland Space Grant Scholarship, and the Eddie L. Loh Scholarship.

Information that will help students be successful in the program, such as the Biophysics curriculum and degree requirements, learning management system support, financial aid, student support services, etc., will be posted on TU's website and in the undergraduate catalog published annually.

G9. Advertising, Recruiting, and Admissions Materials Assurances
TU regularly reviews its advertising, recruiting, and admissions materials to ensure that they clearly and accurately represent programs and services available, and that there is consistency across different modes of communication such as the TU website, the academic catalog, and other print and online promotional materials.

H. Adequacy of Articulation
TU is developing an articulation agreement for the Biophysics major with Cecil College and will pursue articulation agreements with other community colleges once the program is approved.

I. Adequacy of Faculty Resources
I1. Quality of Program Faculty
This new major is built entirely from existing courses and will require few significant new outlays of resources to launch in the short term. Appendix C lists the faculty who could contribute to the successful execution of this new major. All tenure and tenure track faculty have terminal degrees in their disciplinary fields and bring expertise to the courses they teach and the research they conduct.

The PAGS department has recently hired a new faculty member with expertise in planetary science and in the next two years the department anticipates hiring a faculty member in biophysics. These new faculty members will allow us to expand the current course offerings with which we propose to launch the Biophysics program and strengthen them going forward.

Because this new major is truly interdisciplinary in nature, the proposed program will build ties between physics faculty and faculty within and outside our multidisciplinary PAGS department, particularly in the Department of Biological Sciences and the Department of Chemistry.

I2. Ongoing Faculty Training
The Faculty Academic Center of Excellence at Towson (FACET) is the faculty development center for Towson University. FACET's mission is to support an inclusive and collaborative faculty community and foster a culture of excellence in scholarship and teaching. FACET supports all campus faculty in their scholarship and teaching through a combination of programs, workshops, resources, funding, and communities of practice such as: Student Engagement, Emerging Technologies, Open Educational Resources, and High Impact Educational Practices. In collaboration with the TU Office of Technology Services, FACET also recommends, reviews, and provides programs to support advancement of faculty skills with Blackboard, TU's learning management system. FACET provides one-on-one or small group, virtual or face-to-face meetings with an instructional design team, who also perform course reviews. Faculty may attend open meetings as well as request consultation from FACET staff.

J. Adequacy of Library Resources
Resources available through TU's Cook Library are sufficient to meet the needs of students and faculty in the proposed program. The library houses an extensive collection of materials, including more than 500,000 print and electronic volumes. In addition to a dedicated subject librarian, team of research librarians, and subject-specific research guides, the library provides access to 19 physics and astronomy subject-specific databases, such as Nature Portfolio, Scopus, ScienceDirect, JoVE Science Education Unlimited, JSTOR, and SpringerLink. Cook Library also houses computer workstations with specialty software for data analysis, data visualization and mapping.

In addition to Cook Library, faculty and students have access to materials through reciprocal agreements at nearby Baltimore institutions and across USM-affiliated institutions. Materials from other libraries across the country can be requested for loan through standard interlibrary loan (ILL) services. As part of this service, faculty and students have access to RAPID ILL, a service customary at high research activity institutions. The current turnaround time for article requests is typically less than 48 hours.

K. Adequacy of Physical Facilities, Infrastructure, and Instructional Equipment

K1. Assurance of Physical Facilities, Infrastructure and Equipment
TU's existing physical facilities, infrastructure, and instructional equipment are sufficient to support the needs of the proposed program. The Biophysics program will be administratively housed in the Department of Physics, Astronomy, and Geosciences in the Fisher College of Science and Mathematics. TU opened the 320,000 square foot Science Complex building in 2021. The Science Complex includes 50 new teaching laboratories and 30 research laboratory facilities with state-of-the-art instrumentation.

K2. Assurance of Distance Learning Resources
The proposed program is designed to be delivered in-person via traditional modes of face-to-face instruction. If distance learning resources are required, whether in an individual course or at a broader scale, TU is well positioned to provide adequate support. The Faculty Academic Center of Excellence at Towson (FACET) offers training and certification programs for online and hybrid/blended instruction, Universal Design for Learning (UDL), and effective pedagogical approaches for enriching distance learning, including the Quality Matters Rubric. Students and faculty can enroll in training modules that provide instruction in university-sponsored distance learning technologies, including Blackboard, WebEx, Zoom, and Panopto. Technology support is available online, as well as via email, text, phone and on a walk-in basis at Student Computing Services and the Office of Technology Services.

L. Adequacy of Financial Resources with Documentation
The proposed Biophysics program will be funded through existing resources from FCSM. Students in the new program will be taking courses already offered for Physics majors within PAGS, and for many other undergraduate majors outside PAGS (specifically Biology and Chemistry); therefore, no expenditures are necessary to develop the program curriculum.

A biophysicist hire, anticipated to begin in fall 2025, will also be available to teach lower-level physics courses that support the new Biophysics program and TU's existing Physics major. This new faculty line could be a joint appointment with the Department of Biological Sciences. The line is included in the expenditures listed in **Table 7.** The proposed Biophysics program will otherwise be supported through existing faculty and staff budget lines, and therefore no additional funding is required.

Additionally, TU's new program will require some modest marketing resources to attract prospective, new, and transferring TU students into the program, as well as to advertise the new opportunity to current TU students. The types of marketing activities PAGS anticipates undertaking include website development, email and social media marketing, flyers and giveaway items for TU Open House/TU4U events, and a small travel budget for student club outreach to area high schools. TU has budgeted approximately $1,000 per year for these efforts.

Table 6. Programmatic Resources

Resource Categories	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
1. Reallocated Funds	$0	$0	$0	$0	$0
a. Reallocated Funds-Faculty FTE[1]	$0	$0	$0	$0	$0
2. Tuition/Fee Revenue (c + g below)	$79,142	$197,968	$287,869	$420,049	$509,000
a. Number of F/T Students	7	17	24	34	40
b. Annual Tuition/Fee Rate (In State)[1,2]	$11,306	$11,645	$11,995	$12,354	$12,725

c. Total F/T Revenue (a x b)	$79,142	$197,968	$287,869	$420,049	$509,000
d. Number of P/T Students	0	0	0	0	0
e. Credit Hour Rate	$0	$0	$0	$0	$0
f. Annual Credit Hour Rate	$0	$0	$0	$0	$0
g. Total P/T Revenue (d x e x f)	$0	$0	$0	$0	$0
3. Grants, Contracts & Other External Sources	$0	$0	$0	$0	$0
4. Other Sources	$0	$0	$0	$0	$0
TOTAL (Add 1-4)	$79,142	$197,968	$287,869	$420,049	$509,000

[1] Student enrollments are calculated at 100 percent in-state. It is anticipated that all students will enroll on a full-time basis.
[2] Tuition and fees increase by three percent annually.

Table 7. Programmatic Expenditures

Expenditure Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1. Faculty (b + c below)	$0	$22,656	$23,336	$24,036	$24,757
a. Number of FTE	0	0.2	0.2	0.2	0.2
b. Total Salary[1]	$0	$16,068	$16,550	$17,047	$17,558
c. Total Benefits[1]	$0	$6,588	$6,786	$6,989	$7,199
2. Admin. Staff (b + c below)	$0	$0	$0	$0	$0
a. Number of FTE	0	0	0	0	0
b. Total Salary	$0	$0	$0	$0	$0
c. Total Benefits	$0	$0	$0	$0	$0
3. Support Staff (b + c below)	$0	$0	$0	$0	$0
a. Number of FTE	0	0	0	0	0
b. Total Salary	$0	$0	$0	$0	$0
c. Total Benefits	$0	$0	$0	$0	$0
4. Technical Support & Equipment	$0	$0	$0	$0	$0
5. Library	$0	$0	$0	$0	$0
6. New or Renovated Space	$0	$0	$0	$0	$0
7. Other Expenses	$1,000	$1,000	$1,000	$1,000	$1,000
TOTAL (Add 1-7)	$1,000	$23,656	$24,336	$25,036	$25,757

[1] Salary and fringe benefit rates increase by three percent annually.

M. Adequacy of Provisions for Evaluation of Program

M1. Procedures for Evaluating Courses, Faculty and Student Learning Outcomes

The proposed program will be built from existing courses. Nevertheless, future course development will follow the regular Towson University procedures for approval, first at the program and PAGS department level, through the FCSM Curriculum Committee, and finally the University Curriculum Committee.

The course approval process evaluates new courses for appropriate rigor, effective assessment and grading, and adherence of the course syllabus to best practices. Evaluation at the program level ensures course content accuracy and program alignment, while the college and university level reviews facilitate the production of quality course proposals.

Existing courses are evaluated through regular review by program faculty and by student evaluations. Faculty regularly review courses to determine if the course meets overall program objectives. Additionally, instructors are observed by peers on a routine basis, with more frequent observations if faculty are new to a course or the university. If a course review indicates concerns or problems with a course, faculty develop strategies for addressing problems. Student course evaluation takes place at the end of every semester. Using a tool developed by TU faculty that allows for quantitative and qualitative feedback, students give feedback on instructors (e.g., ability to communicate clearly; quality of student-instructor interaction; preparedness) and suggest improvements for a course.

Evaluation of faculty follows policies and procedures established by TU's policies for faculty annual merit review and for faculty reappointment, tenure, and promotion. These evaluations occur at the department, college, and university level. The main areas of evaluation include teaching, scholarship, and service. Tools used as part of the annual evaluation process include review of the individual's portfolio that includes, but is not limited to, the following:

- Evidence of scholarship (e.g., articles in scholarly journals; presentations at scholarly meetings).
- Service work.
- A synopsis of teaching related activities (e.g., courses taught; new instructional procedures; interdisciplinary, diversity, international, and technology-related projects).
- Review of course syllabi.
- Peer teaching observation reports.
- Quantitative and qualitative student evaluation of instruction.

Section G3 outlines the program assessment measures and shows their alignment with specific student learning outcomes. On an annual basis, specific learning outcomes are identified for assessment purposes. The program director, with the support of TU's Office of Assessment, will oversee the processes involved in the assessment of student learning outcomes, including collection and analysis of data, and creation of action plans, as necessary.

M2. Evaluation of Program Educational Effectiveness

The assessment of this program will be guided by TU's Office of Assessment, following established TU policies and procedures, including review of the program's assessment plan to ensure that learning outcomes remain appropriate, and that students are meeting expectations.

The program will work with TU entities such as the Office of the Provost, Enrollment Services and Student Services to review data on a regular basis and improve the program when needed. Effectiveness will be assessed by student retention, progress toward degree completion, career outcomes for graduates, student and faculty satisfaction, cost-effectiveness, and other key performance indicators.

Additionally, TU will conduct a comprehensive evaluation of the program every seven years as part of the USM-mandated Periodic Review of Academic Programs process. The purpose of the review is to promote continuous program improvement and ensure that the needs of students are being met. Each program will prepare a self-study, engage an external reviewer to evaluate the program and identify strengths and areas for improvement, and submit a final report to the USM Board of Regents for review and approval.

N. Consistency with the State's Minority Student Achievement Goals

TU has a strong commitment to diversity, equity, and inclusion. With over 56 percent of the students identifying as a racial or ethnic minority,[7] TU is nearly as diverse as the state of Maryland. It is only one of a few universities in the country to have no achievement gap, meaning that underrepresented student groups achieve the same or better academic success as the entire student population. In 2020, the university introduced its inaugural Diversity Strategic Plan. The plan, "*A More Inclusive TU: Advancing Equity and Diversity (2020–25)*," is firmly grounded in the premise that TU's ongoing success is dependent on the university's capacity to shift perspectives and approaches and strategically place diversity, equity, and inclusion at the core of its mission.

Diverse faculty recruitment is a TU institutional goal and faculty recruitment at the University is designed to reach and attract a diverse pool of candidates. Through diverse faculty recruitment, TU strives to foster a learning community that reflects the population of our campus, region, and state, and supports recruitment and retention of a diverse student population along with academic achievement of students from minority and underrepresented backgrounds.

In physics at TU, as with physics programs elsewhere in the U.S., racial minority groups are underrepresented. In 2019-2020, African Americans comprised 13.6 percent of the U.S. population but earned only three percent of the physics bachelor's degrees. Similarly, Hispanic/Latinx people comprised 19 percent of the U.S. population, but earned 11 percent of physics bachelor's degrees.[8,9] The 2020 report of the American Institute of Physics National Task Force to Elevate African American Representation in Undergraduate Physics and Astronomy advocates the use of multiple curricular options to retain African American physics majors.[10] Since TU's proposed Biophysics degree will provide additional pathways to a physics degree, we anticipate that this program will enhance the overall racial diversity of PAGS students.

O. Relationship to Low Productivity Programs Identified by the Commission

Not applicable.

P. Adequacy of Distance Education Programs

Not applicable. The majority of courses in the program will be delivered on the main TU campus via face-to-face instruction.

[7] Fall 2023 numbers according to TU Office of Institutional Research https://www.towson.edu/ir/documents/f_hdct_car_coll_eth.pdf.
[8] U. S. Census Bureau, 2020: https://www.census.gov/quickfacts/fact/table/US/POP010220#POP010220.
[9] American Institute of Physics Statistical Research Center, Engineering and Physical Science Degrees Earned by Members of Underrepresented Groups: https://www.aip.org/statistics/stats-degrees.
[10] American Institute of Physics National Task Force to Elevate African American Representation in Undergraduate Physics and Astronomy, 2020. The Time is Now: Systemic Changes to Increase African Americans with Bachelors Degrees in Physics and Astronomy: https://www.aip.org/sites/default/files/aipcorp/files/teamup-full-report.pdf.

Appendix A. Descriptions of Course Options in Program Outline

PHYS 185 INTRODUCTORY SEMINAR IN PHYSICS (1)
This seminar is intended for freshmen and sophomores who have demonstrated exceptional ability in the sciences and will involve them directly with current ideas and research in physics. Classical physics, quantum physics, relativity, and the new astronomy will be covered.

PHYS 211 GENERAL PHYSICS I NON-CALCULUS-BASED (4)[11]
For Arts and Sciences, Biology and Geosciences majors: mechanics, heat, light, electricity, magnetism, and a brief introduction to modern physics. Three lecture units and one three-unit laboratory period. Prerequisite: MATH 115 or good standing in high school algebra and trigonometry. Core: Biological & Physical Sciences. Lab/Class fee will be assessed.

PHYS 241 GENERAL PHYSICS I CALCULUS-BASED (4)[11]
Calculus-based physics for science and engineering majors. Mechanics and the conservation laws, gravitation, simple harmonic motion. Prerequisite: MATH 273 (may be taken concurrently). Core: Biological & Physical Sciences. Lab/Class fee will be assessed.

PHYS 242 GENERAL PHYSICS II CALCULUS-BASED (4)
Continuation of PHYS 241. Electricity, magnetism, DC and AC currents, geometric optics. Prerequisites: PHYS 241, MATH 274 (may be taken concurrently). Core: Biological & Physical Sciences. Lab/Class fee will be assessed.

PHYS 243 GENERAL PHYSICS III (4)
Special relativity, fluid kinematics and dynamics, waves, thermodynamics. Prerequisite: PHYS 242.

PHYS 305 COMPUTERS IN PHYSICS (4)
Introduction to hardware and software applications of computers in physics, including computer interfacing to experiments, computer aided design, LabView programming, data analysis, simulation, and modeling techniques. Prerequisite: PHYS 241. Lab/Class fee will be assessed.

PHYS 311 MODERN PHYSICS I (3)
A description of special relativity, quantum theory, atomic structure, and spectra. Three lecture hours. Prerequisites: MATH 274, PHYS 242 or PHYS 252; or PHYS 212 with consent of instructor).

PHYS 320 BIOPHYSICS (3)
Application of physical principles and techniques to problems in biology, with emphasis on understanding cellular and subcellular structure and function. Prerequisites: CHEM 131/131L, BIOL 200/L, PHYS 243.

PHYS 341 INTERMEDIATE PHYSICS LABORATORY I (3)
Experiments which defined modern physics. Exploration of classical and modern research methods: data acquisition and analysis, optical and nuclear spectroscopy. Six laboratory hours. Prerequisites: PHYS 305; PHYS 311 (may be taken concurrently). Lab/Class fee will be assessed.

PHYS 385 PHYSICS SEMINAR (1)
Students participate in colloquia on topics of current interest in physics research under guidance of instructor. One lecture hour. Prerequisite: at least junior standing.

[11] Students may take either PHYS 211 or PHYS 241.

PHYS 486 PHYSICS SEMINAR II (1)
Students participate in colloquia on topics of current interests in physics research under guidance of instructor. One lecture hour. Prerequisite: senior standing or consent of instructor.

MATH 273 CALCULUS I (4)
Functions, limits, and continuity; differentiation of algebraic and trigonometric functions; mean value theorem; differentials; introduction to integration; applications. Four lecture hours and one laboratory hour per week. Prerequisite: qualifying score on Math Placement exam or MATH 117 or MATH 119. Core: Mathematics.

MATH 274 CALCULUS II (4)
Differentiation and integration of exponential, logarithmic, and inverse trigonometric functions; techniques of integration and applications; indeterminate forms; improper integrals; sequences and series of numbers; power series. Prerequisite: MATH 273. Core: Mathematics.

CHEM 131 GENERAL CHEMISTRY I (3)
Atomic and molecular structure; theories of bonding, stoichiometry; chemical reactions; gases; solutions. Open to science/math majors/minors only. Not open to those who successfully completed CHEM 110. CHEM 131 is a quantitative course and students are expected to be proficient in algebraic manipulations and graphical interpretation. Corequisite: CHEM 131L. Core: Biological & Physical Sciences. Lab/Class fee will be assessed.

CHEM 131L GENERAL CHEMISTRY I LABORATORY (1)
Laboratory experiments to support concepts of General Chemistry I Lecture. Not open to those who successfully completed CHEM 110. Corequisite: CHEM 131. Core: Biological & Physical Sciences. Lab/class fee will be assessed.

CHEM 132 GENERAL CHEMISTRY II (3)
Physical properties of liquids, solids and solutions, kinetics, equilibrium, acids and bases, chemical thermodynamics, and electrochemistry. Not open to those who successfully completed CHEM 111. CHEM 132 is a quantitative course and students are expected to be proficient in algebraic manipulations, exponentials, logarithms, and graphical interpretation. Corequisite: CHEM 132L. Prerequisites: CHEM 131 & CHEM 131L. Core: Biological & Physical Sciences.

CHEM 132L GENERAL CHEMISTRY II LABORATORY (1)
Laboratory experiments to support concepts of General Chemistry II Lecture. Not open to those who successfully completed CHEM 111. Corequisite: CHEM 132. Core: Biological & Physical Sciences. Lab/class fee will be assessed.

CHEM 333 ESSENTIALS OF ORGANIC CHEMISTRY (3)
A one-term survey course in organic chemistry for non-chemistry majors taught on a conceptual basis. Not part of a traditional two-term organic chemistry sequence. Emphasis will be on principles, mechanisms, and modern techniques. Three lecture hours. Not open to students who have successfully completed CHEM 330. Prerequisites: CHEM 132 and CHEM 132L. Corequisite: CHEM 333L or successful completion of CHEM 333L or CHEM 336; students are required to be enrolled in both lecture and lab until two weeks prior to the final withdrawal date.

CHEM 333L ESSENTIALS OF ORGANIC CHEMISTRY LABORATORY (2)
Lab for a one-term survey course in organic chemistry for non-chemistry majors taught on a conceptual basis. Not part of a traditional two-term organic chemistry sequence. Emphasis will be

on principles, mechanisms, and modern techniques. Laboratory will include synthesis and identification of organic compounds. One hour of laboratory lecture and one three-hour lab. Not open to students who have successfully completed CHEM 330. Prerequisites: CHEM 132 and CHEM 132L. Corequisite CHEM 333; students are required to be enrolled in both lecture and lab until two weeks prior to the final withdrawal date. Lab/Class fee will be assessed.

CHEM 351 BIOCHEMISTRY I (3)
An overview of the chemistry of proteins, nucleic acids, carbohydrates, and lipids. Basic enzyme catalysis and kinetics, biochemical genetics, membrane structure, bioenergetics, and analytical methods. General principles of metabolism applied to several major pathways. Three lecture hours. Prerequisite: CHEM 330 or CHEM 332.

BIOL 200 BIOLOGY I: INTRODUCTION TO CELLULAR BIOLOGY AND GENETICS (3)
An introduction to biology, including biologically important molecules, cell and tissue structure, respiration, photosynthesis, mitosis, meiosis, and genetics. Course designed for Biology and related science majors; taking this course to fulfill Core credit generally not advised (see BIOL 120/ BIOL 120L as alternative). Core credit not given for both BIOL 200/ BIOL 200L and BIOL 120/ BIOL 120L. Corequisite: BIOL 200L. Prerequisites: qualifying score on the Math Placement exam into MATH 115 or higher, or successful completion of MATH 102. Core: Lab and Non-Lab Sciences.

BIOL 200L BIOLOGY I: INTRODUCTION TO CELLULAR BIOLOGY AND GENETICS LABORATORY (1)
An introduction to biology, including biologically important molecules, cell and tissue structure, respiration, photosynthesis, mitosis, meiosis, and genetics. Average of three laboratory hours per week. Course designed for Biology and related science majors; taking this course to fulfill Core credit generally not advised (see BIOL 120/ BIOL 120L as alternative). Core credit not given for both BIOL 200/ BIOL 200L and BIOL 120/ BIOL 120L. Core: Lab and Non-Lab Sciences. Corequisite: BIOL 200. Prerequisites: qualifying score on the Math Placement exam into MATH 115 or higher, or successful completion of MATH 102. Lab/Class fee will be assessed.

BIOL 206 BIOLOGY II: INTRODUCTION TO ECOLOGY AND EVOLUTION (3)
Population dynamics, community patterns and processes, origin and diversity of species, natural selection, speciation, and population genetics. Course designed for BIOL and related science majors; taking this course to fulfill GenEd credit generally not advised (see BIOL 120 and BIOL 120L as alternative). Corequisite: BIOL 206L (lab). Prerequisite: BIOL 200/ BIOL 200L (BIOL 201). Core: Lab & Non-Lab Sciences.

BIOL 206L BIOLOGY II: INTRODUCTION TO ECOLOGY AND EVOLUTION LABORATORY (1)
Gathering biological data; developing testable hypotheses and quantitative analysis of biological data. Three laboratory hours per week. Course designed for BIOL and related science majors; taking this course to fulfill GenEd credit generally not advised (see BIOL 120 and BIOL 120L as alternative). Corequisite: BIOL 206 (lecture). Prerequisite: BIOL 200/ BIOL 200L (BIOL 201). Core: Lab & Non-Lab Sciences.

BIOL 309 GENETICS (4)
Problem-based genetics: Mendelian genetics, genetic linkage and mapping, nucleic acid structure, replication and function, protein synthesis and the genetic code, gene expression and regulation, mutation, repair, and recombination, recombinant DNA technology, and population genetics. Prerequisites: BIOL 200/ BIOL 200L (BIOL 201); BIOL 206/ BIOL 206L (BIOL 202) and CHEM 131/ CHEM 131L.

BIOL 408 CELL BIOLOGY (4)
The molecular and morphological organization of the cell in relationship to cellular activities with emphasis on eukaryotic cells. Average of three laboratory or discussion hours per week. Prerequisites: BIOL 309; CHEM 132/CHEM 132L is recommended.

Appendix B. Example Program of Study

Courses used for measures of Student Learning Outcomes are shaded in yellow.

Biophysics: Four-Year Plan				
Year 1				
Fall			*Spring*	
PHYS 185	1		PHYS 211 (=CORE 7)	4
CHEM 131/131L	4		BIOL 206/L	4
BIOL 200/L	4		ELECTIVE	4
MATH 273 (=CORE 3)	4		CORE 2	3
CORE 1	3			
Total	16		Total	15
Year 2				
Fall			*Spring*	
PHYS 242 (=CORE 8)	4		PHYS 243	4
PHYS 305	4		CHEM 333/333L	5
MATH 274	4		CORE 4	3
CHEM 132/132L	4		CORE 5	3
Total	16		Total	15
Year 3				
Fall			*Spring*	
PHYS 311	3		ELECTIVE	3
PHYS 341	3		PHYS 385	1
CHEM 351	3		PHYS 320	3
BIOL 309	4		CORE 9	3
CORE 6	3		CORE 10	3
Total	16		Total	13
Year 4				
Fall			*Spring*	
PHYS 486	1		ELECTIVE	3
BIOL 408	4		ELECTIVE	3
ELECTIVE	3		ELECTIVE	3
CORE 11	3		CORE 13	3
CORE 12	3		CORE 14	3
Total	14		Total	15
Credit Grand Total	**120**			

Appendix C. Faculty Supporting the Biophysics Major

Full-Time PAGS Program Faculty			
Name	**Terminal Degree**	**Field**	**Academic Title**
Bedard, Antoine	Ph.D.	Electrical Engineering	Lecturer
Casey, Michelle	Ph.D.	Geosciences	Associate Professor
Ghavamian, Parviz	Ph.D.	Astrophysics	Professor
Guice, George	Ph.D.	Geosciences	Visiting Assistant Professor
Ha, Phuoc	Ph.D.	Physics	Professor
Hasse, Tobias	Ph.D.	Geosciences	Lecturer
Hawkins, Andrew	Ph.D.	Geosciences	Lecturer
Hilligoss, Dylan	M.S.	Physics	Lecturer
Jackson, Alan	Ph.D.	Astrophysics	Assistant Professor
Kolagani, Rajeswari	Ph.D.	Physics	Professor
Krause, Thomas	Ph.D.	Physics	Associate Professor
Kudsieh, Nicholas	Ph.D.	Physics	Lecturer
Lising, Laura	Ph.D.	Physics	Lecturer
Moore, Joel	Ph.D.	Geosciences	Professor
Nelson, Wendy	Ph.D.	Geosciences	Associate Professor
Overduin, James	Ph.D.	Physics	Professor
Perkons, Eriks	M.S.	Geosciences	Lecturer
Ready, Christian	B.S.	Astrophysics	Lecturer
Requena Torres, Miguel	Ph.D.	Astrophysics	Lecturer
Schaefer, David	Ph.D.	Physics	Professor
Scott, Jennifer	Ph.D.	Astrophysics	Professor
Simpson, Jeffrey	Ph.D.	Physics	Professor
Smolyaninova, Vera	Ph.D.	Physics	Professor
Tsai, Tevis	B.S.	Mathematics	Lecturer
Yan, Jia-An	Ph.D.	Physics	Professor

Full-time PAGS faculty who are available to teach specific courses in the Biophysics program's core curriculum are listed below.

There is a sizable pool of full-time and adjunct faculty drawn from other departments across FCSM who are available to teach in the Biophysics program—approximate numbers of non-PAGS faculty qualified to teach each non-physics course are listed below. TU will determine which non-PAGS faculty will teach in the program, based on faculty availability, on a semester-by-semester basis.

Physics Core Requirements

PAGS Faculty	PHYS										
	185	211	241	242	243	305	311	320	341	385	486
Bedard, Antoine		X	X	X				X			
Ghavamian, Parviz	X	X	X	X	X		X			X	X
Ha, Phuoc	X	X	X	X	X		X			X	X
Jackson, Alan	X	X	X	X	X	X					
Kolagani, Rajeswari	X	X	X	X	X		X		X	X	X
Krause, Thomas	X	X	X	X	X				X	X	X
Kudsieh, Nicholas		X	X	X							X
Lising, Laura		X	X	X							
Overduin, James	X	X	X	X	X		X			X	X
Schaefer, David	X	X	X	X	X	X	X	X	X	X	X
Scott, Jennifer	X	X	X	X	X		X			X	X
Simpson, Jeffrey	X	X	X	X	X	X	X		X	X	X
Smolyaninova, Vera	X	X	X	X	X		X		X	X	X
Tsai, Tevis		X	X	X							
Yan, Jia-An	X	X	X	X	X	X	X			X	X

Non-PAGS faculty		
Requirement	**TU Department**	**Number of faculty**
MATH 273	Mathematics	10
MATH 274	Mathematics	10
CHEM 131	Chemistry	12
CHEM 131L	Chemistry	12
CHEM 132	Chemistry	7
CHEM 132L	Chemistry	7
CHEM 333	Chemistry	3
CHEM 333L	Chemistry	3
CHEM 351	Chemistry	3
BIOL 200	Biological Sciences	4
BIOL 200L	Biological Sciences	4
BIOL 206	Biological Sciences	6
BIOL 206L	Biological Sciences	6
BIOL 309	Biological Sciences	3
BIOL 408	Biological Sciences	3

TOPIC: *Towson University Bachelor of Science (B.S.) in Interdisciplinary Physics*

COMMITTEE: Education Policy and Student Life and Safety

DATE OF COMMITTEE MEETING: April 12, 2024

SUMMARY: Towson University (TU) seeks to establish a new Bachelor of Science (B.S.) in Interdisciplinary Physics (IP) with three concentrations: Computational Physics, Physics Innovation and Entrepreneurship (PIE), and Planetary Science. This B.S. degree, which will be housed in the Department of Physics, Astronomy, and Geosciences (PAGS), will complement TU's existing B.S. in Physics major. It will provide students with a strong foundation in fundamental physics along with the freedom to develop a coherent academic program of study across other disciplines.

The IP curriculum consists of 33 credits in a core set of physics and mathematics courses and 54-66 credits in a variety of other subjects, depending on concentration, ranging from computer science and mathematics (Computational Physics); to marketing, economics, and communications (PIE); to astronomy, geology, and geography (Planetary Science). In adopting an interdisciplinary approach and drawing upon TU faculty expertise from across multiple colleges, the proposed IP program is well-aligned with TU's mission of preparing students as leaders in high demand careers through interdisciplinary study and research.

The program leverages the strength and expertise of current TU faculty. All courses in the program can be taught by existing faculty, and existing facilities are sufficient to support the program. The program will be financially self-sustaining.

ALTERNATIVE(S): The Regents may not approve the program or may request further information.

FISCAL IMPACT: No additional funds are required. The program can be supported by the projected tuition and fee revenue.

CHANCELLOR'S RECOMMENDATION: That the Education Policy and Student Life Committee recommend that the Board of Regents approve the proposal from Towson University to offer the B.S. in Interdisciplinary Physics.

COMMITTEE RECOMMENDATION:	DATE:
BOARD ACTION:	DATE:
SUBMITTED BY: Alison M. Wrynn 301-445-1992	awrynn@usmd.edu

TOWSON UNIVERSITY

Mark R. Ginsberg, Ph.D.
Interim President

Office of the President
8000 York Road
Towson, MD 21252-0001

March 15, 2024

Jay Perman, M.D.
Chancellor
University System of Maryland
3300 Metzerott Road
Adelphi, MD 20783

Dear Chancellor Perman:

In accordance with the Code of Maryland Regulation (COMAR) 13B.02.03.06, Towson University seeks your review and approval to offer a **Bachelor of Science in Interdisciplinary Physics** with three areas of concentration in Computational Physics, Physics Innovation and Entrepreneurship (PIE), and Planetary Science.

The proposed program will complement TU's existing Bachelor of Science in Physics major and will provide students with a strong foundation in fundamental physics along with the freedom to develop a coherent academic program of study across other disciplines. Students will be required to enroll in an area of concentration within the major and pursue specialized coursework, ranging from computer science and mathematics (Computational Physics); to marketing, economics, and communications (PIE); to astronomy, geology, and geography (Planetary Science).

Please note that while TU considers the Bachelor of Science in Interdisciplinary Physics as a single degree program, MHEC requires institutions to submit separate proposals for each area of concentration embedded within the degree. TU intends to submit the three area of concentration proposals to MHEC on April 1, 2024, along with a signed articulation agreement with a community college partner.

If you have any questions or require additional information, please contact Rhodri Evans, Assistant Provost for Assessment, Accreditation and Compliance, at rhodrievans@towson.edu or by phone at 410-704-3312.

Thank you in advance for your review.

Sincerely,

Mark Ginsberg, Ph.D.
President

MG/rjme
cc: Dr. Candace Caraco, Associate Vice Chancellor for Academic Affairs, USM
Dr. Melanie L. Perreault, Provost and Executive Vice President for Academic Affairs
Dr. Clare N. Muhoro, Associate Provost for Academic Affairs
Dr. Matthew Nugent, Dean, Fisher College of Science and Mathematics

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UNIVERSITY SYSTEM OF MARYLAND INSTITUTION PROPOSAL FOR

X	New Instructional Program
	Substantial Expansion/Major Modification
	Cooperative Degree Program
X	Within Existing Resources, or
	Requiring New Resources

Towson University
Institution Submitting Proposal

Interdisciplinary Physics
Title of Proposed Program

Bachelor of Science
Award to be Offered

Fall 2024
Projected Implementation Date

1902.01
Proposed HEGIS Code

40.0801
Proposed CIP Code

Physics, Astronomy & Geosciences
Department in which program will be located

Dr. Jennifer E. Scott
Department Contact

410-704-2220
Contact Phone Number

jescott@towson.edu
Contact E-Mail Address

Signature of President or Designee

March 15, 2024
Date

Proposal for a Bachelor of Science in Interdisciplinary Physics with an Area of Concentration in Computational Physics at Towson University

A. Centrality to Institutional Mission Statement and Planning Priorities

A1. Program Description and Alignment with Institutional Mission

Towson University (TU) proposes a new major in the Department of Physics, Astronomy, and Geosciences (PAGS): a Bachelor of Science (B.S.) in Interdisciplinary Physics (IP) with an area of concentration in Computational Physics. This IP major will provide students with a strong foundation in fundamental physics along with the freedom to develop a coherent academic program of study across other disciplines. The concentrations are centered on areas that will prepare students to contribute to scientific advancement and economic development in our region and nation.

Several Maryland institutions (See Table 2 in Section C.4), including TU, offer a traditional physics major as a standard subject in the core sciences. Some institutions offer programs that take an interdisciplinary approach to science more generally, e.g., Morgan State University's B.S. in Interdisciplinary Sciences and B.S. in Interdisciplinary Engineering, Information, and Computational Sciences and Salisbury University's B.S. in Integrated Science, but there are no interdisciplinary science programs that are specifically physics focused. No Maryland institution currently offers a program comparable to the proposed IP major.

This new concentration within the IP major is distinct from TU's current B.S. in Physics, as it requires 11 fewer credits in upper-level physics courses, affording students freedom to take courses in other disciplines. The General Physics, Applied Physics, and Astrophysics concentrations within TU's existing B.S. in Physics are heavily physics-focused, requiring over 30 credits of 300- or 400- level physics or astrophysics courses that emphasize theoretical concepts and mathematical rigor. In particular, the Applied Physics concentration is designed for students interested in engineering and physics subdisciplines such as materials science. Because of the number of upper-level physics requirements, TU's existing B.S. in Physics is not a suitable pathway for students who are interested in the applications of physics to other disciplines, such as computational physics, which blends core physics with computer science and mathematics.

The Computational Physics concentration curriculum consists of 33 credits in a core set of physics and mathematics courses and 54 credits in computer science and mathematics. Thus, the concentration will draw on TU faculty expertise from across the Fisher College of Science and Mathematics (FCSM). The proposed concentration is well-aligned with Towson University's mission of preparing students as leaders in high demand careers through interdisciplinary study and research.

A2. Strategic Goals Alignment and Affirmation of Institutional Priority

The proposed program in Interdisciplinary Physics aligns with Towson University's [2020-2030 Strategic Plan]. Specifically, the program will:

- Educate with an "innovative student-centered curriculum emphasizing engaged learning, in-demand academic programs, and new approaches to instruction and learning."
- Innovate through research experiences with TU faculty, who are "leaders in scholarship and creative activities" or through creative approaches to technical entrepreneurship.

- Engage by "extending the talents of our students, faculty and staff beyond our campus boundaries" with entrepreneurship and experiential learning.
- Support students' intellectual growth with a "campus experience that reflects the educational values of Towson University and produces graduates prepared for careers or advanced education."

A3. Five-year Funding Plan

The proposed new bachelor's degree program will be funded with reallocated support from across the university, as this program is built on existing undergraduate courses and faculty expertise. One new faculty will be hired as part of the existing hiring plan for the PAGS department to support and enhance the program. TU's central administration has committed funds to assist program implementation. Resources and expenditures anticipated for the first five years are presented in Section L**, Tables 7** and **8**.

A4. Institutional Commitment

The proposed bachelor's degree program is aligned with the university's new research- and innovation-oriented mission and strategic plan.

The new Computational Physics concentration in the proposed IP major will require minimal financial commitment and no new funding allocations for administration or infrastructure (see Section L for further details). There are currently over 40 faculty from across FCSM who will contribute to this program as part of their existing instructional load (see Section I.1 and Appendix C for a detailed listing). See Section K for more details about physical facilities and infrastructure available to support the program.

TU's Office of Technology Services will provide support for general computing needs. More specialized technical support will come directly from the relevant colleges involved in the program, which have dedicated staff for computer technology needs, classroom support, and website development. This concentration will benefit from the laboratory and analytical facilities of TU's Science Complex and access to several software packages and utilities available to students through university, FCSM, or PAGS licenses: Capstone, DataStudio, Tracker, LabVIEW, MultiSim, Mathematica, Origin, SigmaPlot, MatLab, OSLO EDU, and Acrobat Creative Cloud.

TU is committed to student success. All students in the IP program will receive academic advising from PAGS faculty who will assist them in designing degree completion plans, completing the degree requirements, choosing elective courses, and finding and applying for internship opportunities. The IP major requirements are designed to be completed in the four-year duration of an undergraduate degree. Required courses and a typical four-year plan of study for the Computational Physics concentration are outlined in Appendix A and Appendix B.

B. Critical and Compelling Regional or Statewide Need as Identified in the State Plan

B1. Program Demand and Need

Physics is a foundational science. Increasingly, the most interesting problems and exciting opportunities are at the intersections of physics and other fields. Many of these interdisciplinary fields are at the forefront of scientific advancement. Computational Physics provides an entry into quantum computing and modeling of complex systems and novel materials.

B2. Alignment with Maryland State Plan for Higher Education

The proposed B.S. in Interdisciplinary Physics aligns with the Student Success and Innovation goals in the 2022 Maryland State Plan for Higher Education. TU faculty are committed to high quality instruction (Priority 5). The proposed program will provide students with knowledge and training through integrated curricula that emphasize synthesis of ideas and provide opportunities to earn credit through real world experiences in research and internships.

The IP degree is designed for students who wish to study physics as it is applied to other fields, in a less theoretical context than the existing B.S. in Physics offered at TU. The proposed Interdisciplinary Physics curriculum gives students flexibility to fulfill requirements and develop a course of study that allows them to explore interests within a well-defined structure. The degree will also provide students who matriculate at TU as physics or other science majors an alternative pathway for completing a bachelor's degree in a timely manner and, through articulation agreements with Maryland's community colleges, will facilitate enrollment and graduation of transfer students (Priority 6).

The nature of the IP degree will foster a culture of risk–taking (Priority 8) by encouraging students to take intellectual risks in exploring new and emerging fields.

C. Quantifiable and Reliable Evidence and Documentation of Market Supply and Demand in the Region and State

C1. Pipeline and Employment Opportunities

Students with physics backgrounds are problem-solvers, and those with interdisciplinary backgrounds, including business knowledge and soft skills, are well situated for the job market.[1,2] Overall, physics bachelor's degree holders enter the workforce and postgraduate study at about the same rate and have low rates of unemployment one year after graduation (**Figure 1**).[3] About 60 percent of the graduates entering the workforce are in the private sector, and among these graduates in the private sector, over 90 percent are in STEM-related positions or positions in which they regularly solve technical problems (**Figure 2**).

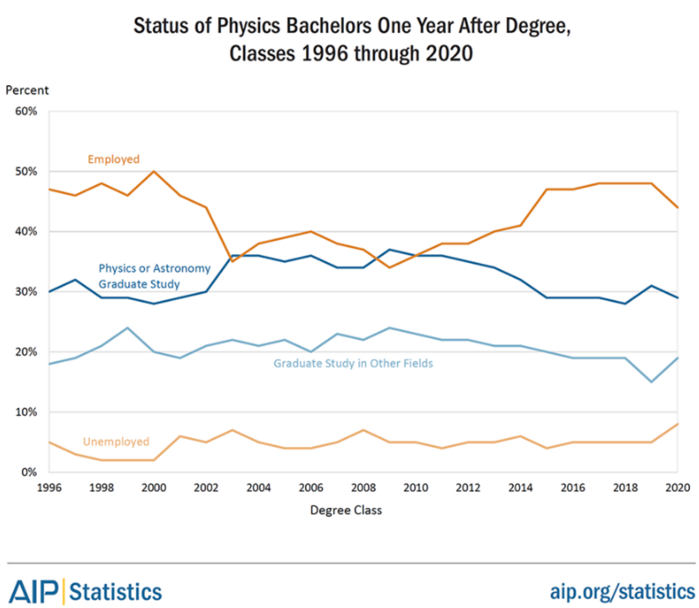

Figure 1. Physics Bachelors One Year After Degree

[1] Educating Physicists for Impactful Careers APS Epic Report: https://epic.aps.org/.

[2] Phys-21 Preparing Students for 21st Century Careers. Joint Task Force on Undergraduate Physics Programs: https://www.compadre.org/JTUPP/docs/J-Tupp_Report.pdf.

[3] AIP Report, Initial Employment of Physics Bachelors and PhDs, Classes 2019 and 2020: https://www.aip.org/statistics/resources/initial-employment-physics-bachelors-and-phds-classes-2019-and-2020.

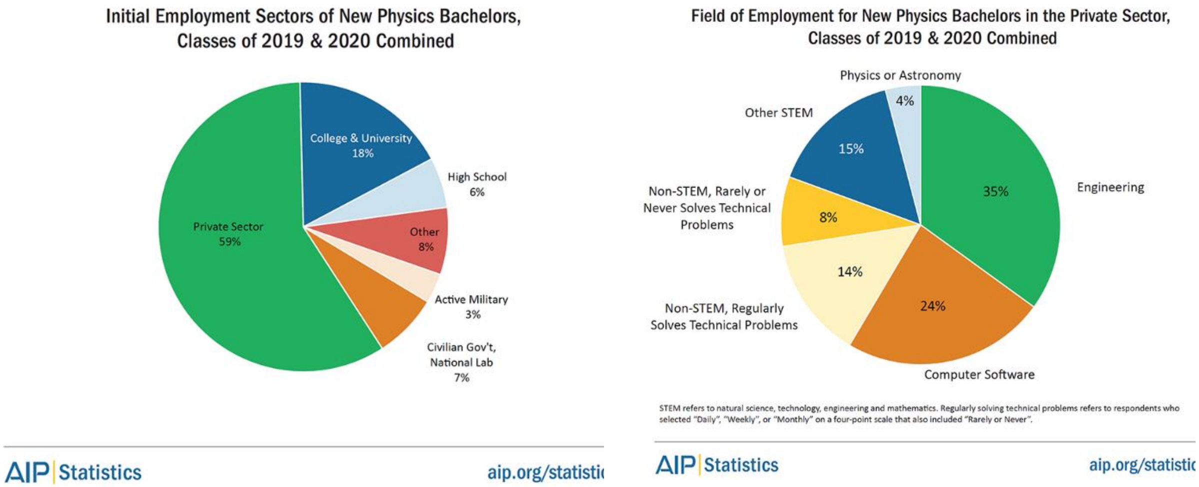

Figure 2. (a) Initial Employment Sectors of Physics Bachelors. (b) Fields of Employment for New Physics Bachelors in the Private Sector.

Computational skills are highly valued in the private and government sectors. Students focusing on computational physics are well-positioned for a wide variety of jobs that require data analysis or computational modeling. Students enrolled in the Computational Physics concentration will be able to pursue a 4+1 pathway to TU's master's in Computer Science. Computational physics and related fields are projected to show increased demand according to the Maryland Department of Labor (**Table 1**).

C2. Market Demand

A market study commissioned by TU and conducted by EAB reports that according to the U. S. Bureau of Labor Statistics, in the past year, national and regional employers advertised a moderate total number of job postings for bachelor's-level interdisciplinary physics professionals (178,499 and 30,917 respectively). **Figures 3** and **4** show total monthly postings over the past three years. Average monthly employer demand for relevant professionals outpaced demand for all bachelor's-level professionals in both markets (1.97 percent vs. 1.79 percent nationally; and 1.80 percent vs. 1.45 percent regionally). Additionally, three of the top five most relevant occupations both regionally and nationwide are projected to grow faster than average. Together with Maryland Department of Labor projections reported in the following section, these trends indicate ample employment opportunities for graduates of an interdisciplinary physics program.

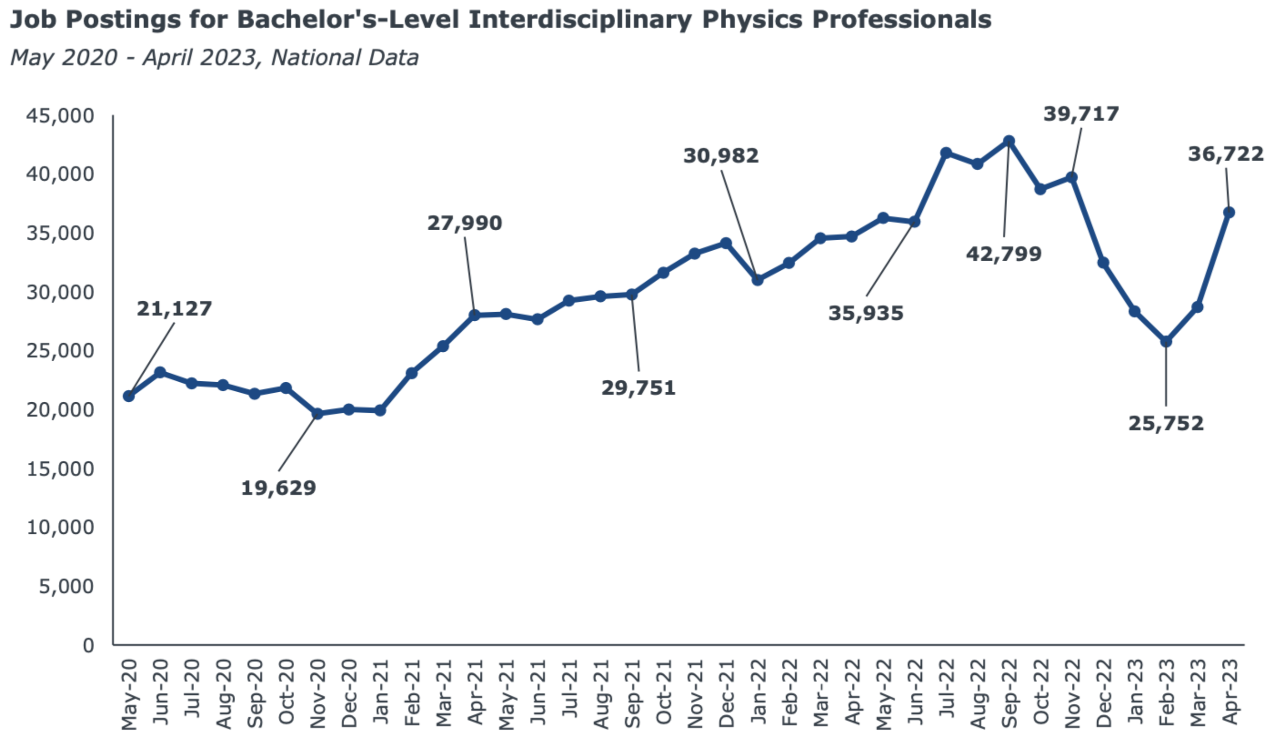

Figure 3. National Job Postings for Bachelor's Level Interdisciplinary Physics Professionals – EAB Report

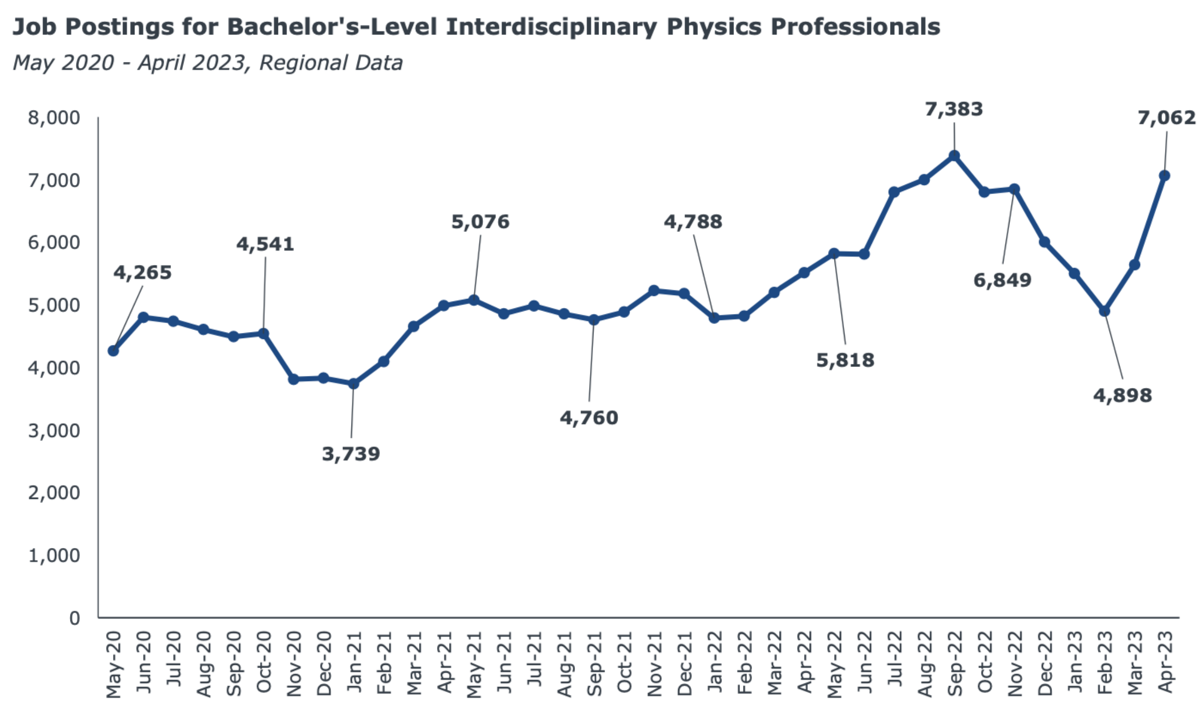

Figure 4. Regional Job Postings for Bachelor's Level Interdisciplinary Physics Professionals – EAB Report

Note that the decline in job postings between September 2022 and February 2023 aligns with overall market trends during the same period. Both the regional and national market trends indicate a growing labor market for program graduates.

C3. Anticipated Vacancies and Training Needs

According to the Maryland Department of Labor, the occupational projections growth in job titles most closely related to the Computational Physics concentration (**Table 1**) is between 16.8 percent and 30.5 percent for the period 2020-2030.

Table 1. Maryland Department of Labor Occupational Projections (2020-2030)

Title	Projected Change	Projected Annual Openings	Education Value
Computer and Information Research Scientists	16.8%	3,285	Master's
Data Scientists and Mathematical Science Occupations, All Other*	30.5%	3,045	Bachelor's

**Not Actuaries, Mathematicians, Operations Research Analysts, Statisticians*

According to the EAB market study, commissioned to examine interdisciplinary physics overall, the projected growth during the period 2022-2033 in occupations for IP professionals such as Data Scientists, Software Developers, Electrical, Mechanical, and Industrial Engineers and Operations Research Analysts is 7.0 percent regionally and 8.8 percent nationally. Top skills in regional and national job postings encompass physics and additional disciplines included in the concentrations to be offered in the Computational Physics concentration of the proposed program: computer programming and simulations, mathematics, etc. (**Figures 5** and **6**).

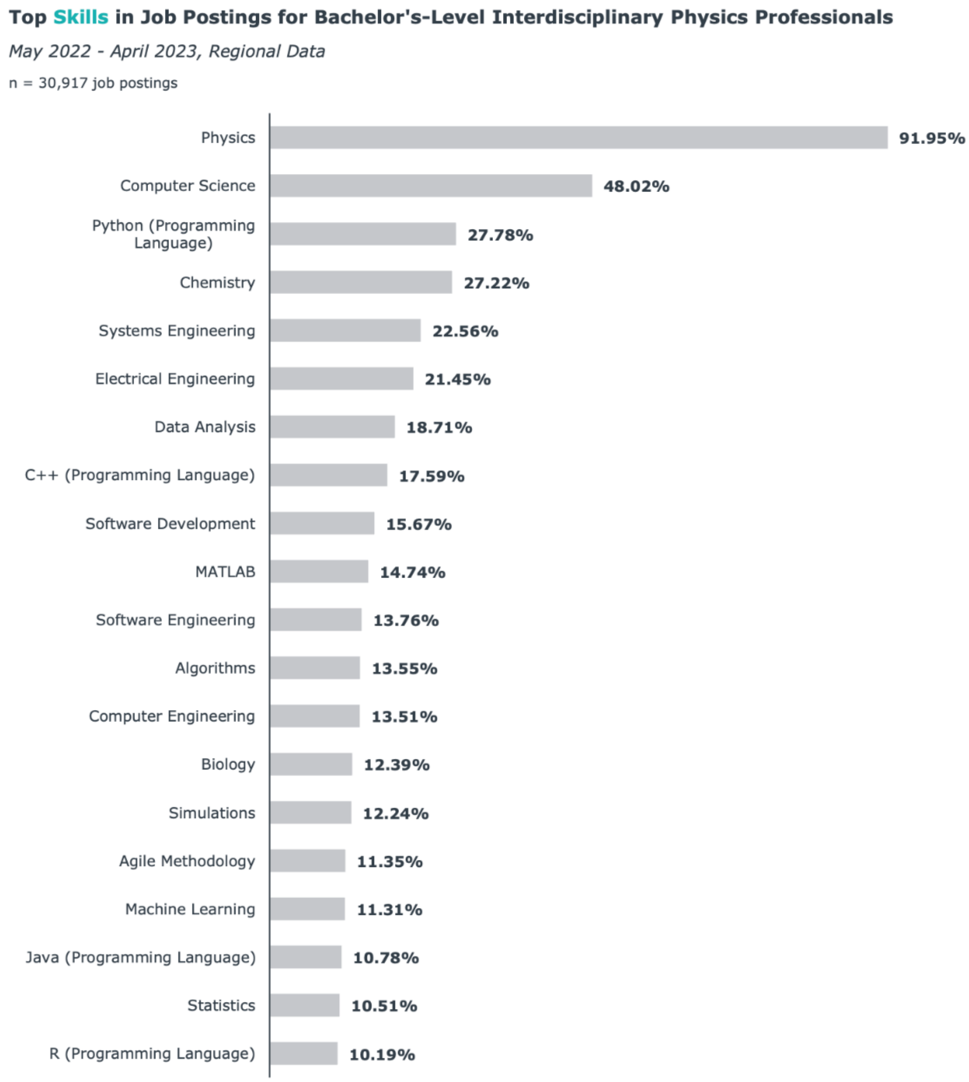

Figure 5. Top Skills in Regional Job Postings for Bachelor's Level Interdisciplinary Physics Professionals – EAB Report

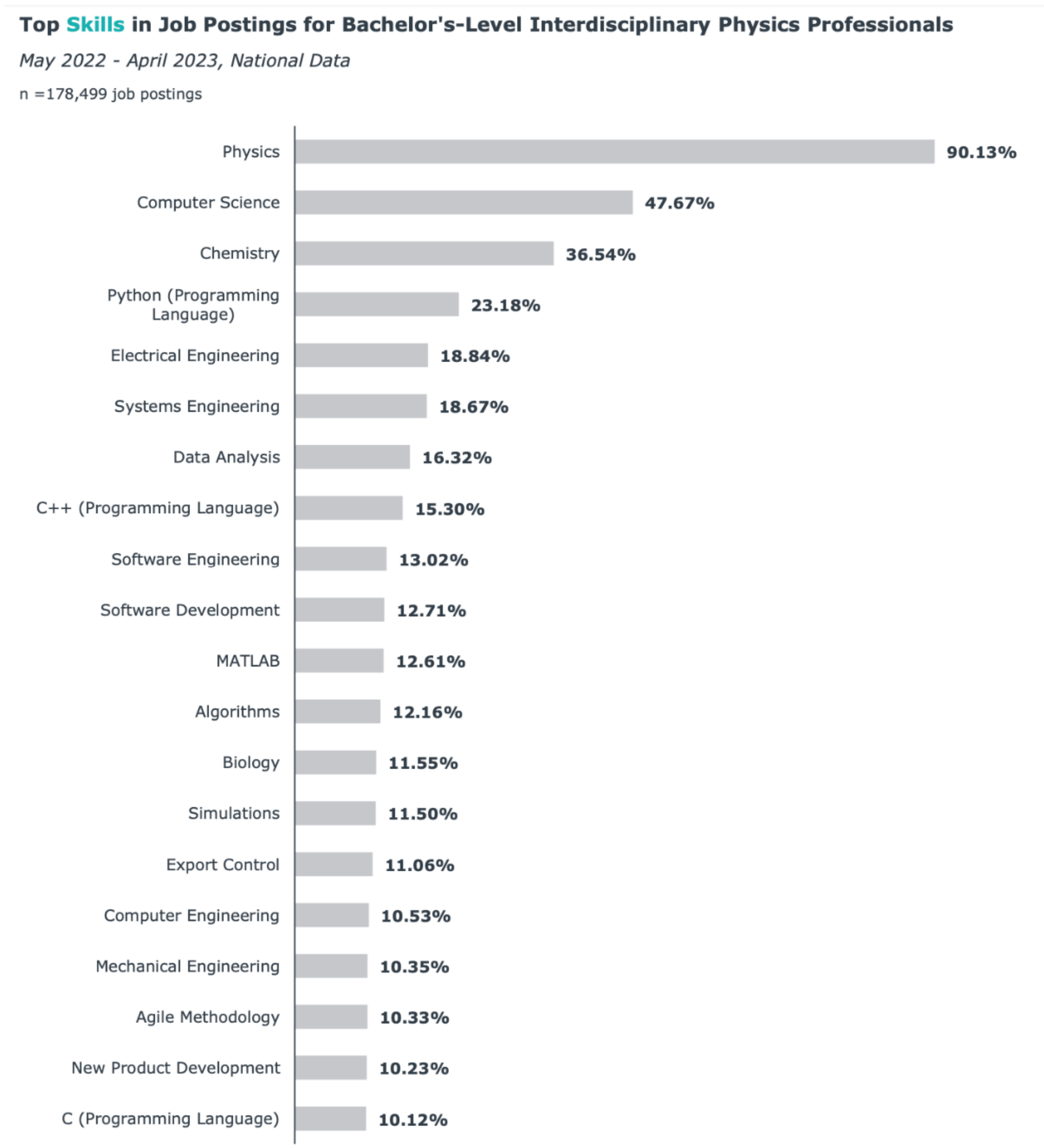

Figure 6. Top Skills in National Job Postings for Bachelor's Level Interdisciplinary Physics Professionals – EAB Report

C4. Projected Supply of Prospective Graduates

TU's proposed program will complement existing physics-related programs, most of which follow the traditional physics curriculum and are similar to TU's existing physics major. The IP program will attract students from a variety of STEM backgrounds who want to pursue opportunities at the intersection of physics and other fields.

The number of students enrolled in these programs and the number of degree completions for the period 2018-2022 as reported by MHEC is summarized in **Table 2**.[4] The number of physics and physics-related degrees awarded statewide has remained relatively stable over the past five years, with fluctuations of about 10 percent. Because of its interdisciplinary nature, the IP program

[4] Maryland Higher Education Commission, Trends in Degrees and Certificates by Program, Maryland Higher Education Institutions 2014-2021, March 2022 https://mhec.maryland.gov/publications/Documents/Research/AnnualReports/2021DegreesByProgram.pdf.

is expected to attract students who would have majored in other STEM fields. Thus, for the Computational Physics concentration proposed here, **Table 2** also tabulates the number of TU degree completions in Computer Science. Finally, **Table 2** includes the number of potential students who may be drawn to the program from two-year institutions, including those who complete associate degrees in computer science.

Table 2. Enrollment Trends in Physics and Interdisciplinary Physics Related Programs at Two- and Four-Year institutions[5]

Comparable Programs in Maryland

Program	Institution	Enrollment				
		2018	2019	2020	2021	2022
Physics	Frostburg State University	10	7	8	4	7
Engineering Science	Goucher College	0	0	0	5	7
Physics	Johns Hopkins University	54	40	40	41	48
Materials Science & Engineering	Johns Hopkins University	17	20	9	13	26
Physics	Loyola University	9	4	7	6	9
Physics (Engineering)	Loyola University	2	1	3	5	4
Physics	McDaniel College	7	4	8	11	8
Physics	Morgan State University	10	12	13	7	11
Engineering Physics	Morgan State University	28	27	23	23	19
Interdisciplinary Engineering, Information, & Computational Sciences	Morgan State University	N/A	N/A	N/A	N/A	5
Interdisciplinary Sciences	Morgan State University	N/A	N/A	N/A	N/A	3
Physics	Notre Dame of Maryland University	11	8	8	4	3
Physics	Salisbury University	84	80	60	44	56
Integrated Science	Salisbury University	N/A	N/A	N/A	3	11
Physics	St. Mary’s College of Maryland	29	21	22	25	31
Physics	University of Maryland, Baltimore County	128	133	114	102	88
Physics	University of Maryland, College Park	324	301	321	288	269
Physical Sciences	University of Maryland, College Park	0	1	0	0	0
Materials Science & Engineering	University of Maryland, College Park	130	121	110	79	56
Physics	Washington College	29	28	16	13	8

[5] N/A indicates program was not yet operational for the year listed.

		Bachelor's Degree Completions				
		2018	**2019**	**2020**	**2021**	**2022**
Physics	Frostburg State University	2	4	2	2	1
Engineering Science	Goucher College	0	0	0	0	0
Physics	Johns Hopkins University	22	21	14	15	10
Materials Science & Engineering	Johns Hopkins University	17	20	9	13	26
Physics	Loyola University	2	1	3	2	1
Physics	McDaniel College	7	4	1	1	3
Physics	Morgan State University	0	1	4	1	0
Engineering Physics	Morgan State University	1	2	2	0	2
Interdisciplinary Engineering, Information, & Computational Sciences	Morgan State University	N/A	N/A	N/A	N/A	N/A
Interdisciplinary Sciences	Morgan State University	N/A	N/A	N/A	N/A	N/A
Physics	Notre Dame of Maryland University	1	2	4	1	1
Physics	Salisbury University	30	12	20	14	9
Integrated Science	Salisbury University	N/A	N/A	N/A	1	1
Physics	St. Mary's College of Maryland	4	10	8	5	6
Physics	University of Maryland, Baltimore County	20	12	24	16	21
Physics	University of Maryland, College Park	62	73	71	76	66
Physical Sciences	University of Maryland, College Park	3	0	0	1	0
Materials Science & Engineering	University of Maryland, College Park	38	22	36	34	33
Physics	Washington College	4	8	11	7	8

Internal TU Student Migration						
TU Program (transfer from)		**Enrollment**				
		2018	**2019**	**2020**	**2021**	**2022**
Physics	Towson University	106	99	93	68	57
Computer Science	Towson University	837	884	933	950	971
		Bachelor's Degree Completions				
		2018	**2019**	**2020**	**2021**	**2022**
Physics	Towson University	14	19	24	12	13
Computer Science	Towson University	121	133	137	141	167
External Feeder or Transfer Programs						
Program	**Institution**	**Enrollment**				

Arts & Sciences Transfer	Baltimore City Community College	350	239	198	187	120
Mathematics & Science	College of Southern Maryland	179	144	150	153	125
Science	Community College of Baltimore County	575	555	484	428	382
Physical Science	Carroll Community College	2	12	8	9	18
Physics	Cecil Community College	1	4	3	2	3
Engineering Science	Hagerstown Community College	42	37	40	44	44
Arts & Sciences Transfer	Harford Community College	855	796	721	705	671
Computer Science	Harford Community College	129	110	94	94	111
Arts & Sciences Transfer	Howard Community College	1,334	1,411	1,391	1,258	1,151
Computer Science	Howard Community College	147	176	257	277	342
Science	Montgomery College	1,283	1,078	1,053	820	838
Engineering Science	Montgomery College	1,110	895	801	713	660
		Associate's Degree Completions				
		2018	**2019**	**2020**	**2021**	**2022**
Arts & Sciences Transfer	Baltimore City Community College	47	25	20	13	31
Mathematics & Science	College of Southern Maryland	6	6	3	7	5
Science	Community College of Baltimore County	55	65	48	40	40
Physical Science	Carroll Community College	0	1	3	2	2
Physics	Cecil Community College	2	4	4	1	1
Engineering Science	Hagerstown Community College	9	11	5	5	6
Arts & Sciences Transfer	Harford Community College	217	195	167	167	169
Computer Science	Harford Community College	18	9	19	15	12
Arts & Sciences Transfer	Howard Community College	238	225	221	203	188
Computer Science	Howard Community College	26	15	28	39	21
Science	Montgomery College	148	193	170	164	178
Engineering Science	Montgomery College	108	122	106	115	92

D. Reasonableness of Program Duplication

D1. Similar Programs

As detailed in **Table 2**, there are a number of institutions of higher education in Maryland that offer undergraduate degrees in physics and related fields. Most of these programs are "traditional" physics degrees, similar to TU's existing B.S. in Physics, or they have a specialized area of focus (such as engineering or materials science) that is wholly distinct from TU's IP degree. While TU believes that the combination of a strong physics foundation and three specialized areas of focus, with critical bridge courses that provide connections, makes this proposed program unique, a summary of existing programs at other Maryland institutions that are the most like the Computational Physics concentration is provided:

Computational Physics

Computer science, computer engineering, and computer information systems are common majors in Maryland, but none has the distinct focus on application to physical problems offered by TU's Computational Physics concentration.

Interdisciplinary Programs

Morgan State University: Interdisciplinary Engineering, Information, and Computational Sciences

Morgan State University: Interdisciplinary Sciences

Salisbury University: Integrated Science

Morgan State University (MSU) programs were approved in 2021 and are two of eight interdisciplinary bachelor's degrees offered within its College of Interdisciplinary and Continuing Studies. These two programs have a much broader interdisciplinary scope than TU's proposed IP program, allowing students to take coursework in a wide range of subject areas (depending on the program) that are not available to TU students, such as psychology, sociology and anthropology, various engineering fields, transportation and urban infrastructure, education, public health, nursing, etc.

The Salisbury University Integrated Science degree is also a general interdisciplinary program that allows students to combine areas of study across disciplines. There are no options for Salisbury's Integrated Science program that correspond directly to the Computational Physics concentration in TU's proposed IP program.

D2. Program Justification

Approximately 9,000 physics bachelor's degrees are awarded each year in the U.S. About one half of those degree recipients will enter the workforce in a STEM-related field. Students expect their degrees to confer skills that will help them succeed in the modern economy, which is increasingly technical and interdisciplinary. Thus, it will be highly beneficial for students to obtain a degree with a strong physics foundation and with concentrations that span a variety of other scientific, technical, and business-related fields. The EAB market study found that "...projected growth in employer demand and rising student demand suggests a favorable outlook for the proposed bachelor's-level interdisciplinary physics program." The data presented in sections C.2 and C.3 show the market demand and anticipated vacancies for students possessing skills conferred by the Computational Physics concentration within the proposed IP degree program.

E. Relevance to High-demand Programs at Historically Black Institutions (HBIs)

While Morgan State University does offer undergraduate degree programs (in Physics, Engineering Physics, Interdisciplinary Engineering, Information, and Computational Sciences, and Interdisciplinary Sciences) that have some curricular overlap with the Computational Physics concentration within TU's proposed IP degree, section D.1 highlights how TU's proposed IP program differs substantively from MSU's programs. The other three HBIs in the University System of Maryland (USM), Bowie State University, Coppin State University, and University of Maryland Eastern Shore, do not offer physics-related programs.

Interested and qualified students who graduate from TU with a bachelor's degree in Interdisciplinary Physics may pursue programs such as the master's in Integrated Sciences at Morgan State University, so this new bachelor's program may provide a pathway for Towson University undergraduate degree holders to pursue graduate education at a nearby HBI.

F. Relevance to the Identity of Historically Black Institutions (HBIs)
Given the specialized subject areas of the proposed degree, TU does not anticipate that its implementation will impact the uniqueness and institutional identities and missions of HBIs.

G. Adequacy of Curriculum Design, Program Modality, and Related Learning Outcomes

G1 Program Development and Faculty Oversight
The curriculum for the Computational Physics concentration was developed primarily by faculty with expertise in physics and astronomy within the Department of Physics, Astronomy, and Geosciences, in consultation with TU faculty and staff from the variety of disciplines represented in the concentration. Faculty members who will oversee the program are identified in section I.1; they are tenured and tenure-track faculty with diverse research and pedagogical expertise in physics and all the related disciplines in the IP program concentrations.

G2. Educational Objectives and Learning Outcomes
The IP program has three overarching student learning outcomes (SLOs). Upon successful completion of the degree, students in all IP concentrations will be able to:

1. Demonstrate an understanding of fundamental principles of physics and major concepts in a student's chosen concentration and be able to apply these principles to solve quantitative problems.
2. Communicate scientific information effectively in both oral and written formats.

Additionally, students in the Computational Physics concentration will achieve a third learning outcome:

3. Demonstrate the ability to apply computational methods and computer controls to investigate experimental and theoretical scientific problems.

These SLOs address the Middle States Commission on Higher Education requirement in the following ways:

SLO 1: Scientific and quantitative reasoning, critical analysis and reasoning, technical competency, and information literacy.

SLO 2: Oral and written communication, information literacy.

SLO 3: Scientific and quantitative reasoning, critical analysis and reasoning, technical competency, and information literacy.

Table 3 shows the alignment of the core requirements of the IP curriculum with the program and concentration-specific SLOs. Yellow shading indicates courses used for SLO measures. Additional courses in each concentration are also used for SLO measures, which are summarized in the following section. All courses used for SLO measures are also shaded in section G.4 Program Requirements and in the Example Program of Study included in Appendix B.

Table 3. Curricular Alignment with Student Learning Outcomes			
Physics Core Requirements	**SLO 1**	**SLO 2**	**SLO 3**
PHYS 185 Introductory Seminar in Physics	x	x	
PHYS 241 General Physics I Calculus-based or PHYS 211 General Physics I non Calculus-based	x	x	x
PHYS 242 General Physics II Calculus-based	x	x	x
PHYS 243 General Physics III	x	x	x
PHYS 305 Computers in Physics	x	x	x
PHYS 311 Modern Physics I	x	x	
PHYS 341 Intermediate Physics Laboratory	x	x	x
PHYS 385 Physics Seminar or ASTR 385 Astrophysics Seminar	x	x	x
PHYS 486 Physics Seminar II	x	x	
MATH 273 Calculus I	x		
MATH 274 Calculus II	x		

Descriptions of all required and concentration courses are included in Appendix A.

G3. Assessment and Documentation of Student Learning Outcomes

Each core SLO has two measures. Performance data are collected each time the courses are taught. Descriptions of the measures are summarized in **Table 4**.

Table 4. Brief Descriptions of Measures		
	Measure 1	**Measure 2**
Outcome 1	The Force Concept Inventory will be administered to all PHYS 241 or PHYS 211 students as a pre/post exam. This exam, developed using physics education research, is a standard test used across the country and allows comparison of TU student results with other institutions.	The Concepts Survey in Electricity and Magnetism (CSEM) exam will be administered to all PHYS 242 students as a pre/post exam. This exam, developed using physics education research, is a standard test used across the country and allows comparison of TU student results with other institutions.
Outcome 2	Students are required to submit written reports for the experiments performed in PHYS 341. One report will be chosen to assess the ability of students to communicate in written form. The "Introduction" and "Conclusion" sections will be evaluated to assess this outcome.	Students will be assessed on oral presentations given in PHYS 385 or ASTR 385.
Outcome 3	A common assignment will be used in PHYS 305 which demonstrates the ability of students in the Computational Physics concentration to use technology to solve a theoretical physics problem. Students in the Computational Physics concentration will be expected to investigate two or more computational methods to solve the problem.	Students in the Computational Physics concentration will be assessed on a final project in PHYS 460.

G4. Program Requirements

The curricula of the concentrations within the Interdisciplinary Physics major provide students with a strong foundation in physics along with the freedom to develop an academic program across other fields of study. The IP major has a set of core physics requirements for all concentrations. Each concentration has its own set of requirements, in physics and in a wide variety of other disciplines, crafted as a coherent pathway for development of knowledge and skills sought by today's employers. Because the concentrations within the IP major are tailored to specific projected advanced degree and career pathways, students must choose a concentration.

The Computational Physics concentration blends physics with courses in mathematics and computer science appropriate for students interested in technical careers involving data analysis and modeling. The curriculum includes courses that explicitly integrate physics with mathematics and computer science. All IP core courses and Computational Physics concentration requirements are listed in the tables below. Yellow shading indicates courses used for SLO measures described in the previous section. Descriptions of all core and concentration courses are included in Appendix A.

Table 5. Required Courses for B.S. in Interdisciplinary Physics - Required Physics Courses		
Course number	**Title**	**Credits**
PHYS 185	Introductory Seminar in Physics	1
PHYS 241 or PHYS 211*	General Physics I (Calculus or non-Calculus-based)	4
PHYS 242	General Physics II Calculus-based	4
PHYS 243	General Physics III	4
PHYS 305	Computers in Physics	4
PHYS 311	Modern Physics I	3
PHYS 341	Intermediate Physics Laboratory I	3
PHYS 385 or ASTR 385	Physics or Astrophysics Seminar	1
PHYS 486	Physics Seminar II	1
Subtotal		**25**
- Required non-Physics Courses		
Course number	**Title**	**Credits**
MATH 273	Calculus I	4
MATH 274	Calculus II	4
Subtotal		**8**
TOTAL		**33**

**A grade of B or better in PHYS 211 is required to substitute for PHYS 241.*

Table 6. Computational Physics Concentration Coursework - Required Physics Courses		
Course number	**Title**	**Credits**
PHYS 307	Introductory Mathematical Physics	3
PHYS 337	Digital Electronics	4
PHYS 460	Computational Methods in Physics	3
Subtotal		**10**

- Required non-Physics Courses		
Course number	**Title**	**Credits**
COSC 236	Introduction to Computer Science I	4
COSC 237	Introduction to Computer Science II	4
COSC 290	Principles of Computer Organization	4
COSC 336	Data Structures and Algorithm Analysis	4
MATH 263	Discrete Mathematics	3
MATH 275	Calculus III	4
MATH 374	Differential Equations	3
Upper-level electives in PHYS, COSC or MATH		12
General Electives		6
Subtotal		**44**
TOTAL Concentration		**54**
TOTAL w/IP Core		**87**
TOTAL for B.S. Degree		**120**

G5. General Education Requirements
TU's Core Curriculum, comprising fourteen categories within four themes (43-46 credits in total), satisfies the general education requirements mandated by the State of Maryland (COMAR 13B.06.01.03) and educational effectiveness standards held by the university's accrediting body, the Middle States Commission on Higher Education.

The IP Core will allow students to satisfy TU's Core Curriculum requirements in Mathematics (Core 3) and Biological & Physical Sciences (Core 7 and 8), while also completing the IP major requirements. All other TU Core Curriculum requirements will be fulfilled through additional credits as described in the tables above and in Appendix B. All concentrations in the proposed major allow students to fulfil major and TU Core Curriculum requirements in 120 total credits.

G6. Specialized Accreditation and Certification
Not applicable.

G7. Outside Contracts
Not applicable.

G8. Program Information Assurances
All TU undergraduate students are required to meet with an academic advisor each semester. In the first meeting with an advisee, the academic advisor develops a Four-Year Degree Completion Plan for the student, according to the academic requirements for the major and the schedule of course offerings. During subsequent advising meetings, the advisor reviews the student's progress towards their degree and helps the student plan courses for the next semester. The advisor may help the student modify the degree completion plan, if necessary. Advisors and students will also discuss the student's plans for employment or postgraduate education. Academic advisors often provide information about internships and other opportunities to help students achieve those goals.

Academic advising for students in the Computational Physics concentration will be particularly important for helping students choose a set of elective courses within the concentration that forms a coherent curriculum aligned with the student's interests. Faculty advisors will be assigned so that they are knowledgeable about their advisee's subfield within the IP program.

Students in the IP program will be expected to develop technical competencies throughout the duration of the program, but there are no specific requirements to enter the program other than admission to TU. IP students will have access to the same academic support that all TU students have, such as tutoring, coaching, and workshops available through the TU Tutoring and Learning Center.

IP students will pay regular TU undergraduate tuition and fees and will have the same opportunities for scholarships and research experiences as students in the existing physics program, including the Fisher Scholarship, the Maryland Space Grant Scholarship, and the Eddie L. Loh Scholarship.

Information that will help students be successful in the program, such as the IP's curriculum and degree requirements, learning management system support, financial aid, student support services, etc., will be posted on TU's website and in the undergraduate catalog published annually.

G9. Advertising, Recruiting, and Admissions Materials Assurances

TU regularly reviews its advertising, recruiting, and admissions materials to ensure that they clearly and accurately represent programs and services available, and that there is consistency across different modes of communication such as the TU website, the academic catalog, and other print and online promotional materials.

H. Adequacy of Articulation

TU is developing an articulation agreement for the Computational Physics concentration within the IP major with Cecil College and will pursue articulation agreements with other community colleges once the program is approved.

I. Adequacy of Faculty Resources

I1. Quality of Program Faculty

All the concentrations in this new major are built entirely from existing courses and will require few significant new outlays of resources to launch in the short term. Appendix C lists the faculty who could contribute to the successful execution of this new major. All tenure and tenure track faculty have terminal degrees in their disciplinary fields and bring expertise to the courses they teach and the research they conduct.

Because the IP new major is truly interdisciplinary in nature, the proposed Computational Physics concentration will build ties between physics faculty and faculty within and outside the multidisciplinary PAGS department and, in particular, help strengthen relationships with FCSM's Departments of Computer & Information Sciences and Mathematics.

I2. Ongoing Faculty Training

The Faculty Academic Center of Excellence at Towson (FACET) is the faculty development center for Towson University. FACET's mission is to support an inclusive and collaborative faculty community and foster a culture of excellence in scholarship and teaching. FACET supports all campus faculty in their scholarship and teaching through a combination of programs, workshops, resources, funding, and communities of practice such as: Student Engagement, Emerging Technologies, Open Educational Resources, and High Impact Educational Practices. In collaboration with the TU Office of Technology Services, FACET also recommends, reviews, and provides programs to support advancement of faculty skills with Blackboard, TU's learning management system. FACET provides one-on-one or small group, virtual or face-to-face meetings with an instructional design team, who also perform course reviews. Faculty may attend open meetings as well as request consultation from FACET staff.

J. Adequacy of Library Resources

Resources available through TU's Cook Library (https://libraries.towson.edu) are sufficient to meet the needs of students and faculty in the proposed program. The library houses an extensive collection of materials, including more than 500,000 print and electronic volumes. In addition to a dedicated subject librarian, team of research librarians, and subject-specific research guides, the library provides access to 19 physics and astronomy subject-specific databases, such as Nature Portfolio, Scopus, ScienceDirect, JoVE Science Education Unlimited, JSTOR, and SpringerLink. Cook Library also houses computer workstations with specialty software for data analysis, data visualization and mapping.

In addition to Cook Library, faculty and students have access to materials through reciprocal agreements at nearby Baltimore institutions and across USM-affiliated institutions. Materials from other libraries across the country can be requested for loan through standard interlibrary loan (ILL) services. As part of this service, faculty and students have access to RAPID ILL, a service customary at high research activity institutions. The current turnaround time for article requests is typically less than 48 hours.

K. Adequacy of Physical Facilities, Infrastructure, and Instructional Equipment

K1. Assurance of Physical Facilities, Infrastructure and Equipment

TU's existing physical facilities, infrastructure and instructional equipment are sufficient to support the needs of the proposed program. The IP program will be administratively housed in the Department of Physics, Astronomy, and Geosciences in the Fisher College of Science and Mathematics. TU opened the 320,000 square foot Science Complex building in 2021. The Science Complex includes 50 new teaching laboratories and 30 research laboratory facilities with state-of-the-art instrumentation.

K2. Assurance of Distance Learning Resources

The proposed program is designed to be delivered in-person via traditional modes of face-to-face instruction. If distance learning resources are required, whether in an individual course or at a broader scale, TU is well positioned to provide adequate support. The Faculty Academic Center of Excellence at Towson (FACET) offers training and certification programs for online and hybrid/blended instruction, Universal Design for Learning (UDL), and effective pedagogical approaches for enriching distance learning, including the Quality Matters Rubric. Students and faculty can enroll in training modules that provide instruction in university-sponsored distance learning technologies, including Blackboard, WebEx, Zoom, and Panopto. Technology support is available online, as well as via email, text, phone and on a walk-in basis at Student Computing Services and the Office of Technology Services.

L. Adequacy of Financial Resources with Documentation

The proposed IP program will be funded through existing resources from FCSM, the College of Business and Economics, and the College of Liberal Arts. Students in the Computational Physics concentration will be taking courses already offered for physics majors within PAGS and in other TU undergraduate majors outside PAGS (e.g., Computer Science, Information Technology, and Mathematics); therefore, no expenditures are necessary to develop the program curriculum. Additionally, PAGS anticipates hiring a new faculty member in Year 2; this position would support teaching in the concentration (budgeted at a 0.13 FTE rate in **Table 8**). Other than this new faculty position, the Computational Physics concentration will be supported through existing faculty budget lines, and therefore no additional funding is required.

TU's new IP program will require some modest marketing resources to attract prospective, new, and transfer students, as well as to advertise the new opportunity to current TU students who may be interested in changing their major to Interdisciplinary Physics with a Computational Physics concentration from programs such as Computer Science, Information Technology, or Mathematics. The types of marketing activities PAGS anticipates undertaking include website development, email and social media marketing, flyers, and giveaway items for TU Open House/TU4U events, and a small travel budget for student club outreach to area high schools. TU has budgeted approximately $1,000 per year for these efforts.

Table 7. Programmatic Resources

Resource Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1. Reallocated Funds	$0	$0	$0	$0	$0
a. Reallocated Funds-Faculty FTE[1]	$0	$0	$0	$0	$0
2. Tuition/Fee Revenue (c + g below)	$22,612	$58,225	$95,952	$135,894	$165,425
a. Number of F/T Students	2	5	8	11	13
b. Annual Tuition/Fee Rate (In State)[1,2]	$11,306	$11,645	$11,994	$12,354	$12,725
c. Total F/T Revenue (a x b)	$22,612	$58,225	$95,952	$135,894	$165,425
d. Number of P/T Students	0	0	0	0	0
e. Credit Hour Rate	$0	$0	$0	$0	$0
f. Annual Credit Hour Rate	$0	$0	$0	$0	$0
g. Total P/T Revenue (d x e x f)	$0	$0	$0	$0	$0
3. Grants, Contracts & Other External Sources	$0	$0	$0	$0	$0
4. Other Sources	$0	$0	$0	$0	$0
TOTAL (Add 1-4)	$22,612	$58,225	$95,952	$135,894	$165,425

[1] Student enrollments are calculated at 100 percent in-state. It is anticipated that all students will enroll on a full-time basis.
[2] Tuition and fees increase by three percent annually.

Table 8. Programmatic Expenditures

Expenditure Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1. Faculty (b + c below)	$0	$15,089	$15,541	$16,008	$16,489
a. Number of FTE	0	0.13	0.13	0.13	0.13
b. Total Salary[1]	$0	$10,701	$11,022	$11,353	$11,694
c. Total Benefits[1]	$0	$4,388	$4,519	$4,655	$4,795
2. Admin. Staff (b + c below)	$0	$0	$0	$0	$0
a. Number of FTE	0	0	0	0	0
b. Total Salary	$0	$0	$0	$0	$0
c. Total Benefits	$0	$0	$0	$0	$0

3. Support Staff (b + c below)	$0	$0	$0	$0	$0
a. Number of FTE	0	0	0	0	0
b. Total Salary	$0	$0	$0	$0	$0
c. Total Benefits	$0	$0	$0	$0	$0
4. Technical Support & Equipment	$0	$0	$0	$0	$0
5. Library	$0	$0	$0	$0	$0
6. New or Renovated Space	$0	$0	$0	$0	$0
7. Other Expenses	$1,000	$1,000	$1,000	$1,000	$1,000
TOTAL (Add 1-7)	$1,000	$16,089	$16,541	$17,008	$17,489

[1] *Salary and fringe benefit rates increase by three percent annually.*

M. Adequacy of Provisions for Evaluation of Program

M1. Procedures for Evaluating Courses, Faculty and Student Learning Outcomes

The proposed program will be built from existing courses. Nevertheless, future course development will follow the regular Towson University procedures for approval, first at the program and PAGS department level, through the FCSM Curriculum Committee, and finally the University Curriculum Committee.

The course approval process evaluates new courses for appropriate rigor, effective assessment and grading, and adherence of the course syllabus to best practices. Evaluation at the program level ensures course content accuracy and program alignment, while the college and university level reviews facilitate the production of quality course proposals.

Existing courses are evaluated through regular review by program faculty and by student evaluations. Faculty regularly review courses to determine if the course meets overall program objectives. Additionally, instructors are observed by peers on a routine basis, with more frequent observations if faculty are new to a course or the university. If a course review indicates concerns or problems with a course, faculty develop strategies for addressing problems. Student course evaluation takes place at the end of every semester. Using a tool developed by TU faculty that allows for quantitative and qualitative feedback, students give feedback on instructors (e.g., ability to communicate clearly; quality of student-instructor interaction; preparedness) and suggest improvements for a course.

Evaluation of faculty follows policies and procedures established by TU's policies for faculty annual merit review and for faculty reappointment, tenure, and promotion. These evaluations occur at the department, college, and university level. The main areas of evaluation include teaching, scholarship, and service. Tools used as part of the annual evaluation process include review of the individual's portfolio that includes, but is not limited to, the following:

- Evidence of scholarship (e.g., articles in scholarly journals; presentations at scholarly meetings).
- Service work.
- A synopsis of teaching related activities (e.g., courses taught; new instructional procedures; interdisciplinary, diversity, international, and technology-related projects).
- Review of course syllabi.
- Peer teaching observation reports.
- Quantitative and qualitative student evaluation of instruction.

Section G.3 outlines the program assessment measures and shows their alignment with specific student learning outcomes. On an annual basis, specific learning outcomes are identified for assessment purposes. The program director, with the support of TU's Office of Assessment, will oversee the processes involved in the assessment of student learning outcomes, including collection and analysis of data, and creation of action plans, as necessary.

M2. Evaluation of Program Educational Effectiveness
The assessment of this program will be guided by TU's Office of Assessment, following established TU policies and procedures, including review of the program's assessment plan to ensure that learning outcomes remain appropriate, and that students are meeting expectations.

The program will work with TU entities such as the Office of the Provost, Enrollment Services and Student Services to review data on a regular basis and improve the program when needed. Effectiveness will be assessed by student retention, progress toward degree completion, career outcomes for graduates, student and faculty satisfaction, cost-effectiveness, and other key performance indicators.

Additionally, TU will conduct a comprehensive evaluation of the program every seven years as part of the USM-mandated Periodic Review of Academic Programs process. The purpose of the review is to promote continuous program improvement and ensure that the needs of students are being met. Each program will prepare a self-study, engage an external reviewer to evaluate the program and identify strengths and areas for improvement, and submit a final report to the USM Board of Regents for review and approval.

N. Consistency with the State's Minority Student Achievement Goals
TU has a strong commitment to diversity, equity, and inclusion. With over 56 percent of the students identifying as a racial or ethnic minority,[6] TU is nearly as diverse as the state of Maryland. It is only one of a few universities in the country to have no achievement gap, meaning that underrepresented student groups achieve the same or better academic success as the entire student population. In 2020, the university introduced its inaugural Diversity Strategic Plan. The plan, "*A More Inclusive TU: Advancing Equity and Diversity (2020–25)*," is firmly grounded in the premise that TU's ongoing success is dependent on the university's capacity to shift perspectives and approaches and strategically place diversity, equity, and inclusion at the core of its mission.

Diverse faculty recruitment is a TU institutional goal and faculty recruitment at the University is designed to reach and attract a diverse pool of candidates. Through diverse faculty recruitment, TU strives to foster a learning community that reflects the population of our campus, region, and state, and supports recruitment and retention of a diverse student population along with academic achievement of students from minority and underrepresented backgrounds.

In physics at TU, as with physics programs elsewhere in the U.S., racial minority groups are underrepresented. In 2019-2020, African Americans comprised 13.6 percent of the U.S. population but earned only three percent of the physics bachelor's degrees. Similarly, Hispanic/Latinx people comprised 19 percent of the U.S. population, but earned 11 percent of physics bachelor's degrees.[7,8] The 2020 report of the American Institute of Physics National Task Force to Elevate African American Representation in Undergraduate Physics and Astronomy

[6] Fall 2023 numbers according to TU Office of Institutional Research: https://www.towson.edu/ir/documents/f_hdct_car_coll_eth.pdf.
[7] U. S. Census Bureau, 2020: https://www.census.gov/quickfacts/fact/table/US/POP010220#POP010220.
[8] American Institute of Physics Statistical Research Center, Engineering and Physical Science Degrees Earned by Members of Underrepresented Groups: https://www.aip.org/statistics/stats-degrees.

advocates the use of multiple curricular options to retain African American physics majors.[9] Since the Computational Physics concentration of TU's proposed IP degree will provide an additional pathway to a physics degree, we anticipate that this program will enhance the overall racial diversity of PAGS students.

O. Relationship to Low Productivity Programs Identified by the Commission
Not applicable.

P. Adequacy of Distance Education Programs
Not applicable. The majority of courses in the program will be delivered on the main TU campus via face-to-face instruction.

[9] American Institute of Physics National Task Force to Elevate African American Representation in Undergraduate Physics and Astronomy, 2020. The Time is Now: Systemic Changes to Increase African Americans with Bachelors Degrees in Physics and Astronomy: https://www.aip.org/sites/default/files/aipcorp/files/teamup-full-report.pdf.

Appendix A. Descriptions of Course Options in Program Outline

INTERDISCIPLINARY PHYSICS CORE COURSE DESCRIPTIONS

PHYS 185 INTRODUCTORY SEMINAR IN PHYSICS (1)

This seminar is intended for freshmen and sophomores who have demonstrated exceptional ability in the sciences and will involve them directly with current ideas and research in physics. Classical physics, quantum physics, relativity, and the new astronomy will be covered.

PHYS 211 GENERAL PHYSICS I NON-CALCULUS-BASED (4)[10]

For Arts and Sciences, Biology and Geosciences majors: mechanics, heat, light, electricity, magnetism, and a brief introduction to modern physics. Three lecture units and one three-unit laboratory period. Prerequisite: MATH 115 or good standing in high school algebra and trigonometry. Core: Biological & Physical Sciences. Lab/Class fee will be assessed.

PHYS 241 GENERAL PHYSICS I CALCULUS-BASED (4)[10]

Calculus-based physics for science and engineering majors. Mechanics and the conservation laws, gravitation, simple harmonic motion. Prerequisite: MATH 273 (may be taken concurrently). Core: Biological & Physical Sciences. Lab/Class fee will be assessed.

PHYS 242 GENERAL PHYSICS II CALCULUS-BASED (4)

Continuation of PHYS 241. Electricity, magnetism, DC and AC currents, geometric optics. Prerequisites: PHYS 241, MATH 274 (may be taken concurrently). Core: Biological & Physical Sciences. Lab/Class fee will be assessed.

PHYS 243 GENERAL PHYSICS III (4)

Special relativity, fluid kinematics and dynamics, waves, thermodynamics. Prerequisite: PHYS 242.

PHYS 305 COMPUTERS IN PHYSICS (4)

Introduction to hardware and software applications of computers in physics, including computer interfacing to experiments, computer aided design, LabView programming, data analysis, simulation, and modeling techniques. Prerequisite: PHYS 241. Lab/Class fee will be assessed.

PHYS 311 MODERN PHYSICS I (3)

A description of special relativity, quantum theory, atomic structure, and spectra. Three lecture hours. Prerequisites: MATH 274, PHYS 242 or PHYS 252; or PHYS 212 with consent of instructor).

PHYS 341 INTERMEDIATE PHYSICS LABORATORY I (3)

Experiments which defined modern physics. Exploration of classical and modern research methods: data acquisition and analysis, optical and nuclear spectroscopy. Six laboratory hours. Prerequisites: PHYS 305; PHYS 311 (may be taken concurrently). Lab/Class fee will be assessed.

PHYS 385 PHYSICS SEMINAR (1)[11]

Students participate in colloquia on topics of current interest in physics research under guidance of instructor. One lecture hour. Prerequisite: at least junior standing.

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[10] Students may take either PHYS 211 or PHYS 241.
[11] Students may take either PHYS 385 or ASTR 385.

ASTR 385 ASTROPHYSICS SEMINAR (1)[11]
Students learn to present technical material orally by attending and discussing presentations given by others and by giving presentations themselves on topics of current interest in astrophysics. Prerequisite: junior/senior standing as a Physics Major or Astronomy Minor.

PHYS 486 PHYSICS SEMINAR II (1)
Students participate in colloquia on topics of current interests in physics research under guidance of instructor. One lecture hour. Prerequisite: senior standing or consent of instructor.

MATH 273 CALCULUS I (4)
Functions, limits, and continuity; differentiation of algebraic and trigonometric functions; mean value theorem; differentials; introduction to integration; applications. Four lecture hours and one laboratory hour per week. Prerequisite: qualifying score on Math Placement exam or MATH 117 or MATH 119. Core: Mathematics.

MATH 274 CALCULUS II (4)
Differentiation and integration of exponential, logarithmic, and inverse trigonometric functions; techniques of integration and applications; indeterminate forms; improper integrals; sequences and series of numbers; power series. Prerequisite: MATH 273. Core: Mathematics.

COMPUTATIONAL PHYSICS CONCENTRATION COURSE DESCRIPTIONS

PHYS 307 INTRODUCTORY MATHEMATICAL PHYSICS (3)
Mathematical expressions for selected topics, such as forces and potentials, vector analysis, applications of Fourier series and complex variables, and solutions of the harmonic oscillator and wave equations. Prerequisites: PHYS 212 or PHYS 242; MATH 274; and consent of department.

PHYS 337 DIGITAL ELECTRONICS (4)
Subjects covered will be basic concepts of digital electronics such as gates, logic modules, truth tables, digital codes, sequential systems, semi-conductor memories, decade counters, etc. The laboratory program is designed to give students first-hand experience on the material covered in lecture using integrated circuits and LED display systems. Two hours lecture, three hours laboratory. Lab/Class fee will be assessed. Prerequisite: PHYS 242.

PHYS 460 COMPUTATIONAL METHODS IN PHYSICS (3)
Introduction to the basic concepts and programming skills of computational physics. Students will develop their own computer programs to solve problems in mechanics, electromagnetism, quantum mechanics, chaos, nonlinear dynamics, and other areas. No previous computer programming experience is required. Prerequisites: MATH 374 and PHYS 307 or consent of the instructor.

COSC 236 INTRODUCTION TO COMPUTER SCIENCE I (4)
Introduction to structured problem-solving, algorithm development and computer programming. Three lecture hours and two laboratory hours. Prerequisites: COSC 175 and at least one of [MATH 117, MATH 119, MATH 211, (MATH 231 or ECON 205), MATH 273, MATH 274, MATH 275, or a qualifying score on the Math Placement Exam].

COSC 237 INTRODUCTION TO COMPUTER SCIENCE II (4)
Development of programming and problem-solving skills, with a focus on object-oriented programming and design. Students will design and develop programs using encapsulation and information hiding, inheritance, polymorphism, and generics. Introduction to data structures and their implementations (lists, stacks, queues, and trees), recursion, and searching and sorting

algorithms. Includes two laboratory hours per week. Prerequisites: COSC 236; MATH 211 or MATH 273.

COSC 290 PRINCIPLES OF COMPUTER ORGANIZATION (4)
Computer organization and architecture including computer arithmetic, digital logic, principles of assembly language, memory system organization, computer interfacing, CISC and RISC architecture. Three hours per week of laboratory work required. Prerequisites: COSC 236 and (MATH 263 or MATH 267).

COSC 336 DATA STRUCTURES AND ALGORITHM ANALYSIS (4)
Fundamental data structures used in programming and the basic techniques used to design and analyze algorithms. Topics include: complexity analysis of elementary algorithms, linear data structures, trees, heaps, graphs, search algorithms (balanced binary trees, B-trees, hashing), sorting algorithms, basic graph algorithms (graph traversal, topological sorting, shortest path, minimum spanning trees), and paradigms in the design of algorithms (divide and conquer, dynamic programming, greedy). Prerequisites: COSC 237 and MATH 274.

MATH 263 DISCRETE MATHEMATICS (3)
Sets, logic, induction, functions, relations, sequences, recursion, combinatorics, graphs and trees, matrices with an emphasis on applications in computer science. Prerequisite: COSC 236.

MATH 275 CALCULUS III (4)
Vectors in two and three dimensions, differential and integral calculus of functions of several variables. Four lecture hours and one laboratory hours per week. Prerequisite: MATH 274.

MATH 374 DIFFERENTIAL EQUATIONS (3)
Theory and application of linear ordinary differential equations: homogeneous and nonhomogeneous linear equations, initial and boundary value problems, exact equations, variation of parameters, Euler equations; solutions of non-linear ordinary differential equations of the first order and second order; power series solutions; system of linear equations. Prerequisite: MATH 274.

Appendix B. Example Program of Study

Courses used for measures of Student Learning Outcomes are shaded in yellow.

Computational Physics Concentration: Four-Year Plan				
Year 1				
Fall			*Spring*	
PHYS 185	1		PHYS 241 (=CORE 7)	4
MATH 273 (=CORE 3)	4		COSC 237	4
COSC 236	4		CORE 4	3
CORE 1	3		CORE 5	3
CORE 2	3			
Total	15		Total	14
Year 2				
Fall			*Spring*	
PHYS 242 (=CORE 8)	4		PHYS 243	4
PHYS 305	4		MATH 275	4
MATH 263	3		MATH 374	3
MATH 274	4		CORE 6	3
Total	15		Total	14
Year 3				
Fall			*Spring*	
PHYS 311	3		PHYS 307	3
PHYS 341	3		PHYS 385	1
COSC 290	4		COSC 336	4
ELECTIVE	3		ELECTIVE	3
CORE 9	3		CORE 10	3
			CORE 11	3
Total	16		Total	17
Year 4				
Fall			*Spring*	
PHYS 337	4		ELECTIVE	3
PHYS 460	3		ELECTIVE	3
PHYS 486	1		ELECTIVE	3
ELECTIVE	3		CORE 13	3
CORE 12	3		CORE 14	3
Total	14		Total	15
Credit Grand Total	**120**			

Appendix C. Faculty Supporting the Computational Physics Concentration in the Interdisciplinary Physics Major

Full-Time PAGS Program Faculty			
Name	**Terminal Degree**	**Field**	**Academic Title**
Bedard, Antoine	Ph.D.	Electrical Engineering	Lecturer
Ghavamian, Parviz	Ph.D.	Astrophysics	Professor
Ha, Phuoc	Ph.D.	Physics	Professor
Jackson, Alan	Ph.D.	Astrophysics	Assistant Professor
Kolagani, Rajeswari	Ph.D.	Physics	Professor
Krause, Thomas	Ph.D.	Physics	Associate Professor
Kudsieh, Nicholas	Ph.D.	Physics	Lecturer
Lising, Laura	Ph.D.	Physics	Lecturer
Overduin, James	Ph.D.	Physics	Professor
Schaefer, David	Ph.D.	Physics	Professor
Scott, Jennifer	Ph.D.	Astrophysics	Professor
Simpson, Jeffrey	Ph.D.	Physics	Professor
Smolyaninova, Vera	Ph.D.	Physics	Professor
Tsai, Tevis	B.S.	Mathematics	Lecturer
Yan, Jia-An	Ph.D.	Physics	Professor

Full-time PAGS faculty who are available to teach specific courses in the IP program's core curriculum and in the Computational Physics concentration are listed below.

There is a sizable pool of full-time and adjunct faculty drawn from other colleges across TU who are available to teach in the Computational Physics concentration—approximate numbers of non-PAGS faculty qualified to teach each non-physics course are listed below. TU will determine which non-PAGS faculty will teach in the program, based on faculty availability, on a semester-by-semester basis.

Interdisciplinary Physics Core

PAGS Faculty	**PHYS**									
	185	211	241	242	243	305	311	341	385	486
Bedard, Antoine		X	X	X						
Ghavamian, Parviz	X	X	X	X	X		X		X	X
Ha, Phuoc	X	X	X	X	X		X		X	X
Jackson, Alan	X	X	X	X	X	X				
Kolagani, Rajeswari	X	X	X	X	X		X	X	X	X
Krause, Thomas	X	X	X	X	X			X	X	X
Kudsieh, Nicholas		X	X	X						X
Lising, Laura		X	X	X						
Overduin, James	X	X	X	X	X		X		X	X
Schaefer, David	X	X	X	X	X	X	X	X	X	X

Scott, Jennifer	X	X	X	X	X		X		X	X
Simpson, Jeffrey	X	X	X	X	X	X	X	X	X	X
Smolyaninova, Vera	X	X	X	X	X		X	X	X	X
Tsai, Tevis		X	X	X						
Yan, Jia-An	X	X	X	X	X	X	X		X	X

Non-PAGS faculty		
Requirement	**TU Department**	**Number of faculty**
MATH 273	Mathematics	10
MATH 274	Mathematics	10

<u>Computational Physics Concentration</u>

PAGS Faculty	**PHYS**		
	307	337	460
Ghavamian, Parviz	X		
Ha, Phuoc	X	X	X
Krause, Thomas	X		
Overduin, James	X		
Schaefer, David		X	X
Simpson, Jeffrey	X	X	X
Yan, Jia-An	X		X

Non-PAGS faculty		
Requirement	**TU Department**	**Number of faculty**
COSC 236	Computer and Information Sciences	8
COSC 237	Computer and Information Sciences	3
COSC 290	Computer and Information Sciences	3
COSC 336	Computer and Information Sciences	2
MATH 263	Mathematics	6
MATH 265	Mathematics	3
MATH 374	Mathematics	4

Proposal for a Bachelor of Science in Interdisciplinary Physics with an Area of Concentration in Physics Innovation and Entrepreneurship at Towson University

Table of Contents

A. Centrality to Institutional Mission Statement and Planning Priorities

A1. Program Description and Alignment with Institutional Mission

Towson University (TU) proposes a new major in the Department of Physics, Astronomy, and Geosciences (PAGS): a Bachelor of Science (B.S.) in Interdisciplinary Physics (IP) with an area of concentration in Physics Innovation and Entrepreneurship (PIE). This IP major will provide students with a strong foundation in fundamental physics along with the freedom to develop a coherent academic program of study across other disciplines. The concentrations are centered on areas that will prepare students to contribute to scientific advancement and economic development in our region and nation.

Several Maryland institutions (See Table 2 in Section C.4), including TU, offer a traditional physics major as a standard subject in the core sciences. Some institutions offer programs that take an interdisciplinary approach to science more generally, e.g., Morgan State University's B.S. in Interdisciplinary Sciences and B.S. in Interdisciplinary Engineering, Information, and Computational Sciences and Salisbury University's B.S. in Integrated Science, but there are no interdisciplinary science programs that are specifically physics focused. No Maryland institution currently offers a program comparable to the proposed IP major.

This new concentration within the IP major is distinct from TU's current B.S. in Physics, as it requires 11 fewer credits in upper-level physics courses, affording students freedom to take courses in other disciplines. The General Physics, Applied Physics, and Astrophysics concentrations within TU's existing B.S. in Physics are heavily physics-focused, requiring over 30 credits of 300- or 400- level physics or astrophysics courses that emphasize theoretical concepts and mathematical rigor. In particular, the Applied Physics concentration is designed for students interested in engineering and physics subdisciplines such as materials science. Because of the number of upper-level physics requirements, TU's existing B.S. in Physics is not a suitable pathway for students who are interested in the applications of physics to other disciplines. The PIE concentration, which blends core physics with communications, business, and marketing, will be a unique concentration within Maryland.

The PIE concentration curriculum consists of 33 credits in a core set of physics and mathematics courses and 66 credits in marketing, economics, and communications. Thus, the concentration will draw on TU faculty expertise from across the Fisher College of Science and Mathematics (FCSM), as well as from the College of Business and Economics and the College of Liberal Arts. The proposed concentration is well-aligned with Towson University's mission of preparing students as leaders in high demand careers through interdisciplinary study and research. The PIE concentration will drive community engagement through entrepreneurial efforts.

A2. Strategic Goals Alignment and Affirmation of Institutional Priority

The proposed program in Interdisciplinary Physics aligns with Towson University's 2020-2030 Strategic Plan. Specifically, the program will:

- Educate with an "innovative student-centered curriculum emphasizing engaged learning, in-demand academic programs, and new approaches to instruction and learning."
- Innovate through research experiences with TU faculty, who are "leaders in scholarship and creative activities" or through creative approaches to technical entrepreneurship.
- Engage by "extending the talents of our students, faculty and staff beyond our campus boundaries" with entrepreneurship and experiential learning.

- Support students' intellectual growth with a "campus experience that reflects the educational values of Towson University and produces graduates prepared for careers or advanced education."

A3. Five-year Funding Plan
The proposed new bachelor's degree program will be funded with reallocated support from across the university, as this program is built on existing undergraduate courses and faculty expertise. One new faculty will be hired as part of the existing hiring plan for the PAGS department to support and enhance the program. TU's central administration has committed funds to assist program implementation. Resources and expenditures anticipated for the first five years are presented in Section L**, Tables 7** and **8**.

A4. Institutional Commitment
The proposed bachelor's degree program is aligned with the university's new research- and innovation-oriented mission and strategic plan.

The new PIE concentration in the proposed IP major will require minimal financial commitment and no new funding allocations for administration or infrastructure (see Section L for further details). There are currently over 80 faculty from across three TU colleges who will contribute to this program as part of their existing instructional load (see Section I.1 and Appendix C for a detailed listing). See Section K for more details about physical facilities and infrastructure available to support the program.

TU's Office of Technology Services will provide support for general computing needs. More specialized technical support will come directly from the relevant colleges involved in the program, which have dedicated staff for computer technology needs, classroom support, and website development. This concentration will benefit from the laboratory and analytical facilities of TU's Science Complex and access to several software packages and utilities available to students through university, FCSM, or PAGS licenses: Capstone, DataStudio, Tracker, LabVIEW, MultiSim, Mathematica, Origin, SigmaPlot, MatLab, OSLO EDU, and Acrobat Creative Cloud.

TU is committed to student success. All students in the IP program will receive academic advising from PAGS faculty who will assist them in designing degree completion plans, completing the degree requirements, choosing elective courses, and finding and applying for internship opportunities. The IP major requirements are designed to be completed in the four-year duration of an undergraduate degree. Required courses and a typical four-year plan of study for the PIE concentration are outlined in Appendix A and Appendix B.

B. Critical and Compelling Regional or Statewide Need as Identified in the State Plan
B1. Program Demand and Need
Physics is a foundational science. Increasingly, the most interesting problems and exciting opportunities are at the intersections of physics and other fields. Many of these interdisciplinary fields are at the forefront of scientific advancement. Students who choose the PIE concentration will be prepared to enhance economic development in Maryland through technical sales, technical product development and marketing, and small business startups.

B2. Alignment with Maryland State Plan for Higher Education
The proposed B.S. in Interdisciplinary Physics aligns with the Student Success and Innovation goals in the 2022 Maryland State Plan for Higher Education. TU faculty are committed to high quality instruction (Priority 5). The proposed program will provide students with knowledge and

training through integrated curricula that emphasize synthesis of ideas and provide opportunities to earn credit through real world experiences in research, internships, and business activities.

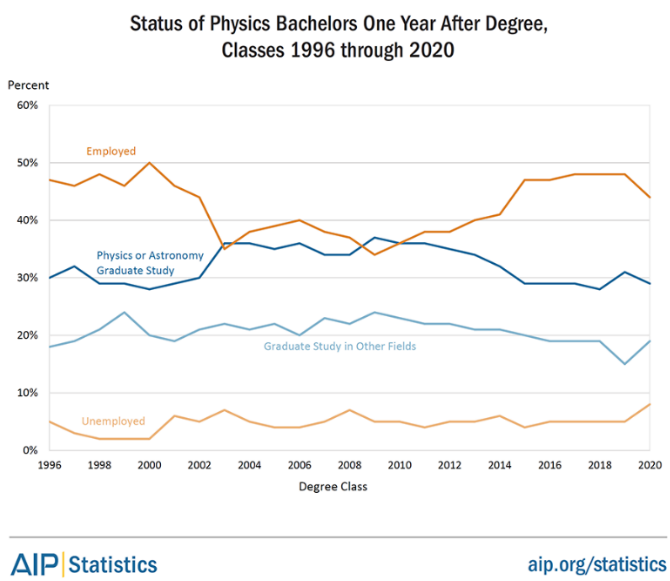
The IP degree is designed for students who wish to study physics as it is applied to other fields, in a less theoretical context than the existing B.S. in Physics offered at TU. The proposed Interdisciplinary Physics curriculum gives students flexibility to fulfill requirements and develop a course of study that allows them to explore interests within a well-defined structure. The degree will also provide students who matriculate at TU as physics or other science majors an alternative pathway for completing a bachelor's degree in a timely manner and, through articulation agreements with Maryland's community colleges, will facilitate enrollment and graduation of transfer students (Priority 6).

The nature of the IP degree will foster a culture of risk–taking (Priority 8) by encouraging students to take intellectual risks in exploring new and emerging fields. The PIE concentration will be especially appealing to students who wish to gain a background in foundational science while also engaging in creative problem solving, product development, and business planning.

C. Quantifiable and Reliable Evidence and Documentation of Market Supply and Demand in the Region and State

C1. Pipeline and Employment Opportunities

Students with physics backgrounds are problem-solvers, and those with interdisciplinary backgrounds, including business knowledge and soft skills, are well situated for the job market.[12,13] Overall, physics bachelor's degree holders enter the workforce and postgraduate study at about the same rate and have low rates of unemployment one year after graduation (**Figure 1**).[14] About 60 percent of the graduates entering the workforce are in the private sector, and among these graduates in the private sector, over 90 percent are in STEM-related positions or positions in which they regularly solve technical problems (**Figure 2**).



[12] Educating Physicists for Impactful Careers APS Epic Report: https://epic.aps.org/.
[13] Phys-21 Preparing Students for 21st Century Careers. Joint Task Force on Undergraduate Physics Programs: https://www.compadre.org/JTUPP/docs/J-Tupp_Report.pdf.
[14] AIP Report, Initial Employment of Physics Bachelors and PhDs, Classes 2019 and 2020: https://www.aip.org/statistics/resources/initial-employment-physics-bachelors-and-phds-classes-2019-and-2020.

Figure 1. Physics Bachelors One Year After Degree

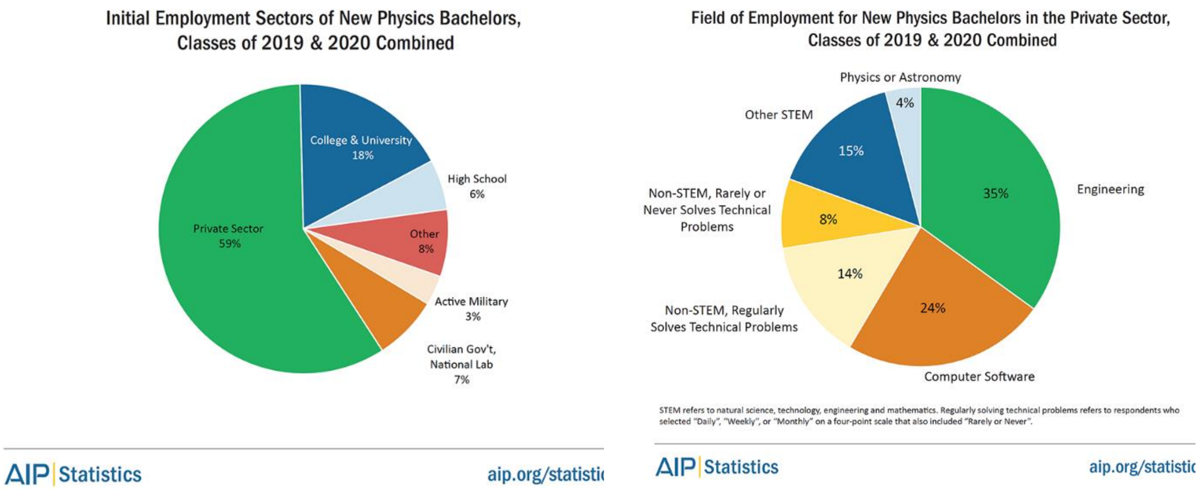


Figure 2. (a) Initial Employment Sectors of Physics Bachelors. (b) Fields of Employment for New Physics Bachelors in the Private Sector.

The American Physical Society has recently emphasized the opportunities at the intersection of physics and entrepreneurship.[1,15,16] The PIE concentration in the proposed IP major will prepare students for careers in the commercial sector, in which many of the highest paying positions are sales and marketing positions that require a combination of technical knowledge and soft skills in business and communications. These types of positions are projected to show increased demand according to the Maryland Department of Labor (**Table 1**).

C2. Market Demand

A market study commissioned by TU and conducted by EAB reports that according to the U. S. Bureau of Labor Statistics, in the past year, national and regional employers advertised a moderate total number of job postings for bachelor's-level interdisciplinary physics professionals (178,499 and 30,917 respectively). **Figures 3** and **4** show total monthly postings over the past three years. Average monthly employer demand for relevant professionals outpaced demand for all bachelor's-level professionals in both markets (1.97 percent vs. 1.79 percent nationally; and 1.80 percent vs. 1.45 percent regionally). Additionally, three of the top five most relevant occupations both regionally and nationwide are projected to grow faster than average. Together with Maryland Department of Labor projections reported in the following section, these trends indicate ample employment opportunities for graduates of an interdisciplinary physics program.

[15] Teaching physics for tomorrow: Equipping students to change the world (2019) Physics Today, 72, 10: https://physicstoday.scitation.org/doi/10.1063/PT.3.4318.

[16] Physics in the real world Careers2020, APS Careers & Physics World: https://reader.exacteditions.com/issues/84341/spread/16.

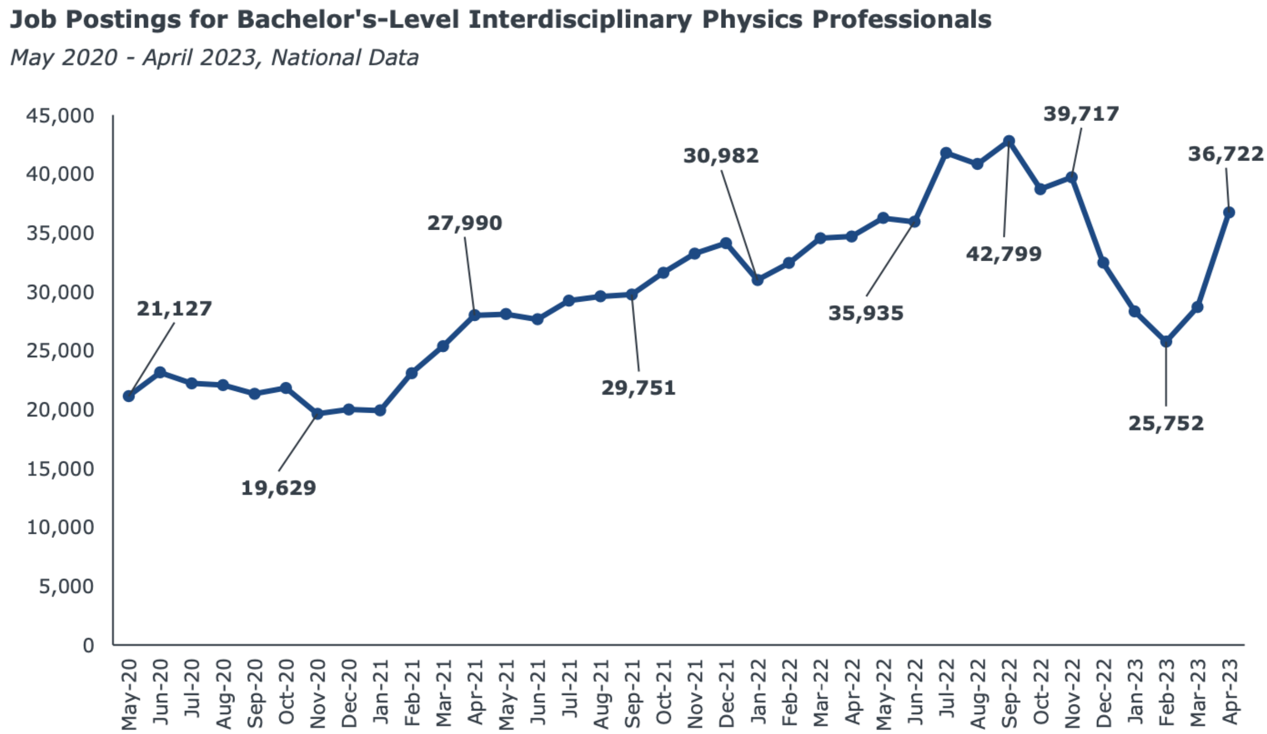


Figure 3. National Job Postings for Bachelor's Level Interdisciplinary Physics Professionals – EAB Report

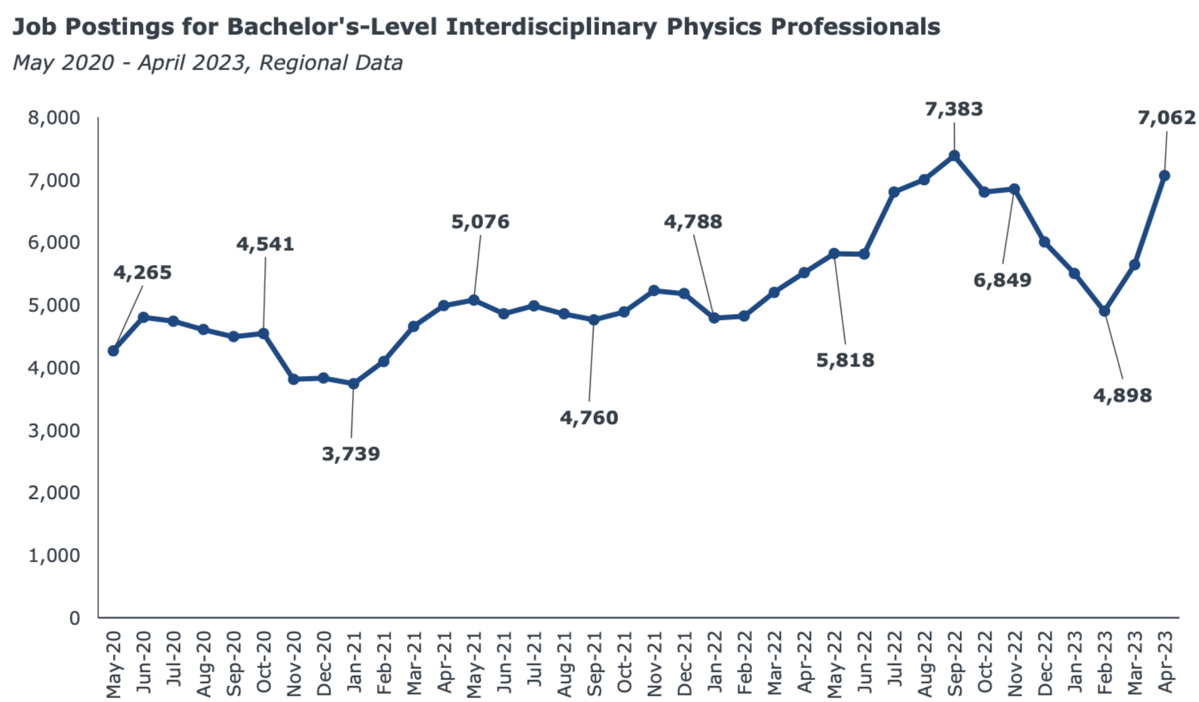


Figure 4. Regional Job Postings for Bachelor's Level Interdisciplinary Physics Professionals – EAB Report

Note that the decline in job postings between September 2022 and February 2023 aligns with overall market trends during the same period. Both the regional and national market trends indicate a growing labor market for program graduates.

C3. Anticipated Vacancies and Training Needs

According to the Maryland Department of Labor, the occupational projections growth in job titles most closely related to the PIE Concentration (**Table 1**) is between 6.2 percent and 9.5 percent for the period 2020-2030.

Table 1. Maryland Department of Labor Occupational Projections (2020-2030)

Title	Projected Change	Projected Annual Openings	Education Value
Sales Engineers	9.5%	1,032	Bachelor's
Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	6.2%	7,401	Bachelor's

According to the EAB market study, commissioned to examine interdisciplinary physics overall, the projected growth during the period 2022-2033 in occupations for IP professionals such as Data Scientists, Software Developers, Electrical, Mechanical, and Industrial Engineers and Operations Research Analysts is 7.0 percent regionally and 8.8 percent nationally. Top skills in regional and national job postings encompass physics and additional disciplines included in the concentrations to be offered in the PIE concentration of the proposed program: computer programming, electronics, mathematics, product development, etc. (**Figures 5** and **6**).

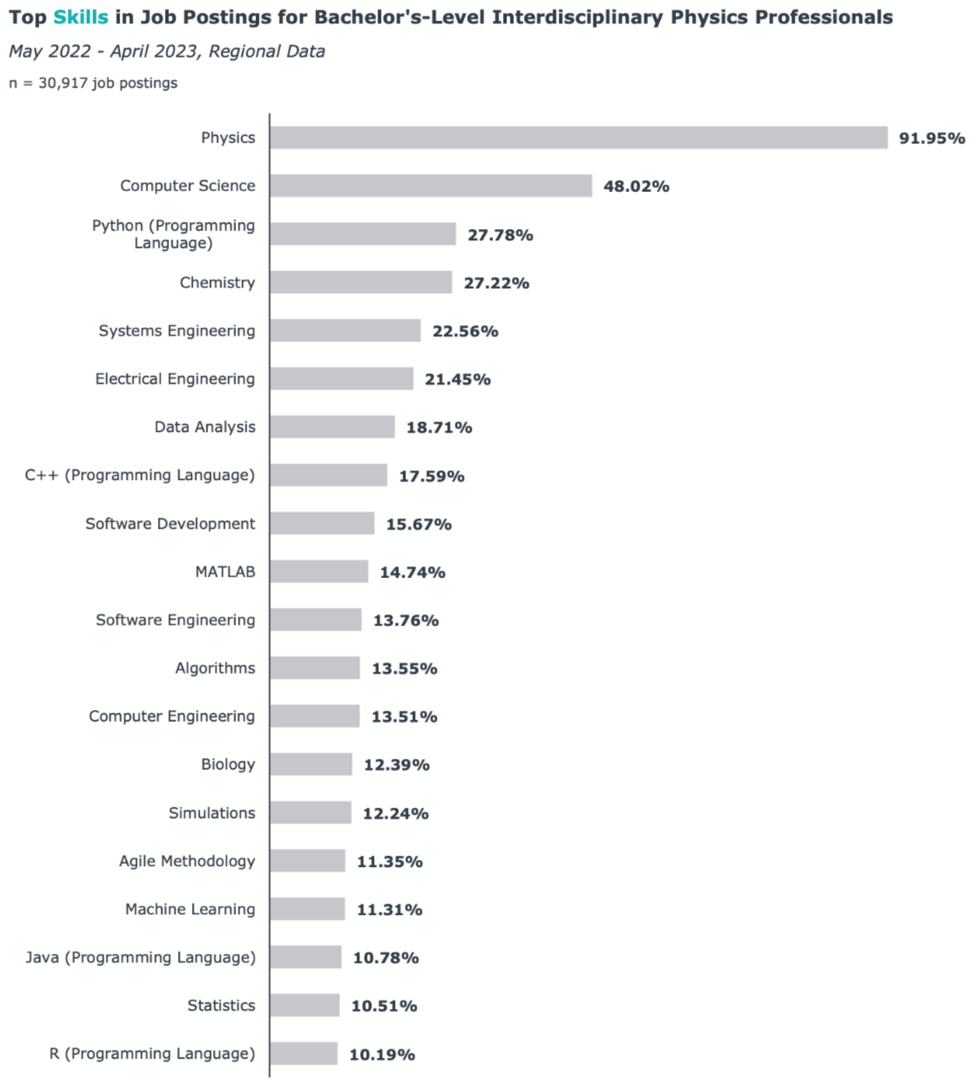


Figure 5. Top Skills in Regional Job Postings for Bachelor's Level Interdisciplinary Physics Professionals – EAB Report

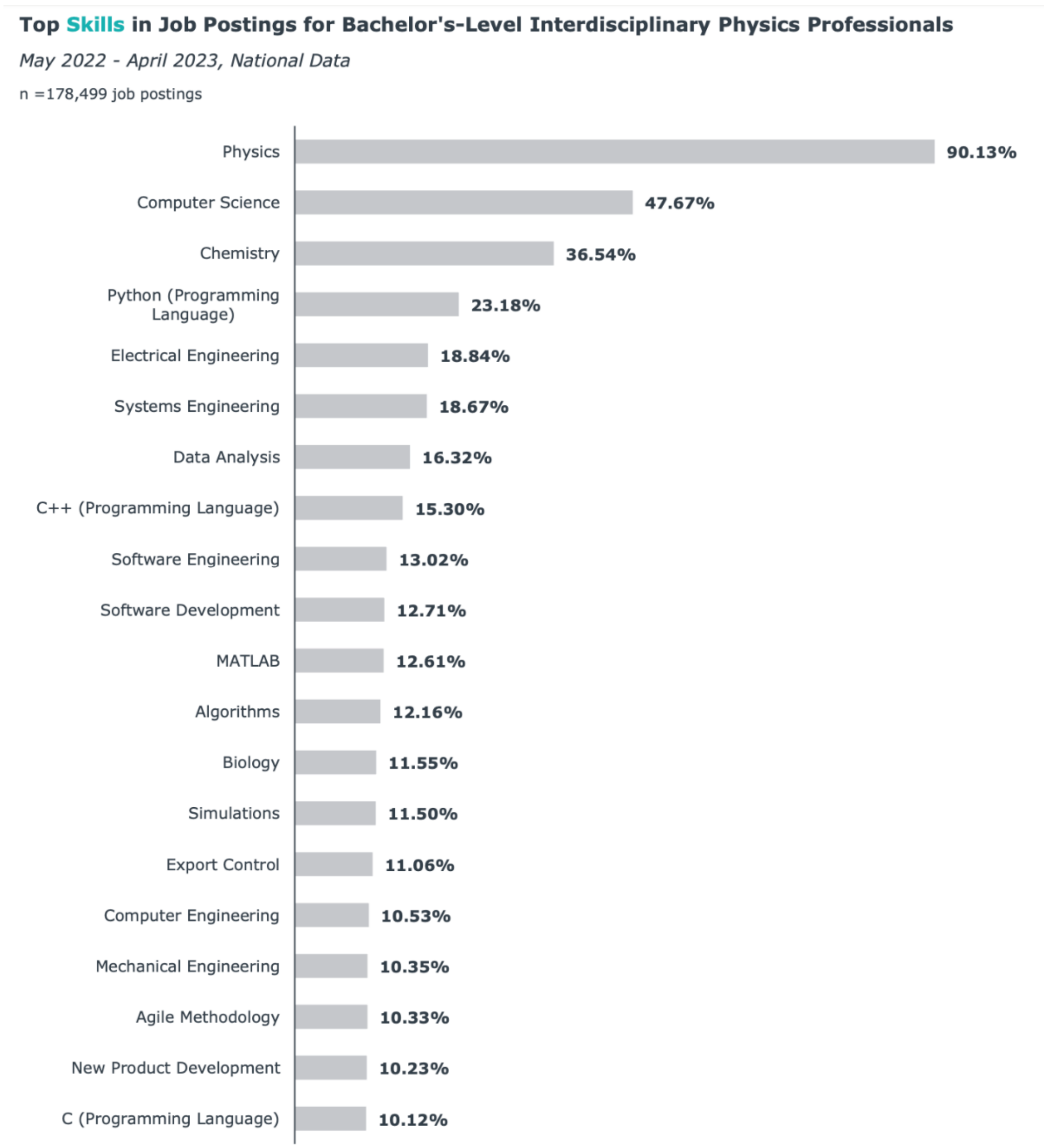


Figure 6. Top Skills in National Job Postings for Bachelor's Level Interdisciplinary Physics Professionals – EAB Report

C4. Projected Supply of Prospective Graduates

TU's proposed program will complement existing physics-related programs, most of which follow the traditional physics curriculum and are similar to TU's existing physics major. The IP program will attract students from a variety of STEM backgrounds who want to pursue opportunities at the intersection of physics and other fields.

The number of students enrolled in these programs and the number of degree completions for the period 2018-2022 as reported by MHEC is summarized in **Table 2**.[17] The number of physics and physics-related degrees awarded statewide has remained relatively stable over the past five years, with fluctuations of about 10 percent. Because of its interdisciplinary nature, the IP program

[17] Maryland Higher Education Commission, Trends in Degrees and Certificates by Program, Maryland Higher Education Institutions 2014-2021, March 2022 https://mhec.maryland.gov/publications/Documents/Research/AnnualReports/2021DegreesByProgram.pdf.

is expected to attract students who would have majored in other STEM fields. **Table 2 also** includes the number of potential students who may be drawn to the program from two-year institutions, including those who complete associate's degrees in computer science.

Table 2. Enrollment Trends in Physics and Interdisciplinary Physics Related Programs at Two- and Four-Year institutions[18]						
Comparable Programs in Maryland						
Program	**Institution**	**Enrollment**				
		2018	**2019**	**2020**	**2021**	**2022**
Physics	Frostburg State University	10	7	8	4	7
Engineering Science	Goucher College	0	0	0	5	7
Physics	Johns Hopkins University	54	40	40	41	48
Materials Science & Engineering	Johns Hopkins University	17	20	9	13	26
Physics	Loyola University	9	4	7	6	9
Physics (Engineering)	Loyola University	2	1	3	5	4
Physics	McDaniel College	7	4	8	11	8
Physics	Morgan State University	10	12	13	7	11
Engineering Physics	Morgan State University	28	27	23	23	19
Interdisciplinary Engineering, Information, & Computational Sciences	Morgan State University	N/A	N/A	N/A	N/A	5
Interdisciplinary Sciences	Morgan State University	N/A	N/A	N/A	N/A	3
Physics	Notre Dame of Maryland University	11	8	8	4	3
Physics	Salisbury University	84	80	60	44	56
Integrated Science	Salisbury University	N/A	N/A	N/A	3	11
Physics	St. Mary's College of Maryland	29	21	22	25	31
Physics	University of Maryland, Baltimore County	128	133	114	102	88
Physics	University of Maryland, College Park	324	301	321	288	269
Physical Sciences	University of Maryland, College Park	0	1	0	0	0
Materials Science & Engineering	University of Maryland, College Park	130	121	110	79	56
Physics	Washington College	29	28	16	13	8

[18] N/A indicates program was not yet operational for the year listed.

		Bachelor’s Degree Completions				
		2018	**2019**	**2020**	**2021**	**2022**
Physics	Frostburg State University	2	4	2	2	1
Engineering Science	Goucher College	0	0	0	0	0
Physics	Johns Hopkins University	22	21	14	15	10
Materials Science & Engineering	Johns Hopkins University	17	20	9	13	26
Physics	Loyola University	2	1	3	2	1
Physics	McDaniel College	7	4	1	1	3
Physics	Morgan State University	0	1	4	1	0
Engineering Physics	Morgan State University	1	2	2	0	2
Interdisciplinary Engineering, Information, & Computational Sciences	Morgan State University	N/A	N/A	N/A	N/A	N/A
Interdisciplinary Sciences	Morgan State University	N/A	N/A	N/A	N/A	N/A
Physics	Notre Dame of Maryland University	1	2	4	1	1
Physics	Salisbury University	30	12	20	14	9
Integrated Science	Salisbury University	N/A	N/A	N/A	1	1
Physics	St. Mary’s College of Maryland	4	10	8	5	6
Physics	University of Maryland, Baltimore County	20	12	24	16	21
Physics	University of Maryland, College Park	62	73	71	76	66
Physical Sciences	University of Maryland, College Park	3	0	0	1	0
Materials Science & Engineering	University of Maryland, College Park	38	22	36	34	33
Physics	Washington College	4	8	11	7	8

Internal TU Student Migration						
TU Program (transfer from)		**Enrollment**				
		2018	**2019**	**2020**	**2021**	**2022**
Physics	Towson University	106	99	93	68	57
		Bachelor’s Degree Completions				
		2018	**2019**	**2020**	**2021**	**2022**
Physics	Towson University	14	19	24	12	13

External Feeder or Transfer Programs						
Program	**Institution**	**Enrollment**				
Arts & Sciences Transfer	Baltimore City Community College	350	239	198	187	120
Mathematics & Science	College of Southern Maryland	179	144	150	153	125
Science	Community College of Baltimore County	575	555	484	428	382
Physical Science	Carroll Community College	2	12	8	9	18
Physics	Cecil Community College	1	4	3	2	3
Engineering Science	Hagerstown Community College	42	37	40	44	44
Arts & Sciences Transfer	Harford Community College	855	796	721	705	671
Computer Science	Harford Community College	129	110	94	94	111
Arts & Sciences Transfer	Howard Community College	1,334	1,411	1,391	1,258	1,151
Computer Science	Howard Community College	147	176	257	277	342
Science	Montgomery College	1,283	1,078	1,053	820	838
Engineering Science	Montgomery College	1,110	895	801	713	660
		Associate Degree Completions				
		2018	**2019**	**2020**	**2021**	**2022**
Arts & Sciences Transfer	Baltimore City Community College	47	25	20	13	31
Mathematics & Science	College of Southern Maryland	6	6	3	7	5
Science	Community College of Baltimore County	55	65	48	40	40
Physical Science	Carroll Community College	0	1	3	2	2
Physics	Cecil Community College	2	4	4	1	1
Engineering Science	Hagerstown Community College	9	11	5	5	6
Arts & Sciences Transfer	Harford Community College	217	195	167	167	169
Computer Science	Harford Community College	18	9	19	15	12
Arts & Sciences Transfer	Howard Community College	238	225	221	203	188
Computer Science	Howard Community College	26	15	28	39	21
Science	Montgomery College	148	193	170	164	178
Engineering Science	Montgomery College	108	122	106	115	92

D. Reasonableness of Program Duplication

D1. Similar Programs

As detailed in **Table 2**, there are a number of institutions of higher education in Maryland that offer undergraduate degrees in physics and related fields. Most of these programs are "traditional" physics degrees, similar to TU's existing B.S. in Physics, or they have a specialized area of focus (such as engineering or materials science) that is wholly distinct from TU's IP degree. While TU believes that the combination of a strong physics foundation and three specialized areas of focus, with critical bridge courses that provide connections, makes this proposed program unique, a summary of existing programs at other Maryland institutions that are the most like the PIE concentration is provided:

Physics Innovation and Entrepreneurship
none

Interdisciplinary Programs
Morgan State University: Interdisciplinary Engineering, Information, and Computational Sciences
Morgan State University: Interdisciplinary Sciences
Salisbury University: Integrated Science

Morgan State University (MSU) programs were approved in 2021 and are two of eight interdisciplinary bachelor's degrees offered within its College of Interdisciplinary and Continuing Studies. These two programs have a much broader interdisciplinary scope than TU's proposed IP program, allowing students to take coursework in a wide range of subject areas (depending on the program) that are not available to TU students, such as psychology, sociology and anthropology, various engineering fields, transportation and urban infrastructure, education, public health, nursing, etc.

The Salisbury University Integrated Science degree is also a general interdisciplinary program that allows students to combine areas of study across disciplines. There are no options for Salisbury's Integrated Science program that correspond directly to the PIE concentration in TU's proposed IP program.

D2. Program Justification
Approximately 9,000 physics bachelor's degrees are awarded each year in the U.S. About one half of those degree recipients will enter the workforce in a STEM-related field. Students expect their degrees to confer skills that will help them succeed in the modern economy, which is increasingly technical and interdisciplinary. Thus, it will be highly beneficial for students to obtain a degree with a strong physics foundation and with concentrations that span a variety of other scientific, technical, and business-related fields. The EAB market study found that "...projected growth in employer demand and rising student demand suggests a favorable outlook for the proposed bachelor's-level interdisciplinary physics program." The data presented in sections C.2 and C.3 show the market demand and anticipated vacancies for students possessing skills conferred by the PIE concentration within the proposed IP degree program.

E. Relevance to High-demand Programs at Historically Black Institutions (HBIs)
While Morgan State University does offer undergraduate degree programs (in Physics, Engineering Physics, Interdisciplinary Engineering, Information, and Computational Sciences, and Interdisciplinary Sciences) that have some curricular overlap with the PIE concentration within TU's proposed IP degree, section D.1 highlights how TU's proposed IP program differs substantively from MSU's programs. The other three HBIs in the University System of Maryland (USM), Bowie State University, Coppin State University, and University of Maryland Eastern Shore, do not offer physics-related programs.

Interested and qualified students who graduate from TU with a bachelor's degree in Interdisciplinary Physics may pursue programs such as the master's in Integrated Sciences at Morgan State University, so this new bachelor's program may provide a pathway for Towson University undergraduate degree holders to pursue graduate education at a nearby HBI.

F. Relevance to the Identity of Historically Black Institutions (HBIs)

Given the specialized subject areas of the proposed degree, TU does not anticipate that its implementation will impact the uniqueness and institutional identities and missions of HBIs.

G. Adequacy of Curriculum Design, Program Modality, and Related Learning Outcomes

G1 Program Development and Faculty Oversight

The curriculum for the PIE concentration was developed primarily by faculty with expertise in physics and astronomy within the Department of Physics, Astronomy, and Geosciences, in consultation with TU faculty and staff from the variety of disciplines represented in the concentration. Faculty members who will oversee the program are identified in Section I.1; they are tenured and tenure-track faculty with diverse research and pedagogical expertise in physics and all the related disciplines in the IP program concentrations.

G2. Educational Objectives and Learning Outcomes

The IP program has three overarching student learning outcomes (SLOs). Upon successful completion of the degree, students in all IP concentrations will be able to:

4. Demonstrate an understanding of fundamental principles of physics and major concepts in a student's chosen concentration and be able to apply these principles to solve quantitative problems.
5. Communicate scientific information effectively in both oral and written formats.

Additionally, students in the PIE concentration will achieve a third learning outcome:

6. Demonstrate an understanding of the interdisciplinary nature of scientific research and technology as they apply to the fields of business, entrepreneurship, and physics.

These SLOs address the Middle States Commission on Higher Education requirement in the following ways:

SLO 1: Scientific and quantitative reasoning, critical analysis and reasoning, technical competency, and information literacy.

SLO 2: Oral and written communication, information literacy.

SLO 3: Scientific and quantitative reasoning, critical analysis and reasoning, technical competency, and information literacy.

Table 3 shows the alignment of the core requirements of the IP curriculum with the program and concentration-specific SLOs. Yellow shading indicates courses used for SLO measures. Additional courses in each concentration are also used for SLO measures, which are summarized in the following section. All courses used for SLO measures are also shaded in section G.4 Program Requirements and in the Example Program of Study included in Appendix B.

Table 3. Curricular Alignment with Student Learning Outcomes

Physics Core Requirements	SLO 1	SLO 2	SLO 3
PHYS 185 Introductory Seminar in Physics	x	x	
PHYS 241 General Physics I Calculus-based or PHYS 211 General Physics I non Calculus-based	x	x	x
PHYS 242 General Physics II Calculus-based	x	x	x

PHYS 243 General Physics III	x	x	x
PHYS 305 Computers in Physics	x	x	x
PHYS 311 Modern Physics I	x	x	
PHYS 341 Intermediate Physics Laboratory	x	x	x
PHYS 385 Physics Seminar or ASTR 385 Astrophysics Seminar	x	x	x
PHYS 486 Physics Seminar II	x	x	
MATH 273 Calculus I	x		
MATH 274 Calculus II	x		

Descriptions of all required and concentration courses are included in Appendix A.

G3. Assessment and Documentation of Student Learning Outcomes

Each core SLO has two measures. Performance data are collected each time the courses are taught. Descriptions of the measures are summarized in **Table 4**.

Table 4. Brief Descriptions of Measures		
	Measure 1	**Measure 2**
Outcome 1	The Force Concept Inventory will be administered to all PHYS 241 or PHYS 211 students as a pre/post exam. This exam, developed using physics education research, is a standard test used across the country and allows comparison of TU student results with other institutions.	The Concepts Survey in Electricity and Magnetism (CSEM) exam will be administered to all PHYS 242 students as a pre/post exam. This exam, developed using physics education research, is a standard test used across the country and allows comparison of TU student results with other institutions.
Outcome 2	Students are required to submit written reports for the experiments performed in PHYS 341. One report will be chosen to assess the ability of students to communicate in written form. The "Introduction" and "Conclusion" sections will be evaluated to assess this outcome.	Students will be assessed on oral presentations given in PHYS 385 or ASTR 385.
Outcome 3	A common assignment will be used in PHYS 305 which demonstrates the ability of students to use technology to solve a theoretical physics problem. Students in the PIE concentration will be expected to investigate applications or develop a marketing plan for their team's technological solution.	In PHYS 385 or ASTR 385, students in the PIE concentration will be required to give a presentation on a topic related to their concentration.

G4. Program Requirements

The curricula of the concentrations within the Interdisciplinary Physics major provide students with a strong foundation in physics along with the freedom to develop an academic program across other fields of study. The IP major has a set of core physics requirements for all concentrations. Each concentration has its own set of requirements, in physics and in a wide variety of other disciplines, crafted as a coherent pathway for development of knowledge and skills sought by today's employers. Because the concentrations within the IP major are tailored to specific projected advanced degree and career pathways, students must choose a concentration.

The PIE concentration combines physics with courses that build knowledge in business and soft skills in writing and communication. The coursework requirements will earn students a Minor either in Entrepreneurship or Marketing in addition to the B.S. in Interdisciplinary Physics. All IP core courses and PIE concentration requirements are listed in the tables below. Yellow shading indicates courses used for SLO measures described in the previous section. Descriptions of all core and concentration courses are included in Appendix A.

Table 5. Required Courses for B.S. in Interdisciplinary Physics - Required Physics Courses		
Course number	**Title**	**Credits**
PHYS 185	Introductory Seminar in Physics	1
PHYS 241 or PHYS 211*	General Physics I (Calculus or non-Calculus-based)	4
PHYS 242	General Physics II Calculus-based	4
PHYS 243	General Physics III	4
PHYS 305	Computers in Physics	4
PHYS 311	Modern Physics I	3
PHYS 341	Intermediate Physics Laboratory I	3
PHYS 385 or ASTR 385	Physics or Astrophysics Seminar	1
PHYS 486	Physics Seminar II	1
Subtotal		**25**
- Required non-Physics Courses		
Course number	**Title**	**Credits**
MATH 273	Calculus I	4
MATH 274	Calculus II	4
Subtotal		**8**
TOTAL		**33**

**A grade of B or better in PHYS 211 is required to substitute for PHYS 241.*

Table 6. Physics Innovation and Entrepreneurship Concentration Coursework - Required Physics Courses		
Course number	**Title**	**Credits**
PHYS 312	Modern Physics II	3
PHYS 335 or PHYS 337 or PHYS 361	Choice of Basic or Digital Electronics or Optics	4
Upper-level electives in PHYS		9
Subtotal		**16**
- Required non-Physics Courses*		
Course number	**Title**	**Credits**
COMM 131*	Public Speaking	3
ECON 201*	Microeconomic Principles	3
LEGL 225*	Legal Environment of Business	3
BUSX 301 or ENGL 317*	Business Communications or Writing for Business and Industry	3
MKTG 341	Principles of Marketing	3
MKTG 451	Personal Selling	3
Electives (Minor)	From one of two groups (in orange and green)	12

*Entrepreneurship Electives***		
ENTR 110	Creativity and Idea Development	3
ENTR 215	Start-up Basics for non-Business majors	3
ENTR 355	Entrepreneurship Foundations and Pathways	3
ENTR 410	Business Plan Competition	3
*Marketing Electives****		
MKTG 350	Entrepreneurial Marketing	3
MKTG 425	Consumer Behavior Analysis	3
MKTG 445	Global Marketing	3
MKTG Elective	From among list required for Marketing Minor	3
General Electives		20
Subtotal		**50**
TOTAL Concentration		**66**
TOTAL w/IP Core		**99**
TOTAL for B.S. Degree		**120**

**COMM 131 satisfies CORE 5, ECON 201 satisfies CORE 6, ENGL 317 or BUSX 301 satisfy CORE 9, and LEGL 225 satisfies CORE 11 requirements in the TU Core Curriculum.*

***Courses shaded in orange are required for the Entrepreneurship Minor. The Entrepreneurship Minor also requires two electives, which will be physics courses from the IP Core.*

****Courses shaded in green, in addition to the required non-physics courses ECON 201, COMM 131, MKTG 341, and MKTG 451, will satisfy the requirements for the Marketing Minor.*

The total number of credits for this concentration makes it feasible for students to obtain <u>both</u> an Entrepreneurship Minor and a Marketing Minor.

G5. General Education Requirements

TU's Core Curriculum, comprising fourteen categories within four themes (43-46 credits in total), satisfies the general education requirements mandated by the State of Maryland (COMAR 13B.06.01.03) and educational effectiveness standards held by the university's accrediting body, the Middle States Commission on Higher Education.

The IP Core will allow students to satisfy TU's Core Curriculum requirements in Mathematics (Core 3) and Biological & Physical Sciences (Core 7 and 8), while also completing the IP major requirements. The requirements for the PIE concentration also allow students to satisfy TU Core Curriculum requirements in the Arts & Humanities (Core 5), Social & Behavioral Sciences (Core 6), Advanced Writing (Core 9), and the United States as a Nation (Core 11).

All other TU Core Curriculum requirements will be fulfilled through additional credits as described in the tables above and in Appendix B. All concentrations in the proposed major allow students to fulfil major and TU Core Curriculum requirements in 120 total credits.

G6. Specialized Accreditation and Certification

Not applicable.

G7. Outside Contracts

Not applicable.

G8. Program Information Assurances
All TU undergraduate students are required to meet with an academic advisor each semester. In the first meeting with an advisee, the academic advisor develops a Four-Year Degree Completion Plan for the student, according to the academic requirements for the major and the schedule of course offerings. During subsequent advising meetings, the advisor reviews the student's progress towards their degree and helps the student plan courses for the next semester. The advisor may help the student modify the degree completion plan, if necessary. Advisors and students will also discuss the student's plans for employment or postgraduate education. Academic advisors often provide information about internships and other opportunities to help students achieve those goals.

Academic advising for students in the PIE concentration will be particularly important for helping students choose a set of elective courses within the concentration that forms a coherent curriculum aligned with the student's interests. Faculty advisors will be assigned so that they are knowledgeable about their advisee's subfield within the IP program.

Students in the IP program will be expected to develop technical competencies throughout the duration of the program, but there are no specific requirements to enter the program other than admission to TU. IP students will have access to the same academic support that all TU students have, such as tutoring, coaching, and workshops available through the TU Tutoring and Learning Center.

IP students will pay regular TU undergraduate tuition and fees and will have the same opportunities for scholarships and research experiences as students in the existing physics program, including the Fisher Scholarship, the Maryland Space Grant Scholarship, and the Eddie L. Loh Scholarship.

Information that will help students be successful in the program, such as the IP's curriculum and degree requirements, learning management system support, financial aid, student support services, etc., will be posted on TU's website and in the undergraduate catalog published annually.

G9. Advertising, Recruiting, and Admissions Materials Assurances
TU regularly reviews its advertising, recruiting, and admissions materials to ensure that they clearly and accurately represent programs and services available, and that there is consistency across different modes of communication such as the TU website, the academic catalog, and other print and online promotional materials.

H. Adequacy of Articulation
TU is developing an articulation agreement for the PIE concentration within the IP major with Cecil Community College and will pursue articulation agreements with other community colleges once the program is approved.

I. Adequacy of Faculty Resources
I1. Quality of Program Faculty
All the concentrations in this new major are built entirely from existing courses and will require few significant new outlays of resources to launch in the short term. Appendix C lists the faculty who could contribute to the successful execution of this new major. All tenure and tenure track faculty have terminal degrees in their disciplinary fields and bring expertise to the courses they teach and the research they conduct.

Because the IP major is truly interdisciplinary in nature, the proposed PIE concentration will build ties between physics faculty and faculty within and outside the multidisciplinary PAGS department and, in particular, strengthen relationships with the Departments of Economics and Marketing within the College of Business and Economics.

I2. Ongoing Faculty Training

The Faculty Academic Center of Excellence at Towson (FACET) is the faculty development center for Towson University. FACET's mission is to support an inclusive and collaborative faculty community and foster a culture of excellence in scholarship and teaching. FACET supports all campus faculty in their scholarship and teaching through a combination of programs, workshops, resources, funding, and communities of practice such as: Student Engagement, Emerging Technologies, Open Educational Resources, and High Impact Educational Practices. In collaboration with the TU Office of Technology Services, FACET also recommends, reviews, and provides programs to support advancement of faculty skills with Blackboard, TU's learning management system. FACET provides one-on-one or small group, virtual or face-to-face meetings with an instructional design team, who also perform course reviews. Faculty may attend open meetings as well as request consultation from FACET staff.

J. Adequacy of Library Resources

Resources available through TU's Cook Library (https://libraries.towson.edu) are sufficient to meet the needs of students and faculty in the proposed program. The library houses an extensive collection of materials, including more than 500,000 print and electronic volumes. In addition to a dedicated subject librarian, team of research librarians, and subject-specific research guides, the library provides access to 19 physics and astronomy subject-specific databases, such as Nature Portfolio, Scopus, ScienceDirect, JoVE Science Education Unlimited, JSTOR, and SpringerLink. Cook Library also houses computer workstations with specialty software for data analysis, data visualization and mapping.

In addition to Cook Library, faculty and students have access to materials through reciprocal agreements at nearby Baltimore institutions and across USM-affiliated institutions. Materials from other libraries across the country can be requested for loan through standard interlibrary loan (ILL) services. As part of this service, faculty and students have access to RAPID ILL, a service customary at high research activity institutions. The current turnaround time for article requests is typically less than 48 hours.

K. Adequacy of Physical Facilities, Infrastructure, and Instructional Equipment

K1. Assurance of Physical Facilities, Infrastructure and Equipment

TU's existing physical facilities, infrastructure and instructional equipment are sufficient to support the needs of the proposed program. The IP program will be administratively housed in the Department of Physics, Astronomy, and Geosciences in the Fisher College of Science and Mathematics. TU opened the 320,000 square foot Science Complex building in 2021. The Science Complex includes 50 new teaching laboratories and 30 research laboratory facilities with state-of-the-art instrumentation.

Faculty in other colleges associated with the PIE concentration are also housed in facilities that are well suited for supporting its students. The College of Liberal Arts building was completed in 2012 and Stephens Hall, which houses the College of Business and Economics, includes special student labs for behavioral and business data analysis. Additionally, students in the PIE concentration will have access to TU's StarTUp at the Armory, a 26,000 square foot space for start-ups and collaborations with small businesses and the region's largest corporations. The

Armory includes 6,000 square feet of free co-working space and meeting rooms where entrepreneurs and executives can connect.

K2. Assurance of Distance Learning Resources

The proposed program is designed to be delivered in-person via traditional modes of face-to-face instruction. If distance learning resources are required, whether in an individual course or at a broader scale, TU is well positioned to provide adequate support. The Faculty Academic Center of Excellence at Towson (FACET) offers training and certification programs for online and hybrid/blended instruction, Universal Design for Learning (UDL), and effective pedagogical approaches for enriching distance learning, including the Quality Matters Rubric. Students and faculty can enroll in training modules that provide instruction in university-sponsored distance learning technologies, including Blackboard, WebEx, Zoom, and Panopto. Technology support is available online, as well as via email, text, phone and on a walk-in basis at Student Computing Services and the Office of Technology Services.

L. Adequacy of Financial Resources with Documentation

The proposed IP program will be funded through existing resources from FCSM, the College of Business and Economics, and the College of Liberal Arts. Students in the PIE concentration will be taking courses already offered for physics majors within PAGS and in other TU undergraduate majors outside PAGS (e.g., Business and Marketing); therefore, no expenditures are necessary to develop the program curriculum. Additionally, PAGS anticipates hiring a new faculty member in Year 2; this position would support teaching in the concentration (budgeted at a 0.13 FTE rate in **Table 8**). Other than this new faculty position, the PIE concentration will be supported through existing faculty and staff budget lines, and therefore no additional funding is required.

TU's new IP program will require some modest marketing resources to attract prospective, new, and transfer students, as well as to advertise the new opportunity to current TU students who may be interested in changing their major to Interdisciplinary Physics with a PIE concentration from programs such as Computer Science, Marketing, or Business. The types of marketing activities PAGS anticipates undertaking include website development, email and social media marketing, flyers, and giveaway items for TU Open House/TU4U events, and a small travel budget for student club outreach to area high schools. TU has budgeted approximately $1,000 per year for these efforts.

Table 7. Programmatic Resources

Resource Categories	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
1. Reallocated Funds	$0	$0	$0	$0	$0
a. Reallocated Funds-Faculty FTE[1]	$0	$0	$0	$0	$0
2. Tuition/Fee Revenue (c + g below)	$33,918	$69,870	$95,952	$148,248	$178,150
a. Number of F/T Students	3	6	8	12	14
b. Annual Tuition/Fee Rate (In State)[1,2]	$11,306	$11,645	$11,994	$12,354	$12,725
c. Total F/T Revenue (a x b)	$33,918	$69,870	$95,952	$148,248	$178,150
d. Number of P/T Students	0	0	0	0	0
e. Credit Hour Rate	$0	$0	$0	$0	$0
f. Annual Credit Hour Rate	$0	$0	$0	$0	$0
g. Total P/T Revenue (d x e x f)	$0	$0	$0	$0	$0
3. Grants, Contracts & Other External Sources	$0	$0	$0	$0	$0
4. Other Sources	$0	$0	$0	$0	$0

TOTAL (Add 1-4)	$33,918	$69,870	$95,952	$148,248	$178,150

[1] Student enrollments are calculated at 100 percent in-state. It is anticipated that all students will enroll on a full-time basis.
[2] Tuition and fees increase by three percent annually.

Table 8. Programmatic Expenditures					
Expenditure Categories	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
1. Faculty (b + c below)	$0	$15,089	$15,541	$16,008	$16,489
a. Number of FTE	0	0.13	0.13	0.13	0.13
b. Total Salary[1]	$0	$10,701	$11,022	$11,353	$11,694
c. Total Benefits[1]	$0	$4,388	$4,519	$4,655	$4,795
2. Admin. Staff (b + c below)	$0	$0	$0	$0	$0
a. Number of FTE	0	0	0	0	0
b. Total Salary	$0	$0	$0	$0	$0
c. Total Benefits	$0	$0	$0	$0	$0
3. Support Staff (b + c below)	$0	$0	$0	$0	$0
a. Number of FTE	0	0	0	0	0
b. Total Salary	$0	$0	$0	$0	$0
c. Total Benefits	$0	$0	$0	$0	$0
4. Technical Support & Equipment	$0	$0	$0	$0	$0
5. Library	$0	$0	$0	$0	$0
6. New or Renovated Space	$0	$0	$0	$0	$0
7. Other Expenses	$1,000	$1,000	$1,000	$1,000	$1,000
TOTAL (Add 1-7)	$1,000	$16,089	$16,541	$17,008	$17,489

[1] Salary and fringe benefit rates increase by three percent annually.

M. Adequacy of Provisions for Evaluation of Program

M1. Procedures for Evaluating Courses, Faculty and Student Learning Outcomes

The proposed program will be built from existing courses. Nevertheless, future course development will follow the regular Towson University procedures for approval, first at the program and PAGS department level, through the FCSM Curriculum Committee, and finally the University Curriculum Committee.

The course approval process evaluates new courses for appropriate rigor, effective assessment and grading, and adherence of the course syllabus to best practices. Evaluation at the program level ensures course content accuracy and program alignment, while the college and university level reviews facilitate the production of quality course proposals.

Existing courses are evaluated through regular review by program faculty and by student evaluations. Faculty regularly review courses to determine if the course meets overall program objectives. Additionally, instructors are observed by peers on a routine basis, with more frequent observations if faculty are new to a course or the university. If a course review indicates concerns or problems with a course, faculty develop strategies for addressing problems. Student course evaluation takes place at the end of every semester. Using a tool developed by TU faculty that allows for quantitative and qualitative feedback, students give feedback on instructors (e.g., ability to communicate clearly; quality of student-instructor interaction; preparedness) and suggest improvements for a course.

Evaluation of faculty follows policies and procedures established by TU's policies for faculty annual merit review and for faculty reappointment, tenure, and promotion. These evaluations occur at the department, college, and university level. The main areas of evaluation include teaching, scholarship, and service. Tools used as part of the annual evaluation process include review of the individual's portfolio that includes, but is not limited to, the following:

- Evidence of scholarship (e.g., articles in scholarly journals; presentations at scholarly meetings).
- Service work.
- A synopsis of teaching related activities (e.g., courses taught; new instructional procedures; interdisciplinary, diversity, international, and technology-related projects).
- Review of course syllabi.
- Peer teaching observation reports.
- Quantitative and qualitative student evaluation of instruction.

Section G.3 outlines the program assessment measures and shows their alignment with specific student learning outcomes. On an annual basis, specific learning outcomes are identified for assessment purposes. The program director, with the support of TU's Office of Assessment, will oversee the processes involved in the assessment of student learning outcomes, including collection and analysis of data, and creation of action plans, as necessary.

M2. Evaluation of Program Educational Effectiveness
The assessment of this program will be guided by TU's Office of Assessment, following established TU policies and procedures, including review of the program's assessment plan to ensure that learning outcomes remain appropriate, and that students are meeting expectations.

The program will work with TU entities such as the Office of the Provost, Enrollment Services and Student Services to review data on a regular basis and improve the program when needed. Effectiveness will be assessed by student retention, progress toward degree completion, career outcomes for graduates, student and faculty satisfaction, cost-effectiveness, and other key performance indicators.

Additionally, TU will conduct a comprehensive evaluation of the program every seven years as part of the USM-mandated Periodic Review of Academic Programs process. The purpose of the review is to promote continuous program improvement and ensure that the needs of students are being met. Each program will prepare a self-study, engage an external reviewer to evaluate the program and identify strengths and areas for improvement, and submit a final report to the USM Board of Regents for review and approval.

N. Consistency with the State's Minority Student Achievement Goals
TU has a strong commitment to diversity, equity, and inclusion. With over 56 percent of the students identifying as a racial or ethnic minority,[19] TU is nearly as diverse as the state of Maryland. It is only one of a few universities in the country to have no achievement gap, meaning that underrepresented student groups achieve the same or better academic success as the entire student population. In 2020, the university introduced its inaugural Diversity Strategic Plan. The plan, "*A More Inclusive TU: Advancing Equity and Diversity (2020–25)*," is firmly grounded in the premise that TU's ongoing success is dependent on the university's capacity to shift perspectives and approaches and strategically place diversity, equity, and inclusion at the core of its mission.

[19] Fall 2023 numbers according to TU Office of Institutional Research: https://www.towson.edu/ir/documents/f_hdct_car_coll_eth.pdf.

Diverse faculty recruitment is a TU institutional goal and faculty recruitment at the University is designed to reach and attract a diverse pool of candidates. Through diverse faculty recruitment, TU strives to foster a learning community that reflects the population of our campus, region, and state, and supports recruitment and retention of a diverse student population along with academic achievement of students from minority and underrepresented backgrounds.

In physics at TU, as with physics programs elsewhere in the U.S., racial minority groups are underrepresented. In 2019-2020, African Americans comprised 13.6 percent of the U.S. population but earned only three percent of the physics bachelor's degrees. Similarly, Hispanic/Latinx people comprised 19 percent of the U.S. population, but earned 11 percent of physics bachelor's degrees.[20,21] The 2020 report of the American Institute of Physics National Task Force to Elevate African American Representation in Undergraduate Physics and Astronomy advocates the use of multiple curricular options to retain African American physics majors.[22] Since the PIE concentration of TU's proposed IP degree will provide an additional pathway to a physics degree, we anticipate that this program will enhance the overall racial diversity of PAGS students.

O. Relationship to Low Productivity Programs Identified by the Commission
Not applicable.

P. Adequacy of Distance Education Programs
Not applicable. The majority of courses in the program will be delivered on the main TU campus via face-to-face instruction.

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[20] U. S. Census Bureau, 2020: https://www.census.gov/quickfacts/fact/table/US/POP010220#POP010220.

[21] American Institute of Physics Statistical Research Center, Engineering and Physical Science Degrees Earned by Members of Underrepresented Groups: https://www.aip.org/statistics/stats-degrees.

[22] American Institute of Physics National Task Force to Elevate African American Representation in Undergraduate Physics and Astronomy, 2020. The Time is Now: Systemic Changes to Increase African Americans with Bachelors Degrees in Physics and Astronomy: https://www.aip.org/sites/default/files/aipcorp/files/teamup-full-report.pdf.

Appendix A. Descriptions of Course Options in Program Outline

INTERDISCIPLINARY PHYSICS CORE COURSE DESCRIPTIONS

PHYS 185 INTRODUCTORY SEMINAR IN PHYSICS (1)

This seminar is intended for freshmen and sophomores who have demonstrated exceptional ability in the sciences and will involve them directly with current ideas and research in physics. Classical physics, quantum physics, relativity, and the new astronomy will be covered.

PHYS 211 GENERAL PHYSICS I NON-CALCULUS-BASED (4)[23]

For Arts and Sciences, Biology and Geosciences majors: mechanics, heat, light, electricity, magnetism, and a brief introduction to modern physics. Three lecture units and one three-unit laboratory period. Prerequisite: MATH 115 or good standing in high school algebra and trigonometry. Core: Biological & Physical Sciences. Lab/Class fee will be assessed.

PHYS 241 GENERAL PHYSICS I CALCULUS-BASED (4)[12]

Calculus-based physics for science and engineering majors. Mechanics and the conservation laws, gravitation, simple harmonic motion. Prerequisite: MATH 273 (may be taken concurrently). Core: Biological & Physical Sciences. Lab/Class fee will be assessed.

PHYS 242 GENERAL PHYSICS II CALCULUS-BASED (4)

Continuation of PHYS 241. Electricity, magnetism, DC and AC currents, geometric optics. Prerequisites: PHYS 241, MATH 274 (may be taken concurrently). Core: Biological & Physical Sciences. Lab/Class fee will be assessed.

PHYS 243 GENERAL PHYSICS III (4)

Special relativity, fluid kinematics and dynamics, waves, thermodynamics. Prerequisite: PHYS 242.

PHYS 305 COMPUTERS IN PHYSICS (4)

Introduction to hardware and software applications of computers in physics, including computer interfacing to experiments, computer aided design, LabView programming, data analysis, simulation, and modeling techniques. Prerequisite: PHYS 241. Lab/Class fee will be assessed.

PHYS 311 MODERN PHYSICS I (3)

A description of special relativity, quantum theory, atomic structure, and spectra. Three lecture hours. Prerequisites: MATH 274, PHYS 242 or PHYS 252; or PHYS 212 with consent of instructor).

PHYS 341 INTERMEDIATE PHYSICS LABORATORY I (3)

Experiments which defined modern physics. Exploration of classical and modern research methods: data acquisition and analysis, optical and nuclear spectroscopy. Six laboratory hours. Prerequisites: PHYS 305; PHYS 311 (may be taken concurrently). Lab/Class fee will be assessed.

PHYS 385 PHYSICS SEMINAR (1)[24]

Students participate in colloquia on topics of current interest in physics research under guidance of instructor. One lecture hour. Prerequisite: at least junior standing.

ASTR 385 ASTROPHYSICS SEMINAR (1)[13]

Students learn to present technical material orally by attending and discussing presentations given by others and by giving presentations themselves on topics of current interest in astrophysics. Prerequisite: junior/senior standing as a Physics Major or Astronomy Minor.

PHYS 486 PHYSICS SEMINAR II (1)

Students participate in colloquia on topics of current interests in physics research under guidance of instructor. One lecture hour. Prerequisite: senior standing or consent of instructor.

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[23] Students may take either PHYS 211 or PHYS 241.

[24] Students may take either PHYS 385 or ASTR 385.

MATH 273 CALCULUS I (4)
Functions, limits, and continuity; differentiation of algebraic and trigonometric functions; mean value theorem; differentials; introduction to integration; applications. Four lecture hours and one laboratory hour per week. Prerequisite: qualifying score on Math Placement exam or MATH 117 or MATH 119. Core: Mathematics.

MATH 274 CALCULUS II (4)
Differentiation and integration of exponential, logarithmic, and inverse trigonometric functions; techniques of integration and applications; indeterminate forms; improper integrals; sequences and series of numbers; power series. Prerequisite: MATH 273. Core: Mathematics.

PHYSICS INNOVATION AND ENTREPRENEURSHIP CONCENTRATION COURSE DESCRIPTIONS

PHYS 312 MODERN PHYSICS II (3)
Required course for the Applied and General tracks of the Physics major. Applications of special relativity and quantum theory to the various disciplines in physics, including solid state, nuclear, elementary particles, and cosmology. Prerequisite: PHYS 311.

PHYS 335 BASIC ELECTRONICS (4)[25]
Circuit components, characteristics of semi-conductors, electrical measurements, method of circuit analysis, electronic devices. Three lecture hours and one three-hour laboratory period. Prerequisites: PHYS 212 or PHYS 242 or consent of the instructor. Lab/Class fee will be assessed.

PHYS 337 DIGITAL ELECTRONICS (4)[14]
Subjects covered will be basic concepts of digital electronics such as gates, logic modules, truth tables, digital codes, sequential systems, semi-conductor memories, decade counters, etc. The laboratory program is designed to give students first-hand experience on the material covered in lecture using integrated circuits and LED display systems. Two hours lecture, three hours laboratory. Lab/Class fee will be assessed. Prerequisite: PHYS 242.

PHYS 361 OPTICS FUNDAMENTALS (4)[14]
Geometric, wave and quantum optics; lenses and mirrors, lens aberrations and design, optical instruments, interference diffraction, polarization, absorption and scattering, lasers, holography, and the dual nature of light. Three lecture hours and one three-hour laboratory each week. Prerequisites: PHYS 243 and PHYS 341 (may be taken concurrently) or consent of the instructor. Lab/Class fee will be assessed.

COMM 131 PUBLIC SPEAKING (3)
Perspectives of rhetoric and public speaking, investigating contemporary American experiences, delivering, and critiquing speeches. Core: Arts & Humanities.

ECON 201 MICROECONOMIC PRINCIPLES (3)
Economic reasoning of individual choice in household and market decisions. Behavior of firms in competitive and noncompetitive markets, functioning of labor and capital markets, role of the entrepreneur and effects of government policies. Core: Social & Behavioral Sciences.

LEGL 225 LEGAL ENVIRONMENT OF BUSINESS (3)
Examines the nature and sources of law, the U.S. legal system with emphasis on court jurisdiction, procedure, constitutional law, torts, criminal law, and contracts in general and as they relate to business. Core: The United States as a Nation.

BUSX 301 BUSINESS COMMUNICATIONS (4)[26]

[25] Students may take either PHYS 335, PHYS 337, or PHYS 361.
[26] Students may take either BUSX 301 or ENGL 317.

Seminar designed to enable students to gain the written and oral communication skills needed in professional business situations and to develop and practice important skills for workplace success. Requires grade of C or better to fulfill Core requirement. Prerequisites: a grade of C (2.0) or higher in ENGL 102 or ENGL 190, or equivalent; ECON 202; junior/senior status. Core: Advanced Writing Seminar.

ENGL 317 WRITING FOR BUSINESS AND INDUSTRY (3)[15]
Standard written formats used in business and industry, including correspondence, memoranda, and reports. Projects individualized to meet student needs and career interests. Requires grade of C or better to fulfill Core requirement. Prerequisite: ENGL 102 or ENGL 190 or equivalent. Core: Advanced Writing Seminar.

MKTG 341 PRINCIPLES OF MARKETING (3)
Design, distribution, pricing and promotion of goods, services, places, people and causes of both national and international markets. Included is an introduction to strategic and tactical applications of marketing. Not open to students who have completed MKTG T41. Prerequisites: ECON 201; sophomore standing (subject to availability); majors and eligible pre-major, BUAD, MKTG or MUID minor.

MKTG 451 PERSONAL SELLING (3)
The role and principles of personal selling as it relates to an organization's marketing strategy, specific techniques for uncovering customer needs and delivering effective sales presentations, and the critical nature of building interpersonal relationships throughout a sales cycle. Prerequisites: MKTG 341; major in BUAD or minor in MKTG; junior/senior standing.

ENTREPRENEURSHIP MINOR ELECTIVES
ENTR 110 CREATIVITY AND IDEA DEVELOPMENT (3)
Focuses on creativity and thinking creatively. Topics include developing creative abilities, opportunity recognition, creating a new product/service, and pitches for the new product/service. Prerequisites: BUAD major or ENTR minor.

ENTR 215 START-UP BASICS FOR NON-BUSINESS MAJORS (3)
Introduces students to important business concepts that will help them to run a business. Helps to prepare non-business major students with knowledge and skills needed for upper-level courses in entrepreneurship. Topics covered include economics, understanding business financial measures, types of financing available to entrepreneurs and data analyses. Prerequisite: ENTR Minor.

ENTR 355 ENTREPRENEURSHIP FOUNDATIONS AND PATHWAYS (3)
Introduces the entrepreneurial process including a focus on the identification and evaluation of opportunities. Discusses the importance of innovation, creating a business concept and business models. Develop business ideas and evaluate them for potential formation of a new venture.

ENTR 410 BUSINESS PLAN COMPETITION (3)
Focuses on developing a business plan for a successful new venture. Topics include opportunity evaluation, feasibility analysis, creating persuasive pitches for the business idea, competitive analysis, profiling the target market, developing financial forecasts and presentation of a business plan in a competitive style format. Prerequisites: ENTR 355; and BUAD major, ENTR minor or Certificate in Entrepreneurship.

MARKETING MINOR ELECTIVES
MKTG 350 ENTREPRENEURIAL MARKETING (3)
Examines how start-up and small/medium-sized companies identify and critically evaluate opportunities that exist within new and established market niches and develop marketing plans to take advantage of those opportunities based on the creative use of scarce resources. Prerequisites: MKTG 341, junior / senior and major standing.

MKTG 425 CONSUMER BEHAVIOR ANALYSIS (3)
An examination of the buying behavior of individual and organizational buyers with regards to the decision process utilized when purchasing goods and services and the resulting consequences in the development

of marketing strategies by business firms, and other organizations. Prerequisites: MKTG 341; major in BUAD or minor in MKTG; junior/senior standing.

MKTG 445 GLOBAL MARKETING (3)
Impact of globalization, inter-country trade agreements, and national culture on country marketing environments and their influence on strategic marketing decisions related to pricing, product, channels of distribution, and marketing communications. Problems and obstacles related to acquiring information to guide market entry decisions and development of country marketing plans and policies. Prerequisites: MKTG 425; major in ACCT, BUAD, INST-BA or minor in MKTG; junior/senior standing.

Appendix B. Example Programs of Study

Courses used for measures of Student Learning Outcomes are shaded in yellow.

Physics Innovation and Entrepreneurship Concentration with Entrepreneurship Minor: Four-Year Plan				
Year 1				
Fall			*Spring*	
PHYS 185	1		MATH 273 (=CORE 3)	4
CORE 1	3		PHYS 211 (=CORE 7)	4
CORE 2	3		CORE 10	3
ELECTIVE	3		ELECTIVE	4
ELECTIVE	4			
Total	14		Total	15
Year 2				
Fall			*Spring*	
CORE 4	3		PHYS 242 (=CORE 8)	4
MATH 274	4		ENTR 215	3
ENTR 110	3		ECON 201 (=CORE 6)	3
COMM 131 (=CORE 5)	3		MKTG 341	3
ELECTIVE	3		ELECTIVE	3
Total	16		Total	16
Year 3				
Fall			*Spring*	
PHYS xxx	3		PHYS 243	4
PHYS 305	4		PHYS 385	1
MKTG 451	3		LEGL 225 (=CORE 11)	3
BUSX 301 or ENGL 317 (=CORE 9)	3		ENTR 355	3

			ELECTIVE	3
Total	13		Total	14
Year 4				
Fall			*Spring*	
PHYS 311	3		ENTR 410	3
PHYS 341	3		CORE 14	3
PHYS 486	1		PHYS xxx	3
PHYS xxx	3		PHYS 312	3
CORE 12	3		PHYS 335/337/361	4
CORE 13	3			
Total	16		Total	16
Credit Grand Total	**120**			

Physics Innovation and Entrepreneurship Concentration with Marketing Minor: Four-Year Plan				
Year 1				
Fall			*Spring*	
PHYS 185	1		MATH 273 (=CORE 3)	4
CORE 1	3		PHYS 211 (=CORE 7)	4
CORE 2	3		CORE 10	3
ELECTIVE	3		ELECTIVE	4
ELECTIVE	4			
Total	14		Total	15
Year 2				
Fall			*Spring*	
CORE 4	3		PHYS 242 (=CORE 8)	4
MATH 274	4		MKTG 425	3
MKTG 350	3		ECON 201 (=CORE 6)	3
COMM 131 (=CORE 5)	3		MKTG 341	3
ELECTIVE	3		ELECTIVE	3
Total	16		Total	16
Year 3				
Fall			*Spring*	
PHYS xxx	3		PHYS 243	4
PHYS 305	4		PHYS 385	1
MKTG 451	3		LEGL 225 (=CORE 11)	3
BUSX 301 or ENGL 317 (=CORE 9)	3		MKTG 445	3
			ELECTIVE	3
Total	13		Total	14
Year 4				
Fall			*Spring*	
PHYS 311	3		MKTG xxx	3
PHYS 341	3		CORE 14	3
PHYS 486	1		PHYS xxx	3
PHYS xxx	3		PHYS 312	3
CORE 12	3		PHYS 335/337/361	4
CORE 13	3			
Total	16		Total	16
Credit Grand Total	**120**			

Appendix C. Faculty Supporting the PIE Concentration in the Interdisciplinary Physics Major

Full-Time PAGS Program Faculty			
Name	**Terminal Degree**	**Field**	**Academic Title**
Bedard, Antoine	Ph.D.	Electrical Engineering	Lecturer
Ghavamian, Parviz	Ph.D.	Astrophysics	Professor
Ha, Phuoc	Ph.D.	Physics	Professor
Jackson, Alan	Ph.D.	Astrophysics	Assistant Professor
Kolagani, Rajeswari	Ph.D.	Physics	Professor
Krause, Thomas	Ph.D.	Physics	Associate Professor
Kudsieh, Nicholas	Ph.D.	Physics	Lecturer
Lising, Laura	Ph.D.	Physics	Lecturer
Overduin, James	Ph.D.	Physics	Professor
Schaefer, David	Ph.D.	Physics	Professor
Scott, Jennifer	Ph.D.	Astrophysics	Professor
Simpson, Jeffrey	Ph.D.	Physics	Professor
Smolyaninova, Vera	Ph.D.	Physics	Professor
Tsai, Tevis	B.S.	Mathematics	Lecturer
Yan, Jia-An	Ph.D.	Physics	Professor

Full-time PAGS faculty who are available to teach specific courses in the Interdisciplinary Physics program's core curriculum and in the PIE concentration are listed below.

There is a sizable pool of full-time and adjunct faculty drawn from other colleges across TU who are available to teach in the PIE concentration—approximate numbers of non-PAGS faculty qualified to teach each non-physics course are listed below. TU will determine which non-PAGS faculty will teach in the program, based on faculty availability, on a semester-by-semester basis.

<u>Interdisciplinary Physics Core</u>

PAGS Faculty	**PHYS**									
	185	211	241	242	243	305	311	341	385	486
Bedard, Antoine		X	X	X						
Ghavamian, Parviz	X	X	X	X	X		X		X	X
Ha, Phuoc	X	X	X	X	X		X		X	X
Jackson, Alan	X	X	X	X	X	X				
Kolagani, Rajeswari	X	X	X	X	X		X	X	X	X
Krause, Thomas	X	X	X	X	X			X	X	X
Kudsieh, Nicholas		X	X	X						X
Lising, Laura		X	X	X						
Overduin, James	X	X	X	X	X		X		X	X
Schaefer, David	X	X	X	X	X	X	X	X	X	X
Scott, Jennifer	X	X	X	X	X		X		X	X

Simpson, Jeffrey	X	X	X	X	X	X	X	X	X	X
Smolyaninova, Vera	X	X	X	X	X		X	X	X	X
Tsai, Tevis		X	X	X						
Yan, Jia-An	X	X	X	X	X	X	X		X	X

Non-PAGS faculty		
Requirement	**TU Department**	**Number of faculty**
MATH 273	Mathematics	10
MATH 274	Mathematics	10

<u>**Physics Innovation and Entrepreneurship Concentration**</u>

PAGS Faculty	**PHYS**			
	312	335	337	361
Ha, Phuoc	X	X	X	
Kolagani, Rajeswari	X			
Schaefer, David				X
Simpson, Jeffrey		X		X
Smolyaninova, Vera				X
Yan, Jia-An			X	

Non-PAGS Faculty		
Requirement	**TU Department**	**Number of faculty**
MKTG 341	Marketing	10
MKTG 451	Marketing	3
COMM 131	Communications	16
BUSX 301	Economics, Finance, Business Excellence Program	10
ENGL 317	English	13
ECON 201	Economics	10
LEGL 225	Marketing	8
Entrepreneurship Minor		
ENTR 110	Marketing	1
ENTR 215	Marketing	2
ENTR 355	Marketing	1
ENTR 410	Marketing	3
Marketing Minor		
MKTG 350	Marketing	1
MKTG 425	Marketing	2
MKTG 445	Marketing	1

Proposal for a Bachelor of Science in Interdisciplinary Physics with an Area of Concentration in Planetary Science at Towson University

Table of Contents

A. Centrality to Institutional Mission Statement and Planning Priorities

A1. Program Description and Alignment with Institutional Mission

Towson University (TU) proposes a new major in the Department of Physics, Astronomy, and Geosciences (PAGS): a Bachelor of Science (B.S.) in Interdisciplinary Physics (IP) with an area of concentration in Planetary Science. This IP major will provide students with a strong foundation in fundamental physics along with the freedom to develop a coherent academic program of study across other disciplines. The concentrations are centered on areas that will prepare students to contribute to scientific advancement and economic development in our region and nation.

Several Maryland institutions (See Table 2 in Section C.4), including TU, offer a traditional physics major as a standard subject in the core sciences. Some institutions offer programs that take an interdisciplinary approach to science more generally, e.g., Morgan State University's B.S. in Interdisciplinary Sciences and B.S. in Interdisciplinary Engineering, Information, and Computational Sciences and Salisbury University's B.S. in Integrated Science, but there are no interdisciplinary science programs that are specifically physics focused. No Maryland institution currently offers a program comparable to the proposed IP major.

This new concentration within the IP major is distinct from TU's current B.S. in Physics, as it requires 11 fewer credits in upper-level physics courses, affording students freedom to take courses in other disciplines. The General Physics, Applied Physics, and Astrophysics concentrations within TU's existing B.S. in Physics are heavily physics-focused, requiring over 30 credits of 300- or 400- level physics or astrophysics courses that emphasize theoretical concepts and mathematical rigor. In particular, the Applied Physics concentration is designed for students interested in engineering and physics subdisciplines such as materials science. Because of the number of upper-level physics requirements, TU's existing B.S. in Physics is not a suitable pathway for students who are interested in the applications of physics to other disciplines. The Planetary Science concentration, which blends core physics with astronomy, geology, and geography will be unique concentration within Maryland.

The Planetary Science concentration curriculum consists of 33 credits in a core set of physics and mathematics courses and 54 credits in astronomy, geology, and geography. Thus, the concentration will draw on TU faculty expertise from across the Fisher College of Science and Mathematics (FCSM), as well as from the College of Liberal Arts. The proposed concentration is well-aligned with Towson University's mission of preparing students as leaders in high demand careers through interdisciplinary study and research.

A2. Strategic Goals Alignment and Affirmation of Institutional Priority

The proposed program in Interdisciplinary Physics aligns with Towson University's 2020-2030 Strategic Plan. Specifically, the program will:

- Educate with an "innovative student-centered curriculum emphasizing engaged learning, in-demand academic programs, and new approaches to instruction and learning."
- Innovate through research experiences with TU faculty, who are "leaders in scholarship and creative activities" or through creative approaches to technical entrepreneurship.
- Engage by "extending the talents of our students, faculty and staff beyond our campus boundaries" with entrepreneurship and experiential learning.
- Support students' intellectual growth with a "campus experience that reflects the educational values of Towson University and produces graduates prepared for careers or advanced education."

A3. Five-year Funding Plan

The proposed new bachelor's degree program will be funded with reallocated support from across the university, as this program is built on existing undergraduate courses and faculty expertise. One new faculty will be hired as part of the existing hiring plan for the PAGS department to support and enhance the program. TU's central administration has committed funds to assist program implementation. Resources and expenditures anticipated for the first five years are presented in Section L**, Tables 7** and **8**.

A4. Institutional Commitment

The proposed bachelor's degree program is aligned with the university's new research- and innovation-oriented mission and strategic plan.

Beyond the currently anticipated addition of new faculty, the new Planetary Science concentration in the proposed IP major will require minimal financial commitment and no new funding allocations for administration or infrastructure (see Section L for further details). There are currently over 60 faculty from across two TU colleges who will contribute to this program as part of their existing instructional load (see Section I.1 and Appendix C for a detailed listing). See Section K for more details about physical facilities and infrastructure available to support the program.

TU's Office of Technology Services will provide support for general computing needs. More specialized technical support will come directly from the relevant colleges involved in the program, which have dedicated staff for computer technology needs, classroom support, and website development. This concentration will benefit from the laboratory and analytical facilities of TU's Science Complex, access to specialized software such as ArcGIS (through the College of Liberal Arts), and several software packages and utilities available to students through university, FCSM, or PAGS licenses: Capstone, DataStudio, Tracker, LabVIEW, MultiSim, Mathematica, Origin, SigmaPlot, MatLab, RSpecExplorer, OSLO EDU, and Acrobat Creative Cloud.

TU is committed to student success. All students in the IP program will receive academic advising from PAGS faculty who will assist them in designing degree completion plans, completing the degree requirements, choosing elective courses, and finding and applying for internship opportunities. The IP major requirements are designed to be completed in the four-year duration of an undergraduate degree. Required courses and a typical four-year plan of study for the Planetary Science concentration are outlined in Appendix A and Appendix B.

B. Critical and Compelling Regional or Statewide Need as Identified in the State Plan

B1. Program Demand and Need

Physics is a foundational science. Increasingly, the most interesting problems and exciting opportunities are at the intersections of physics and other fields. Many of these interdisciplinary fields are at the forefront of scientific advancement. Planetary science will prepare a student to participate in solar system exploration, exoplanet discoveries and characterizations and the search for life in the universe, and atmospheric science and the study of global climate change.

B2. Alignment with Maryland State Plan for Higher Education

The proposed B.S. in Interdisciplinary Physics aligns with the Student Success and Innovation goals in the 2022 Maryland State Plan for Higher Education. TU faculty are committed to high quality instruction (Priority 5). The proposed program will provide students with knowledge and training through integrated curricula that emphasize synthesis of ideas and provide opportunities to earn credit through real world experiences in research and internships.

The IP degree is designed for students who wish to study physics as it is applied to other fields, in a less theoretical context than the existing B.S. in Physics offered at TU. The proposed Interdisciplinary

Physics curriculum gives students flexibility to fulfill requirements and develop a course of study that allows them to explore interests within a well-defined structure. The degree will also provide students who matriculate at TU as physics or other science majors an alternative pathway for completing a bachelor's degree in a timely manner and, through articulation agreements with Maryland's community colleges, will facilitate enrollment and graduation of transfer students (Priority 6).

The nature of the IP degree will foster a culture of risk–taking (Priority 8) by encouraging students to take intellectual risks in exploring new and emerging fields.

C. Quantifiable and Reliable Evidence and Documentation of Market Supply and Demand in the Region and State

C1. Pipeline and Employment Opportunities

Students with physics backgrounds are problem-solvers, and those with interdisciplinary backgrounds, including business knowledge and soft skills, are well situated for the job market.[27,28] Overall, physics bachelor's degree holders enter the workforce and postgraduate study at about the same rate and have low rates of unemployment one year after graduation (**Figure 1**).[29] About 60 percent of the graduates entering the workforce are in the private sector, and among these graduates in the private sector, over 90 percent are in STEM-related positions or positions in which they regularly solve technical problems (**Figure 2**).

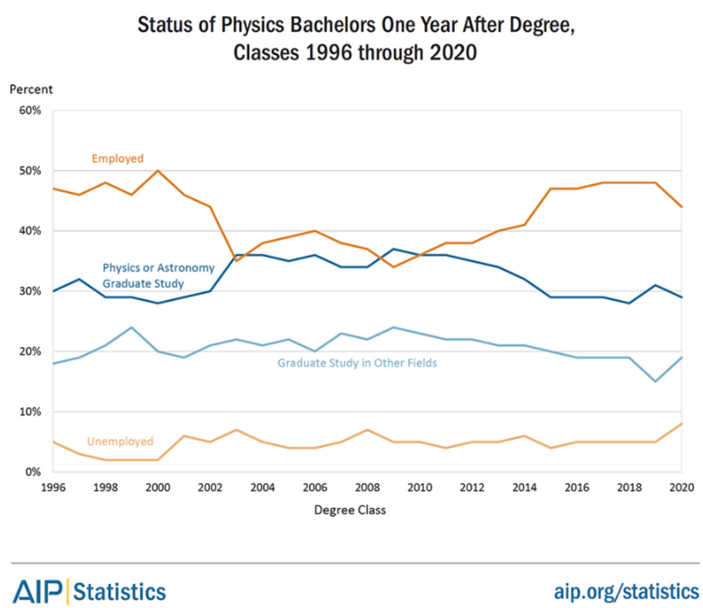

Figure 1. Physics Bachelors One Year After Degree

[27] Educating Physicists for Impactful Careers APS Epic Report: https://epic.aps.org/.
[28] Phys-21 Preparing Students for 21st Century Careers. Joint Task Force on Undergraduate Physics Programs: https://www.compadre.org/JTUPP/docs/J-Tupp_Report.pdf.
[29] AIP Report, Initial Employment of Physics Bachelors and PhDs, Classes 2019 and 2020: https://www.aip.org/statistics/resources/initial-employment-physics-bachelors-and-phds-classes-2019-and-2020.

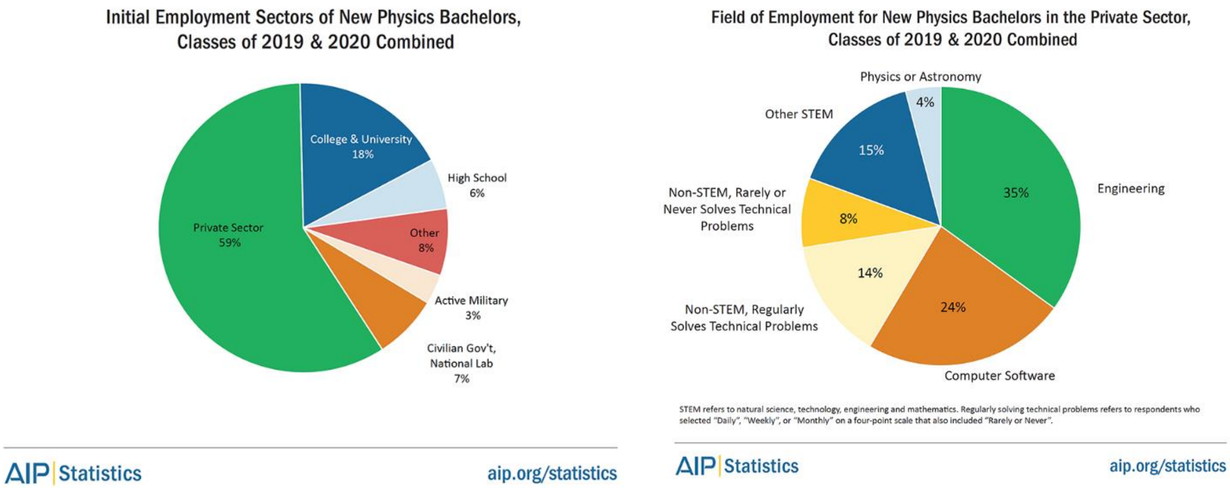

Figure 2. (a) Initial Employment Sectors of Physics Bachelors. (b) Fields of Employment for New Physics Bachelors in the Private Sector.

Students pursuing the Planetary Science concentration in the IP program will be well-prepared for postgraduate programs in the field or for research data analyst positions at local employment centers such as the Johns Hopkins Applied Physics Lab, NASA/Goddard, or one of the many Maryland businesses that contract with NASA. Stronger emphasis on geology would prepare a student for employment at government agencies such as the US Geological Survey. Geographic Information System (GIS) skills will be marketable for analyst positions, including in some areas of U.S. Intelligence. Planetary science and related fields are projected to show increased demand according to the Maryland Department of Labor (**Table 1**).

C2. Market Demand

A market study commissioned by TU and conducted by EAB reports that according to the U. S. Bureau of Labor Statistics, in the past year, national and regional employers advertised a moderate total number of job postings for bachelor's-level interdisciplinary physics professionals (178,499 and 30,917 respectively). **Figures 3** and **4** show total monthly postings over the past three years. Average monthly employer demand for relevant professionals outpaced demand for all bachelor's-level professionals in both markets (1.97 percent vs. 1.79 percent nationally; and 1.80 percent vs. 1.45 percent regionally). Additionally, three of the top five most relevant occupations both regionally and nationwide are projected to grow faster than average. Together with Maryland Department of Labor projections reported in the following section, these trends indicate ample employment opportunities for graduates of an interdisciplinary physics program.

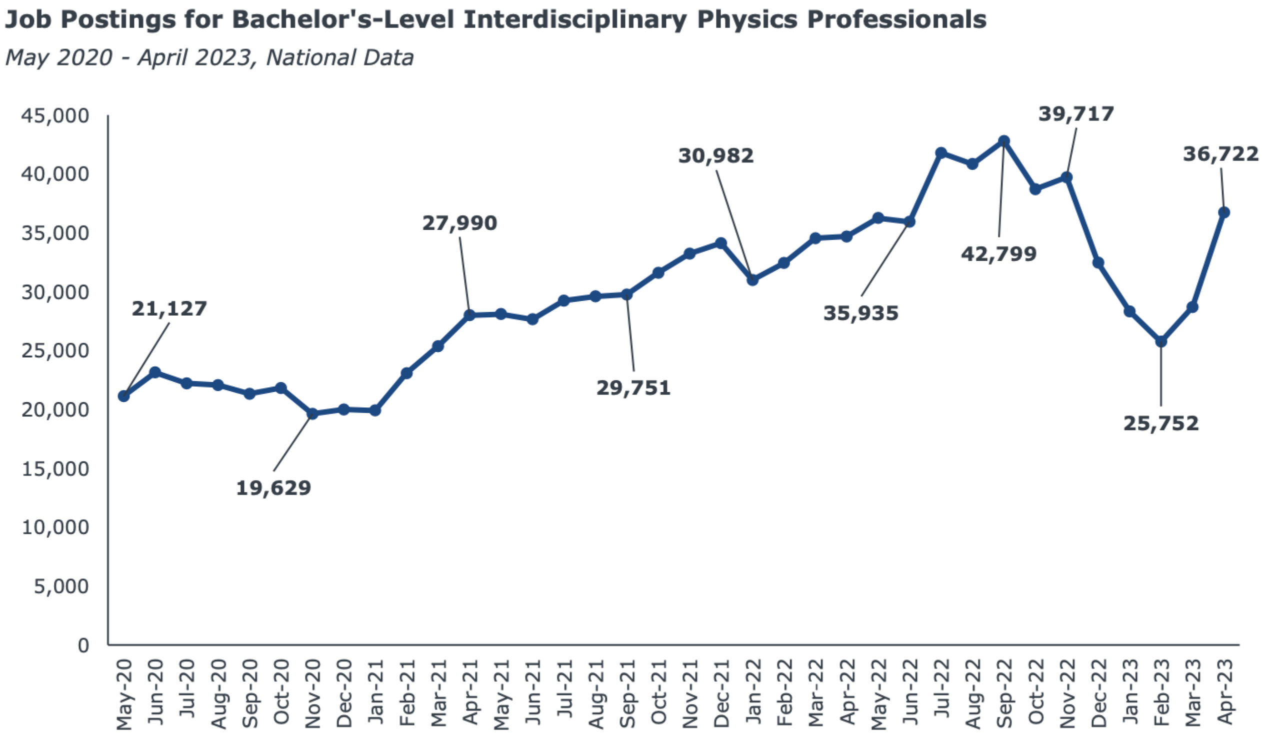

Figure 3. National Job Postings for Bachelor's Level Interdisciplinary Physics Professionals – EAB Report

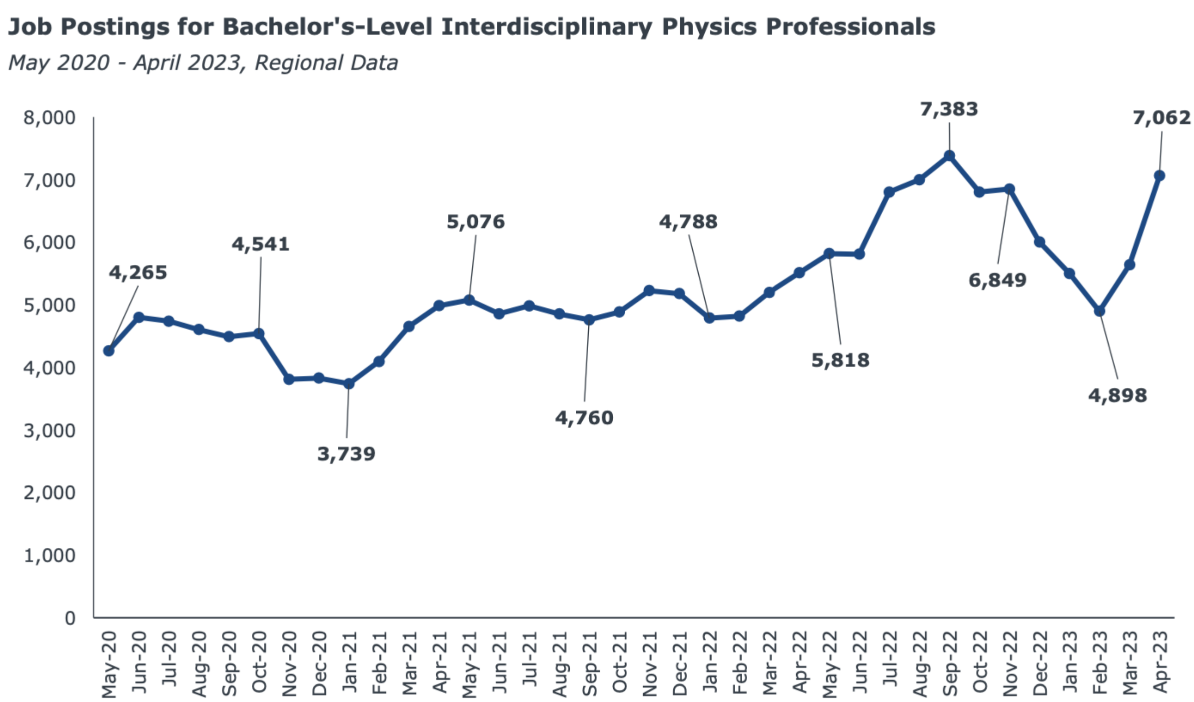

Figure 4. Regional Job Postings for Bachelor's Level Interdisciplinary Physics Professionals – EAB Report

Note that the decline in job postings between September 2022 and February 2023 aligns with overall market trends during the same period. Both the regional and national market trends indicate a growing labor market for program graduates.

C3. Anticipated Vacancies and Training Needs

According to the Maryland Department of Labor, the occupational projections growth in job titles most closely related to the Planetary Science concentration (**Table 1**) is between 3.3 percent and 5.4 percent for the period 2020-2030.

Table 1. Maryland Department of Labor Occupational Projections (2020-2030)

Title	Projected Change	Projected Annual Openings	Education Value
Atmospheric and Space Scientists	5.4%	706	Bachelor’s
Geoscientists except Hydrologists and Geographers	3.3%	433	Bachelor’s

According to the EAB market study, commissioned to examine interdisciplinary physics overall, the projected growth during the period 2022-2033 in occupations for IP professionals such as Data Scientists, Software Developers, Electrical, Mechanical, and Industrial Engineers and Operations Research Analysts is 7.0 percent regionally and 8.8 percent nationally. Top skills in regional and national job postings encompass physics and additional disciplines included in the concentrations to be offered in the Planetary Science concentration of the proposed program: chemistry, data analysis, computer programming and simulations, mathematics, etc. (**Figures 5** and **6**).

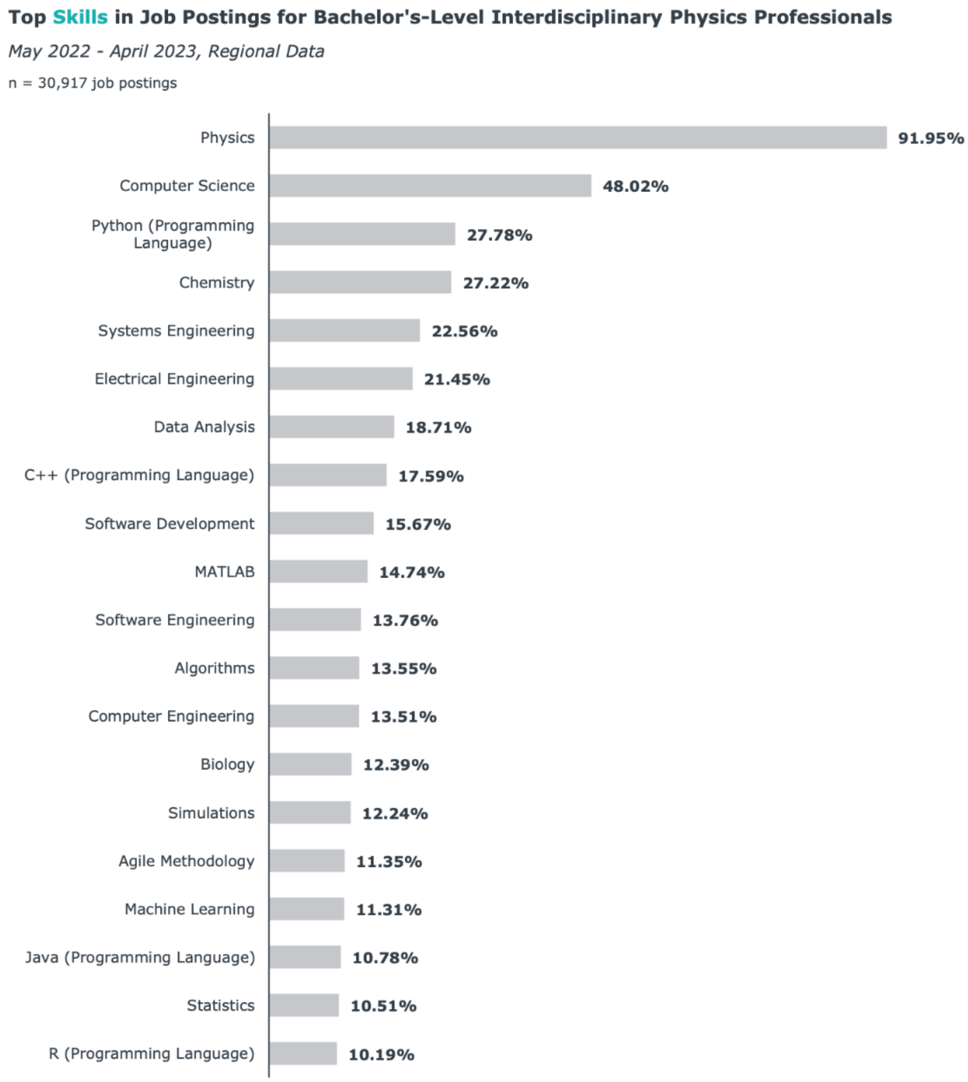

Figure 5. Top Skills in Regional Job Postings for Bachelor's Level Interdisciplinary Physics Professionals – EAB Report

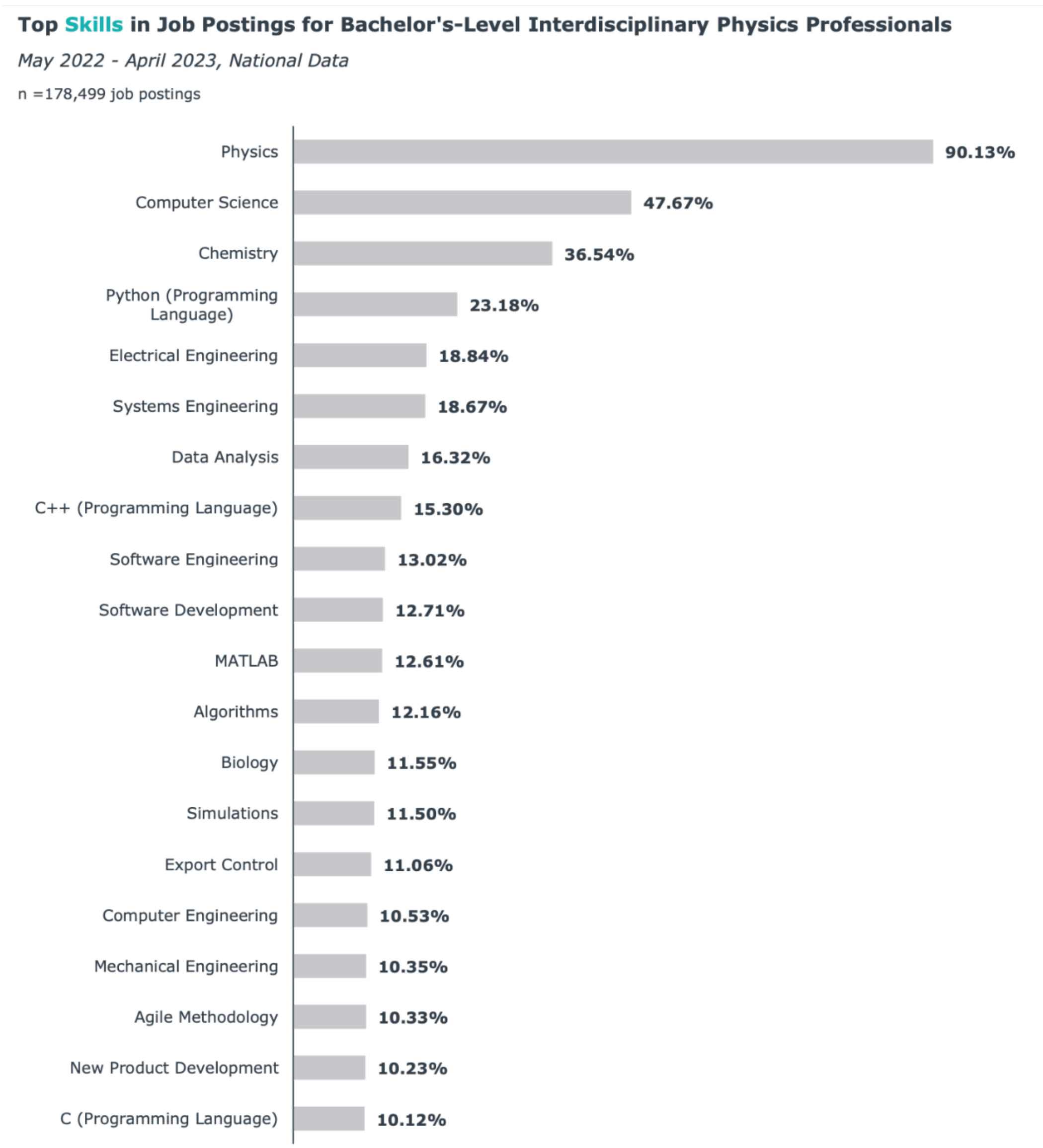

Figure 6. Top Skills in National Job Postings for Bachelor's Level Interdisciplinary Physics Professionals – EAB Report

C4. Projected Supply of Prospective Graduates

TU's proposed program will complement existing physics-related programs, most of which follow the traditional physics curriculum and are similar to TU's existing physics major. The IP program will attract students from a variety of STEM backgrounds who want to pursue opportunities at the intersection of physics and other fields.

The number of students enrolled in these programs and the number of degree completions for the period 2018-2022 as reported by MHEC is summarized in **Table 2**.[30] The number of physics and physics-related degrees awarded statewide has remained relatively stable over the past five years,

[30] Maryland Higher Education Commission, Trends in Degrees and Certificates by Program, Maryland Higher Education Institutions 2014-2021, March 2022 https://mhec.maryland.gov/publications/Documents/Research/AnnualReports/2021DegreesByProgram.pdf.

with fluctuations of about 10 percent. Because of its interdisciplinary nature, the IP program is expected to attract students who would have majored in other STEM fields. Thus, for the proposed Planetary Science concentration, **Table 2** also tabulates the number of TU degree completions in Geology and Earth Space Science. Finally, **Table 2** includes the number of potential students who may be drawn to the program from two-year institutions, including those who complete associate degrees in geosciences.

Table 2. Enrollment Trends in Physics and Interdisciplinary Physics Related Programs at Two- and Four-Year institutions[31]						
Comparable Programs in Maryland						
Program	**Institution**	**Enrollment**				
		2018	**2019**	**2020**	**2021**	**2022**
Physics	Frostburg State University	10	7	8	4	7
Physics	Johns Hopkins University	54	40	40	41	48
Earth and Planetary Sciences	Johns Hopkins University	6	8	3	5	4
Physics	Loyola University	9	4	7	6	9
Physics	McDaniel College	7	4	8	11	8
Physics	Morgan State University	10	12	13	7	11
Interdisciplinary Engineering, Information, & Computational Sciences	Morgan State University	N/A	N/A	N/A	N/A	5
Interdisciplinary Sciences	Morgan State University	N/A	N/A	N/A	N/A	3
Physics	Notre Dame of Maryland University	11	8	8	4	3
Physics	Salisbury University	84	80	60	44	56
Integrated Science	Salisbury University	N/A	N/A	N/A	3	11
Physics	St. Mary's College of Maryland	29	21	22	25	31
Physics	University of Maryland, Baltimore County	128	133	114	102	88
Physics	University of Maryland, College Park	324	301	321	288	269
Physical Sciences	University of Maryland, College Park	0	1	0	0	0
Physics	Washington College	29	28	16	13	8
		Bachelor's Degree Completions				
		2018	**2019**	**2020**	**2021**	**2022**
Physics	Frostburg State University	2	4	2	2	1
Physics	Johns Hopkins University	22	21	14	15	10
Earth and Planetary Sciences	Johns Hopkins University	7	4	4	2	1
Physics	Loyola University	2	1	3	2	1
Physics	McDaniel College	7	4	1	1	3

[31] N/A indicates program was not yet operational for the year listed.

Physics	Morgan State University	0	1	4	1	0
Interdisciplinary Engineering, Information, & Computational Sciences	Morgan State University	N/A	N/A	N/A	N/A	N/A
Interdisciplinary Sciences	Morgan State University	N/A	N/A	N/A	N/A	N/A
Physics	Notre Dame of Maryland University	1	2	4	1	1
Physics	Salisbury University	30	12	20	14	9
Integrated Science	Salisbury University	N/A	N/A	N/A	1	1
Physics	St. Mary's College of Maryland	4	10	8	5	6
Physics	University of Maryland, Baltimore County	20	12	24	16	21
Physics	University of Maryland, College Park	62	73	71	76	66
Physical Sciences	University of Maryland, College Park	3	0	0	1	0
Physics	Washington College	4	8	11	7	8

Internal TU Student Migration						
TU Program (transfer from)		**Enrollment**				
		2018	**2019**	**2020**	**2021**	**2022**
Physics	Towson University	106	99	93	68	57
Earth-Space Science	Towson University	11	8	7	14	13
Geology	Towson University	45	37	38	34	35
		Bachelor's Degree Completions				
		2018	**2019**	**2020**	**2021**	**2022**
Physics	Towson University	14	19	24	12	13
Earth-Space Science	Towson University	2	2	3	1	0
Geology	Towson University	9	17	10	12	11

External Feeder or Transfer Programs						
Program	**Institution**	**Enrollment**				
Arts & Sciences Transfer	Baltimore City Community College	350	239	198	187	120
Mathematics & Science	College of Southern Maryland	179	144	150	153	125
Science	Community College of Baltimore County	575	555	484	428	382
Physical Science	Carroll Community College	2	12	8	9	18
Geosciences	Cecil Community College	0	1	1	3	3
Physics	Cecil Community College	1	4	3	2	3
Arts & Sciences Transfer	Harford Community College	855	796	721	705	671
Arts & Sciences Transfer	Howard Community College	1,334	1,411	1,391	1,258	1,151
Science	Montgomery College	1,283	1,078	1,053	820	838

		Associate's Degree Completions				
		2018	2019	2020	2021	2022
Arts & Sciences Transfer	Baltimore City Community College	47	25	20	13	31
Mathematics & Science	College of Southern Maryland	6	6	3	7	5
Science	Community College of Baltimore County	55	65	48	40	40
Physical Science	Carroll Community College	0	1	3	2	2
Geosciences	Cecil Community College	0	0	0	0	0
Physics	Cecil Community College	2	4	4	1	1
Arts & Sciences Transfer	Harford Community College	217	195	167	167	169
Arts & Sciences Transfer	Howard Community College	238	225	221	203	188
Science	Montgomery College	148	193	170	164	178

D. Reasonableness of Program Duplication

D1. Similar Programs

As detailed in **Table 2**, there are a number of institutions of higher education in Maryland that offer undergraduate degrees in physics and related fields. Most of these programs are "traditional" physics degrees, similar to TU's existing B.S. in Physics, or they have a specialized area of focus (such as engineering or materials science) that is wholly distinct from TU's IP degree. While TU believes that the combination of a strong physics foundation and three specialized areas of focus, with critical bridge courses that provide connections, makes this proposed program unique, a summary of existing programs at other Maryland institutions that are the most like the Planetary Science concentration is provided:

Planetary Science
University of Maryland College Park (UMD): Minor in Planetary Science
Johns Hopkins University (JHU): Major in Earth and Planetary Sciences

TU's proposed Planetary Science concentration within the IP major is a combination of physics, astronomy, geology, and geography, while the curriculum for the UMD minor is primarily astronomy and geology, with no physics requirement. Similarly, the JHU undergraduate program in Earth and Planetary Sciences focuses on earth science, environmental science, geology, geography, with no physics or astronomy requirements other than one course in planetary atmospheres.

Interdisciplinary Programs
Morgan State University: Interdisciplinary Engineering, Information, and Computational Sciences
Morgan State University: Interdisciplinary Sciences
Salisbury University: Integrated Science

Morgan State University (MSU) programs were approved in 2021 and are two of eight interdisciplinary bachelor's degrees offered within its College of Interdisciplinary and Continuing Studies. These two programs have a much broader interdisciplinary scope than TU's proposed IP program, allowing students to take coursework in a wide range of subject areas (depending on the program) that are not available to TU students, such as psychology, sociology and anthropology, various engineering fields, transportation and urban infrastructure, education, public health, nursing, etc.

The Salisbury University Integrated Science degree is also a general interdisciplinary program that allows students to combine areas of study across disciplines. There are no options for Salisbury's Integrated Science program that correspond directly to the Planetary Science concentration in TU's proposed IP program.

D2. Program Justification

Approximately 9,000 physics bachelor's degrees are awarded each year in the U.S. About one half of those degree recipients will enter the workforce in a STEM-related field. Students expect their degrees to confer skills that will help them succeed in the modern economy, which is increasingly technical and interdisciplinary. Thus, it will be highly beneficial for students to obtain a degree with a strong physics foundation and with concentrations that span a variety of other scientific, technical, and business-related fields. The EAB market study found that "...projected growth in employer demand and rising student demand suggests a favorable outlook for the proposed bachelor's-level interdisciplinary physics program." The data presented in sections C.2 and C.3 show the market demand and anticipated vacancies for students possessing skills conferred by the Planetary Science concentration within the proposed IP degree program.

E. Relevance to High-demand Programs at Historically Black Institutions (HBIs)

While Morgan State University does offer undergraduate degree programs (in Physics and Interdisciplinary Sciences) that have some curricular overlap with the Planetary Science concentration within TU's proposed IP degree, section D.1 highlights how TU's proposed IP program differs substantively from MSU's programs. The other three HBIs in the University System of Maryland (USM), Bowie State University, Coppin State University, and University of Maryland Eastern Shore, do not offer physics-related programs.

Interested and qualified students who graduate from TU with a bachelor's degree in Interdisciplinary Physics may pursue programs such as the master's in Integrated Sciences at Morgan State University, so this new bachelor's program may provide a pathway for Towson University undergraduate degree holders to pursue graduate education at a nearby HBI.

F. Relevance to the Identity of Historically Black Institutions (HBIs)

Given the specialized subject areas of the proposed degree, TU does not anticipate that its implementation will impact the uniqueness and institutional identities and missions of HBIs.

G. Adequacy of Curriculum Design, Program Modality, and Related Learning Outcomes

G1 Program Development and Faculty Oversight

The curriculum for the Planetary Science concentration was developed primarily by faculty with expertise in physics and astronomy within the Department of Physics, Astronomy, and Geosciences, in consultation with TU faculty and staff from the variety of disciplines represented in the concentration. Faculty members who will oversee the program are identified in section I.1; they are tenured and tenure-track faculty with diverse research and pedagogical expertise in physics and all the related disciplines in the IP program concentrations.

G2. Educational Objectives and Learning Outcomes

The IP program has three overarching student learning outcomes (SLOs). Upon successful completion of the degree, students in all IP concentrations will be able to:

7. Demonstrate an understanding of fundamental principles of physics and major concepts in a student's chosen concentration and be able to apply these principles to solve quantitative problems.
8. Communicate scientific information effectively in both oral and written formats.

Additionally, students in the Planetary Science concentration will achieve a third learning outcome:

9. Demonstrate an understanding of the interdisciplinary nature of scientific research and theory as they apply to the fields of astronomy, geology, and physics.

These SLOs address the Middle States Commission on Higher Education requirement in the following ways:

SLO 1: Scientific and quantitative reasoning, critical analysis and reasoning, technical competency, and information literacy.

SLO 2: Oral and written communication, information literacy.

SLO 3: Scientific and quantitative reasoning, critical analysis and reasoning, technical competency, and information literacy.

Table 3 shows the alignment of the core requirements of the IP curriculum with the program and concentration-specific SLOs. Yellow shading indicates courses used for SLO measures. Additional courses in each concentration are also used for SLO measures, which are summarized in the following section. All courses used for SLO measures are also shaded in section G.4 Program Requirements and in the Example Program of Study included in Appendix B.

Table 3. Curricular Alignment with Student Learning Outcomes			
Physics Core Requirements	**SLO 1**	**SLO 2**	**SLO 3**
PHYS 185 Introductory Seminar in Physics	x	x	
PHYS 241 General Physics I Calculus-based or PHYS 211 General Physics I non Calculus-based	x	x	x
PHYS 242 General Physics II Calculus-based	x	x	x
PHYS 243 General Physics III	x	x	x
PHYS 305 Computers in Physics	x	x	x
PHYS 311 Modern Physics I	x	x	
PHYS 341 Intermediate Physics Laboratory	x	x	x
PHYS 385 Physics Seminar or ASTR 385 Astrophysics Seminar	x	x	x
PHYS 486 Physics Seminar II	x	x	
MATH 273 Calculus I	x		
MATH 274 Calculus II	x		

Descriptions of all required and concentration courses are included in Appendix A.

G3. Assessment and Documentation of Student Learning Outcomes

Each core SLO has two measures. Performance data are collected each time the courses are taught. Descriptions of the measures are summarized in **Table 4**.

Table 4. Brief Descriptions of Measures

	Measure 1	Measure 2
Outcome 1	The Force Concept Inventory will be administered to all PHYS 241 or PHYS 211 students as a pre/post exam. This exam, developed using physics education research, is a standard test used across the country and allows comparison of TU student results with other institutions.	The Concepts Survey in Electricity and Magnetism (CSEM) exam will be administered to all PHYS 242 students as a pre/post exam. This exam, developed using physics education research, is a standard test used across the country and allows comparison of TU student results with other institutions.
Outcome 2	Students are required to submit written reports for the experiments performed in PHYS 341. One report will be chosen to assess the ability of students to communicate in written form. The "Introduction" and "Conclusion" sections will be evaluated to assess this outcome.	Students will be assessed on oral presentations given in PHYS 385 or ASTR 385.
Outcome 3	The TU Core assessment instrument (pre/post exam) for ASTR 261 will be scored for students in the Planetary Science concentration.	Students in the Planetary Science concentration will be assessed on a data analysis assignment in ASTR 371.

G4. Program Requirements

The curricula of the concentrations within the Interdisciplinary Physics major provide students with a strong foundation in physics along with the freedom to develop an academic program across other fields of study. The IP major has a set of core physics requirements for all concentrations. Each concentration has its own set of requirements, in physics and in a wide variety of other disciplines, crafted as a coherent pathway for development of knowledge and skills sought by today's employers. Because the concentrations within the IP major are tailored to specific projected advanced degree and career pathways, students must choose a concentration.

The Planetary Science concentration combines physics with astronomy and astrophysics, as well as necessary background in geology, in preparation for employment or advanced degrees in the field. Course requirements in geography build skills in analysis of mapping and remote sensing data. The curriculum includes courses that explicitly integrate physics, astronomy, geology, and planetary science. All IP core courses and Planetary Science concentration requirements are listed in the tables below. Yellow shading indicates courses used for SLO measures described in the previous section. Descriptions of all core and concentration courses are included in Appendix A.

Table 5. Required Courses for B.S. in Interdisciplinary Physics - Required Physics Courses		
Course number	**Title**	**Credits**
PHYS 185	Introductory Seminar in Physics	1
PHYS 241 or PHYS 211*	General Physics I (Calculus or non-Calculus-based)	4
PHYS 242	General Physics II Calculus-based	4
PHYS 243	General Physics III	4
PHYS 305	Computers in Physics	4
PHYS 311	Modern Physics I	3
PHYS 341	Intermediate Physics Laboratory I	3
PHYS 385 or ASTR 385	Physics or Astrophysics Seminar	1

PHYS 486	Physics Seminar II	1
Subtotal		**25**
- Required non-Physics Courses		
Course number	**Title**	**Credits**
MATH 273	Calculus I	4
MATH 274	Calculus II	4
Subtotal		**8**
TOTAL		**33**

**A grade of B or better in PHYS 211 is required to substitute for PHYS 241.*

Table 6: Planetary Science Concentration Coursework - Required Physics/Astrophysics Courses		
Course number	**Title**	**Credits**
ASTR 261	Introduction to Astrophysics	4
ASTR 371	Planetary Astronomy	3
Subtotal		**7**
- Required non-Physics Courses		
Course number	**Title**	**Credits**
COSC 175	General Computer Science	4
CHEM 131/131L	General Chemistry I	4
GEOL 121	Physical Geology	4
GEOL 331	Mineralogy	4
GEOL 333	Petrology of Igneous & Metamorphic Rocks	4
GEOG 221	Introduction to Geospatial Technology	3
GEOG 321	Introduction to Remote Sensing and Photogrammetry	3
Upper-level electives in ASTR, CHEM, PHYS, or GEOL		15
General Electives		6
Subtotal		**47**
TOTAL Concentration		**54**
TOTAL w/IP Core		**87**
TOTAL for B.S. Degree		**120**

G5. General Education Requirements
TU's Core Curriculum, comprising fourteen categories within four themes (43-46 credits in total), satisfies the general education requirements mandated by the State of Maryland (COMAR 13B.06.01.03) and educational effectiveness standards held by the university's accrediting body, the Middle States Commission on Higher Education.

The IP Core will allow students to satisfy TU's Core Curriculum requirements in Mathematics (Core 3) and Biological & Physical Sciences (Core 7 and 8), while also completing the IP major requirements. All other TU Core Curriculum requirements will be fulfilled through additional credits as described in the tables above and in Appendix B. All concentrations in the proposed major allow students to fulfil major and TU Core Curriculum requirements in 120 total credits.

G6. Specialized Accreditation and Certification
Not applicable.

G7. Outside Contracts
Not applicable.

G8. Program Information Assurances
All TU undergraduate students are required to meet with an academic advisor each semester. In the first meeting with an advisee, the academic advisor develops a Four-Year Degree Completion Plan for the student, according to the academic requirements for the major and the schedule of course offerings. During subsequent advising meetings, the advisor reviews the student's progress towards their degree and helps the student plan courses for the next semester. The advisor may help the

student modify the degree completion plan, if necessary. Advisors and students will also discuss the student's plans for employment or postgraduate education. Academic advisors often provide information about internships and other opportunities to help students achieve those goals.

Academic advising for students in the Planetary Science concentration will be particularly important for helping students choose a set of elective courses within the concentration that forms a coherent curriculum aligned with the student's interests. Faculty advisors will be assigned so that they are knowledgeable about their advisee's subfield within the IP program.

Students in the IP program will be expected to develop technical competencies throughout the duration of the program, but there are no specific requirements to enter the program other than admission to TU. IP students will have access to the same academic support that all TU students have, such as tutoring, coaching, and workshops available through the TU Tutoring and Learning Center.

IP students will pay regular TU undergraduate tuition and fees and will have the same opportunities for scholarships and research experiences as students in the existing physics program, including the Fisher Scholarship, the Maryland Space Grant Scholarship, and the Eddie L. Loh Scholarship.

Information that will help students be successful in the program, such as the IP's curriculum and degree requirements, learning management system support, financial aid, student support services, etc., will be posted on TU's website and in the undergraduate catalog published annually.

G9. Advertising, Recruiting, and Admissions Materials Assurances
TU regularly reviews its advertising, recruiting, and admissions materials to ensure that they clearly and accurately represent programs and services available, and that there is consistency across different modes of communication such as the TU website, the academic catalog, and other print and online promotional materials.

H. Adequacy of Articulation
TU is developing an articulation agreement for the Planetary Science concentration within the IP major with Cecil College and will pursue articulation agreements with other community colleges once the program is approved.

I. Adequacy of Faculty Resources
I1. Quality of Program Faculty
All the concentrations in this new major are built entirely from existing courses and will require few significant new outlays of resources to launch in the short term. Appendix C lists the faculty who could contribute to the successful execution of this new major. All tenure and tenure track faculty have terminal degrees in their disciplinary fields and bring expertise to the courses they teach and the research they conduct.

The PAGS department has recently hired a new faculty member with expertise in planetary science. The new faculty member will allow us to expand the current course offerings with which we propose to launch the Planetary Science concentration and strengthen it going forward.

Because the IP major is truly interdisciplinary in nature, the proposed Planetary Science concentration will build ties between physics faculty and faculty within and outside the multidisciplinary PAGS department and, in particular, strengthen relationships with the Department of Geography & Environmental Planning within the College of Liberal Arts.

I2. Ongoing Faculty Training

The Faculty Academic Center of Excellence at Towson (FACET) is the faculty development center for Towson University. FACET's mission is to support an inclusive and collaborative faculty community and foster a culture of excellence in scholarship and teaching. FACET supports all campus faculty in their scholarship and teaching through a combination of programs, workshops, resources, funding, and communities of practice such as: Student Engagement, Emerging Technologies, Open Educational Resources, and High Impact Educational Practices. In collaboration with the TU Office of Technology Services, FACET also recommends, reviews, and provides programs to support advancement of faculty skills with Blackboard, TU's learning management system. FACET provides one-on-one or small group, virtual or face-to-face meetings with an instructional design team, who also perform course reviews. Faculty may attend open meetings as well as request consultation from FACET staff.

J. Adequacy of Library Resources

Resources available through TU's Cook Library (https://libraries.towson.edu) are sufficient to meet the needs of students and faculty in the proposed program. The library houses an extensive collection of materials, including more than 500,000 print and electronic volumes. In addition to a dedicated subject librarian, team of research librarians, and subject-specific research guides, the library provides access to 19 physics and astronomy subject-specific databases, such as Nature Portfolio, Scopus, ScienceDirect, JoVE Science Education Unlimited, JSTOR, and SpringerLink. Cook Library also houses computer workstations with specialty software for data analysis, data visualization and mapping.

In addition to Cook Library, faculty and students have access to materials through reciprocal agreements at nearby Baltimore institutions and across USM-affiliated institutions. Materials from other libraries across the country can be requested for loan through standard interlibrary loan (ILL) services. As part of this service, faculty and students have access to RAPID ILL, a service customary at high research activity institutions. The current turnaround time for article requests is typically less than 48 hours.

K. Adequacy of Physical Facilities, Infrastructure, and Instructional Equipment

K1. Assurance of Physical Facilities, Infrastructure and Equipment

TU's existing physical facilities, infrastructure and instructional equipment are sufficient to support the needs of the proposed program. The IP program will be administratively housed in the Department of Physics, Astronomy, and Geosciences in the Fisher College of Science and Mathematics. TU opened the 320,000 square foot Science Complex building in 2021. The Science Complex includes 50 new teaching laboratories and 30 research laboratory facilities with state-of-the-art instrumentation. Faculty in other colleges associated with the Planetary Science concentration are also housed in facilities that are well suited for supporting its students.

K2. Assurance of Distance Learning Resources

The proposed program is designed to be delivered in-person via traditional modes of face-to-face instruction. If distance learning resources are required, whether in an individual course or at a broader scale, TU is well positioned to provide adequate support. The Faculty Academic Center of Excellence at Towson (FACET) offers training and certification programs for online and hybrid/blended instruction, Universal Design for Learning (UDL), and effective pedagogical approaches for enriching distance learning, including the Quality Matters Rubric. Students and faculty can enroll in training modules that provide instruction in university-sponsored distance learning technologies, including Blackboard, WebEx, Zoom, and Panopto. Technology support is available online, as well as via email, text, phone and on a walk-in basis at Student Computing Services and the Office of Technology Services.

L. Adequacy of Financial Resources with Documentation

The proposed IP program will be funded through existing resources from FCSM, the College of Business and Economics, and the College of Liberal Arts. Students in the Planetary Science concentration will be taking courses already offered for physics and geology majors within PAGS and for many other TU undergraduate majors outside PAGS (e.g., Chemistry and Geography); therefore, no expenditures are necessary to develop the program curriculum.

A new faculty hire in astronomy, who began their appointment in fall 2023, will support the Planetary Science concentration at 30 percent FTE effort. This position is included under reallocated funds in **Table 7**. Additionally, PAGS anticipates hiring a new faculty member in Year 2; this position would support teaching in the concentration (budgeted at a 0.13 FTE rate in **Table 8**). Other than this new faculty position, the Planetary Science concentration will be supported through existing faculty and staff budget lines, and therefore no additional funding is required.

TU's new IP program will require some modest marketing resources to attract prospective, new, and transfer students, as well as to advertise the new opportunity to current TU students who may be interested in changing their major to Interdisciplinary Physics with a Planetary Science concentration from programs such as Chemistry or Geography. The types of marketing activities PAGS anticipates undertaking include website development, email and social media marketing, flyers, and giveaway items for TU Open House/TU4U events, and a small travel budget for student club outreach to area high schools. TU has budgeted approximately $1,000 per year for these efforts.

Table 7. Programmatic Resources

Resource Categories	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
1. Reallocated Funds	$32,994	$33,984	$35,004	$36,054	$37,136
a. Reallocated Funds-Faculty FTE[1]	$32,994	$33,984	$35,004	$36,054	$37,136
2. Tuition/Fee Revenue (c + g below)	$33,918	$69,870	$107,946	$135,894	$165,425
a. Number of F/T Students	3	6	9	11	13
b. Annual Tuition/Fee Rate (In State)[2,3]	$11,306	$11,645	$11,994	$12,354	$12,725
c. Total F/T Revenue (a x b)	$33,918	$69,870	$107,946	$135,894	$165,425
d. Number of P/T Students	0	0	0	0	0
e. Credit Hour Rate	$0	$0	$0	$0	$0
f. Annual Credit Hour Rate	$0	$0	$0	$0	$0
g. Total P/T Revenue (d x e x f)	$0	$0	$0	$0	$0
3. Grants, Contracts & Other External Sources	$0	$0	$0	$0	$0
4. Other Sources	$0	$0	$0	$0	$0
TOTAL (Add 1-4)	$66,912	$103,854	$142,949	$171,947	$202,560

[1] *Salary and fringe benefit rates increase by three percent annually.*
[2] *Student enrollments are calculated at 100 percent in-state. It is anticipated that all students will enroll on a full-time basis.*
[3] *Tuition and fees increase by three percent annually.*

Table 8. Programmatic Expenditures

Expenditure Categories	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
1. Faculty (b + c below)	$0	$15,089	$15,541	$16,008	$16,489
a. Number of FTE	0	0.13	0.13	0.13	0.13

b. Total Salary[1]	$0	$10,701	$11,022	$11,353	$11,694
c. Total Benefits[1]	$0	$4,388	$4,519	$4,655	$4,795
2. Admin. Staff (b + c below)	$0	$0	$0	$0	$0
a. Number of FTE	0	0	0	0	0
b. Total Salary	$0	$0	$0	$0	$0
c. Total Benefits	$0	$0	$0	$0	$0
3. Support Staff (b + c below)	$0	$0	$0	$0	$0
a. Number of FTE	0	0	0	0	0
b. Total Salary	$0	$0	$0	$0	$0
c. Total Benefits	$0	$0	$0	$0	$0
4. Technical Support & Equipment	$0	$0	$0	$0	$0
5. Library	$0	$0	$0	$0	$0
6. New or Renovated Space	$0	$0	$0	$0	$0
7. Other Expenses	$1,000	$1,000	$1,000	$1,000	$1,000
TOTAL (Add 1-7)	$1,000	$16,089	$16,541	$17,008	$17,489

[1] *Salary and fringe benefit rates increase by three percent annually.*

M. Adequacy of Provisions for Evaluation of Program

M1. Procedures for Evaluating Courses, Faculty and Student Learning Outcomes

The proposed program will be built from existing courses. Nevertheless, future course development will follow the regular Towson University procedures for approval, first at the program and PAGS department level, through the FCSM Curriculum Committee, and finally the University Curriculum Committee.

The course approval process evaluates new courses for appropriate rigor, effective assessment and grading, and adherence of the course syllabus to best practices. Evaluation at the program level ensures course content accuracy and program alignment, while the college and university level reviews facilitate the production of quality course proposals.

Existing courses are evaluated through regular review by program faculty and by student evaluations. Faculty regularly review courses to determine if the course meets overall program objectives. Additionally, instructors are observed by peers on a routine basis, with more frequent observations if faculty are new to a course or the university. If a course review indicates concerns or problems with a course, faculty develop strategies for addressing problems. Student course evaluation takes place at the end of every semester. Using a tool developed by TU faculty that allows for quantitative and qualitative feedback, students give feedback on instructors (e.g., ability to communicate clearly; quality of student-instructor interaction; preparedness) and suggest improvements for a course.

Evaluation of faculty follows policies and procedures established by TU's policies for faculty annual merit review and for faculty reappointment, tenure, and promotion. These evaluations occur at the department, college, and university level. The main areas of evaluation include teaching, scholarship, and service. Tools used as part of the annual evaluation process include review of the individual's portfolio that includes, but is not limited to, the following:

- Evidence of scholarship (e.g., articles in scholarly journals; presentations at scholarly meetings).

- Service work.
- A synopsis of teaching related activities (e.g., courses taught; new instructional procedures; interdisciplinary, diversity, international, and technology-related projects).
- Review of course syllabi.
- Peer teaching observation reports.
- Quantitative and qualitative student evaluation of instruction.

Section G.3 outlines the program assessment measures and shows their alignment with specific student learning outcomes. On an annual basis, specific learning outcomes are identified for assessment purposes. The program director, with the support of TU's Office of Assessment, will oversee the processes involved in the assessment of student learning outcomes, including collection and analysis of data, and creation of action plans, as necessary.

M2. Evaluation of Program Educational Effectiveness
The assessment of this program will be guided by TU's Office of Assessment, following established TU policies and procedures, including review of the program's assessment plan to ensure that learning outcomes remain appropriate, and that students are meeting expectations.

The program will work with TU entities such as the Office of the Provost, Enrollment Services and Student Services to review data on a regular basis and improve the program when needed. Effectiveness will be assessed by student retention, progress toward degree completion, career outcomes for graduates, student and faculty satisfaction, cost-effectiveness, and other key performance indicators.

Additionally, TU will conduct a comprehensive evaluation of the program every seven years as part of the USM-mandated Periodic Review of Academic Programs process. The purpose of the review is to promote continuous program improvement and ensure that the needs of students are being met. Each program will prepare a self-study, engage an external reviewer to evaluate the program and identify strengths and areas for improvement, and submit a final report to the USM Board of Regents for review and approval.

N. Consistency with the State's Minority Student Achievement Goals
TU has a strong commitment to diversity, equity, and inclusion. With over 56 percent of the students identifying as a racial or ethnic minority,[32] TU is nearly as diverse as the state of Maryland. It is only one of a few universities in the country to have no achievement gap, meaning that underrepresented student groups achieve the same or better academic success as the entire student population. In 2020, the university introduced its inaugural Diversity Strategic Plan. The plan, "*A More Inclusive TU: Advancing Equity and Diversity (2020–25)*," is firmly grounded in the premise that TU's ongoing success is dependent on the university's capacity to shift perspectives and approaches and strategically place diversity, equity, and inclusion at the core of its mission.

Diverse faculty recruitment is a TU institutional goal and faculty recruitment at the University is designed to reach and attract a diverse pool of candidates. Through diverse faculty recruitment, TU strives to foster a learning community that reflects the population of our campus, region, and state, and supports recruitment and retention of a diverse student population along with academic achievement of students from minority and underrepresented backgrounds.

[32] Fall 2023 numbers according to TU Office of Institutional Research: https://www.towson.edu/ir/documents/f_hdct_car_coll_eth.pdf.

In physics at TU, as with physics programs elsewhere in the U.S., racial minority groups are underrepresented. In 2019-2020, African Americans comprised 13.6 percent of the U.S. population but earned only three percent of the physics bachelor's degrees. Similarly, Hispanic/Latinx people comprised 19 percent of the U.S. population, but earned 11 percent of physics bachelor's degrees.[33,34] The 2020 report of the American Institute of Physics National Task Force to Elevate African American Representation in Undergraduate Physics and Astronomy advocates the use of multiple curricular options to retain African American physics majors.[35] Since the Planetary Science concentration of TU's proposed IP degree will provide an additional pathway to a physics degree, we anticipate that this program will enhance the overall racial diversity of PAGS students.

O. Relationship to Low Productivity Programs Identified by the Commission
Not applicable.

P. Adequacy of Distance Education Programs
Not applicable. The majority of courses in the program will be delivered on the main TU campus via face-to-face instruction.

[33] U. S. Census Bureau, 2020: https://www.census.gov/quickfacts/fact/table/US/POP010220#POP010220.
[34] American Institute of Physics Statistical Research Center, Engineering and Physical Science Degrees Earned by Members of Underrepresented Groups: https://www.aip.org/statistics/stats-degrees.
[35] American Institute of Physics National Task Force to Elevate African American Representation in Undergraduate Physics and Astronomy, 2020. The Time is Now: Systemic Changes to Increase African Americans with Bachelors Degrees in Physics and Astronomy: https://www.aip.org/sites/default/files/aipcorp/files/teamup-full-report.pdf.

Appendix A. Descriptions of Course Options in Program Outline

<u>INTERDISCIPLINARY PHYSICS CORE COURSE DESCRIPTIONS</u>

PHYS 185 INTRODUCTORY SEMINAR IN PHYSICS (1)

This seminar is intended for freshmen and sophomores who have demonstrated exceptional ability in the sciences and will involve them directly with current ideas and research in physics. Classical physics, quantum physics, relativity, and the new astronomy will be covered.

PHYS 211 GENERAL PHYSICS I NON-CALCULUS-BASED (4)[36]

For Arts and Sciences, Biology and Geosciences majors: mechanics, heat, light, electricity, magnetism, and a brief introduction to modern physics. Three lecture units and one three-unit laboratory period. Prerequisite: MATH 115 or good standing in high school algebra and trigonometry. Core: Biological & Physical Sciences. Lab/Class fee will be assessed.

PHYS 241 GENERAL PHYSICS I CALCULUS-BASED (4)[10]

Calculus-based physics for science and engineering majors. Mechanics and the conservation laws, gravitation, simple harmonic motion. Prerequisite: MATH 273 (may be taken concurrently). Core: Biological & Physical Sciences. Lab/Class fee will be assessed.

PHYS 242 GENERAL PHYSICS II CALCULUS-BASED (4)

Continuation of PHYS 241. Electricity, magnetism, DC and AC currents, geometric optics. Prerequisites: PHYS 241, MATH 274 (may be taken concurrently). Core: Biological & Physical Sciences. Lab/Class fee will be assessed.

PHYS 243 GENERAL PHYSICS III (4)

Special relativity, fluid kinematics and dynamics, waves, thermodynamics. Prerequisite: PHYS 242.

PHYS 305 COMPUTERS IN PHYSICS (4)

Introduction to hardware and software applications of computers in physics, including computer interfacing to experiments, computer aided design, LabView programming, data analysis, simulation, and modeling techniques. Prerequisite: PHYS 241. Lab/Class fee will be assessed.

PHYS 311 MODERN PHYSICS I (3)

A description of special relativity, quantum theory, atomic structure, and spectra. Three lecture hours. Prerequisites: MATH 274, PHYS 242 or PHYS 252; or PHYS 212 with consent of instructor).

PHYS 341 INTERMEDIATE PHYSICS LABORATORY I (3)

Experiments which defined modern physics. Exploration of classical and modern research methods: data acquisition and analysis, optical and nuclear spectroscopy. Six laboratory hours. Prerequisites: PHYS 305; PHYS 311 (may be taken concurrently). Lab/Class fee will be assessed.

PHYS 385 PHYSICS SEMINAR (1)[37]

Students participate in colloquia on topics of current interest in physics research under guidance of instructor. One lecture hour. Prerequisite: at least junior standing.

ASTR 385 ASTROPHYSICS SEMINAR (1)[11]

Students learn to present technical material orally by attending and discussing presentations given by others and by giving presentations themselves on topics of current interest in astrophysics. Prerequisite: junior/senior standing as a Physics Major or Astronomy Minor.

PHYS 486 PHYSICS SEMINAR II (1)

Students participate in colloquia on topics of current interests in physics research under guidance of instructor. One lecture hour. Prerequisite: senior standing or consent of instructor.

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[36] Students may take either PHYS 211 or PHYS 241.

[37] Students may take either PHYS 385 or ASTR 385.

MATH 273 CALCULUS I (4)
Functions, limits, and continuity; differentiation of algebraic and trigonometric functions; mean value theorem; differentials; introduction to integration; applications. Four lecture hours and one laboratory hour per week. Prerequisite: qualifying score on Math Placement exam or MATH 117 or MATH 119. Core: Mathematics.

MATH 274 CALCULUS II (4)
Differentiation and integration of exponential, logarithmic, and inverse trigonometric functions; techniques of integration and applications; indeterminate forms; improper integrals; sequences and series of numbers; power series. Prerequisite: MATH 273. Core: Mathematics.

PLANETARY SCIENCE CONCENTRATION COURSE DESCRIPTIONS

ASTR 261 INTRODUCTION TO ASTROPHYSICS (4)
Students will develop an understanding of the physical processes governing motions of celestial objects; the electromagnetic spectrum and the interaction of light and matter; star and planet formation and evolution; the extragalactic distance scale; and the early universe. Prerequisites: PHYS 211 or PHYS 241; not open to students who have successfully completed ASTR 161 and ASTR 181.

ASTR 371 PLANETARY ASTRONOMY (3)
Planetary formation both around our Sun and around other stars, planetary interiors and surface processes, and atmospheres. Primitive surfaces, cratering, volcanism, tectonism, origin and evolution of planetary atmospheres. The course may include an observational segment (e.g., sketching the planets through a telescope) and field trips to local sites of geological interest. Prerequisites: ASTR 161 or ASTR 261 or GEOL 121 and PHYS 211 or PHYS 241.

COSC 175 GENERAL COMPUTER SCIENCE (4)
Computer systems overview, algorithm development, data representation, software design and testing methodologies, and brief overview of advanced topics.

CHEM 131 GENERAL CHEMISTRY I (3)
Atomic and molecular structure; theories of bonding, stoichiometry; chemical reactions; gases; solutions. Open to science/math majors/minors only. Not open to those who successfully completed CHEM 110. CHEM 131 is a quantitative course and students are expected to be proficient in algebraic manipulations and graphical interpretation. Corequisite: CHEM 131L. Core: Biological & Physical Sciences. Lab/Class fee will be assessed.

CHEM 131L GENERAL CHEMISTRY I LABORATORY (3)
Laboratory experiments to support concepts of General Chemistry I Lecture. Not open to those who successfully completed CHEM 110. Corequisite: CHEM 131. Core: Biological & Physical Sciences. Lab/class fee will be assessed.

GEOL 121 PHYSICAL GEOLOGY (4)
Composition and structure of the earth, the internal and external forces acting upon it, and the surface features resulting. Laboratory studies of common rocks and minerals, geologic and topographic maps, and aerial photographs. Field trips required. Three lecture hours and three laboratory hours per week. Core: Biological & Physical Sciences. Lab/Class fee will be assessed.

GEOL 331 MINERALOGY (4)
The study of minerals with emphasis on crystallography, crystal chemistry, and chemical-structural classification. Laboratory identification of minerals in hand specimen, in thin section by application of principles of optical mineralogy, by chemical analysis, and by X-ray diffraction analysis. Three lecture hours and three laboratory hours. Prerequisites: GEOL 121 and CHEM 131/ CHEM 131L. Lab/Class fee will be assessed.

GEOL 333 PETROLOGY OF IGNEOUS AND METAMORPHIC ROCKS (4)
Study of the properties and genesis of two major rock groups. Megascopic and microscopic techniques in rock classification. Environments of formation. Case studies from the Maryland Piedmont. Field trips required. Three lecture hours and three laboratory hours. Prerequisite: GEOL 331. Lab/Class fee will be assessed.

GEOG 221 INTRODUCTION TO GEOSPATIAL TECHNOLOGY (3)
Introduction to most effective ways to record and communicate spatial information. Emphasizes geotechniques including digital cartography, remote sensing, GIS, and GPS. Includes georeference systems, cartographic representation, and basic skills needed to use and understand geospatial data.

GEOG 321 INTRODUCTION TO REMOTE SENSING AND PHOTOGRAMMETRY (3)
Fundamentals and the development of remote sensing, the nature of the electromagnetic radiation and its interaction with the atmosphere and surface objects, photographic systems, aerial photography, and photogrammetry basics. Prerequisites: GEOG 101 and GEOG 221.

Appendix B. Example Program of Study

Courses used for measures of Student Learning Outcomes are shaded in yellow.

Planetary Science Concentration: Four-Year Plan				
Year 1				
Fall			*Spring*	
PHYS 185	1		GEOL 121	4
CHEM 131/131L	4		MATH 273 (=CORE 3)	4
CORE 1	3		CORE 4	3
CORE 2	3		ELECTIVE	3
ELECTIVE	3			
Total	14		Total	14
Year 2				
Fall			*Spring*	
PHYS 241 (=CORE 7)	4		PHYS 242 (=CORE 8)	4
MATH 274	4		GEOG 221	3
COSC 175	4		ELECTIVE	3
GEOL 331	4		CORE 5	3
			CORE 6	3
Total	16		Total	16
Year 3				
Fall			*Spring*	
ASTR 261	4		ASTR 385	1
PHYS 305	4		PHYS 243	4
ELECTIVE	3		GEOG 321	3
CORE 9	3		CORE 10	3
			CORE 11	3
Total	14		Total	14
Year 4				
Fall			*Spring*	
ASTR 371	3		GEOL 333	4
PHYS 311	3		CORE 13	3
PHYS 341	3		CORE 14	3
PHYS 486	1		ELECTIVE	3
ELECTIVE	3		ELECTIVE	3
CORE 12	3			
Total	16		Total	16
Credit Grand Total	**120**			

Appendix C. Faculty Supporting the Planetary Science Concentration in the Interdisciplinary Physics Major

Full-Time PAGS Program	**Faculty**		
Name	**Terminal Degree**	**Field**	**Academic Title**
Bedard, Antoine	Ph.D.	Electrical Engineering	Lecturer
Casey, Michelle	Ph.D.	Geosciences	Associate Professor
Ghavamian, Parviz	Ph.D.	Astrophysics	Professor
Guice, George	Ph.D.	Geosciences	Visiting Assistant Professor
Ha, Phuoc	Ph.D.	Physics	Professor
Hasse, Tobias	Ph.D.	Geosciences	Lecturer
Hawkins, Andrew	Ph.D.	Geosciences	Lecturer
Hilligoss, Dylan	M.S.	Physics	Lecturer
Jackson, Alan	Ph.D.	Astrophysics	Assistant Professor
Kolagani, Rajeswari	Ph.D.	Physics	Professor
Krause, Thomas	Ph.D.	Physics	Associate Professor
Kudsieh, Nicholas	Ph.D.	Physics	Lecturer
Lising, Laura	Ph.D.	Physics	Lecturer
Moore, Joel	Ph.D.	Geosciences	Professor
Nelson, Wendy	Ph.D.	Geosciences	Associate Professor
Overduin, James	Ph.D.	Physics	Professor
Perkons, Eriks	M.S.	Geosciences	Lecturer
Ready, Christian	B.S.	Astrophysics	Lecturer
Requena Torres, Miguel	Ph.D.	Astrophysics	Lecturer
Schaefer, David	Ph.D.	Physics	Professor
Scott, Jennifer	Ph.D.	Astrophysics	Professor
Simpson, Jeffrey	Ph.D.	Physics	Professor
Smolyaninova, Vera	Ph.D.	Physics	Professor
Tsai, Tevis	B.S.	Mathematics	Lecturer
Yan, Jia-An	Ph.D.	Physics	Professor

Full-time PAGS faculty who are available to teach specific courses in the Interdisciplinary Physics program's core curriculum and in the Planetary Science concentration are listed below.

There is a sizable pool of full-time and adjunct faculty drawn from other colleges across TU who are available to teach in the Planetary Science concentration—approximate numbers of non-PAGS faculty qualified to teach each non-physics course are listed below. TU will determine which non-PAGS faculty will teach in the program, based on faculty availability, on a semester-by-semester basis.

Interdisciplinary Physics Core

PAGS Faculty	**PHYS**

	185	211	241	242	243	305	311	341	385	486
Bedard, Antoine		X	X	X						
Ghavamian, Parviz	X	X	X	X	X		X		X	X
Ha, Phuoc	X	X	X	X	X		X		X	X
Jackson, Alan	X	X	X	X	X	X				
Kolagani, Rajeswari	X	X	X	X	X		X	X	X	X
Krause, Thomas	X	X	X	X	X			X	X	X
Kudsieh, Nicholas		X	X	X						X
Lising, Laura		X	X	X						
Overduin, James	X	X	X	X	X		X		X	X
Schaefer, David	X	X	X	X	X	X	X	X	X	X
Scott, Jennifer	X	X	X	X	X		X		X	X
Simpson, Jeffrey	X	X	X	X	X	X	X	X	X	X
Smolyaninova, Vera	X	X	X	X	X		X	X	X	X
Tsai, Tevis		X	X	X						
Yan, Jia-An	X	X	X	X	X	X	X		X	X

Non-PAGS faculty		
Requirement	**TU Department**	**Number of faculty**
MATH 273	Mathematics	10
MATH 274	Mathematics	10

Planetary Science Concentration

PAGS Faculty	**ASTR**		**GEOL**		
	261	371	121	331	333
Casey, Michelle			X	X	
Ghavamian, Parviz	X	X			
Guice, George			X	X	X
Hasse, Tobias			X	X	
Hawkins, Andrew			X		
Hilligoss, Dylan	X				
Jackson, Alan	X	X			
Krause, Thomas	X				
Moore, Joel			X	X	X
Nelson, Wendy			X	X	X
Perkons, Eriks			X		
Ready, Christian	X	X			
Requena Torres, Miguel	X	X			
Scott, Jennifer	X	X			

Non-PAGS Faculty		
Requirement	**TU Department**	**Number of faculty**
COSC 175	Computer and Information Sciences	10

CHEM 131	Chemistry	12
CHEM 131L	Chemistry	12
GEOG 221	Geography	5
GEOG 232	Geography	1
GEOG 321	Geography	1

UNIVERSITY SYSTEM of MARYLAND

BOARD OF REGENTS
SUMMARY OF ITEM FOR ACTION,
INFORMATION, OR DISCUSSION

TOPIC: *The University of Baltimore Master of Science (M.S.) in Artificial Intelligence for Business*

COMMITTEE: Education Policy and Student Life and Safety

DATE OF COMMITTEE MEETING: April 12, 2024

SUMMARY: The University of Baltimore seeks the approval of the Board of Regents to introduce a new program, the MS in Artificial Intelligence for Business, designed to meet critical workforce needs in the region. It will achieve this by endowing participants with practical AI competencies and knowledge of how to apply AI in various business fields. This will be accomplished through coursework in the general application of AI in business, ethics and regulation of AI, and the application of AI in such fields as accounting, finance, marketing, entrepreneurship, organizational behavior, and supply chain management.

The 30-credit AI-focused program provides a swift route for professionals to enhance their skills and progress in the field of business and AI. The goal is to train professionals who can use AI strategically, across all aspects of business, but also do so while being mindful of ethical and regulatory issues that entail AI implementation in business.

In October 2023, President Joe Biden and Secretary of Commerce Gina Raimondo named Baltimore as one of 31 "federal tech hubs," a designation that will prompt tens of millions of dollars in funding across the region. As a result of this announcement, Baltimore is expected to become home to major advancements in artificial intelligence and biotechnology, with an emphasis on the use of data to guide clinical decisions and improve patient outcomes. The university believes that the proposed program meets the needs of our learners as well as our community.

ALTERNATIVE(S): The Regents may not approve the program or may request further information.

FISCAL IMPACT: No additional funds are required. The program can be supported by the projected tuition and fee revenue.

CHANCELLOR'S RECOMMENDATION: That the Education Policy and Student Life and Safety Committee recommend that the Board of Regents approve the proposal from the University of Baltimore to offer the Master of Science (M.S.) in Artificial Intelligence for Business.

COMMITTEE RECOMMENDATION:	DATE:
BOARD ACTION:	DATE:
SUBMITTED BY: Alison M. Wrynn 301-445-1992	awrynn@usmd.edu

March 15, 2024

Jay A. Perman, M.D.
Chancellor
University System of Maryland
3300 Metzerott Road
Adelphi, Maryland 20783

Dear Dr. Perman,

The University of Baltimore is proposing a new Master of Science in Artificial Intelligence in Business (proposed CIP 52.1399 and proposed program code 0599.00). This is a 30-credit program that provides a graduate degree in an area of study swift route for professionals to enhance their skills and progress in the field of business and AI.

This proposed program addresses a need in training highly qualified business professionals for the region. It will achieve this by endowing participants with practical AI and knowledge of how to apply AI in various business fields, skills which are currently in high demand across various industries.

If you have any questions, please contact the Office of the Provost at 410.837.5243. Thank you for your review.

Sincerely,

Ralph O. Mueller
Sr. Vice President and Provost

Encl.

cc: Dr. Candace Caraco, Associate Vice Chancellor for Academic Programs, Academic & Enrollment Services and Articulation

Office of the Provost
UNIVERSITY OF BALTIMORE
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UNIVERSITY SYSTEM OF MARYLAND INSTITUTION PROPOSAL FOR

X	New Instructional Program
	Substantial Expansion/Major Modification
	Cooperative Degree Program
X	Within Existing Resources, or
	Requiring New Resources

The University of Baltimore
Institution Submitting Proposal

MS in Artificial Intelligence for Business
Title of Proposed Program

Master's Degree	**Fall 2024**
Award to be Offered	Projected Implementation Date
0599.00	**52.1399**
Proposed HEGIS Code	Proposed CIP Code
Merrick School of Business	Mikhail Pevzner
Department in which program will be located	Department Contact
410-837-5862	mpevzner@ubalt.edu
Contact Phone Number	Contact E-Mail Address
	2/28/24
Signature of President or Designee	Date

A. Centrality to Institutional Mission and Planning Priorities:

1. Provide a description of the program, including each area of concentration (if applicable), and how it relates to the institution's approved mission.

The University of Baltimore, a Predominantly Black Institution in Maryland, seeks MHEC's authorization to introduce a new program, MS in Artificial Intelligence for Business. Established in 1925, the university has consistently upheld the mission of preparing highly skilled professionals for the state of Maryland with a special emphasis on business education. The Merrick School of Business (MSB) at the University of Baltimore earned AACSB accreditation in 1983 and pioneered the first AACSB-accredited, fully online MBA in the United States.

Today, the University of Baltimore stands as a diverse institution, where African Americans constitute 45% of our student body. An integral aspect of our mission is to equip individuals with exceptional business acumen, particularly for the diverse communities of Baltimore and its surroundings.

In October 2023, President Joe Biden and Secretary of Commerce Gina Raimondo named Baltimore as one of 31 "federal tech hubs," a designation that will prompt tens of millions of dollars in funding across the region as part of a nationwide effort to ensure American competitiveness in various aspects of technology.

As a result of this announcement, Baltimore is expected to become home to major advancements in artificial intelligence (AI) and biotechnology, with an emphasis on the use of data to guide clinical decisions and improve patient outcomes. Our city is now eligible for approximately $500 million in federal funds for projects within the area over the next five years. According to the Greater Baltimore Committee, the tech hub designation will bring $3.2 billion in economic impact and 52,000 jobs over the next 5+ years. Thus, training business professionals on how to apply AI, particularly in the biotech industry, is critical to our local economy.

The University of Baltimore's mission statement emphasizes our commitment to providing career-focused education for both aspiring and current professionals. This approach ensures that the region benefits from highly educated leaders who contribute significantly to the broader community. As the landscape of business undergoes a transformative shift due to the advent of AI tools, our proposed program will equip individuals with the essential skills to apply AI techniques effectively in the business sphere.

Recent advancements in AI and, in particular, Generative AI are expected to fundamentally transform business. A recent survey by Amazon Web Services (AWS) indicated that "80% of respondents to the AWS survey said they believe it will transform their organizations, and 64% in the Wavestone survey said it is the most transformational technology in a generation. A large majority of survey takers are also increasing investment in the technology." [1]

The envisioned MS in Artificial Intelligence for Business program will thus play a pivotal role in training highly qualified business professionals for the region to meet the significant labor demand expected from this AI transformation. It will achieve this by endowing participants with practical AI and knowledge of how to apply AI in various business fields, skills which are currently in high demand across various industries. This will be accomplished through coursework in the general application of AI in business, ethics and regulation of AI, application of AI in such fields as

[1] https://sloanreview.mit.edu/article/five-key-trends-in-ai-and-data-science-for-2024/

accounting and finance, marketing, entrepreneurship, organizational behavior and supply chain management.

Our 30-credit AI-focused program provides a swift route for professionals to enhance their skills and progress in the field of business and AI. Our goal is to train professionals who can use AI strategically, across all aspects of business, but also do so while being mindful of ethical and regulatory issues that entail AI implementation in business.

We have observed a growing demand for business professionals who possess robust AI competencies in Maryland. As detailed below, this trend underscores the significance of our MS in Artificial Intelligence for Business program in satisfying the state's need for highly skilled graduates.

The demand for strong applied AI skills within the state is now more pressing than ever. According to The Wall Street Journal, "Generative AI, by some estimates, is poised to double the rate of U.S. productivity growth after a decade of widespread adoption, potentially contributing trillions of dollars annually to global economic output."[2] According to the consulting firm McKinsey, “Generative AI’s impact on productivity could add trillions of dollars in value to the global economy. Our latest research estimates that generative AI could add the equivalent of $2.6 trillion to $4.4 trillion annually across the 63 use cases we analyzed—by comparison, the United Kingdom’s entire GDP in 2021 was $3.1 trillion. This would increase the impact of all artificial intelligence by 15 to 40 percent. This estimate would roughly double if we include the impact of embedding generative AI into software that is currently used for other tasks beyond those use cases.”[3] According to Forbes, “The AI market is projected to reach a staggering $407 billion by 2027, experiencing substantial growth from its estimated $86.9 billion revenue in 2022… AI is expected to contribute a significant 21% net increase to the United States GDP by 2030, showcasing its impact on economic growth... A significant 64% of businesses believe that artificial intelligence will help increase their overall productivity, as revealed in a Forbes Advisor survey. This demonstrates the growing confidence in AI’s potential to transform business operations.”[4]

McKinsey’s report[5] further explains how AI is expected to affect business operations. For example, it will do so through:

- Customer operations: Improving customer and agent experiences
- Marketing and sales: Boosting personalization, content creation, and sales productivity
- Software engineering: Speeding developer work as a coding assistant
- Product R&D: Reducing research and design time, improving simulation and testing

It stands to reason that the wide-spread adoption of the AI in business will be truly transformative of how business will be done in the U.S. and worldwide in the upcoming decades. This underscores the need for a program that will provide the link between AI and business which is what we are trying to create.

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[2] https://www.wsj.com/articles/generative-ai-promises-an-economic-revolution-managing-the-disruption-will-be-crucial-b1c0f054
[3] https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/the-economic-potential-of-generative-ai-the-next-productivity-frontier#key-insights
[4] https://www.forbes.com/advisor/business/ai-statistics/#sources_section
[5] https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/the-economic-potential-of-generative-ai-the-next-productivity-frontier#industry-impacts

Consistent with these staggering expectations, Figure 1, sourced from Stanford University's AI Annual Report, reveals that Maryland witnessed the addition of nearly 17,000 AI-related job openings in 2022. This is consistent with a recent University of Maryland's White Paper reporting that Maryland is one of the States that has the largest gains in AI jobs between 2018 and 2023. In particular, this White Paper reports that "Maryland's share [of AI jobs] increased from 1.51% in 2018 to 2.97% in 2023." [6] Overall, these statistics are consistent with Visualcapitalist.com's report that in 2022, Maryland ranked 17th in the nation in terms of demand for AI jobs, as shown in Figure 2.

Looking more broadly, the University of Maryland's White Paper cited above reported that "In 2018, the National Capital Region's share of AI job postings (7.54%) was about half that of the region's share of IT job postings (14.05%) and not much more than its share of all job postings (6.36%). By 2023, the picture has been transformed. At 12.63%, the region's share of AI job postings is second only to California's at 19.03%. This share is now at parity to the region's share of IT job postings (12.77%) and more than double that of all job postings (5.83%). The National Capital Region has emerged as the second biggest hub for AI job postings after California."

Anticipating continued growth, the demand for AI professionals is projected to escalate. By some estimates, by 2030, up to 375 million workers will need to retool their skills due to the integration of automation and AI in the workplace. Consequently, we foresee that this seismic shift in how American companies conduct business will create substantial demand for business graduates with a deep understanding of how AI will integrate into various business practices. We thus want to create this program to appropriately prepare the Maryland workforce for this all-encompassing transition.

[6] UMD-LinkUp AI Maps Project (2024). From West to the Rest: Growing Geographic Dispersion of AI Jobs in America. White Paper #1. University of Maryland.

Figure 1:

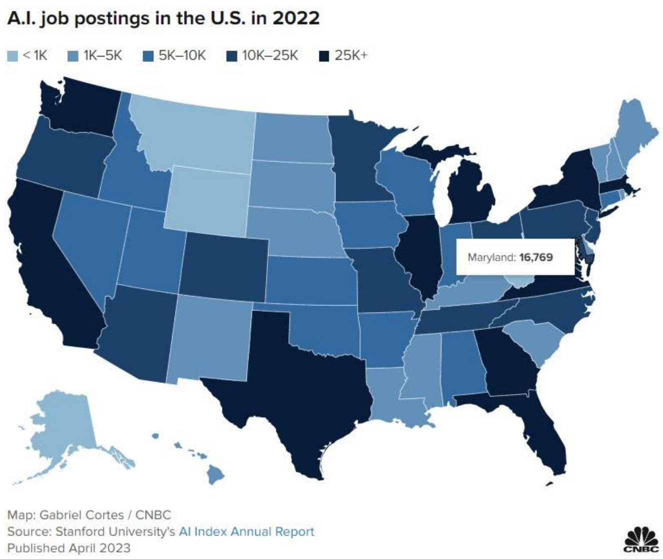


Figure 2:

Search:

Rank	State	Number of job postings	% of total
11	North Carolina	23,854	3.0%
12	New Jersey	23,447	2.9%
13	Colorado	20,421	2.6%
14	Pennsylvania	20,397	2.6%
15	Arizona	19,514	2.5%
16	Ohio	19,208	2.4%
17	Maryland	16,769	2.1%
18	Minnesota	11,808	1.5%
19	Tennessee	11,173	1.4%
20	Missouri	10,990	1.4%

Our faculty members are well-qualified to lead the courses outlined in the program curriculum. The majority of the AI, business, and related courses will be instructed by our faculty, who actively engage in both research and teaching in these areas as part of their standard responsibilities.

Moreover, the applied business electives featured in the program will be delivered by our Merrick School of Business faculty. These dedicated educators have either undergone rigorous training in AI techniques or are currently in the process of acquiring this expertise to enhance their teaching capabilities.

2. **Explain how the proposed program supports the institution's strategic goals and provide evidence that affirms it is an institutional priority.**

The University of Baltimore's (UBALT) Strategic Goals are:

- Goal 1: Position UBALT as the region's premier professional, career-focused university
- Goal 2: Strengthen student success
- Goal 3: Solidify UBALT's commitment to community engagement and service
- Goal 4: Organize for long-term financial stability
- Goal 5: Achieve excellence in research, scholarship, and creative activity
- Goal 6: Strengthen UBALT's commitment to diversity, equity and inclusion

The program directly aligns with Goals 1, 4, and 6, underscoring the University of Baltimore's commitment to producing highly qualified business professionals. By introducing the MS in Artificial Intelligence for Business program, tailored to meet the demands of a market hungry for professionals adept in AI, business analytics, and general business skills, our institution solidifies its reputation as a premier training ground for exceptional talent.

Furthermore, we are at the forefront of innovation by integrating cutting-edge machine learning and generative AI tools into our business curriculum through this program. This initiative equips our students with the necessary competencies to remain competitive in today's swiftly evolving marketplace. In fact, a recent article in The Wall Street Journal emphasizes the imminent ubiquity of AI-driven tools, underlining the urgency for individuals to adapt or risk falling behind. We are witnessing an increasing reliance on AI-assisted communications, planning, and product development, all of which demand a deep and integrated understanding of AI in business operations.

Additionally, the STEM designation of the program enhances its appeal to international students, contributing to our institution's financial stability and enriching the diversity of our student body. This strategic move aligns with our commitment to global inclusivity and further positions the University of Baltimore as a leader in providing advanced business education.

3. **Provide a brief narrative of how the proposed program will be adequately funded for at least the first five years of program implementation. (Additional related information is required in section L.)**

The program, in its current configuration, will be managed by our existing faculty, thereby eliminating the need for additional resources in terms of new faculty hires. Our current faculty members possess the capability to effectively instruct within the program, as we can reassign them from other programs that are experiencing a decreased demand. Furthermore, we are prepared to leverage adjunct faculty members as needed to ensure the program's successful delivery.

Please find detailed financial information in Section L of this proposal, beginning on page 29.

4. **Provide a description of the institution's commitment to:**

   a) **ongoing administrative, financial, and technical support of the proposed program**

   The program's needs will be met within the capacity of the existing faculty's teaching loads. To the extent necessary, overload compensation will be utilized.

   b) **continuation of the program for a period of time sufficient to allow enrolled students to complete the program.**

   We are committed to offering the program as long as reasonably necessary to build sufficient and sustainable enrollments.

B. Critical and Compelling Regional or Statewide Need as Identified in the State Plan:

1. **Demonstrate demand and need for the program in terms of meeting present and future needs of the region and the State in general based on one or more of the following:**

   a) **The need for the advancement and evolution of knowledge**
   b) **Societal needs, including expanding educational opportunities and choices for minority and educationally disadvantaged students at institutions of higher education**
   c) **The need to strengthen and expand the capacity of historically black institutions to provide high quality and unique educational programs**

   The University of Baltimore is a Predominantly-Black, minority-serving Institution with a highly diverse student body in multiple dimensions—racially, economically, and ethnically. Recent news reports suggest that racial minorities and women are disproportionally exposed to AI-related job displacement[7]. Thus, creating this new program to emphasize the role of AI in business should significantly increase access to higher-paying jobs among minority and economically disadvantaged students and thus shield them from the negative consequences of the AI-driven revolution in our economy.

2. **Provide evidence that the perceived need is consistent with the Maryland State Plan for Postsecondary Education.**

   The 2022 Maryland State Plan for Postsecondary Education outlines three primary goals for the postsecondary community in Maryland:

   Student Access: Ensure equitable access to affordable and quality postsecondary education for all Maryland residents.

   Student Success: Promote and implement practices and policies that will ensure student success.

   Innovation: Foster innovation in all aspects of Maryland higher education to improve access and student success.

[7] https://www.nbcnews.com/news/asian-america/asian-american-workers-heavily-affected-ai-rcna98179

The University of Baltimore is an open-access, minority-serving, Predominantly Black Institution. To our knowledge, currently, there are no similar programs on the role of AI in business in the State of Maryland.

Specifically, the program addresses the Priority 8 *Promote the Culture of Risk Taking* of 2022 Maryland Plan for Higher Education. Specifically, Priority 8 states: "In order to remain one of the leading states in higher education, Maryland will need to be *innovative and agile* to serve the changing student and changing workforce... Innovations should be centered on *solving problems and providing new opportunities*. The challenge, of course, is to identify the problem. Additionally, it is essential that an equity framework or lens is adopted when implementing innovative solutions and opportunities. The use of metrics that establish the problem can help identify solutions and help schools, colleges, universities, and organizations more readily consider innovative solutions." (emphasis added). The program is focused on a new and emerging field of AI which is bound to significantly change how companies will do business in the foreseeable future.

C. Quantifiable and Reliable Evidence and Documentation of Market Supply and Demand in the Region and State:

1. Describe potential industry or industries, employment opportunities, and expected level of entry (ex: mid-level management) for graduates of the proposed program.

We expect our graduates to be employed in a variety of industries as AI product managers, prompt engineers, AI product strategists and analysts, AI consultants, AI data analysts and financial systems analysts, and intelligence analysts.

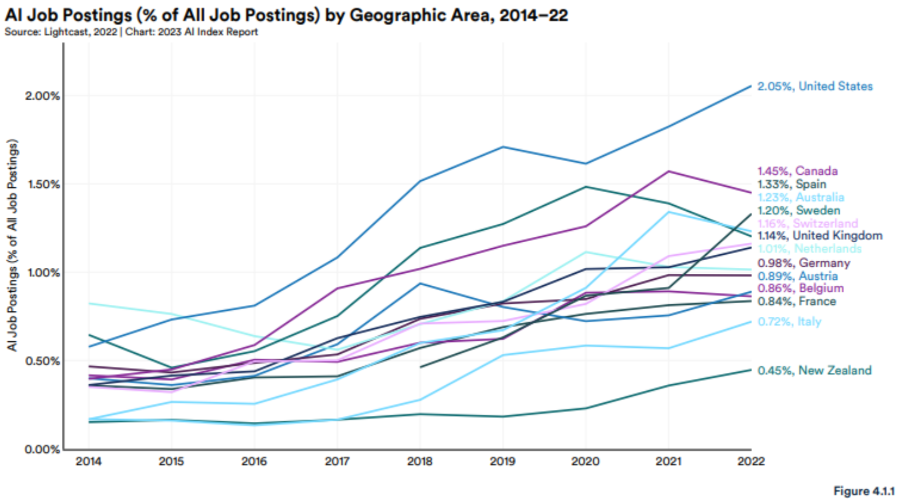
2. Present data and analysis projecting market demand and the availability of openings in a job market to be served by the new program.

According to Stanford University's 2023 Artificial Intelligence Index Report, "Across *every sector* in the United States for which there is data (with the exception of agriculture, forestry, fishing, and hunting), the number of AI-related job postings has increased on average from 1.7% in 2021 to 1.9% in 2022. Employers in the United States are increasingly looking for workers with AI-related skills" (page 170, emphasis added).

The Report further discusses AI-skills penetration. "The AI skill penetration rate is a metric created by LinkedIn that measures the prevalence of various AI-related skills across occupations…".

Figure 3 below from the Report illustrates that the U.S. has some of the highest AI-job-posting levels in the world.

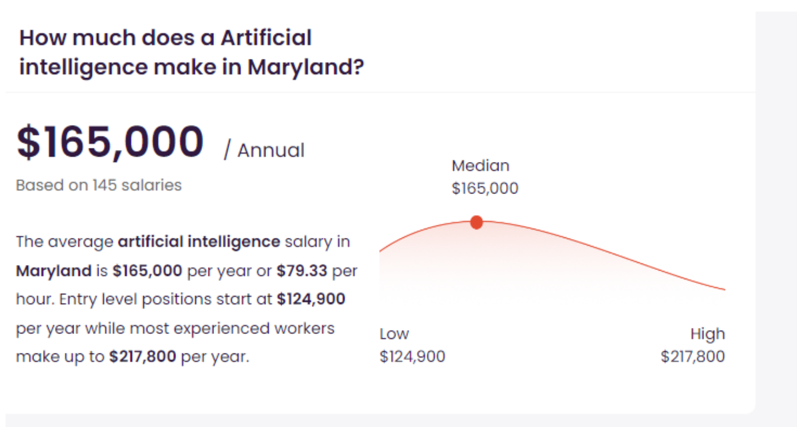
Figure 3:



Taken together, this suggests that the nationwide AI-related employer demand will remain strong in the future.

As this is an emerging area of employment, there is currently no official data on the projected demand in AI jobs from the State of Maryland beyond an estimate of approximately 17,000 jobs from Stanford University's Report we identify above. As of this writing, there are 1,310 AI-related job postings in Maryland on Indeed.com and 922 such job postings on Simplyhired.com. According to Talent.com, the average AI-related salary in MD is $165,000 (Figure 4). Given that the current demand for AI-jobs in Maryland appears to be stronger than many other states, we expect that the growth in AI-related jobs in Maryland will mirror national trends.

Figure 4:

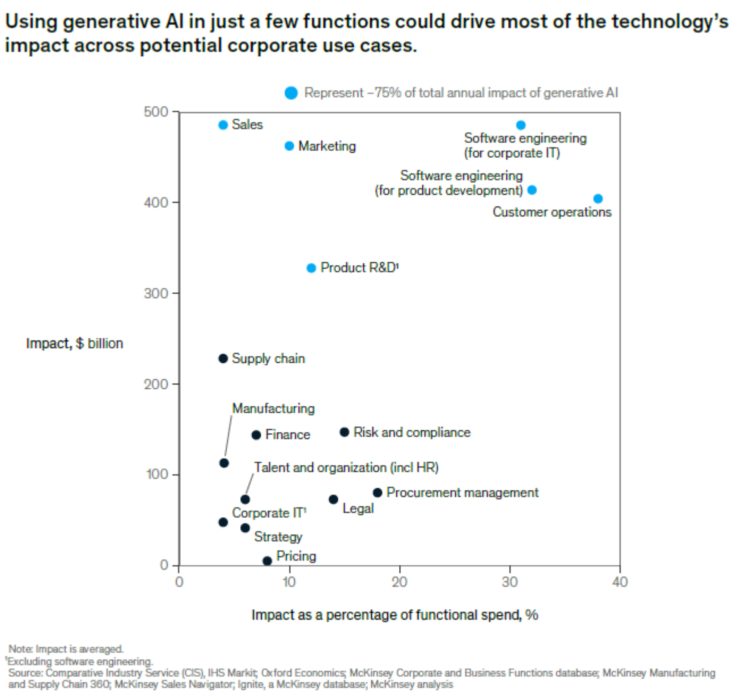


2. **Discuss and provide evidence of market surveys that clearly provide quantifiable and reliable data on the educational and training needs and the anticipated number of vacancies expected over the next 5 years.**

Forbes indicates that "AI continues to revolutionize various industries, with an expected annual growth rate of 37.3% between 2023 and 2030, as reported by Grand View Research. This rapid growth emphasizes the increasing impact of AI technologies in the coming years."[8] An article in Onhires.com states that "…the demand for AI specialists is believed to steadily grow in the coming years, with a projected growth rate of 40% in the AI workforce from 2023 to 2025, according to the World Economic Forum's report. The number of AI-related job openings will reach an estimated 97 million new jobs created by 2025. The same report also claims that the share of jobs requiring AI skills will increase by 58%." [9] Because Maryland is a home for many IT firms and government contractors that will likely adopt AI technology more quickly, we expect this trend to be consistent, if not stronger, in Maryland.

Figure 5 below from the McKinsey Report on the economic potential of Generative AI summarizes the expected impact of Generative AI adoption in various business fields indicating high demand for professionals that understand how AI will affect various aspects of business.

Figure 5[10]:



State of Maryland employment projections currently do not specifically forecast AI or AI-related job demand. However, it does provide data on the demand for data science and computer-related occupations[11] It is reasonable to expect that the AI-job demand is correlated with data science and computer-related jobs. This is because AI-jobs are "generated" as a result of the work of data scientists and others in the computer-related industries.

[8] https://www.forbes.com/advisor/business/ai-statistics/#sources_section
[9] https://www.onhires.com/blog-post/statistics-and-forecasts-for-recruiting-in-ai#:~:text=The%20same%20report%20also%20claims,28.4%25%20from%202018%20to%202023
[10] Source: The Economic Potential of Integrative AI, McKinsey and Company, June 2023, https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/the-economic-potential-of-generative-ai-the-next-productivity-frontier
[11] https://www.dllr.state.md.us/lmi/iandoproj/occupationalprojections.xls

Table 1:

Occupational Title	Employment			
	2020	2030	Change	% Chg
Database Administrators and Architects	5,117	5,615	498	9.7%
Data Scientists and Mathematical Science Occupations, All Other	2,334	3,045	711	30.5%
Computer and Information Systems Managers	13,771	15,402	1,631	11.8%
Computer and Mathematical Occupations	165,712	192,508	26,796	16.2%
Computer Occupations	155,003	178,976	23,973	15.5%
Computer Systems Analysts	18,870	21,063	2,193	11.6%
Information Security Analysts	8,337	11,396	3,059	36.7%
Computer and Information Research Scientists	2,813	3,285	472	16.8%
Computer Network Support Specialists	8,009	8,910	901	11.3%
Computer User Support Specialists	13,649	15,499	1,850	13.6%
Computer Network Architects	8,030	8,848	818	10.2%

As can be seen from Table 1, data science and related computer occupations are expected to have robust double-digit growth in the next 6 years in Maryland with data science jobs exhibiting growth in excess of 30%. This is consistent with the nation-wide expectations of data science job growth of 35% through 2032[12]. This is also consistent with the expected worldwide AI-related job growth of 97 million additional jobs[13].

It should also be noted that it is broadly expected that as AI is further integrated into business, new jobs and occupations will be created. For example, it is reasonable to expect that there will be a demand for professionals specifically involved in management of AI in business. As our program focuses on application of AI in various business fields, our students will develop knowledge and skills related to (a) identifying and understanding how AI can add value to specific business functions; (b) selecting the appropriate AI tools to address the problems or opportunities involved; and (c) planning and managing the implementation of integrating the AI into business processes. For example, our program incorporates a course on the application of AI in human resource management (Applications of Artificial Intelligence for Human Resources and General Management); students in this course will benefit from understanding how AI can affect interactions within business teams. Similarly, AI is widely expected to affect the marketing field. Our Program's students who take Applications of AI in Marketing course will be able to better take advantage of those opportunities.[14]

3. **Provide data showing the current and projected supply of prospective graduates.**

[12] https://www.bls.gov/ooh/math/data-scientists.htm
[13] https://edisonandblack.com/pages/over-97-million-jobs-set-to-be-created-by-ai.html#:~:text=AI%20Job%20Boom%3F,million%20new%20jobs%20by%202025.
[14] https://www.qortex.ai/blog/how-ai-is-affecting-the-job-market-in-marketing-advertising

The proposed program is unique, particularly within the state of Maryland. As such, there is no current or projected supply of graduates within this area of study.

D. Reasonableness of Program Duplication:

D.1. Programs with the Same CIP Code 52.1399

MHEC has indicated that one area of particular program duplication scrutiny is the programs with the same CIP code. Thus, we begin by comparing our proposed Master of Science Program to the existing Master's and Post-Baccalaureate Certificate programs with CIP code 52.1399 in MHEC Program Inventory. Table 2 below summarizes the programs in Maryland that have the same CIP code 52.1399. As can be seen, with the exception of Johns Hopkins MS in Business Analytics and Risk Management, which is further discussed in Table 3, none of the programs in this CIP code emphasize either data analytics or artificial intelligence, and as such our proposed program is not duplicative with respect to these other programs.

Table 2: Maryland Programs with CIP Code 52.1399[15]

Institution	Program	Degree Type	HEGIS Code
Johns Hopkins University	BUSINESS ANALYTICS & RISK MNGT	Master's Degree	50603
Johns Hopkins University	BUSINESS ANALYTICS AND RISK MANAGEMENT	Post-Baccalaureate Certificate[16]	50603
Towson University	SUPPLY CHAIN MANAGEMENT	Master's Degree and Post-Baccalaureate Certificate	50602
Towson University	MARKETING INTELLIGENCE	Master's Degree	50900
Towson University	INTERACTIVE MARKETING	Post-Baccalaureate Certificate	50900
Towson University	INTERACTIVE MARKETING	Post-Baccalaureate Certificate	50901
Towson University	SUPPLY CHAIN MANAGEMENT	Post-Baccalaureate Certificate	50602
Univ. of Maryland, College Park	SUPPLY CHAIN MANAGEMENT	Master's Degree	51000
Univ. of Maryland, College Park	ACCOUNTING	Master's Degree	50200

D.2. Analysis of the Other Potentially Similar Programs

While there are *technical (i.e., focused on computer science)* AI programs in Maryland (which are described in Table 3 below), to our knowledge, there are currently no similar *AI business application* programs in Maryland. There are, however, programs in the adjacent fields such as data and business analytics. We note that although our program does include data analytics courses as a means of supporting AI and application of AI in business courses, **our program is *neither a data or traditional***

[15] Source: MHEC Program Inventory
[16] This program appears to be inactive, as it is not shown on JHU catalog website: https://e-catalogue.jhu.edu/business/degrees-certificates/

business analytics-focused nor technical (i.e. programming or application development-focused) AI program*.** **Rather, our program emphasizes the *interaction between AI and business, and to our knowledge there are no such other programs in Maryland. In particular, our program emphasizes the study of relevant applications of AI tools to specific business tasks, how to select, plan for, and manage the implementation of such tools into existing organizations. Furthermore, our program emphasizes students' understanding of the ethics and regulation of AI in business. The distinctiveness of our program from the other programs in Maryland is illustrated in Table 3 below. Accordingly, in that Table and notes thereto we discuss AI and data analytics programs that are typically more technical in nature and therefore pose the least program duplication concerns.

Table 3: Other AI, data, and business analytics programs in Maryland

This table summarizes the content of programs in the other institutions that cover technical AI or have a general data analytics focus. Panel A discusses technical AI or AI-related programs in Maryland while Panel B discusses the other data science and related business analytics programs in Maryland that could have an appearance of connection to AI.

Panel A: Programs in Maryland with a technical AI or general data analytics focus

Institution	Program	Program Focus
University of Maryland College Park	Machine Learning Specialization in Combined BS/MS program MS in Data Science MPS in Data Science and Analytics	Technical[17]
Johns Hopkins University	PBC in AI (School of Engineering) MS in Artificial Intelligence	Technical[18]
Johns Hopkins University	MS in Data Science	Technical with AI only being one of several elements of the program. [19]
Morgan State University	MS in Advanced Computing (School of Computer, Mathematical and Natural Sciences).	Technical with AI only being one of several elements of the program[20]
Capitol Technology University	PhD in Artificial Intelligence MS in Research (MSRes) in Artificial Intelligence BS in Artificial Intelligence	A technical research doctorate[21]

[17] https://undergrad.cs.umd.edu/machine-learning-degree-requirements; https://cmns.umd.edu/graduate/science-academy/data-science/masters; https://academiccatalog.umd.edu/graduate/programs/data-science-analytics-mpda/data-science-analytics-mps/

[18] https://ep.jhu.edu/programs/artificial-intelligence/graduate-certificate/; https://e-catalogue.jhu.edu/engineering/engineering-professionals/artificial-intelligence/master-of-science/

[19] https://ep.jhu.edu/programs/data-science/courses/

[20] https://mhec.maryland.gov/institutions_training/documents/acadaff/acadproginstitapprovals/Proposals/PP20132.pdf

[21] https://www.captechu.edu/degrees-and-programs/doctoral-degrees/artificial-intelligence-phd ; https://www.captechu.edu/degrees-and-programs/masters-degrees/artificial-intelligence-mres; https://www.captechu.edu/degrees-and-programs/bachelors-degrees/artificial-intelligence-bs

Notes to Panel A of Table 3:

AI-related programs at the University of Maryland College Park (UMCP). UMCP does not have a program with AI in its title, but it's a nexus of Ai-related research in the State of Maryland whereby it operates a multitude of AI and AI-related initiative on its campus[22]. UMCP has several graduate programs that are AI-related: the machine learning track in the accelerated five year BS/MS in Computer Science program; MS in Data Science, and MPS in Data Science and Analytics. All these programs have very strong computer science and machine learning focus unlike the UBALT program where the emphasis is on business implementation issues related to AI.

AI programs in Johns Hopkins University (JHU). JHU has two programs that AI-based—MS in Artificial Intelligence and PBC in Artificial Intelligence. MS in Artificial Intelligence consists of 12 credits of required technical computer science and AI courses (coursework in algorithms, applied machine learning, technical AI, and creating of AI-enabled systems; these 12 credits also constitute the PBC in Artificial Intelligence); the students can then also take 18 credits of electives, almost all of which are technical AI or computer science or related courses. Of those electives, only one, Values and Ethics and AI has any resemblance to the business-application AI coursework in the UBALT program. However, a closer look at that course makes it clear that its focus is also technical, with much greater emphasis on technical bias in AI-driven algorithms.

Please refer to Section D.3. for a more in-depth discussion of the offerings of **Morgan State University.**

AI programs in Capital Technology University (CTU). The two graduate CTU programs MSRes in Artificial Intelligence and PhD in Artificial Intelligence have a strong research focus which is very different than the UBALT proposed program that has an applied business focus. On online MSRes in Artificial Intelligence consists of six five-credit courses that cover research design methodologies, research on future design of artificial intelligence, and coursework on actual doctoral research. CTU's Phd in Artificial Intelligence builds on the MSRes program by adding more research method and evolution of AI courses and providing space for doctoral theses credits. Thus, these graduate two programs have no real resemblance to the UBALT program other than the use of the name Artificial Intelligence in title.

Capital Technology University's Bachelor in Artificial Intelligence is a technical computer science-focused program much more similar to JHU's or UMCP programs. Its primary emphasis is on technical computer science, machine learning, technical AI, and mathematics. It requires two business courses focused on introduction to management and project management, respectively which have very minimal overlap with the business application of AI coursework requirements of the UBALT program.

[22] https://research.umd.edu/capabilities/research-areas/ai-and-data-science

Panel B: Other Programs in Maryland with Potential AI-connection

Institution	Program	Program Focus
Morgan State University	MS in Data Analytics and Visualization (Graves School of Business)	A program with broad focus in data analytics and visualization without specific AI focus[23]. There is a general business track in the program, but it does not emphasize how AI is used in business (discussed in Section D3 below).
Notre Dame College of MD	MS in Analytics	A technical data analytics program without AI impact
Johns Hopkins University	MS in Business Analytics and Risk Management	Business Analytics program[24] emphasizing the applications of data analytics in various fields of business. The face-to-face modality of the program is offered in Washington DC and as such would not be a competitor in Baltimore market. The program does not have AI-specific content.
McDaniel College	MS in Data Analytics	A technical data analytics program without AI impact
Towson University	MS in Actuarial Science and Predictive Analytics	A technical program focused on actuarial science and its analytics applications.
Loyola University Maryland	MS in Data Science	The program has technical and business analytics specialization (discussed in Section D3 below) without specific AI focus.
University of Maryland Global Campus (UMGC)	MS in Data Analytics (online)	A data analytics focused program with a single machine learning course. No coursework examining the role of AI in business.
University of Maryland Baltimore County (UMBC)	MPS in Data Science	A technical program in data science with several tracks, one of which is management science (discussed in Section D3 below). No courses on application of AI in business are in the program.
Maryland Institute College of Art (MICA)	MPS in Data Analytics and Visualization	A technical program that emphasizes visualization and cognitive perception aspects of data analytics. No AI is included in the program.

23 https://www.morgan.edu/information-science-and-systems/academic-programs/graduate/data-analytics-and-visualization

24 https://carey.jhu.edu/programs/master-science-programs/ms-business-analytics-risk-management

Notes to Panel B of Table 3:

As can be seen above, these programs have an emphasis in business analytics or data science without a particular AI-emphasis. As such, there are no potential program duplication issues.

D.3. Discussion of Possible Program Duplication Issues

Our analysis of potential program duplication issues results in the conclusion that our program does not duplicate any existing program offered within Maryland.

In this section, we elaborate on possible duplication issues with respect to the programs in Maryland business schools that have stronger business component than more technical programs listed in Panels A and B in Table 3.

Morgan State University (MSU)'s MS in Data Analytics and Visualization offered through MSU's Graves School of Business.

The original MSU program application states: "This new program is designed for students who have completed a bachelor's degree program and are interested in furthering their careers within their discipline by adding the theory, tools, methodologies, and processes for data analytics and data visualization, which are in high demand. The program will also meet the needs of working professionals who wish to update or improve their knowledge of data analytics and data visualization and apply best practices to strengthen their current roles" (emphasis added).

While our proposed MS in Artificial Intelligence for Business program shares some coursework with the MSU program, their focuses are radically different. Our program primarily emphasizes the application of AI in business, whereas the MSU program is transdisciplinary, with only one of its elective tracks focusing on business. However, this business track at MSU does not delve into the practical implementation and use of AI in business, as our program application proposes. To clarify, our program includes some data analytics courses because data analytics often serves as a foundational step before implementing AI. High-quality, clean, and well-structured data is essential for training and validating AI models. Therefore, our program equips students with the necessary tools for AI coursework, enabling them to prepare data, identify relevant features, and discern patterns that inform the design and training of AI models.

Our MS in Artificial Intelligence for Business program places particular emphasis on cutting-edge Artificial Intelligence algorithms and their practical applications. Instead of covering a broad spectrum of topics in data science "horizontally," our program delves deep into the AI domain "vertically." In contrast to existing data analytics programs, such as the data analytics and visualization program offered by Morgan State University, our program places less emphasis on traditional data analytics and visualization techniques. After providing students with fundamental programming and statistical knowledge, we shift our focus to advanced AI algorithms, including deep learning, reinforcement learning, and large language models. Notably, we have developed a series of courses focused on AI applications in various domains, such as finance, accounting, supply chain, and marketing. It's important to highlight that these courses are not generic business classes, as found in the MSU program's business track. In our AI application courses, students learn how to apply cutting-edge AI models in specific fields. For instance, in the marketing application course, students will gain expertise in using ChatGPT to generate advertising texts. Graduates from our program acquire a deep understanding of AI's capabilities across various fields and possess the skills to apply appropriate AI models or software to address specific business challenges.

In summary, data analytics primarily revolves around historical data analysis to derive insights and make informed decisions, whereas AI involves using algorithms to simulate human intelligence and automate tasks. Data analytics serves as a critical preparatory step for utilizing data in AI applications within a business context. Consequently, graduates of the UBALT and MSU programs are likely to pursue entirely different career paths. MSU graduates will focus on working with data, involving tasks such as coding, database management, and modeling software utilization. In contrast, our UBALT program graduates will apply AI algorithms to specific functional areas and excel in identifying and implementing AI solutions for precise business problems.

Loyola University Maryland (LUM)—MS in Data Science with Specialization in Business Analytics

LUM's program website[25] states:

"The Business Analytics specialization is designed for students who have introductory statistics, and who are interested *in business applications of data science such as marketing or management*. The specialization requires two courses in computer science, two courses in data science, and two courses in statistics followed by electives in business, computer science, or statistics; and a capstone research project conducted with a partner in local industry/government/non-profit. The Technical specialization requires three courses in computer science, two courses in data science, and two courses in statistics followed by electives in computer science, statistics, and/or business; and a capstone research project conducted with a partner in local industry/government/non-profit.

For students beginning in Fall 2021 and thereafter, all courses will be offered *100% online*. Depending on the instructor, the course may be offered either synchronously or asynchronously" (emphasis added).

Required Courses

- CS701 - Introduction to Programming
- CS703 - Programming for Data Science
- CS737 - Machine Learning (only Technical Specialization)
- DS730 - Introduction to Data Science
- DS795 - Data Science Project Design
- DS796 - Data Science Project
- DS851 - Business Intelligence and Data Mining
- ST710 - Statistical Computing
- ST765 - Linear Statistical Models

Technical Electives

- Computer Science Electives
- CS745 - Multimedia Data Analysis and Mining
- CS766 - Information Retrieval and Natural Language Processing
- ST767 - Multivariate Analysis
- ST775 - Generalized Linear Models and Multilevel Models
- ST778 - Time Series Analysis

The program's business electives are:

- GB712 - Law, Ethics, and Social Responsibility

[25] https://www.loyola.edu/academics/data-science/graduate/curriculum-course-planning

- GB735 - Project Management
- DS736 - Data Visualization for Decision Making
- DS739 - Data Management and Database Systems
- GB740 - Digital Marketing and Analytics (only Business Analytics Specialization)
- GB759 - Special Topics in Management Information Systems: Location Analytics (only Business Analytics Specialization)

A review of the coursework above suggests that the program has only a minimal overlap with our program through a single technical Machine Learning course. Among business electives, there is an ethics course but the ethics course in our program emphasizes ethical issues in AI and is not a generalized ethics course. Moreover, the LUM program is entirely online but we are applying for a face-to-face program. Hence, our programs will not be competing against each other.

UMBC's MPS in Data Science

Based on the listing of program requirements on its website[26], this appears to be a technical data science program with one required machine learning course. The program also includes a Management Science track which allows 9 credits of electives from management and engineering management. However, none of these courses emphasize the application of AI in business. Thus, this program does not compete with our program.

In conclusion, we would like to point out that our program duplication analysis also reveals that our program is complementary to all data or business analytics programs in Maryland. As such, students completing these programs in the other institutions can still take advantage of our program; it is particularly advantageous for students completing business analytics or data analytics undergraduate programs.

E. Relevance to High-demand Programs at Historically Black Institutions (HBIs)

1. Discuss the program's potential impact on the implementation or maintenance of high-demand programs at HBIs.

According to the current MHEC Program Inventory, none of the HBIs in the State currently offer graduate business programs in Artificial Intelligence. Thus, we do not expect any impact on high-demand HBI programs.

F. Relevance to the identity of Historically Black Institutions (HBIs)

1. Discuss the program's potential impact on the uniqueness and institutional identities and missions of HBIs.

We expect no effect on the uniqueness and institutional identities and missions of HBIs since none of the HBIs in the State currently provide graduate programs that emphasize applications of Artificial Intelligence for Business. We have discussed above how our program is truly distinct from the existing data analytics programs in Maryland's HBIs.

[26] https://professionalprograms.umbc.edu/data-science/masters-of-professional-studies-data-science/

G. Adequacy of Curriculum Design, Program Modality, and Related Learning Outcomes (as outlined in COMAR 13B.02.03.10):

1. Describe how the proposed program was established, and also describe the faculty who will oversee the program.

This is a new program that is cross-disciplinary in nature. It will be taught by the University of Baltimore's Merrick School of Business faculty from Information and Decision Sciences, Management, Finance, and Marketing and Entrepreneurship.

2. Describe educational objectives and learning outcomes appropriate to the rigor, breadth, and (modality) of the program.

Competency 1: AI and Machine Learning

LO 1.1: Students will articulate how to design, train, and evaluate AI and Machine Learning models that can be used in solving business challenges.

Competency 2: Application of AI and Machine Learning Tools in Business

LO 2.1 Students will be able to employ discipline-specific knowledge to identify proper models and critical features for solving business problems (including general and strategic human resource management, financial management, entrepreneurship, marketing, and operations and supply chain management).

LO 2.2 Students will be able to evaluate and address ethical, legal, and regulatory implications of applying Artificial Intelligence for Business.

Competency 3: Communication and Presentation Skills

LO 3.1 Students will be able to effectively communicate their recommendations and guidance on AI applications in various business disciplines to their constituents.

3. Explain how the institution will:

a) provide for assessment of student achievement of learning outcomes in the program.

Program goals have been mapped across all courses in the curriculum and assessments for each competency and goal occur within courses. Rubrics are developed by the department and used to assess artifacts collected by faculty bi-annually. Departmental assessment meetings discuss ways to improve student outcomes across the curriculum and improvements are not limited to the courses where the assessment occurs. Finally, the Merrick School of Business conducts bi-annual Assessment Retreats where assessment results are presented to a broad constituency.

b) document student achievement of learning outcomes in the program.

As described above, assessment is a faculty-driven cycle of continuous improvement. While assessment results document student achievement, they are also used to drive curriculum change.

4. **Provide a list of courses with title, semester credit hours and course descriptions, along with a description of program requirements.**

   While the total number of credits after prerequisites remains unchanged, both the required and elective courses have been realigned in the proposed program.

   <u>Program Requirements:</u>

   Prior to starting their studies, students are required to demonstrate basic knowledge of business functions and operations. This can be evidenced by prior coursework or completion of the Business Foundations module (which can be in the form of a MOOC or equivalent course).

   Required Courses (18 credits):

Course Number	Title	Credits
INSS 611 and 612	Data Science Tool Kit I and II	3
OPRE 505 and 506	Fundamentals of Statistics and Managerial Statistics	3
OPRE 605 and 606	Business Analytics, Data Mining for Business	3
INSS 625	Introduction of AI in Business	3
INSS 630	Machine Learning for Business	3
ECON 740	Business, Ethical, and Regulatory Perspectives of AI	3

Application of AI in business electives: choose 4 courses from the following list (12 credits)

Course Number	Title	Credits
MGMT 740	Applications of Artificial Intelligence for Human Resources and General Management	3
MKTG 740	Applications of Artificial Intelligence in Marketing	3
ENTR 740	Business Applications of Artificial Intelligence in Entrepreneurship	3
OPM 740	Applications of Artificial Intelligence for Operations and Supply Chain Management	3
FIN 624	Finance and Accounting Analytics	3

CIP Code 52.1399 is defined as follows: *Any instructional program in business quantitative methods and management science not listed above*.[27]

Because our program combines requirements in business statistics, machine learning and business applications of AI, it incorporates elements of management science and business quantitative methods; thus, we believe this CIP code is appropriate.

[27] https://nces.ed.gov/ipeds/cipcode/cipdetail.aspx?y=55&cipid=88928

Recommended Course Sequencing

The proposed program builds heavily upon skills in artificial intelligence that are introduced in the first semester(s) of study. Upon this foundation, students will gain insights into ethics and emerging regulation in the field and will then apply this knowledge in their final 12 credits. A prospective three semester sequence for a full-time student would be:

First Semester	**Second Semester**	**Third Semester**
INSS 611 and 612	OPRE 605 and 606	Application of AI Elective
OPRE 505 and 506	ECON 740	Application of AI Elective
INSS 625	INSS 630	Application of AI Elective
	Application of AI Elective	

For students studying part-time, additional semesters will be required to complete the program, although the general course sequencing will be similar.

Course Descriptions (credit hours are given in parentheses)

INSS 611 Data Science Toolkit I (1.50)
This course will introduce the basis of using the Python programming language in data science, specifically to collect and manipulate data in preparation for exploratory data analysis and prediction. No prior programming experience is required. Topics will include Python data structures, program logic and libraries, as well as data wrangling and data management. Types of data sources covered will include databases as well as unstructured data sources such as social media feeds.

INSS 612 Data Science Toolkit II (1.50)
The effectiveness of business analytics depends on the quality of the data fed into the analytics models used. Data scientists can spend as much as 60% of their time cleaning and organizing data. This course focuses on preparing data for analytics tasks, to improve the accuracy and reliability of the results. Using Python students will learn to "wrangle" (clean, transform, merge, and reshape) data. Techniques will include data parsing, data correction, and data standardization. Prerequisite: INSS 611 Data Science Toolkit I

OPRE 505 Fundamentals of Statistics (1.50)
Emphasizes applications of descriptive statistics in business. Topics include basic probability concepts, summary measures of location and dispersion, discrete and continuous probability distributions, sampling distribution of mean, and introductions to confidence interval estimation and hypothesis testing. Excel-based software is used for computer implementation.
Prerequisite: graduate standing

OPRE 506 Managerial Statistics (1.50)
Emphasizes applications of inferential statistics in business. Topics include confidence interval estimation, hypothesis testing, analysis of variance, simple linear regression and an introduction to multiple regression. Excel-based software is used for computer implementation.
Prerequisite: OPRE 505 Fundamentals of Statistics

OPRE 605 Business Analytics (1.50)
Explores business analytics and its applications to management decision-making for a range of business situations. Covers problem structuring; big data; data mining; optimization; computer simulation; decision analysis; and predictive modeling.
Prerequisite: OPRE 505 and OPRE 506 or equivalent

OPRE 606 Data Mining for Business (1.5)
This course provides an exploration of data mining techniques to discover meaningful insights within vast and complex datasets for business problems. Students will understand the role of data mining in today's data-driven world and gain practical skills for exploring data to extract patterns and associations, making predictions, segmenting data, and evaluating data mining models. Data mining algorithms covered in this course include single linkage cluster analysis, K-means, K-nearest neighbor, discriminant analysis, decision trees, market basket analysis, etc. Python is used as the main software in this course to implement data mining techniques. Students will apply data mining models to real-world case studies using Python to extract actionable knowledge from data.
Prerequisite: OPRE 605 Business Analytics

INSS 625 Introduction to AI for Business (3)
In a business landscape increasingly driven by data and technology, artificial intelligence (AI) has emerged as a transformative force with the potential to drive efficiency, innovation, and competitive advantage across industries. This introductory course aims to equip students with the knowledge and tools needed to harness the power of AI to make informed decisions, enhance processes, and create value. Upon completing this course, participants will have a foundational understanding of AI and its practical applications in the business world. They will be equipped with the knowledge to engage in informed discussions about AI strategies, make data-driven decisions, and explore opportunities for AI integration within their organizations, as well as practical skills using generative AI tools such as ChatGPT.
Prerequisite: Completion of the Business Foundations Bootcamp (e.g., in the form of a MOOC or equivalent course), or permission of the Graduate Program Director.

INSS 630 Machine Learning for Business (3)
This course provides a systematic understanding of why and when machine learning models can help business decision-making processes in various areas. Students learn the use of unsupervised techniques, such as clustering, association, and dimensionality reduction, and supervised techniques, such as regression and classification. Algorithms covered include logistic regression, support vector machines, decision trees, K-Means, KNN, random forest, etc. Hands-on exercises using Python also teach students how to perform machine learning analyses, from data preprocessing to model evaluation. An introduction to deep learning concepts, including tools such as neural networks, caps off the course.
Prerequisites: INSS 612 Data Science Toolkit II and OPRE 506 Managerial Statistics.

ECON 740 Business, Ethical, and Regulatory Perspectives of AI (3)
This course delves into the ethical and regulatory dimensions of using Artificial Intelligence for Business incorporating perspectives of stakeholders. Introductions to various ethical perspectives and approaches are used to ferment analysis within various domains of ethical reasoning. Current and proposed regulations are discussed through an economic lens. Students will gain a comprehensive understanding of the ethical principles guiding AI applications, as well as the legal frameworks and compliance requirements for businesses operating in AI-driven environments. Students will be encouraged to critically consider how to apply AI in our daily and professional lives.
Prerequisite: INSS 625 Introduction to AI for Business.

FIN 624 Finance and Accounting Analytics (3)
This course focuses on applying cutting-edge analytics and artificial intelligence (e.g., machine learning and generative AI) techniques to examine "big data" in finance, accounting, and auditing. Students will acquire working knowledge of common financial data analytics software packages (e.g., Python, SAS, Tableau, ChatGPT and similar generative AI packages). The course will heavily emphasize using data analytics techniques in solving common finance, accounting and auditing problems through using data preparation, data visualization, and analysis techniques. Prerequisite: FIN 605

ENTR 740 Applications of Artificial Intelligence in Entrepreneurship (3)
Introduces students to the opportunities and challenges of artificial intelligence (AI) in entrepreneurship. Main topics include the practical applications of AI in opportunity identification, evaluation and exploitation, the role of AI in shaping startup activity, and societal implications of AI-driven entrepreneurship.
Prerequisite: INSS 625 Introduction to AI for Business.

MGMT 740 Applications of Artificial Intelligence for Human Resources and General Management (3)
Combining theory and practical application, this course first introduces students to foundational principles of General Management and Strategic Human Resource Management. Specific AI applications related to decision-making, and management of these functions are then presented and practiced. Finally, students will apply such relevant tools to business situations.
Prerequisite: INSS 625 Introduction to AI for Business.

MKTG 740 Applications of Artificial Intelligence in Marketing (3)
This course provides a basic understanding of the role artificial intelligence (AI) plays in marketing. The course will provide an overview of the machine learning techniques and applications for marketing.
Prerequisite: INSS 625 Introduction to AI for Business.

OPM 740 Applications of Artificial Intelligence for Operations and Supply Chain Management (3)
Combining theory and practical application, this course introduces students to important principles related to developing and implementing the integration of artificial intelligence tools into key areas related to operations and supply chain management such as forecasting, quality control, service quality, production efficiency, inventory management, and route optimization. Prerequisite: INSS 625 Introduction to AI for Business.

5. Discuss how general education requirements will be met, if applicable.

Not applicable to graduate degrees.

6. **Identify any specialized accreditation or graduate certification requirements for this program and its students.**

   The program is within scope of AACSB accreditation of the Merrick School of Business at the University of Baltimore.

7. **If contracting with another institution or non-collegiate organization, provide a copy of the written contract.**

   Not applicable.

8. **Provide assurance and any appropriate evidence that the proposed program will provide students with clear, complete, and timely information on the curriculum, course and degree requirements, nature of faculty/student interaction, assumptions about technology competence and skills, technical equipment requirements, learning management system, availability of academic support services and financial resources, and costs and payment policies.**

   UBalt's website is a valuable resource that offers students a wealth of up-to-date information. This includes details about program curricula, course and degree requirements, expected technology competencies and skills for each degree, technical equipment prerequisites for courses, academic support services, available financial aid resources, comprehensive cost breakdowns, and payment policies. Additionally, students can access information about our state-of-the-art learning management system (LMS), Canvas, which serves as a vital platform for their educational journey.

   Within Canvas, we provide a range of student tutorials to assist with LMS navigation, ensuring students can make the most of its features. Moreover, individual courses can offer resource materials through this platform, further enhancing the learning experience.

   Our commitment to student success extends to ensuring accessibility. The University's Office of Disability and Access Services maintains a dedicated website and physical office with regular office hours. We also provide access to video and audio technologies to assist students who require accommodation.

   The Division of Student Support and Access Services, along with the Bogomolny Library, offer a diverse array of academic and other support services. These encompass access to counseling resources, available 24/7, to address the various needs of our students and foster their overall well-being. The Office of the Dean will work with the website content manager to ensure that the MS in Artificial Intelligence for Business curriculum is developed. The catalog will be revised to reflect the new program requirements, and an updated Guide to Graduation for the MS in Artificial Intelligence for Business will be provided for the major. Information about course formats and technology assumptions, as well as any equipment requirements, will be available, as usual, to students in the course schedule. Each student will receive a syllabus that outlines student learning outcomes, course format, technology needs, and campus resources. These resources include the Office of Disability and Access Services, the Academic Support Center (which has a Writing Center), and the Office of Technology Services.

9. **Provide assurance and any appropriate evidence that advertising, recruiting, and admissions materials will clearly and accurately represent the proposed program and the services available.**

The program director will communicate with the Merrick School of Business and university marketing departments to ensure that any marketing materials, such as program fact sheets, reflect the new curriculum. See above for information about the catalog and website. The catalog is updated annually and posted online, in addition to the routine program web page updates.

H. Adequacy of Articulation

Address how an undergraduate program supports transfer from other public institutions, especially community colleges. Identify as well any planned accelerated options or dual degrees. For graduate programs, identify any internal accelerated pathways or dual degrees or other planned partnerships that involve articulation.

The Program is within the scope of Accelerated BS-MS programs within the University of Baltimore, as articulated by the University System of Maryland's rules for Accelerated Programs. Under this Policy, an undergraduate student with a GPA of 3.5 or higher is allowed to take up to 9 graduate credits and double count them towards their graduate degree.

I. Adequacy of Faculty Resources (as outlined in COMAR 13B.02.03.11).

1. **Provide a brief narrative demonstrating the quality of program faculty. Include a summary list of faculty with appointment type, terminal degree title and field, academic title/rank, status (full-time, part-time, adjunct) and the course(s) each faculty member will teach in the proposed program.**

Faculty Member	Appointment Type	Field	Status	Terminal Degree	Academic Rank	Courses to be taught
Dan Gerlowski	Tenured	Economics	Full-time	PhD	Professor	ECON 740
Ting Zhang	Tenured	Economics	Full-time	PhD	Associate Professor	ECON 740, OPRE courses
David Lingelbach	Tenured	Entrepreneurship	Full-time	PhD	Professor	ENTR 740
Sunny Sunwar	Tenure Track	Entrepreneurship	Full-time	PhD	Assistant Professor	ENTR 740
Dong Chen	Tenured	Finance	Full-time	PhD	Associate Professor	FIN 624, OPRE courses
Hoang Nguyen	Tenured	Finance	Full-time	PhD	Associate Professor	FIN 624, OPRE courses
Jerry Yu	Tenured	Finance	Full-time	PhD	Associate Professor	FIN 624, OPRE courses
Nafeesa Yunus	Tenured	Finance	Full-time	PhD	Associate Professor	FIN 624, OPRE courses
Danielle Fowler	Tenured	Information Systems	Full-time	PhD	Associate Professor	INSS and OPRE courses
Rajesh Mirani	Tenured	Information Systems	Full-time	PhD	Associate Professor	INSS and OPRE courses
Cong Zhang	Tenure-track	Information Systems	Full-time	PhD	Assistant Professor	INSS and OPRE courses
Kevin Wynne	Tenure Track	Management	Full-time	PhD	Assistant Professor	MGMT 740
Amir Pezeshkan	Tenured	Management	Full-time	PhD	Associate Professor	OPM 740 or MGMT 740
William Carter	Tenured	Management	Full-time	PhD	Associate Professor	OPM 740 or MGMT 740
Jaya Singhal	Tenured	Management Science	Full-time	PhD	Professor	OPRE courses
Claire Guo	Tenure-track	Management Science	Full-time	PhD	Assistant Professor	INSS and OPRE courses
Dennis Pitta	Tenured	Marketing	Full-time	PhD	Professor	MKTG 740
Praneet Randhawa	Tenured	Marketing	Full-time	PhD	Associate Professor	MKTG 740
Kalyan Singhal	Tenured	Operations Management	Full-time	PhD	Professor	OPM 740

2. **Demonstrate how the institution will provide ongoing pedagogy training for faculty in evidenced-based best practices, including training in:**

   a) **Pedagogy that meets the needs of the students**

   The University of Baltimore provides periodic training to its faculty on the use of the latest online and face-to-face teaching tools as well as professional development opportunities through attending national conferences and training, such as for example, Coursera, EdX, etc. In addition, the faculty is afforded opportunities to attend continuing professional education sessions through other providers of technical skills training, such as Coursera and Udemy.

   b) **The learning management system (LMS)**

   The University of Baltimore provides periodic necessary trainings in its Learning Management System—Canvas through its Center for Excellence in Learning, Teaching and Technology (CELTT) as well as periodic quality reviews of the faculty's utilization of LMS.

3. **Evidenced-based best practices for distance education, if distance education is offered.**

   Similar to LMS training, The University of Baltimore's CELTT provides periodic training in online teaching to its faculty. Additionally, each department within the Merrick School of Business coordinates informal, collegial discussions about course design and delivery. Student evaluation data is used to improve course design and effectiveness.

J. Adequacy of Library Resources (as outlined in COMAR 13B.02.03.12).

Describe the library resources available and/or the measures to be taken to ensure resources are adequate to support the proposed program.

The program does not require substantial additional library resources beyond those already provided by the University of Baltimore's Bogomolny Library which provides an adequate level of access to academic books and journals. Bogomolny Library also provides access to a number of datasets that can be used in AI applications.

K. Adequacy of Physical Facilities, Infrastructure and Instructional Equipment (as outlined in COMAR 13B.02.03.13)

1. **Provide an assurance that physical facilities, infrastructure and instruction equipment are adequate to initiate the program, particularly as related to spaces for classrooms, staff and faculty offices, and laboratories for studies in the technologies and sciences.**

   The University of Baltimore's current facilities provide excellent conditions for AI work through our Information Systems Lab and through our current computer labs. The University also provides students with loaner laptops whenever they need them. Our classrooms are adequately equipped for both online and face-to-face instructions, and they have up-to-date IT infrastructure.

2. **Provide assurance and any appropriate evidence that the institution will ensure students enrolled in and faculty teaching in distance education will have adequate access to a) an**

institutional electronic mailing system, and b) a learning management system that provides the necessary technological support for distance education.

The University of Baltimore provides every student with an email address, access to our learning management system (Canvas), and free access to Office 365 software (Word, Excel and PowerPoint). All faculty and credit-earning students are provided with an institutional e-mail account that integrates with the institution’s learning management system, Canvas. Open-access, comprehensive student support for the learning management system is provided in module format and includes “how to” video and print tutorials, links to student services, and tips for success in an online learning environment. Faculty can access an LMS training site and work with Canvas faculty fellows from their colleges and instructional designers for course design and technical support. Both faculty and staff have access to 24/7 phone and chat support.

L. Adequacy of Financial Resources with Documentation (as outlined in COMAR 13B.02.03.14)

1. **Provide finance data for the first five years of program implementation. Enter figures into each cell and provide a total for each year. Also provide a narrative rationale for each resource category. If resources have been or will be reallocated to support the proposed program, briefly discuss the sources of those funds. Do not leave any cells blank (use "0" if no data is applicable).**

   Narrative: The Merrick School of Business anticipates a modest student gain per year as a result of this curriculum revision. The full-time tuition rate is a weighted-average assuming 75% of the students are paying in-state tuition and 25% out-of-state, while part-time tuition is based on the in-state rate (as we assume part-time students to be largely from the state of Maryland).

TABLE 1: PROGRAM RESOURCES					
Resource Categories	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**FY 2029**
1. Tuition and Fee Revenue (c + g below)	$8,825	$366,982	$465,607	$568,030	$674,364
a. Number of F/T students	0	20	25	30	35
b. Annual Tuition/Fee Rate	$17,548	$17,899	$18,257	$18,622	$18,995
c. Total F/T Revenue (a*b)	$0	$357,981	$456,426	$558,665	$664,811
d. Number of P/T students	10	15	15	20	20
e. Credit Hour Rate *[PT tuition & mandatory fees – see note]*	$981	$1,000	$1,020	$1,041	$1,061
f. Annual Credit Hours Rate (per student, average)	9	9	9	9	9
g. Total P/T Revenue (d*e*f)	$8,825	$9,002	$9,182	$9,365	$9,553
2. Grants, Contracts & Other External Sources	0	0	0	0	0
3. Other Sources – N/A	0	0	0	0	0
TOTAL (Add 1-4)	$8,825	$366,982	$465,607	$568,030	$674,364

2. **Complete** <u>Table 2: Program Expenditures and Narrative Rationale</u>**. Provide finance data for the first five years of program implementation. Enter figures into each cell and provide a total for each year. Also provide a narrative rationale for each expenditure category.**

TABLE 2: PROGRAM EXPENDITURES					
Resource Categories	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**FY 2029**
1. Faculty (b + c below)	$12,000	$218,000	$238,000	$436,000	$456,000
a. Number of FTE	0.5	1.5	2	2.5	2.5
b. Total Salary	$12,000	$200,000	$220,000	$400,000	$420,000
c. Total Benefits	$0	$18,000	$18,000	$36,000	$36,000
2. Admin Staff (b + c below)	$0	$0	$0	$0	$0
a. Number of FTE	0	0	0	0	0
b. Total Salary	$0	$0	$0	$0	$0
c. Total Benefits	$0	$0	$0	$0	$0
3. Support Staff (b + c below)	$18,000	$18,900	$19,845	$20,837	$21,879
a. Number of FTE	0.25	0.25	0.25	0.25	0.25
b. Total Salary	$15,000	$15,750	$16,538	$17,364	$18,233
c. Total Benefits	$3,000	$3,150	$3,308	$3,473	$3,647
4. Technical Support and Equipment	$20,000	$25,000	$30,000	$35,000	$40,000
5. Library	$0	$0	$0	$0	$0
6. New or Renovated Space	$0	$0	$0	$0	$0
7. Other Expenses	$0	$0	$0	$0	$0
Total (Add 1 through 7)	$50,000	$261,900	$287,845	$491,837	$517,879

Note: Salary and benefit projections (lines 1, 1b, 1c, 3, 3b, and 3c) are based on current average salary and benefit expenditures adjusted for expected cost-of-living increases over time. It is important to note that faculty often teach in multiple graduate programs. With expected program growth, actual faculty expenses may be lower if part-time faculty are deployed.

We anticipate no new full-time faculty in FY 2025, although one full-time staff member will be added in FY 2026 and FY 2028. In addition, we expect to have additional expenses for adjunct faculty over the five-year period.

There are no expenses related to administrative staff, library, or new or renovated space attributable to the program. Additional support staff expenses relate to advising and student support.

M. Adequacy of Provisions for Evaluation of Program (as outlined in COMAR 13B.02.03.15).

1. Discuss procedures for evaluating courses, faculty and student learning outcomes.

The University has a shared governance process for curriculum approval. Both new courses and new programs are required to submit student learning outcomes (SLOs), which are then evaluated by faculty curriculum committees, plus staff in the deans' and provost's office.

The assessment of program student learning outcomes is faculty-driven. Assessment generally occurs within courses, but assessment results are shared and evaluated within the departments and School of Business.

Faculty are evaluated annually by their supervisor and dean. In addition, policies for tenure-track and tenured faculty call for in-depth peer review at regular intervals.

All courses undergo student evaluation using the college-wide software tool Explorance Evaluations. Students complete evaluations of their course and the instructor at the end of each semester, using an online form. Data from these evaluations are incorporated in the annual chair's evaluation of faculty and are used in faculty promotion and tenure decisions.

2. Explain how the institution will evaluate the proposed program's educational effectiveness, including assessments of student learning outcomes, student retention, student and faculty satisfaction, and cost-effectiveness.

Student learning outcomes are assessed over a two-year cycle using direct and indirect measures. The primary assessment measures are direct assessments administered within courses, evaluated by faculty, reviewed by departments, and affirmed by the College of Business as a whole.

Retention is a key metric of the quality of our courses and faculty and retention data is reviewed on an ongoing basis, as are student evaluations of faculty. These evaluations have highlighted improvements that can be implemented across the curriculum in course delivery and feedback.

As we implement the new curriculum, we have created a new assessment plan. Embedded assessments will be deployed beginning in Fall 2025 for the new program goals and the faculty will use this data to drive curriculum improvement.

N. Consistency with the State's Minority Student Achievement Goals (as outlined in COMAR 13B.02.03.05).

1. Discuss how the proposed program addresses minority student access & success, and the institution's cultural diversity goals and initiatives.

The University of Baltimore is an unusually diverse institution, with an average undergraduate age over 27, and a majority-minority undergraduate population. Approximately 47 percent of UB students are African American and 32 percent white. The University serves nontraditional students, which includes many working adults. UB's current strategic plan underlines the importance of diversity, equity, and inclusion, and one of the strategic goals is specifically to strengthen UB's commitment to these core values.

O. Relationship to Low Productivity Programs Identified by the Commission:

1. **If the proposed program is directly related to an identified low productivity program, discuss how the fiscal resources (including faculty, administration, library resources and general operating expenses) may be redistributed to this program.**

   Not applicable.

P. Adequacy of Distance Education Programs (as outlined in COMAR 13B.02.03.22)

1. **Provide affirmation and any appropriate evidence that the institution is eligible to provide Distance Education.**

   The Merrick School of Business has a long history of online education, offering the first fully online AACSB-accredited MBA program. We also offer the MS in Accounting and Business Advisory Services degree online. At this time, however, this is not an online program, although there is support outside the classroom through Canvas.

2. **Provide assurance and any appropriate evidence that the institution complies with the C-RAC guidelines, particularly as it relates to the proposed program.**

   The University of Baltimore provides support for distance education, both at the program level and in individual courses, through its Center for Excellence in Learning, Teaching, and Technology.

UNIVERSITY SYSTEM of MARYLAND

BOARD OF REGENTS
SUMMARY OF ITEM FOR ACTION,
INFORMATION, OR DISCUSSION

TOPIC: *University of Maryland, College Park proposed Bachelor of Arts (B.A.) in International Relations*

COMMITTEE: Education Policy and Student Life and Safety

DATE OF COMMITTEE MEETING: April 12, 2024

SUMMARY: UMD's Department of Government and Politics currently offers a bachelor's program in Government and Politics with an International Relations (IR) concentration. This proposal is to replace the concentration with a stand-alone bachelor's degree. This new program will have both a Bachelor of Arts (B.A.) option and a Bachelor of Science (B.S.) option (MHEC is requiring two separate proposals). This summary focuses on the B.A. option. In today's globalized world, many of our most pressing challenges involve international relations. Responses to climate change, economic crises, pandemics, and criminal activity crossing international boundaries all require some international cooperation and coordination. Breakdowns in interstate relations can have dire consequences, including, most obviously, war.

This program will provide students with the tools to understand these critical issues. Students will develop a foundational understanding of international relations theory and develop the skills necessary to pursue careers or more advanced degrees in the IR field. Students will also be required to take courses in statistics and political methodology to attain competence in data analysis. In addition, all majors will be required to attain basic proficiency in a foreign language. Of the 120 credits required for a bachelor's degree, the program will require 52-64 credits dedicated to International Relations.

ALTERNATIVE(S): The Regents may not approve the program or may request further information.

FISCAL IMPACT: No additional funds are required. The program can be supported by the projected tuition and fee revenue.

CHANCELLOR'S RECOMMENDATION: That the Education Policy and Student Life Committee recommend that the Board of Regents approve the proposal from the University of Maryland, College Park to offer a Bachelor of Arts in International Relations.

COMMITTEE RECOMMENDATION:	DATE:
BOARD ACTION:	DATE:
SUBMITTED BY: Alison M. Wrynn 301-445-1992	awrynn@usmd.edu

UNIVERSITY OF MARYLAND
OFFICE OF THE PRESIDENT

1101 Thomas V. Miller, Jr. Administration Building
College Park, Maryland 20742
301.405.5803 TEL
301.314.9560 FAX

February 29, 2024

Chancellor Jay A. Perman
University System of Maryland
3300 Metzerott Road
Adelphi, MD 20783

Dear Chancellor Perman:

I am writing to request approval for a new Bachelor of Arts program in International Relations. The proposal for the new program is attached. I am also submitting this proposal to the Maryland Higher Education Commission for approval.

The proposal was endorsed by the appropriate faculty and administrative committees. I also endorse this proposal and am pleased to submit it for your approval.

Sincerely,

Darryll J. Pines
President
Glenn L. Martin Professor of Aerospace Engineering

cc: Candace Caraco, Associate Vice Chancellor
Jennifer King Rice, Senior Vice President and Provost
Susan Rivera, Dean, College of Behavioral and Social Sciences

UNIVERSITY SYSTEM OF MARYLAND INSTITUTION PROPOSAL FOR

x	New Instructional Program
	Substantial Expansion/Major Modification
	Cooperative Degree Program
x	Within Existing Resources, or
	Requiring New Resources

University of Maryland, College Park

Institution Submitting Proposal

International Relations

Title of Proposed Program

Bachelor of Arts	**Fall 2024**
Award to be Offered	Projected Implementation Date
221001	**45.0901**
Proposed HEGIS Code	Proposed CIP Code
Government and Politics	David Cunningham
Department in which program will be located	Department Contact
301-405-8364	dacunnin@umd.edu
Contact Phone Number	Contact E-Mail Address
Darryll J. Pines	02-29-2024
Signature of President or Designee	Date

A. Centrality to the University's Mission and Planning Priorities

Description. In today's globalized world, many of our most pressing challenges involve international relations. Responses to climate change, economic crises, pandemics, and criminal activity crossing international boundaries all require some international cooperation and coordination. Breakdowns in interstate relations can have dire consequences, including, most obviously, war. This new International Relations (IR) undergraduate program will provide students with the tools to understand these critical issues.

The University of Maryland's (UMD's) existing bachelor's program in Government and Politics has an existing Area of Concentration in International Relations. This proposal is to convert that concentration into a stand-alone bachelor's program with both a Bachelor of Arts option and a Bachelor of Science option. The IR major curriculum is based on three educational objectives. First, students will develop a foundational understanding of international relations theory. Students will take a core class on international political relations and more specialized courses on specific topics, including conflict, political economy, international organization, and comparative institutions. Second, students for both the B.A. and B.S. degree options will develop the skills necessary to pursue careers or more advanced degrees in the IR field. Careers in IR, and advanced study in IR, increasingly use data analytics. Majors will thus be required to take courses in statistics and political methodology to attain competence in data analysis. In addition, all IR majors will be required to attain basic proficiency in a foreign language, a skill needed in many IR-related careers. Finally, students majoring in IR will be strongly encouraged to take advantage of UMD's many experiential learning opportunities (including study abroad, internships, and research assistantships) so that they develop hands-on experience that will help them succeed in future careers or educational endeavors.

Students may choose between two curricular options, one leading to a Bachelor of Arts degree and the other to a Bachelor of Science. The Bachelor of Arts in International Relations prepares students to understand and interpret research on international relations and comparative politics. The Bachelor of Science in International Relations provides students with the tools to produce political science research focused on international relations and comparative politics through advanced training in political methodology and data analysis. **This proposal will focus on the Bachelor of Arts option.**

Relation to Strategic Goals. As Maryland's flagship campus and a national leader in higher education, UMD strives to provide exceptional and affordable instruction for the state's most promising students, regardless of income. As one of the country's first land-grant institutions, UMD uses its research, educational, cultural, and technological strengths in partnership with state, federal, private, and non-profit sectors to promote economic development and improve the quality of life in the state and the region. One of the commitments listed in UMD's 2022 Strategic Plan, "Fearlessly Forward in Pursuit of the Public Good," is to "accelerate solutions to humanity's grand challenges—within our communities and around the globe." Many of humanity's grand challenges require international cooperation and coordination. Progress on climate change, for instance, ultimately requires international cooperation, where states bargain with each other over—among other things—commitments to reduce greenhouse gas emissions. Students in this program will learn international relations concepts, modes of inquiry, and analytic skills to address contemporary problems in international politics, understand the politics of diversity, and encourage civic engagement.

Funding. Because the concentration in International Relations already exists within the Government and Politics major, there are no significant financial implications for this new program.

Institutional Commitment. The program will continue to be administered by the Department of Government and Politics, which has the administrative infrastructure and faculty resources to convert the concentration to a stand-alone degree program. The undergraduate major in Government and Politics will still be in operation along with this new major.

B. Critical and Compelling Regional or Statewide Need as Identified in the State Plan

Need. The International Relations program will contribute directly to the need for the advancement and evolution of knowledge. The new major will leverage the unique strengths of the Government and Politics Department, its resources, and premier faculty. Students will have the opportunity to learn from leading experts in the field of international relations, and to take advantage of the wealth of opportunities available in the Washington Metropolitan area. Ultimately, we hope that the major will help to attract top in-state and out-of-state students to Maryland, students who might otherwise have attended other Big Ten schools, or private research universities in the Washington, D.C. area that offer majors in international politics. By offering an IR major to our students, we fill an important gap in opportunities available to Maryland residents at their flagship state university. In turn, we will be building a stronger community of students with an interest in a field of critical contemporary relevance.

State Plan. The proposed program aligns with Priority 5 in the 2022 *Maryland State Plan for Postsecondary Education*: "Maintain the commitment to high-quality postsecondary education in Maryland." The Action Item to "Identify innovative fields of study" fits with this program. To quote the State plan: "With a fast-changing economy, campuses are constantly working to update academic programs to meet industry needs and ensure a quality workforce, support faculty development, consider innovative credentialing models, and provide low-risk high-reward experiential learning opportunities for self- exploration and career development." The proposed program itself is low risk as it already exists as an area of concentration within an existing broader academic program, Government and Politics. With a specific credential in International Relations, students become more marketable for careers in organizations that are unique to the Washington, D.C. area, such as the State Department, the Department of Defense, the Department of Commerce, or the intelligence community. Students might also seek careers in the broad network of think tanks and contracting companies that conduct analyses directly relevant to US foreign policy (such as, for instance, the RAND Corporation, the CNA Corporation, or the Institute for Defense Analyses). The program will be structured to encourage students to take advantage of experiential learning opportunities such as study abroad and international relations related internships in the Washington, D.C. area.

C. Quantifiable and Reliable Evidence and Documentation of Market Supply and Demand in the Region and State

One recent book published by Georgetown University Press offers guidance to students hoping to pursue careers in international affairs.[1] The book examines a broad range of career opportunities that are available to students who specialize in the study of international relations, including careers within the US government, in international organizations, in banking, in business, in consulting, in universities and university research centers, in international development, and more. The book also includes a directory of organizations that hire in international relations; the directory extends for 80 pages.

At a macro-level, the US Government Accountability Office (GAO) released a report in 2014 on trends in the federal workforce. The report found that from 2004 to 2012, the federal non-postal civilian workforce increased by 258,882, and 94% of this increase came from three agencies directly related to international affairs: the Department of Homeland Security, the Department of Defense, and the Department of Veterans Affairs.[2] If we drill down further, the US intelligence community has "tens of thousands" of employees engaged in a broad range of careers, including many that demand expertise in international affairs; the intelligence community actively seeks qualified applicants for its many jobs. The US Foreign Service—again, a career path closely tied to an international relations course of study—currently employs approximately 13,000. And obviously there are many, many other agencies in the federal government that conduct work relating to international relations. Meanwhile, a recent analysis of salaries for recent college graduates showed International Relations majors as having the 17th highest average salary out of 50 majors, behind most engineering specialties but higher than most traditional liberal arts programs, and suggesting that IR majors are in considerable demand.[3]

In sum, the job opportunities for students specializing in international relations are broad. Many students completing our new major will seek employment in the federal government, and here we have provided a snapshot of the job market there. But many students will seek to pursue graduate studies in a range of different disciplines and professional schools, and many others will seek career paths in business, finance, international organizations, among others.

D. Reasonableness of Program Duplication

The proposed program differs from other programs in the state in two primary ways. First, the proposed major is discipline-specific, focusing on international relations through the lens of government and politics, and the programs offered by other institutions in the state generally focus on an inter-disciplinary approach to international relations/international studies. Most of

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[1] Laura E. Cressy, Barrett G. Helmer, and Jennifer E. Steffensen, editors. Careers in International Affairs, Ninth Edition. Washington DC: Georgetown University Press, 2014.

[2] United States Government Accountability Office, Report to the Ranking Member, Committee on the Budget, U.S. Senate, Federal Workforce: Recent Trends in Federal Civilian Employment and Compensation. (GAO-14-215) January 2014.

[3] See "These degrees have the highest salaries in the US," (https://www.weforum.org/agenda/2018/07/which-college-degrees-get-the-highest-salaries).

these programs are titled International Studies rather than International Relations. These programs include those offered by Frostburg, Johns Hopkins, Mount Saint Mary's, Notre Dame of Maryland University, Salisbury, Towson, and Washington College. These programs each have a substantial component of the program that students complete in courses outside of government and politics or political science departments. Goucher University, the only institution to offer a program titled International Relations, allows students to complete the program using a variety of other disciplines. Our proposed major, on the other hand, trades this sort of breadth for depth: students in the major will pursue an intense course of study in international relations from a political science perspective.

E. Relevance to Historically Black Institutions (HBIs)

There are no Historically Black Institutions within the state of Maryland that offer an International Relations major, and it appears unlikely that the proposed program would adversely affect any existing programs.

F. Relevance to the identity of Historically Black Institutions (HBIs)

We do not anticipate any negative impacts on the identities of the HBIs in the state of Maryland, as none offer this degree program. Moreover, UMD already has an International Relations Area of Concentration listed under its Government and Politics major, indicating that field of international relations has already been established within the identity of UMD.

G. Adequacy of Curriculum Design, Program Modality, and Related Learning Outcomes

Curricular Development. The proposed International Relations major curriculum was developed in consultation with the department's undergraduate studies committee and Government and Politics faculty. Additionally, a review of international relations/international studies majors at other universities helped inform our curriculum planning process.

Faculty Oversight. The Department's Director of Undergraduate Studies will provide academic direction and oversight for the proposed program. The Director will consult academic matters with Department of Government and Politics Undergraduate Studies Committee as needed; the committee consists of two tenure-track faculty, one professional track faculty, two undergraduate program staff members, and two undergraduate students. See Appendix A for the list of faculty who will teach in this program.

Educational Objectives and Learning Outcomes. The Bachelor of Arts option and the Bachelor of Science option share three of the same learning outcomes but have two unique outcomes reflecting the difference in emphasis. The learning outcomes for the Bachelor of Arts in International Relations are as follows:

1. Understand basic international relations concepts including power, political institutions, international organizations, political economy, theories of the state, political conflict and war, and contending analytical and theoretical approaches. (Both B.A. and B.S.)

2. Identify causes of systemic bias and discrimination against underrepresented groups and structural disadvantages of states in the Global South, such as persistent legacies of colonialism and imperialism, and critically evaluate theories and evidence on the impact of race and identity in international politics. (Both B.A. and B.S.)
3. Use international relations concepts, modes of inquiry, and analytic skills to address contemporary problems in international politics, understand the politics of diversity, and encourage civic engagement. (Both B.A. and B.S.)
4. Demonstrate familiarity with the methods, approaches, and theories used to interpret information applicable to international relations. (B.A. only)
5. Communicate key arguments and ideas in international relations effectively in writing and speaking. (B.A. only)

Institutional assessment and documentation of learning outcomes. The Government and Politics Department will assess the learning outcomes on an annual basis. Each year, up to two learning outcomes will be assessed, so that all learning outcomes are assessed on a four-year cycle. The department's undergraduate studies committee, which is led by a full professor and includes faculty (both tenure track and professional track), undergraduate program staff members, and undergraduate majors, will develop rubrics that will be used to assess student mastery of each of these learning objectives. Faculty members will then use the rubric to assess a sample of student projects/papers produced in the academic year. The rubric will contain categories related to the specific learning outcome and students will be assessed as "Advanced," "Proficient," "Developing," or "Novice" in each category. The individual categories will be aggregated to produce an overall score. Our overall goal is that 80% of our students are scored as "Advanced" or "Proficient" on each program-level learning outcome assessed. The results of the Learning Outcome Assessment will be discussed in the department's undergraduate studies committee, the department's executive committee, and among the full faculty.

Course requirements. The Bachelor of Arts program will require 52-64 credits dedicated to International Relations. Students will take an introductory American Government course, a math course, nine credits of foundational government and politics courses related to international politics, political philosophy, and comparative politics or global development. Students will take a 3-credit methods of political science research course. Students will also take 15 credits of upper-level international relations courses, as well as 6 credits of electives in government and politics or international relations. Outside of the Government and Politics Department, students will take principles of microeconomics, at least one quantitative skills course, and at least complete a foreign language through the elementary level. A list of courses and descriptions is included in Appendix B.

Required Courses		
Course	*Title*	*Credits*
GVPT170	American Government	3
One of the following math courses:		3-4
STAT100	Elementary Statistics and Probability	
MATH107	Introduction to Math Modeling and Probability	
MATH113	College Algebra and Trigonometry	
MATH115	Precalculus	
MATH120	Elementary Calculus I	
MATH135	Discrete Mathematics for Life Sciences	
MATH136	Calculus for Life Sciences	
MATH140	Calculus I	
Foundational Courses		
GVPT200	International Political Relations	3
GVPT241	The Study of Political Philosophy: Ancient and Modern	3
GVPT280	The Study of Comparative Politics	3
or GVPT282	The Politics of Global Development	
Methods Requirement		
GVPT201	Scope and Methods for Political Science Research	3
Courses of Choice		
Government and Politics/International Relations Course (any level and/or subfield)		3
Government and Politics/International Relations 300-400 level Course (any subfield)		3
International Relations Courses at 300-400 level		15
Skills Requirements		
ECON200	Principles of Microeconomics	3
Completion of a foreign language through the entire elementary level*		4-12
Quantitative Skills course		3
Intermediate-level foreign language course*		3-6
Total Credits for Major		52-64

**Taught by our School of Languages, Literatures, and Cultures. Different languages will require different credits at the elementary level.*

General Education. All UMD students are required to complete General Education requirements in Fundamental Studies (Mathematics, Writing, and Analytic Reasoning) and Distributive Studies in the sciences, humanities, and social sciences. The Distributive Studies area includes a diversity requirement, two practice-based courses, and two "big question" courses (I-Series courses) that address societal grand challenges. Maryland community college students who complete the associate degree and are admitted to UMD are deemed to have completed their General Education requirements, except for Professional Writing (typically completed in the 3rd year of study). See Appendix D for how students in the program will fulfill their General Education requirements.

Accreditation or Certification Requirements. There are no specialized accreditation or certification requirements associated with this program.

Other Institutions or Organizations. The department is not planning to contract with another institution or non-collegiate organization for this program.

Student Support. Students enrolled in this program will have access to all the resources necessary to succeed in the program and make the most of the learning opportunity. Students entering the university as either first-time college students or transfer students will learn about the program through their orientation program. The Government and Politics Department's existing advising staff will support the students in this program. The department does not anticipate the proposed program placing significant additional burdens on the department's administrative infrastructure because International Relations already exists as an Area of Concentration within the Government and Politics major.

Marketing and Admissions Information. The program will be clearly and accurately described in the university website and be marketed at university recruiting events. The University of Maryland's Office of Undergraduate Admissions markets nationally to a broad base of interested students who are admitted to the University as a whole. If the program is approved, it will be included among the more than 100 possible undergraduate majors available to students.

H. Adequacy of Articulation

While UMD accepts transfer students from all Maryland community colleges as well as from other four-year institutions, Montgomery College is one of our most common partners for transfers. UMD and Montgomery College have developed a transfer articulation pathway with the proposed major and the A.A. in International Studies at Montgomery College. See Appendix C.

I. Adequacy of Faculty Resources

Program faculty. Appendix A contains a list of faculty members who will teach in the program. Because of the existing Area of Concentration in International Relations, a core group of faculty already teach the courses listed in the curriculum.

Faculty training. Faculty teaching in the program will use the university's learning management system along with its extensive electronic resources. They will have access to instructional development opportunities available across the College Park campus, including those offered as part of the Teaching and Learning Transformation Center, many of which are delivered in a virtual environment. Instructors will work with the learning design specialists on campus to incorporate best practices when teaching in the online environment.

J. Adequacy of Library Resources

The University of Maryland Libraries assessment concluded that the Libraries are able to meet, with current resources, the curricular and research needs of the program.

K. Adequacy of Physical Facilities, Infrastructure, and Instructional Resources

All physical facilities, infrastructure, and instructional equipment are already in place. No new facilities are required. The proposed program will be in-person, but for the online components of the coursework, UMD maintains an Enterprise Learning Management System (ELMS). ELMS is a Web-based platform for sharing course content, tracking assignments and grades, and enabling virtual collaboration and interaction. All students and faculty have access to UMD's electronic mailing system.

L. Adequacy of Financial Resources

The budget tables reflect the reallocation of internal UMD resources to establish the program.

Resources (see Table 1):
Year 1 is based on the initial cohort enrolling in Fall 2024.

1. Line 1 reflects the reallocated resources anticipated to support the program.
2. Our model assumes that most students will be full-time undergraduates enrolled at UMD. We assume no additional revenue will be generated by this new major since we do not anticipate a significant change in the overall undergraduate population.
3. No external sources of funding are assumed.
4. No other sources of funding are assumed.

Expenditures (see Table 2):
The administrative staff and faculty are already in place to operate this program. Essentially, they will be completing the same activities but instead of for an Area of Concentration, it will be for a new major. A small number of new courses will be offered for the major, but we expect no significant additional expenditures for the program.

1. Line 1 reflects the faculty who will continue their activities under the banner of the new major instead of the current Area of Concentration.
2. Line 2 and 3 reflect the administrative and staffing support, also already in place, that will shift their energies to supporting the new major.
3. Line 4 reflects the graduate assistants, also already in place, that will be assigned to the new major.
4. Facility, equipment, and other expenses are not listed as they are already part of the department's operating expenses.

M. Adequacy of Program Evaluation

Formal program review is carried out according to the University of Maryland's policy for Periodic Review of Academic Units, which includes a review of the academic programs offered by, and the research and administration of, the academic unit (http://www.president.umd.edu/policies/2014-i-600a.html). Program Review is also monitored following the guidelines of the campus-wide cycle of Learning Outcomes Assessment (https://irpa.umd.edu/Assessment/loa_overview.html). Faculty within the department are reviewed according to the University's Policy on Periodic Evaluation of Faculty Performance (http://www.president.umd.edu/policies/2014-ii-120a.html). Since 2005, the University has used an online survey instrument that standardizes student course feedback across campus. The survey has standard, university-wide questions and allows for supplemental, specialized questions from the academic unit offering the course.

N. Consistency with Minority Student Achievement goals

The Department of Government and Politics is strongly committed to diversity. The Department has a very active Diversity, Equity, and Inclusion (DEI) committee, led by the Associate Chair. The program director will work closely with that committee, as well as the College of Behavioral and Social Sciences Assistant Dean for Diversity to develop programs and strategies to advance our diversity objectives, including recruiting and retaining a diverse population of students. Our diversity plans will include working closely with campus student groups that advocate for DEI so that students from groups that are traditionally underrepresented in social science majors are aware of our program and given the tools that they need to succeed in the new major.

O. Relationship to Low Productivity Programs Identified by the Commission

N/A

P. Adequacy of Distance Education Programs

This program is not intended for distance education.

Table 1: Resources

Resources Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1.Reallocated Funds	$800,000	$800,000	$800,000	$800,000	$800,000
2. Tuition/Fee Revenue (c+g below)	$0	$0	$0	$0	$0
a. #FT Students	300	300	300	300	300
b. Annual Tuition/Fee Rate	$15,649	$16,119	$16,602	$17,100	$17,613
c. Annual FT Revenue (a x b)	$4,694,760	$4,835,603	$4,980,671	$5,130,091	$5,283,994
d. # PT Students	30	30	30	30	30
e. Credit Hour Rate	$509.50	$524.79	$540.53	$556.74	$573.45
f. Annual Credit Hours	20	20	20	20	20
g. Total Part Time Revenue (d x e x f)	$305,700	$314,871	$324,317	$334,047	$344,068
3. Grants, Contracts, & Other External Sources	$0	$0	$0	$0	$0
4. Other Sources	$0	$0	$0	$0	$0
TOTAL (Add 1 - 4)	**$800,000**	**$800,000**	**$800,000**	**$800,000**	**$800,000**

Table 2: Expenditures

Expenditure Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1. Faculty (b+c below)	$399,000	$410,970	$423,299	$435,998	$449,078
a. #FTE	3.0	3.0	3.0	3.0	3.0
b. Total Salary	$300,000	$309,000	$318,270	$327,818	$337,653
c. Total Benefits	$99,000	$101,970	$105,029	$108,180	$111,425
2. Admin. Staff (b+c below)	$93,100	$95,893	$98,770	$101,733	$104,785
a. #FTE	1.0	1.0	1.0	1.0	1.0
b. Total Salary	$70,000	$72,100	$74,263	$76,491	$78,786
c. Total Benefits	$23,100	$23,793	$24,507	$25,242	$25,999
3. Total Support Staff (b+c below)	$16,625	$17,124	$17,637	$18,167	$18,712
a. #FTE	0.25	0.25	0.25	0.25	0.25
b. Total Salary	$12,500	$12,875	$13,261	$13,659	$14,069
c. Total Benefits	$4,125	$4,249	$4,376	$4,507	$4,643
4. Graduate Assistants (b+c)	$238,616	$243,291	$248,105	$248,105	$248,105
a. #FTE	5.0	5.0	5.0	5.0	5.0
b. Stipend	$117,155	$120,670	$124,290	$124,290	$124,290
c. Tuition Remission	$82,800	$82,800	$82,800	$82,800	$82,800
d. Benefits	$38,661	$39,821	$41,016	$41,016	$41,016
5. Equipment	$0	$0	$0	$0	$0
5. Library	$0	$0	$0	$0	$0
6. New or Renovated Space	$0	$0	$0	$0	$0
7. Other Expenses: Operational Expenses	$3,375	$2,876	$2,363	$1,833	$1,288
TOTAL (Add 1 - 8)	**$750,716**	**$770,153**	**$790,174**	**$805,836**	**$821,968**

Appendix A: Core Faculty for the International Relations Major

The following faculty members are projected to teach in the program. All faculty are full-time unless otherwise indicated.

Name	Highest Degree Earned, Program, and Institution	UMD Title (indicate if part-time)	Courses
Alcaniz, Isabella	PhD, Political Science Northwestern University	Professor	GVPT482 Government and Politics of Latin America
Allee, Todd	PhD, Political Science University of Michigan	Associate Professor	GVPT200 International Political Relations; GVPT406 International Organizations
Berland, Allison	PhD, Political Science University of Maryland	Lecturer (part-time)	GVPT280 The Study of Comparative Politics; GVPT273 Introduction to Environmental Politics; GVPT459D Democracy and Democratization; GVPT459F Politics of India
Birnir, Johanna	PhD, Political Science University of California, Los Angeles	Professor	GVPT201 Scope and Methods for Political Science Research; GVPT301 Politics of Identity
Calvo, Ernesto	PhD, Political Science Northwestern University	Professor	GVPT459B Comparative Political Institutions; GVPT429T Social Media Politics
Carcelli, Shannon	PhD, Political Science University of California, San Diego	Assistant Professor	GVPT404 Political Economy of Foreign Aid; GVPT457 American Foreign Relations

Croco, Sarah	PhD, Political Science University of Michigan	Professor	GVPT201 Scope and Methods for Political Science Research; GVPT309C Advances in the Study of Conflict;
Cunningham, David	PhD, Political Science University of California, San Diego	Professor	GVPT411 Conflict in the International System; GVPT429W Studying Civil Wars with Data
Cunningham, Kathleen	PhD, Political Science University of California, San Diego	Professor	GVPT410 Politics of Nationalist and Ethnic Conflict; GVPT412 Nonviolent Resistance in the International System
Gimpel, James	PhD, Political Science University of Chicago	Professor	GVPT429B Data Analysis for Political Behavior
Hadden, Jennifer	PhD, Political Science Cornell University	Associate Professor	GVPT409O Politics of Climate Change; GVPT459M Social Movements
Hanmer, Michael	PhD, Political Science University of Michigan	Professor	GVPT479M Political Science Survey Methods and Experience
Haufler, Virginia	PhD, Political Science Cornell University	Associate Professor	GVPT206 GVPT406 International Organizations; GVPT409G Corporations and the Global Political Economy
Jones, Calvert	PhD, Political Science Yale University	Associate Professor	GVPT200 International Political Relations; GVPT203 The Challenge of Authoritarianism; GVPT459Y

			Comparative Political Ideologies; GVPT485 Government and Politics of the Middle East
Kastner, Scott	PhD, Political Science University of California, San Diego	Professor	GVPT204 Uncertain Partners: U.S. and China in a Changing World; GVPT414 International Relations of East Asia
Kazungu, Conny	PhD, Political Science University of Tennessee, Knoxville	Lecturer	GVPT273 Introduction to Environmental Politics; GVPT306 Global Environmental Politics; GVPT417 Advanced Environmental Policy Analysis; GVPT484 Government and Politics of Africa
Kim, Hyunki	PhD, Political Science University of Maryland	Lecturer (part-time)	GVPT409A Peace and Conflict Processes
Kumar, Sujith	PhD, Political Science London School of Economics and Political Science	Senior Lecturer	GVPT241 Political Philosophy Ancient and Modern; GVPT449G Global Justice
McCauley, John	PhD, Political Science University of California, Los Angeles	Associate Professor	GVPT210 Religions, Beliefs, and World Affairs; GVPT354 International Development and Conflict Management; GVPT484 Government and Politics of Africa

Miler, Kristina	PhD, Political Science University of Michigan	Associate Professor	GVPT170 American Government
Pearson, Margaret	PhD, Political Science Yale University	Professor	GVPT454 International Relations of China; GVPT487 Government and Politics of China
Shen-Bayh, Fiona	PhD, Political Science University of California, Berkeley	Assistant Professor	GVPT429J Digital Dictatorships
Telhami, Shibley	PhD, Political Science University of California, Berkeley	Professor	GVPT409H International Relations of the Middle East
Tismaneanu, Vladimir	PhD, Political Science University of Bucharest	Professor	GVPT445H Marxism and Post-Marxism GVPT459H East European Politics and Societies; GVPT459K Russian Politics; GVPT459P Revolutions of 1989 and their Consequences; GVPT459R The Rise and Fall of Communism; GVPT459X Political Radicalism

Appendix B: Course Descriptions

Required:

GVPT170 American Government (3 Credits)
A comprehensive study of national government in the United States.

GVPT200 International Political Relations (3 Credits)
A study of the major factors underlying international relations, the causes of conflict and cooperation among international actors, the role of international institutions, the interactions of domestic and foreign policies, and major issues in security, economy and the environment.

GVPT201 Scope and Methods for Political Science Research (3 Credits)
An introduction to empirical research in political science.

GVPT241 The Study of Political Philosophy: Ancient and Modern (3 Credits)
Examines some of the salient continuities and breaks between the ancient and modern traditions in Western political philosophy.

GVPT280 or GVPT282
GVPT280 The Study of Comparative Politics (3 Credits)
An introduction to the comparative study of politics and governance, including the analytical concepts for studies of politics and a survey of the major types of regimes, including democratic and authoritarian/communist regimes.

GVPT282 The Politics of Global Development (3 Credits)
A study of the domestic governmental institutions; processes and problems such as conflict and economic development; and the socio-economic environments that are common to lower-income countries around the world.

Math Requirement (one of the following):

STAT100 Elementary Statistics and Probability (3 Credits)
Simplest tests of statistical hypotheses; applications to before-and-after and matched pair studies. Events, probability, combinations, independence. Binomial probabilities, confidence limits. Random variables, expected values, median, variance. Tests based on ranks. Law of large numbers, normal approximation. Estimates of mean and variance.

MATH107 Introduction to Math Modeling and Probability (3 Credits)
A goal is to convey the power of mathematics as shown by a variety of problems which can be modeled and solved by quantitative means. Also included is an introduction to probability. Topics include data analysis, equations, systems of equations, inequalities, elementary linear programming, Venn diagrams, counting, basic probability, permutations, combinations, tree diagrams, standard normal and normal distributions. The mathematics of finance is covered. The course includes problem solving and decision making in economics, management, and social sciences.

MATH113 College Algebra and Trigonometry (3 Credits)
Topics include elementary functions including graphs and applications of: polynomial, rational, exponential, and logarithmic functions. Systems of equations and applications. Trigonometric functions: angle and radian measure, graphs and applications.

MATH115 Precalculus (3 Credits)

Preparation for MATH120, MATH130 or MATH140. Elementary functions and graphs: polynomials, rational functions, exponential and logarithmic functions, trigonometric functions. Algebraic techniques preparatory for calculus.

MATH120 Elementary Calculus I (3 Credits)
Basic ideas of differential and integral calculus, with emphasis on elementary techniques of differentiation and applications.

MATH121 Elementary Calculus II (3 Credits)
Trigonometric functions, techniques of integration, infinite series, differential equations, probability.

MATH135 Discrete Mathematics for Life Sciences (4 Credits)
Basic discrete mathematics, with emphasis on relevant models and techniques to the life sciences.

MATH136 Calculus for Life Sciences (4 Credits)
Continuation of MATH135, including basic ideas of differential and integral calculus, with emphasis on elementary techniques and applications to the life sciences.

MATH140 Calculus I (4 Credits)
Introduction to calculus, including functions, limits, continuity, derivatives and applications of the derivative, sketching of graphs of functions, definite and indefinite integrals, and calculation of area. The course is especially recommended for science, engineering and mathematics majors.

Skills Requirement:

ECON200 Principles of Microeconomics (3 Credits)
Introduces economic models used to analyze economic behavior by individuals and firms and consequent market outcomes. Applies conceptual analysis to several policy issues and surveys a variety of specific topics within the broad scope of microeconomics.

Possible Electives:

GVPT202 Politics, Constitutional Policy, and the Institution of the U.S. Supreme Court (3 Credits)
A thorough examination of the U.S. Supreme Court in the American political system. Focusing on the Court as an institution-the set of norms, rules, and policymaking processes that lead to the Supreme Court's decisions-and how justices' decision-making processes critically determine substantive legal policy and the meaning of the U.S. Constitution.

GVPT203 The Challenge of Authoritarianism (3 Credits)
An introduction to the persistent challenge of authoritarianism. The course explores the nature of authoritarianism and its evolution from ancient through modern times. Students will study how authoritarian regimes vary, why citizens sometimes comply with them, and when and how citizens rebel. The course concludes with a review of contemporary authoritarianism, focusing on its resilience in the Middle East and East Asia and its potential for a resurgence in the US and Europe.

GVPT204 Uncertain Partners: US and China in a Changing World (3 Credits)
The rapid ascent of the People's Republic of China (PRC) as a major political and economic power has meant that its relationship with the United States has become central in contemporary international politics. To an increasing extent, some of the biggest global challenges--ranging from nuclear proliferation, to climate change, to economic growth--require U.S.-China cooperation if they are to be managed effectively. Yet the U.S.-China relationship is at times turbulent, and its future remains highly uncertain. Will the U.S. and China be able to forge a closer partnership that will enable them to cooperate in dealing with some of the vexing challenges facing the international community? Or are they more likely to drift toward a more adversarial relationship, as China's

growing power--and the US reaction--generate a vicious cycle of mutual mistrust? In this class, students will grapple with these questions as they learn about the history of U.S.-China relations, and about many of the current issues facing the relationship.

GVPT205 Special Topics in International Ethics, Conflict, and Immigration (3 Credits)
An examination of issues in international ethics, conflict generated at the international level, and problems in immigration policy and law, including theories of rights and immigration, and ideological sources of international violence.

GVPT206 Appetite for Change: Politics and the Globalization of Food (3 Credits)
An overview of the major forces transforming the food system--political, economic, technological, environmental--and the political debates surrounding them.

GVPT207 Racial and Ethnic Politics in the Obama Era (3 Credits)
This course seeks to understand the meaning and significance of Barack Obama as the first African American president. The course examines the extent to which the United States of America has entered into a post-racial society. We also examine the policy challenges Obama has faced as the first African American president. One example is the passing of comprehensive health care reform. We discuss whether opposition to health care is driven by people's racial attitudes or their different views about the role of government. Others topics that the course will examine are: how Obama became the first African American president; the strategies his campaign used to motivate citizens to the voting booth; the public's reaction to Obama's election; racial group identity during the Obama era; Trump's victory as a response to Obama.

GVPT208 Political Science Topics in Study Abroad (3 Credits)
The study of topics in political science taken as part of an approved study abroad program.

GVPT210 Religions, Beliefs, and World Affairs (3 Credits)
Introduces students to an increasingly important question: what is the relationship between religion and politics around the world? For a long period in the 20th Century, religion seemed to be decreasing in importance. Eventually, it was thought, religion would simply go away and secularism, development, and rationality would rule the day. In the last generation, however, events like the Iranian Revolution, the rise of the Christian Right, 9/11, the Tibetan monks protest, the spread of Truth and Reconciliation Commissions, and numerous wars fought in the name of God have brought religion back to prominence in world affairs. In this course, we will explore the contemporary impact of religions on politics around the world, through four broad themes: how to understand religion in politics, the relationship between religion and the state, religious groups as sources of conflict and peace, and contemporary religio-political challenges.

GVPT217 Mock Trial (3 Credits)
Experience the excitement and reward of arguing, and perhaps winning your client's case in court. Mock Trial is designed for students who are interested in learning practical techniques for shaping the evidence, using the law, and exploiting the courtroom to create a coherent and convincing case theory.

GVPT221 Introduction to Formal Theories of Political Behavior and Politics (3 Credits)
An introduction to the theories of rational choice including theories of negotiation and bargaining, elections and voting in democracies, community organizing and the contrast between the roles and performances of government and market.

GVPT228 The Craft of Political Science Research (4 Credits)
An introduction to research design and statistics applicable to political science.

GVPT241 The Study of Political Philosophy: Ancient and Modern (3 Credits)
Examines some of the salient continuities and breaks between the ancient and modern traditions in Western political philosophy.

GVPT258 Introduction to Political Science Topics in Study Abroad (3 Credits)
The study of topics in political science taken as part of an approve study abroad program.

GVPT273 Introduction to Environmental Politics (3 Credits)
An overview of modern environmental philosophy, politics, and policy, exploring environmental politics in the US by way of comparison with other developed and developing countries.

GVPT280 The Study of Comparative Politics (3 Credits)
An introduction to the comparative study of politics and governance, including the analytical concepts for studies of politics and a survey of the major types of regimes, including democratic and authoritarian/communist regimes.

GVPT282 The Politics of Global Development (3 Credits)
A study of the domestic governmental institutions; processes and problems such as conflict and economic development; and the socio-economic environments that are common to lower-income countries around the world.

GVPT289 Special Topics in Government and Politics (1-6 Credits)
Substantive issues of and theoretical approaches to political phenomenon. Topics and credit vary.

GVPT289D How to Make Better Decisions (3 Credits)
The problem with decisions is that we rarely, if ever, find out if our decisions were good or bad. Was choosing your major, for instance, a good decision or could you have made a better one? I don't think most of us would ever know the answer to this question. So, is it possible that we regularly make bad decisions but don't know that we do? And, if so, how can we fix something if we don't know it is broken? In fact, we do regularly make bad decisions. This has been shown in many experimental studies some of which will be covered in this class. What is more, for some types of decision problems we are hardwired to make mistakes. This means that we are bound to go wrong regardless of how much we know or how smart we are. So, what can we do to remedy this problem? Quite a bit, as it turns out.

GVPT301 Identity and Conflict (3 Credits)
An examination of identity as a source of civil conflict. The course explores how identity is embedded in context, how identity is manipulated for political ends, and how identity conflict may be resolved.

GVPT306 Global Environmental Politics (3 Credits)
Focus on three processes of international environmental policy development- identifying problems, negotiating solutions, and implementing agreements- through a range of case studies, including global climate change.

GVPT308 Political Science Topics in Study Abroad II (3 Credits)
The study of topics in political science taken as part of an approved study abroad program.

GVPT309 Topics in International Relations (3 Credits)
The study of topics in international relations.

GVPT317 Mock Trial II: Advanced Trial Advocacy (3 Credits)
Development of trial advocacy skills through participation in practice trials and intercollegiate mock trial competitions. Students may have an opportunity to represent the university in intercollegiate mock trial tournaments, including the National Mock Trial Championships.

GVPT319 Topics in Social Advocacy (1-3 Credits)
Reading, research and discussion of variety of topics related to social advocacy.

GVPT320 Advanced Empirical Research (3 Credits)

Allows students to build on the knowledge of statistical inference they gained from GVPT201. Topics include data collection, data cleaning, data analysis, and data visualization. By the time students complete this class, they will be able to do basic statistical modeling using OLS regression independently.

GVPT331 Courts, Law and Justice (3 Credits)
An introductory course to the study of law with emphasis on how lawyers and judges think and argue. Topics include, contract law, property, family law, torts, and criminal procedure.

GVPT339 Topics in Public Law (3 Credits)
The study of topics in public law.

GVPT349 Topics in Political Philosophy (3 Credits)
The study of topics in political philosophy.

GVPT351 Model United Nations (3 Credits)
Students are prepared for the model United Nations Conference.

GVPT354 International Development and Conflict Management (3 Credits)
Serves as the gateway course for the Minor in International Development and Conflict Management. Provides an introductory foundation in the theory and practice of international development and conflict management. Introduces the structures, key players, intersections, and main trends in the evolution of the fields. Explores causal factors that drive economic growth, poverty, inequality, and conflict, as well as the resources, methods, and tools available to track and address these issues.

GVPT355 Capstone in International Conflict Management (3 Credits)
Serves as one of the two capstone courses for the Minor in International Development and Conflict Management. Focuses on advanced theory and the practice and profession of international conflict management and is designed to provide students an introduction to, and a chance to engage with, a core set of practical skills relevant to the field.

GVPT356 Capstone in International Development (3 Credits)
Serves as one of the two capstone courses for the Minor in International Development and Conflict Management. Focuses on advanced theory and the practice and profession of international development and is designed to provide students an introduction to, and a chance to engage with, a core set of practical skills relevant to the field.

GVPT359 Topics in Comparative Politics (3 Credits)
The study of topics in comparative politics.

GVPT360 International Negotiations (3 Credits)
A study of the complexities of international negotiation and cross-cultural decision-making. Students will apply advanced computer technology in an interactive simulation involving actual negotiations.

GVPT368 Special Topics in Government and Politics (3 Credits)
The study of topics in government and politics.

GVPT368C Asian American Politics (3 Credits)
Students will gain a greater understanding of 1) the role of Asian Americans in US politics, 2) the political attitudes and behaviors of Asian Americans and 3) how to conduct research on Asian American politics. Though the class will concentrate on Asian Americans, issues related to Asian American politics will be examined within the larger context of America's multicultural political landscape.

GVPT373 Geographic Information Systems for Redistricting (3 Credits)
Local, state and federal governments must periodically draw and redraw political boundaries to account for shifts in the population. This course will be an introduction and overview of district drawing and redistricting as an

important application of GIS research in political science and public policy. This class will equip students to use convenient GIS tools to create and consider alternative district scenarios to find the best possible solution. After finishing this class students will be able to draw districts to define police beats, sales territories, congressional and state legislative districts, school and fire protection districts, and numerous other boundaries.

GVPT376 Applied Field Research in Government and Politics (3-6 Credits)
Students in this course participate as interns in an agency of government or in some other appropriate political organization. Assignments are arranged to provide students with insights into both theoretical and practical aspects of politics. Under the tutelage of the host agency and an academic advisor, students conduct a major research project of mutual interest to the student and his or her host agency in the field of government and politics.

GVPT377 Experiential Learning: Government and Politics Internship Program (3 Credits)
The application of major concepts of political science to the realities of the political process. The course connects internship experiences with larger themes of political science. Students must be admitted to the GVPT Internship Program.

GVPT379 Topics in American Politics (3 Credits)
The study of topics in American politics.

GVPT386 Experiential Learning (3-6 Credits)
Restriction: Permission of BSOS-Government & Politics department; and junior standing or higher.

GVPT388 Topical Investigations (1-3 Credits)
Independent research and writing on selected topics in government and politics.

GVPT389 Experiential Learning II (3-6 Credits)
Experiential credit for working in government & politics related internships, research, and teaching opportunities.

GVPT390 Game Theory (3 Credits)
Introduction to game theory with applications to political science, economics and sociology. Topics include preference theory, expected utility theory, Nash equilibria, subgame perfection, repeated games, folk theorems, and evolutionary stability.

GVPT392 Introduction to Geographic Information Systems for Social Science Research (3 Credits)
Introduction to the use of Geographic Information Systems for conducting research in the social sciences. Overview of spatially embedded nature of many social science phenomena and content of theories common to spatial thinking. Students will obtain hands-on experience with various GIS tools and methods most frequently employed by social scientists.

GVPT393 Intermediate Geographic Information Systems (3 Credits)
Part II of a two-semester course that integrates Geographic Information Systems with social science research. Lectures and readings will motivate the use of GIS by exposure to research applications in international relations; political and non-profit fundraising; environmental justice; public health; race relations; business and economics.

GVPT396 Introduction to Honors Research (3 Credits)
A required course for all honors students designed to emphasize library research, methodology, and writing skills in political science and political philosophy. A written proposal, bibliography and research design for an honors paper required of all students as a final project.

GVPT397 Honors Research (3 Credits)
Individual reading and research. Preparation of an original paper.

GVPT399 Seminar in Government and Politics (3 Credits)
Reading, research, discussion, analysis, and writing in the area of politics. Both substantive issues and methodological approaches will be considered. Primarily for government and politics undergraduate majors.

GVPT402 International Law (3 Credits)
A study of the basic character, general principles and specific rules of international law, with emphasis on recent and contemporary trends in the field and its relation to other aspects of international affairs.

GVPT404 Political Economy of Foreign Aid (3 Credits)
The world spends hundreds of billions of dollars on foreign aid every year. The effects of this aid spending are controversial. Research supports both pessimistic and optimistic views of foreign aid's effectiveness, with little consensus. Where does aid money go? What are the motivations of aid donors? Is foreign aid effective at achieving its goals? Why or why not? This course is designed to survey the promise and the challenges of foreign aid as a policy tool. The first half of the course will focus on the motivations and goals of foreign aid. We will consider various foreign aid donors, such as countries, institutions, and individuals, to understand the motivations behind and effects of foreign aid. We will create a typology of foreign aid agendas, motivations, and donors. The second half of the course will consider the challenges specific to foreign aid. This includes both technical challenges and political challenges. We will consider the strategies that aid donors and organizations have taken to try to overcome these challenges.

GVPT406 International Organizations (3 Credits)
A basic introduction to the full range of international organizations that have come into being over the past century and one-half, including those that aspire to be universal or global, those with a geopolitical or regional focus, and those that address specific structural or functional areas of human endeavor or issue areas.

GVPT407 International Political Economy (3 Credits)
Introduces the field of international political economy, which analyzes the ways in which economic and political changes produce both economic and political reactions.

GVPT409 Seminar in International Relations and World Politics (3 Credits)
Reading, writing, and research on topics in international relations and world politics. Both substantive issues and methodological approaches will be considered.

GVPT410 Politics of Nationalist and Ethnic Conflict (3 Credits)
An examination of the major causes and consequences of ethnic, nationalist, and separatist conflict. The course will focus on both theories of ethnicity and nationalism, as well as theories of conflict related to these issues. The course will also explore empirical trends in ethnic and nationalist politics.

GVPT411 Conflict in the International System (3 Credits)
In this course, we will examine conflict, peace, and conflict resolution in contemporary international politics. We will interrogate what we mean by concepts such as peace, conflict, and violence, the different forms that these phenomena can take, and how we can measure their occurrence. We will discuss theoretical explanations for why individuals and groups have disputes, why these actors choose to use violence (or not) in these disputes, and ways in which violent disputes can be resolved peacefully. We will examine these arguments in a detailed study of conflicts in the Middle East, as well as by evaluating published articles that examine the effectiveness of conflict management strategies such as peacekeeping.

GVPT413 Peace, Justice, and Conflict Resolution (3 Credits)
An examination of classic and contemporary perspectives on peace, justice, and conflict resolution after armed conflict. The goal of this course is to expose students to the advantages, risks, and challenges of the most prominent methods of conflict mitigation and resolution, including mediation and arbitration; peacekeeping, peacemaking, and peacebuilding; the protection of civilians, Responsibility to Protect, and humanitarian

assistance; elections, democratization, and power-sharing; and transitional reconciliation and justice. We will do this by reading, discussing, and synthesizing classic and cutting-edge Political Science research on these topics.

GVPT414 International Relations of East Asia (3 Credits)
An examination of international relations in East Asia, focusing mostly on Northeast Asia. The course will provide some background on the evolution of international politics in the region over the past several decades, and will examine several contemporary issues--including the North Korean nuclear issue, the relationship across the Taiwan Strait, and maritime disputes in the East and South China Seas--in depth.

GVPT417 Seminar in Advanced Topics in Environmental Policy Analysis (3 Credits)
A series of critical tools and methods used to analyze environmental policy. This class should be of interest to students who are either considering a career or graduate studies in environmental protection.

GVPT419 Seminar in Public Policy (3 Credits)
Reading, writing, and research on topics in public policy. Both substantive issues and methodological approaches will be considered.

GVPT420 The Logic and Practice of Measuring Political Behavior (3 Credits)
Introduction to concepts and practices used for measuring political behavior. Political analysis is an increasingly quantitative field. It is crucial for students of political behavior to learn how to define concepts in concrete ways, examine different methods of measuring concepts, learn how to test the quality of chosen measures, learn how to construct richer measures out of multiple questions, and finally how to examine the relationship between multiple measures of similar concepts. Common pitfalls, errors, bias, and ethics will be examined along the way.

GVPT421 Advanced Quantitative Methods (3 Credits)
Advanced quantitative methods for political science research.
2 Quantitative Political Analysis (3 Credits)
Introduction to quantitative methods of data analysis, including selected statistical methods, block analysis, content analysis, and scale construction.

GVPT423 Elections and Electoral Behavior (3 Credits)
An examination of various topics relating to elections; the focus includes the legal structure under which elections are conducted, the selection and nomination process, the conduct of election campaigns, and patterns of political participation and voting choice in different types of elections.

GVPT424 Quantitative Study of International Relations (3 Credits)
A comprehensive introduction to the quantitative study of international conflict. Students will perform statistical analysis of international conflict data using the R software platform.

GVPT428 Topics in Formal Theories of Political Behavior and Politics (3 Credits)
An evaluation of theories of political behavior such as game, social choice and voting theory, and their applications to problems of distribution and social justice, community organizing, responsive public policy, institutional design, and alliance and coalition formation.

GVPT429 Problems in Political Behavior (3 Credits)
The problem approach to political behavior with emphasis on theoretical and empirical studies on selected aspects of the political process.

GVPT431 Introduction to Constitutional Law (3 Credits)
A systematic inquiry into the general principles of the American constitutional system, with special reference to the role of the judiciary in the interpretation and enforcement of the federal constitution.

GVPT432 Civil Rights and the Constitution (3 Credits)

A study of civil rights in the American constitutional context, emphasizing freedom of religion, freedom of expression, minority discrimination, and the rights of defendants.

GVPT439 Seminar in Public Law (3 Credits)
Reading, writing, and research on topics in public law. Both substantive issues and methodological approaches will be considered.

GVPT442 History of Political Theory--Medieval to Recent (3 Credits)
A survey of the principal theories set forth in the works of writers from Machiavelli to Nietzsche.

GVPT443 Contemporary Political Theory (3 Credits)
A survey of the principal political theories and ideologies set forth in the works of writers from Karl Marx to the present.

GVPT445 Marxism and Postmarxism (3 Credits)
The study of Marxist thought and an assessment of the critical transformations and reassessments of the theory and practice of Marxism.

GVPT448 Non-Western Political Thought (3 Credits)
Examination of works by major authors and general themes of political thought originating in Asia, the Middle East, and Africa. This is not a survey of all non-Western political thought, but a course to be limited by the professor with each offering.

GVPT449 Seminar in Political Philosophy (3 Credits)
Reading, writing, and research on topics in political philosophy. Both substantive issues and methodological approaches will be considered.

GVPT454 Seminar in the International Relations of China (3 Credits)
Explores the foreign relations behavior of the People's Republic of China, with focus on the contemporary era.

GVPT456 The Politics of Terrorism (3 Credits)
Examination of the definition, causes and organization of terrorist activity, along with key domestic and international counter- and anti-terrorism responses. Special emphasis on challanges and opportunities to the scientific study of terrorism.

GVPT457 American Foreign Relations (3 Credits)
The principles and machinery of the conduct of American foreign relations and an analysis of the major foreign policies of the United States.

GVPT459 Seminar in Comparative Politics (3 Credits)
Reading, writing, and research on topics in comparative politics. Both substantive issues and methodological approaches will be considered.

GVPT460 State Politics and Government (3 Credits)
A study of the structure, procedures and policies of state governments with special emphasis on intergovernmental relationships, and with illustrations from Maryland governmental arrangements.

GVPT461 Local Politics and Government (3 Credits)
An introduction to local government and politics in the U.S. context. The course explores the evolution of local jurisdictions, particularly cities, and the politics of local level decision making.

GVPT473 The U.S. Congress (3 Credits)
A detailed survey of lawmaking and the legislative process, emphasizing the U.S. Congress, and its members.

GVPT474 Political Parties (3 Credits)
A descriptive and analytical examination of American political parties, nominations, elections, and political leadership.

GVPT475 The Presidency and the Executive Branch (3 Credits)
An examination of the U.S. presidency in historical and contemporary perspective: nomination and electoral politics and the president's place in policy-making, administration, and public opinion.

GVPT476 The Business Government Relationship (3 Credits)
Examines the structures, process, and outcomes of business and government and the politics and products of their cooperative-adversarial relationships in the United States. The design integrates interest group and administrative politics and the public policy process.

GVPT477 Voting and Participation (3 Credits)
A study of the factors that influence individual vote choice and voter participation in the U.S. The course will introduce political science research pertaining to both topics and will engage current controversies over such things as political campaign laws and the various state and federal rules that govern election administration.

GVPT479 Seminar in American Politics (3 Credits)
Reading, writing, and research on topics in American politics. Both substantive issues and methodological approaches will be considered.

GVPT481 Government and Administration of Russia and the States of the Former Soviet Union (3 Credits)
A comparative study of the governmental systems and political processes of the states of the former Soviet Union.

GVPT482 Government and Politics of Latin America (3 Credits)
A comparative study of the governmental systems and political processes of the Latin American countries.

GVPT484 Government and Politics of Africa (3 Credits)
A comparative study of the governmental systems and political processes of the African countries, with special emphasis on the problems of nation-building in emergent countries.

GVPT485 Government and Politics of the Middle East (3 Credits)
A comparative study of the governmental systems and political processes of Middle Eastern countries, with special emphasis on the problems of nation-building in emergent countries.

GVPT487 Government and Politics of China (3 Credits)
Discussion of major issues in the study of the domestic politics of the People's Republic of China.

Appendix C Program Transfer Agreement Pathway with Montgomery College

Program Transfer Agreement Pathway: A.A. in International Studies—International Studies Area of Concentration at Montgomery College to B.A. in International Relations at the University of Maryland, College Park *(9/20/23)*

Montgomery College A.A. in International Studies						
	Fall Semester			**Spring Semester**		
	MC Course	**UMD Equivalent**	**Credits**	**MC Course**	**UMD Equivalent**	**Credits**
Year 1	ENGL101: Introduction to College Writing*		3	ENGL102 or ENGL103 (ENGF)	ENGL101	3
	MATH117: Statistics (MATF)+	STAT100	3	ECON202: Principles of Economics II (BSSD)**	ECON200	3
	POLI101: American Government (BSSD)**	GVPT170	3	POLI203: International Relations	GVPT200	3
	HIST114 or HIST116 or HIST117 (HUMD)		3	World Languages		3
	World Languages		3	Arts Distribution (ARTD)		3
	Total Credits		**15**	**Total Credits**		**15**
	Fall Semester			**Spring Semester**		
	MC Course	**UMD Equivalent**	**Credits**	**MC Course**	**UMD Equivalent**	**Credits**
Year 2	ANTH201 (see alternatives ±)		3	COMM108 or COMM112 (GEIR)	COMM107	3
	ENGL201 (see alternatives ±±)		3	POLI230 OR POLI256 OR POLI270	L1 GVPT	3
	HIST245 OR HIST247 OR HIST250 OR HIST252 OR HIST266 (GEIR)		3	Natural Sciences Distribution with Lab (NSLD)		4
	POLI211: Comparative Politics and Government	GVPT280	3	POLI206: Political Ideologies	GVPT241	3
	Natural Sciences Distribution (NSD)		3	Electives		2
	Total Credits		**15**	**Total Credits**		**15**
Apply to graduate from MC with an Associate of Arts in International Studies						
TOTAL MC credits prior to UMD transfer: 60						

*ENGL101/ENGL101A if needed for ENGL102/ENGL103, or select an elective.
**Behavioral and Social Sciences Distribution (BSSD) courses must come from different disciplines.
+ MATH117 recommended, but MATH150 or MATH181 are also acceptable. If lower math placement is achieved, student should work towards completion of one of these courses through elective space.
± ANTH256, ECON103, ECON201, GEOG101, GEOG105, GEOG113, GEOG124, GEOG130, GEOG211, PSYC100, SOCY105.
±± ENGL122, ENGL202, ENGL205, ENGL208, ENGL213, ENGL214, ENGL248, GHUM101, HIST255, PHIL209, additional world language course. Additional world language course may be recommended depending on course equivalencies at UMD.
Students should attempt ENGL and MATH foundation requirements at MC within completion of the first 24 credits of college-level work or at the completion of any prerequisite or non-credit coursework.
Effective for UMD students matriculating in Fall 2022 and beyond: No more than 70 credits earned at a 2-year institution shall be transferrable toward a bachelor's degree.

University of Maryland B.A. in International Relations				
	Fall Semester		**Spring Semester**	
	UMD Course	**Credits**	**UMD Course**	**Credits**
Year 3	Upper-level GVPT/INTR Course of Choice	3	GVPT201	3
	Upper-level INTR Course 1	3	Upper-level INTR Course 2	3
	Quantitative Skills	3	Professional Writing (FSPW)	3
	Elementary Language++	4	Intermediate Language++	4
	Electives	3	Electives	3
	Total Credits	**16**	**Total Credits**	**16**
	Fall Semester		**Spring Semester**	
	UMD Course	**Credits**	**UMD Course**	**Credits**
	Upper-level INTR Course 3	3	Upper-level INTR Course 5	3
	Upper-level INTR Course 4	3	Electives	10
	Electives	9		

Year 4				
	Total Credits	**15**	**Total Credits**	**13**
			Total UMD credits	***60***

++ This plan assumes students are not beginning their language coursework until they matriculate to UMD. It also assumes students are taking a language in which one 4-credit course covers the entire elementary level of that language. Some languages at UMD require multiple courses between 4-6 credits to complete the entire elementary level. The one required intermediate level course may then be completed through one course ranging from 4-6 credits. Students may use elective coursework in their senior year if they wish to take a more credit-intensive language. Students interested in taking language coursework at MC should consult the UMD transfer credit database to determine course equivalency, as their coursework may not transfer as a direct equivalent to language coursework at UMD. GVPT does not determine language placement.

A. Representations and Warranties of the Parties

Both Institutions represent and warrant that the following shall be true and correct as of the Effective Date of this Agreement, and shall continue to be true and correct during the term of this Agreement:

1. The Institutions are and shall remain in compliance with all applicable federal, state, and local statutes, laws, ordinances, and regulations relating to this Agreement, as amended from time to time.

2. Each Institution has taken all action necessary for the approval and execution of this Agreement.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed by their duly authorized representatives.

Montgomery College

By: ___________________________________
Name
President or Chief Academic Officer

____
Date

University of Maryland, College Park

Jennifer King Rice

By: ___________________________________
Jennifer King Rice
Senior Vice President and Provost

2/22/24
____
Date

Appendix D: B.A. in International Relations Four-Year Template (with General Education code)

Year 1	Fall		Spring	
Benchmark Requirements must be completed within two semesters of entering the major GVPT170 with a grade of C- or higher One 200-level GVPT/INTR course with a grade of C- or higher (may not be experiential learning) One of STAT100, MATH107, MATH113, MATH115, MATH120, MATH135, MATH136, or MATH140 with a grade of C- or higher Academic Writing with a grade of C- or higher Note: At least one of the GVPT courses must not be from AP/IB/CLEP credit. Maintain 2.0 or higher cumulative gpa	Course	Credit	Course	Credit
	ENGL101 (Gen Ed AW and Benchmark)	3	Gen Ed Analytic Reasoning (AR)	3
	Math (Gen Ed MA and Benchmark) (Based on Placement)	3/4	ECON200 (Gen Ed HS)	3
	Gen Ed Humanities (HU)	3	GVPT200 (Gen Ed UP and 200-level Benchmark course)	3
	GVPT170 (Gen Ed HS: and Benchmark)	3	Elective	3
	UNIV100	1	Elective	3
	Elective	3		
	Total	**16**	**Total**	**15**
Year 2	**Fall**		**Spring**	
Maintain 2.0 or higher cumulative gpa	Course	Credit	Course	Credit
	Gen Ed Oral Communications (OC)	3	Gen Ed Natural Sciences (NL)	4
	Gen Ed Natural Sciences (NS)	3	Gen Ed Cultural Competency (CC)	3
	GVPT201 (Gen Ed SP)	3	Gen Ed Humanities (HU)	3
	GVPT280 or GVPT282	3	GVPT241	3
	Elective	3	Elementary Foreign Language Requirement	3
	Total	**15**	**Total**	**16**
Year 3	**Fall**		**Spring**	
When you're between 75—89 credits, watch out for an email from your Advisors regarding your remaining degree requirements!	Course	Credit	Course	Credit
	GVPT/INTR Course of Choice 1	3	Gen Ed Non-Major Scholarship in Practice (SP)*	3
	GVPT/INTR Course of Choice 2 300/400 level	3	INTR Course of Choice 3 300/400 level	3
	Quantitative Skills Requirement	3	INTR Course of Choice 4 300/400 level	3
	Elective	3	Intermediate Foreign Language Requirement	3
	Elective	3	Elective	3
	Total	**15**	**Total**	**15**
Year 4	**Fall**		**Spring**	
Apply for graduation!	Course	Credit	Course	Credit
	Gen Ed Professional Writing (PW)	3	INTR Course of Choice 6 300/400 level	3
	INTR Course of Choice 5 300/400 level	3	INTR Course of Choice 7 300/400 level	3
	Elective	3	Elective	3
	Elective	3	Elective	3
	Elective	3	Elective	1
	Total	**15**	**Total**	**13**
			Total Credits	**120**

University of Maryland General Education Requirements Overview		
Fundamental Studies: 15 Credits		
Fundamental Studies Academic Writing	3	AW
Fundamental Studies Professional Writing	3	PW
Fundamental Studies Oral Communication	3	OC
Fundamental Studies Mathematics	3	MA
Fundamental Studies Analytic Reasoning[1]	3	AR

[1] If a student passes an Analytic Reasoning course that requires a Fundamental Studies Math course as a prerequisite, then the Fundamental Studies Math course is considered to be fulfilled (e.g., students who place into and pass a calculus course, which counts for FS-AR, do not need to take a less advanced Math course to fulfill the FS-MA requirement).

Distributive Studies: 25 Credits		
Distributive Studies Natural Sciences	3	NS
Distributive Studies Natural Science Lab Course[2]	4	NL
Distributive Studies History and Social Sciences	6	HS
Distributive Studies Humanities	6	HU
Distributive Studies Scholarship in Practice[3]	6	SP

[2] A second DS-NL course can fulfill the DS-NS course requirement.
[3] Students learn and practice skills of critical evaluation and participate in the process of applying knowledge in the pursuit of a tangible goal. At least one course must be outside of the major.

I-Series Courses: 6 Credits[4]
The signature courses of the UMD General Education program, I-Series courses investigate a significant issue in depth and demonstrate how particular disciplines and fields of study address problems.

I-Series Course	6	IS

[4] I-Series credits may be double-counted with courses taken for the Distributive Studies requirement.

Diversity: 4-6 Credits[5]		
Diversity Understanding Plural Societies[6] Courses examine how diverse cultural and ethnic groups co-exist.	3-6	UP
Diversity Cultural Competence Courses help students develop skills to succeed in a diverse world.	0-3	CC

[5] These credits may be double-counted with courses taken for the Distributive Studies requirement.
[6] Students may take either two DV-UP courses or one DV-UP course and one DV-CC course.

University System of Maryland

Board of Regents
Summary of Item for
Action,
Information, or Discussion

TOPIC: *University of Maryland, College Park proposed Bachelor of Science (B.S.) in International Relations*

COMMITTEE: Education Policy and Student Life and Safety

DATE OF COMMITTEE MEETING: April 12, 2024

SUMMARY: UMD's Department of Government and Politics currently offers a bachelor's program in Government and Politics with an International Relations (IR) concentration. This proposal is to replace the concentration with a stand-alone bachelor's degree. This new program will have both a Bachelor of Arts (B.A.) option and a Bachelor of Science (B.S.) option (MHEC is requiring two separate proposals). This summary focuses on the B.S. option. In today's globalized world, many of our most pressing challenges involve international relations. Responses to climate change, economic crises, pandemics, and criminal activity crossing international boundaries all require some international cooperation and coordination. Breakdowns in interstate relations can have dire consequences, including, most obviously, war.

This program will provide students with the tools to understand these critical issues. Students will develop a foundational understanding of international relations theory and will develop the skills necessary to pursue careers or more advanced degrees in the IR field. Students will also be required to take courses in statistics and political methodology to attain competence in data analysis. Students pursuing the B.S. degree will take more advanced coursework in this area. In addition, all majors will be required to attain basic proficiency in a foreign language. Of the 120 credits required for a bachelor's degree, the program will require 52-61 credits dedicated to International Relations.

ALTERNATIVE(S): The Regents may not approve the program or may request further information.

FISCAL IMPACT: No additional funds are required. The program can be supported by the projected tuition and fee revenue.

CHANCELLOR'S RECOMMENDATION: That the Education Policy and Student Life Committee recommend that the Board of Regents approve the proposal from the University of Maryland, College Park to offer a Bachelor of Science in International Relations.

COMMITTEE RECOMMENDATION:	DATE:
BOARD ACTION:	DATE:
SUBMITTED BY: Alison M. Wrynn 301-445-1992	awrynn@usmd.edu

UNIVERSITY OF MARYLAND
OFFICE OF THE PRESIDENT

1101 Thomas V. Miller, Jr. Administration Building
College Park, Maryland 20742
301.405.5803 TEL
301.314.9560 FAX

February 29, 2024

Chancellor Jay A. Perman
University System of Maryland
3300 Metzerott Road
Adelphi, MD 20783

Dear Chancellor Perman:

I am writing to request approval for a new Bachelor of Science program in International Relations. The proposal for the new program is attached. I am also submitting this proposal to the Maryland Higher Education Commission for approval.

The proposal was endorsed by the appropriate faculty and administrative committees. I also endorse this proposal and am pleased to submit it for your approval.

Sincerely,

Darryll J. Pines
President
Glenn L. Martin Professor of Aerospace Engineering

cc: Candace Caraco, Associate Vice Chancellor
Jennifer King Rice, Senior Vice President and Provost
Susan Rivera, Dean, College of Behavioral and Social Sciences

UNIVERSITY SYSTEM OF MARYLAND INSTITUTION PROPOSAL FOR

x	New Instructional Program
	Substantial Expansion/Major Modification
	Cooperative Degree Program
x	Within Existing Resources, or
	Requiring New Resources

University of Maryland, College Park
Institution Submitting Proposal

International Relations
Title of Proposed Program

Bachelor of Science	**Fall 2024**
Award to be Offered	Projected Implementation Date
221002	**44.0504**
Proposed HEGIS Code	Proposed CIP Code
Government and Politics	David Cunningham
Department in which program will be located	Department Contact
301-405-8364	dacunnin@umd.edu
Contact Phone Number	Contact E-Mail Address
Darryll J. Pines	02-29-2024
Signature of President or Designee	Date

A. Centrality to the University's Mission and Planning Priorities

Description. In today's globalized world, many of our most pressing challenges involve international relations. Responses to climate change, economic crises, pandemics, and criminal activity crossing international boundaries all require some international cooperation and coordination. Breakdowns in interstate relations can have dire consequences, including, most obviously, war. This new International Relations (IR) undergraduate program will provide students with the tools to understand these critical issues.

The University of Maryland's (UMD's) existing bachelor's program in Government and Politics has an existing Area of Concentration in International Relations. This proposal is to convert that concentration into a stand-alone bachelor's program with both a Bachelor of Arts option and a Bachelor of Science option. The IR major curriculum is based on three educational objectives. First, students will develop a foundational understanding of international relations theory. Students will take a core class on international political relations and more specialized courses on specific topics, including conflict, political economy, international organization, and comparative institutions. Second, students for both the B.A. and B.S. degree options will develop the skills necessary to pursue careers or more advanced degrees in the IR field. Careers in IR, and advanced study in IR, increasingly use data analytics. Majors will thus be required to take courses in statistics and political methodology to attain competence in data analysis. In addition, all IR majors will be required to attain basic proficiency in a foreign language, a skill needed in many IR-related careers. Finally, students majoring in IR will be strongly encouraged to take advantage of UMD's many experiential learning opportunities (including study abroad, internships, and research assistantships) so that they develop hands-on experience that will help them succeed in future careers or educational endeavors.

Students may choose between two curricular options, one leading to a Bachelor of Arts degree and the other to a Bachelor of Science. The Bachelor of Arts in International Relations prepares students to understand and interpret research on international relations and comparative politics. The Bachelor of Science in International Relations provides students with the tools to produce political science research focused on international relations and comparative politics through advanced training in political methodology and data analysis. **This proposal will focus on the Bachelor of Science option.**

Relation to Strategic Goals. As Maryland's flagship campus and a national leader in higher education, UMD strives to provide exceptional and affordable instruction for the state's most promising students, regardless of income. As one of the country's first land-grant institutions, UMD uses its research, educational, cultural, and technological strengths in partnership with state, federal, private, and non-profit sectors to promote economic development and improve the quality of life in the state and the region. One of the commitments listed in UMD's 2022 Strategic Plan, "Fearlessly Forward in Pursuit of the Public Good," is to "accelerate solutions to humanity's grand challenges—within our communities and around the globe." Many of humanity's grand challenges require international cooperation and coordination. Progress on climate change, for instance, ultimately requires international cooperation, where states bargain with each other over—among other things—commitments to reduce greenhouse gas emissions. Students in this program will learn international relations concepts, modes of inquiry, and analytic skills to address contemporary problems in international politics, understand the politics of diversity, and encourage civic engagement.

Funding. Because the concentration in International Relations already exists within the Government and Politics major, there are no significant financial implications for this new program.

Institutional Commitment. The program will continue to be administered by the Department of Government and Politics, which has the administrative infrastructure and faculty resources to convert the concentration to a stand-alone degree program. The undergraduate major in Government and Politics will still be in operation along with this new major.

B. Critical and Compelling Regional or Statewide Need as Identified in the State Plan

Need. The International Relations program will contribute directly to the need for the advancement and evolution of knowledge. The new major will leverage the unique strengths of the Government and Politics Department, its resources, and premier faculty. Students will have the opportunity to learn from leading experts in the field of international relations, and to take advantage of the wealth of opportunities available in the Washington Metropolitan area. Ultimately, we hope that the major will help to attract top in-state and out-of-state students to Maryland, students who might otherwise have attended other Big Ten schools, or private research universities in the Washington, D.C. area that offer majors in international politics. By offering an IR major to our students, we fill an important gap in opportunities available to Maryland residents at their flagship state university. In turn, we will be building a stronger community of students with an interest in a field of critical contemporary relevance.

State Plan. The proposed program aligns with Priority 5 in the 2022 *Maryland State Plan for Postsecondary Education*: "Maintain the commitment to high-quality postsecondary education in Maryland." The Action Item to "Identify innovative fields of study" fits with this program. To quote the State plan: "With a fast-changing economy, campuses are constantly working to update academic programs to meet industry needs and ensure a quality workforce, support faculty development, consider innovative credentialing models, and provide low-risk high-reward experiential learning opportunities for self- exploration and career development." The proposed program itself is low risk as it already exists as an area of concentration within an existing broader academic program, Government and Politics. With a specific credential in International Relations, students become more marketable for careers in organizations that are unique to the Washington, D.C. area, such as the State Department, the Department of Defense, the Department of Commerce, or the intelligence community. Students might also seek careers in the broad network of think tanks and contracting companies that conduct analyses directly relevant to US foreign policy (such as, for instance, the RAND Corporation, the CNA Corporation, or the Institute for Defense Analyses). The program will be structured to encourage students to take advantage of experiential learning opportunities such as study abroad and international relations related internships in the Washington, D.C. area.

C. Quantifiable and Reliable Evidence and Documentation of Market Supply and Demand in the Region and State

One recent book published by Georgetown University Press offers guidance to students hoping to pursue careers in international affairs.[1] The book examines a broad range of career opportunities that are available to students who specialize in the study of international relations, including careers within the US government, in international organizations, in banking, in business, in consulting, in universities and university research centers, in international development, and more. The book also includes a directory of organizations that hire in international relations; the directory extends for 80 pages.

At a macro-level, the US Government Accountability Office (GAO) released a report in 2014 on trends in the federal workforce. The report found that from 2004 to 2012, the federal non-postal civilian workforce increased by 258,882, and 94% of this increase came from three agencies directly related to international affairs: the Department of Homeland Security, the Department of Defense, and the Department of Veterans Affairs.[2] If we drill down further, the US intelligence community has "tens of thousands" of employees engaged in a broad range of careers, including many that demand expertise in international affairs; the intelligence community actively seeks qualified applicants for its many jobs. The US Foreign Service—again, a career path closely tied to an international relations course of study—currently employs approximately 13,000. And obviously there are many, many other agencies in the federal government that conduct work relating to international relations. Meanwhile, a recent analysis of salaries for recent college graduates showed International Relations majors as having the 17th highest average salary out of 50 majors, behind most engineering specialties but higher than most traditional liberal arts programs, and suggesting that IR majors are in considerable demand.[3]

In sum, the job opportunities for students specializing in international relations are broad. Many students completing our new major will seek employment in the federal government, and here we have provided a snapshot of the job market there. But many students will seek to pursue graduate studies in a range of different disciplines and professional schools, and many others will seek career paths in business, finance, international organizations, among others.

D. Reasonableness of Program Duplication

The proposed program differs from other programs in the state in two primary ways. First, the proposed major is discipline-specific, focusing on international relations through the lens of government and politics, and the programs offered by other institutions in the state generally focus on an inter-disciplinary approach to international relations/international studies. Most of

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[1] Laura E. Cressy, Barrett G. Helmer, and Jennifer E. Steffensen, editors. Careers in International Affairs, Ninth Edition. Washington DC: Georgetown University Press, 2014.
[2] United States Government Accountability Office, Report to the Ranking Member, Committee on the Budget, U.S. Senate, Federal Workforce: Recent Trends in Federal Civilian Employment and Compensation. (GAO-14-215) January 2014.
[3] See "These degrees have the highest salaries in the US," (https://www.weforum.org/agenda/2018/07/which-college-degrees-get-the-highest-salaries).

these programs are titled International Studies rather than International Relations. These programs include those offered by Frostburg, Johns Hopkins, Mount Saint Mary's, Notre Dame of Maryland University, Salisbury, Towson, and Washington College. These programs each have a substantial component of the program that students complete in courses outside of government and politics or political science departments. Goucher University, the only institution to offer a program titled International Relations, allows students to complete the program using a variety of other disciplines. Our proposed major, on the other hand, trades this sort of breadth for depth: students in the major will pursue an intense course of study in international relations from a political science perspective.

E. Relevance to Historically Black Institutions (HBIs)

There are no Historically Black Institutions within the state of Maryland that offer an International Relations major, and it appears unlikely that the proposed program would adversely affect any existing programs.

F. Relevance to the identity of Historically Black Institutions (HBIs)

We do not anticipate any negative impacts on the identities of the HBIs in the state of Maryland, as none offer this degree program. Moreover, UMD already has an International Relations Area of Concentration listed under its Government and Politics major, indicating that field of international relations has already been established within the identity of UMD.

G. Adequacy of Curriculum Design, Program Modality, and Related Learning Outcomes

Curricular Development. The proposed International Relations major curriculum was developed in consultation with the department's undergraduate studies committee and Government and Politics faculty. Additionally, a review of international relations/international studies majors at other universities helped inform our curriculum planning process.

Faculty Oversight. The Department's Director of Undergraduate Studies will provide academic direction and oversight for the proposed program. The Director will consult academic matters with Department of Government and Politics Undergraduate Studies Committee as needed; the committee consists of two tenure-track faculty, one professional track faculty, two undergraduate program staff members, and two undergraduate students. See Appendix A for the list of faculty who will teach in this program.

Educational Objectives and Learning Outcomes. The Bachelor of Arts option and the Bachelor of Science option share three of the same learning outcomes, but have two unique outcomes reflecting the difference in emphasis. The learning outcomes for the Bachelor of Science in International Relations are as follows:

1. Understand basic international relations concepts including power, political institutions, international organizations, political economy, theories of the state, political conflict and war, and contending analytical and theoretical approaches. (Both B.A. and B.S.)

2. Identify causes of systemic bias and discrimination against underrepresented groups and structural disadvantages of states in the Global South, such as persistent legacies of colonialism and imperialism, and critically evaluate theories and evidence on the impact of race and identity in international politics. (Both B.A. and B.S.)
3. Use international relations concepts, modes of inquiry, and analytic skills to address contemporary problems in international politics, understand the politics of diversity, and encourage civic engagement. (Both B.A. and B.S.)
4. Understand, interpret, and produce empirical international relations research using sophisticated quantitative methodology. (B.S. only)
5. Communicate key arguments and the results of empirical analyses in international relations effectively in writing and speaking. (B.S. only)

Institutional assessment and documentation of learning outcomes. The Government and Politics Department will assess the learning outcomes on an annual basis. Each year, up to two learning outcomes will be assessed, so that all learning outcomes are assessed on a four-year cycle. The department's undergraduate studies committee, which is led by a full professor and includes faculty (both tenure track and professional track), undergraduate program staff members, and undergraduate majors, will develop rubrics that will be used to assess student mastery of each of these learning objectives. Faculty members will then use the rubric to assess a sample of student projects/papers produced in the academic year. The rubric will contain categories related to the specific learning outcome and students will be assessed as "Advanced," "Proficient," "Developing," or "Novice" in each category. The individual categories will be aggregated to produce an overall score. Our overall goal is that 80% of our students are scored as "Advanced" or "Proficient" on each program-level learning outcome assessed. The results of the Learning Outcome Assessment will be discussed in the department's undergraduate studies committee, the department's executive committee, and among the full faculty.

Course requirements. The Bachelor of Science program will require 52-61 credits dedicated to International Relations. Students will take an introductory American Government course, a math course, nine credits of foundational government and politics courses related to international politics, comparative politics, or global development. Students will take 15 credits in quantitative and empirical research methods, including a 200-level Scope and Methods Course for Political Science Research and a 300-level Advanced Empirical Research course. Students will also take nine credits of upper-level international relations courses. Outside of the Government and Politics Department, students will take principles of microeconomics, complete a foreign language through the elementary level and continue through the intermediary level or take an additional quantitative skills course. A list of courses and descriptions is included in Appendix B.

Required Courses		
Course	*Title*	*Credits*
GVPT170	American Government	3
One of the following math courses:		3-4
STAT100	Elementary Statistics and Probability	
MATH107	Introduction to Math Modeling and Probability	
MATH113	College Algebra and Trigonometry	
MATH115	Precalculus	
MATH120	Elementary Calculus I	
MATH135	Discrete Mathematics for Life Sciences	
MATH136	Calculus for Life Sciences	
MATH140	Calculus I	
GVPT201	Scope and Methods for Political Science Research	3
GVPT320	Advanced Empirical Research	3
Foundational Courses		
GVPT200	International Political Relations	3
GVPT280	The Study of Comparative Politics	3
or GVPT282	The Politics of Global Development	
One GVPT 100-200 level course (must be related to IR or comparative politics)		3
Methods Requirements		
GVPT/INTR Methods Course 300-400 level		3
INTR Quantitative Methods Course 300-400 level		3
GVPT/INTR Quantitative Methods Course 300-400 level		3
Courses of Choice		
International Relations Courses at 300-400 level		9
Skills Requirements		
ECON200	Principles of Microeconomics	3
Completion of a foreign language through the entire elementary level*		4-12
Quantitative Skills course		3
Additional Skills Course (may be intermediate-level foreign language course* or additional quantitative skills course)		3
Total Credits for Major		52-61

**Taught by our School of Languages, Literatures, and Cultures. Different languages will require different credits at the elementary level.*

General Education. All UMD students are required to complete General Education requirements in Fundamental Studies (Mathematics, Writing, and Analytic Reasoning) and Distributive Studies in the sciences, humanities, and social sciences. The Distributive Studies area includes a diversity requirement, two practice-based courses, and two “big question” courses (I-Series courses) that address societal grand challenges. Maryland community college students who complete the associate degree and are admitted to UMD are deemed to have completed their General Education requirements, except for Professional Writing (typically completed in the 3rd year of study). See Appendix D for how students in the program will fulfill their General Education requirements.

Accreditation or Certification Requirements. There are no specialized accreditation or certification requirements associated with this program.

Other Institutions or Organizations. The department is not planning to contract with another institution or non-collegiate organization for this program.

Student Support. Students enrolled in this program will have access to all the resources necessary to succeed in the program and make the most of the learning opportunity. Students entering the university as either first-time college students or transfer students will learn about the program through their orientation program. The Government and Politics Department's existing advising staff will support the students in this program. The department does not anticipate the proposed program placing significant additional burdens on the department's administrative infrastructure because International Relations already exists as an Area of Concentration within the Government and Politics major.

Marketing and Admissions Information. The program will be clearly and accurately described in the university website and be marketed at university recruiting events. The University of Maryland's Office of Undergraduate Admissions markets nationally to a broad base of interested students who are admitted to the University as a whole. If the program is approved, it will be included among the more than 100 possible undergraduate majors available to students.

H. Adequacy of Articulation

While UMD accepts transfer students from all Maryland community colleges as well as from other four-year institutions, Montgomery College is one of our most common partners for transfers. UMD and Montgomery College have developed a transfer articulation pathway with the proposed major and the A.A. in International Studies at Montgomery College. See Appendix C.

I. Adequacy of Faculty Resources

Program faculty. Appendix A contains a list of faculty members who will teach in the program. Because of the existing Area of Concentration in International Relations, a core group of faculty already teach the courses listed in the curriculum.

Faculty training. Faculty teaching in the program will use the university's learning management system along with its extensive electronic resources. They will have access to instructional development opportunities available across the College Park campus, including those offered as part of the Teaching and Learning Transformation Center, many of which are delivered in a virtual environment. Instructors will work with the learning design specialists on campus to incorporate best practices when teaching in the online environment.

J. Adequacy of Library Resources

The University of Maryland Libraries assessment concluded that the Libraries are able to meet, with current resources, the curricular and research needs of the program.

K. Adequacy of Physical Facilities, Infrastructure, and Instructional Resources

All physical facilities, infrastructure, and instructional equipment are already in place. No new facilities are required. The proposed program will be in-person, but for the online components of the coursework, UMD maintains an Enterprise Learning Management System (ELMS). ELMS is a Web-based platform for sharing course content, tracking assignments and grades, and enabling virtual collaboration and interaction. All students and faculty have access to UMD's electronic mailing system.

L. Adequacy of Financial Resources

The budget tables reflect the reallocation of internal UMD resources to establish the program.

Resources (see Table 1):
Year 1 is based on the initial cohort enrolling in Fall 2024.

1. Line 1 reflects the reallocated resources anticipated to support the program.
2. Our model assumes that most students will be full-time undergraduates enrolled at UMD. We assume no additional revenue will be generated by this new major since we do not anticipate a significant change in the overall undergraduate population.
3. No external sources of funding are assumed.
4. No other sources of funding are assumed.

Expenditures (see Table 2):
The administrative staff and faculty are already in place to operate this program. Essentially, they will be completing the same activities but instead of for an Area of Concentration, it will be for a new major. A small number of new courses will be offered for the major, but we expect no significant additional expenditures for the program.

1. Line 1 reflects the faculty who will continue their activities under the banner of the new major instead of the current Area of Concentration.
2. Line 2 and 3 reflect the administrative and staffing support, also already in place, that will shift their energies to supporting the new major.
3. Line 4 reflects the graduate assistants, also already in place, that will be assigned to the new major.
4. Facility, equipment, and other expenses are not listed as they are already part of the department's operating expenses.

M. Adequacy of Program Evaluation

Formal program review is carried out according to the University of Maryland's policy for Periodic Review of Academic Units, which includes a review of the academic programs offered by, and the research and administration of, the academic unit (http://www.president.umd.edu/policies/2014-i-600a.html). Program Review is also monitored following the guidelines of the campus-wide cycle of Learning Outcomes Assessment (https://irpa.umd.edu/Assessment/loa_overview.html). Faculty within the department are reviewed according to the University's Policy on Periodic Evaluation of Faculty Performance (http://www.president.umd.edu/policies/2014-ii-120a.html). Since 2005, the University has used an online survey instrument that standardizes student course feedback across campus. The survey has standard, university-wide questions and allows for supplemental, specialized questions from the academic unit offering the course.

N. Consistency with Minority Student Achievement goals

The Department of Government and Politics is strongly committed to diversity. The Department has a very active Diversity, Equity, and Inclusion (DEI) committee, led by the Associate Chair. The program director will work closely with that committee, as well as the College of Behavioral and Social Sciences Assistant Dean for Diversity to develop programs and strategies to advance our diversity objectives, including recruiting and retaining a diverse population of students. Our diversity plans will include working closely with campus student groups that advocate for DEI so that students from groups that are traditionally underrepresented in social science majors are aware of our program and given the tools that they need to succeed in the new major.

O. Relationship to Low Productivity Programs Identified by the Commission

N/A

P. Adequacy of Distance Education Programs

This program is not intended for distance education.

Table 1: Resources

Resources Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1.Reallocated Funds	$800,000	$800,000	$800,000	$800,000	$800,000
2. Tuition/Fee Revenue (c+g below)	$0	$0	$0	$0	$0
a. #FT Students	300	300	300	300	300
b. Annual Tuition/Fee Rate	$15,649	$16,119	$16,602	$17,100	$17,613
c. Annual FT Revenue (a x b)	$4,694,760	$4,835,603	$4,980,671	$5,130,091	$5,283,994
d. # PT Students	30	30	30	30	30
e. Credit Hour Rate	$509.50	$524.79	$540.53	$556.74	$573.45
f. Annual Credit Hours	20	20	20	20	20
g. Total Part Time Revenue (d x e x f)	$305,700	$314,871	$324,317	$334,047	$344,068
3. Grants, Contracts, & Other External Sources	$0	$0	$0	$0	$0
4. Other Sources	$0	$0	$0	$0	$0
TOTAL (Add 1 - 4)	**$800,000**	**$800,000**	**$800,000**	**$800,000**	**$800,000**

Table 2: Expenditures

Expenditure Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1. Faculty (b+c below)	$399,000	$410,970	$423,299	$435,998	$449,078
a. #FTE	3.0	3.0	3.0	3.0	3.0
b. Total Salary	$300,000	$309,000	$318,270	$327,818	$337,653
c. Total Benefits	$99,000	$101,970	$105,029	$108,180	$111,425
2. Admin. Staff (b+c below)	$93,100	$95,893	$98,770	$101,733	$104,785
a. #FTE	1.0	1.0	1.0	1.0	1.0
b. Total Salary	$70,000	$72,100	$74,263	$76,491	$78,786
c. Total Benefits	$23,100	$23,793	$24,507	$25,242	$25,999
3. Total Support Staff (b+c below)	$16,625	$17,124	$17,637	$18,167	$18,712
a. #FTE	0.25	0.25	0.25	0.25	0.25
b. Total Salary	$12,500	$12,875	$13,261	$13,659	$14,069
c. Total Benefits	$4,125	$4,249	$4,376	$4,507	$4,643
4. Graduate Assistants (b+c)	$238,616	$243,291	$248,105	$248,105	$248,105
a. #FTE	5.0	5.0	5.0	5.0	5.0
b. Stipend	$117,155	$120,670	$124,290	$124,290	$124,290
c. Tuition Remission	$82,800	$82,800	$82,800	$82,800	$82,800
d. Benefits	$38,661	$39,821	$41,016	$41,016	$41,016
5. Equipment	$0	$0	$0	$0	$0
5. Library	$0	$0	$0	$0	$0
6. New or Renovated Space	$0	$0	$0	$0	$0
7. Other Expenses: Operational Expenses	$3,375	$2,876	$2,363	$1,833	$1,288
TOTAL (Add 1 - 8)	**$750,716**	**$770,153**	**$790,174**	**$805,836**	**$821,968**

Appendix A: Core Faculty for the International Relations Major

The following faculty members are projected to teach in the program. All faculty are full-time unless otherwise indicated.

Name	Highest Degree Earned, Program, and Institution	UMD Title (indicate if part-time)	Courses
Alcaniz, Isabella	PhD, Political Science Northwestern University	Professor	GVPT482 Government and Politics of Latin America
Allee, Todd	PhD, Political Science University of Michigan	Associate Professor	GVPT200 International Political Relations; GVPT406 International Organizations
Berland, Allison	PhD, Political Science University of Maryland	Lecturer (part-time)	GVPT280 The Study of Comparative Politics; GVPT273 Introduction to Environmental Politics; GVPT459D Democracy and Democratization; GVPT459F Politics of India
Birnir, Johanna	PhD, Political Science University of California, Los Angeles	Professor	GVPT201 Scope and Methods for Political Science Research; GVPT301 Politics of Identity
Calvo, Ernesto	PhD, Political Science Northwestern University	Professor	GVPT459B Comparative Political Institutions; GVPT429T Social Media Politics
Carcelli, Shannon	PhD, Political Science University of California, San Diego	Assistant Professor	GVPT404 Political Economy of Foreign Aid; GVPT457 American Foreign Relations

Croco, Sarah	PhD, Political Science University of Michigan	Professor	GVPT201 Scope and Methods for Political Science Research; GVPT309C Advances in the Study of Conflict;
Cunningham, David	PhD, Political Science University of California, San Diego	Professor	GVPT411 Conflict in the International System; GVPT429W Studying Civil Wars with Data
Cunningham, Kathleen	PhD, Political Science University of California, San Diego	Professor	GVPT410 Politics of Nationalist and Ethnic Conflict; GVPT412 Nonviolent Resistance in the International System
Gimpel, James	PhD, Political Science University of Chicago	Professor	GVPT429B Data Analysis for Political Behavior
Hadden, Jennifer	PhD, Political Science Cornell University	Associate Professor	GVPT409O Politics of Climate Change; GVPT459M Social Movements
Hanmer, Michael	PhD, Political Science University of Michigan	Professor	GVPT479M Political Science Survey Methods and Experience
Haufler, Virginia	PhD, Political Science Cornell University	Associate Professor	GVPT206 GVPT406 International Organizations; GVPT409G Corporations and the Global Political Economy
Jones, Calvert	PhD, Political Science Yale University	Associate Professor	GVPT200 International Political Relations; GVPT203 The Challenge of Authoritarianism; GVPT459Y

			Comparative Political Ideologies; GVPT485 Government and Politics of the Middle East
Kastner, Scott	PhD, Political Science University of California, San Diego	Professor	GVPT204 Uncertain Partners: U.S. and China in a Changing World; GVPT414 International Relations of East Asia
Kazungu, Conny	PhD, Political Science University of Tennessee, Knoxville	Lecturer	GVPT273 Introduction to Environmental Politics; GVPT306 Global Environmental Politics; GVPT417 Advanced Environmental Policy Analysis; GVPT484 Government and Politics of Africa
Kim, Hyunki	PhD, Political Science University of Maryland	Lecturer (part-time)	GVPT409A Peace and Conflict Processes
Kumar, Sujith	PhD, Political Science London School of Economics and Political Science	Senior Lecturer	GVPT241 Political Philosophy Ancient and Modern; GVPT449G Global Justice
McCauley, John	PhD, Political Science University of California, Los Angeles	Associate Professor	GVPT210 Religions, Beliefs, and World Affairs; GVPT354 International Development and Conflict Management; GVPT484 Government and Politics of Africa

Miler, Kristina	PhD, Political Science University of Michigan	Associate Professor	GVPT170 American Government
Pearson, Margaret	PhD, Political Science Yale University	Professor	GVPT454 International Relations of China; GVPT487 Government and Politics of China
Shen-Bayh, Fiona	PhD, Political Science University of California, Berkeley	Assistant Professor	GVPT429J Digital Dictatorships
Telhami, Shibley	PhD, Political Science University of California, Berkeley	Professor	GVPT409H International Relations of the Middle East
Tismaneanu, Vladimir	PhD, Political Science University of Bucharest	Professor	GVPT445H Marxism and Post-Marxism GVPT459H East European Politics and Societies; GVPT459K Russian Politics; GVPT459P Revolutions of 1989 and their Consequences; GVPT459R The Rise and Fall of Communism; GVPT459X Political Radicalism

Appendix B: Course Descriptions

Required:

GVPT170 American Government (3 Credits)
A comprehensive study of national government in the United States.

GVPT200 International Political Relations (3 Credits)
A study of the major factors underlying international relations, the causes of conflict and cooperation among international actors, the role of international institutions, the interactions of domestic and foreign policies, and major issues in security, economy and the environment.

GVPT201 Scope and Methods for Political Science Research (3 Credits)
An introduction to empirical research in political science.

GVPT280 or GVPT282
GVPT280 The Study of Comparative Politics (3 Credits)
An introduction to the comparative study of politics and governance, including the analytical concepts for studies of politics and a survey of the major types of regimes, including democratic and authoritarian/communist regimes.

GVPT282 The Politics of Global Development (3 Credits)
A study of the domestic governmental institutions; processes and problems such as conflict and economic development; and the socio-economic environments that are common to lower-income countries around the world.

GVPT320 Advanced Empirical Research (3 Credits)
Allows students to build on the knowledge of statistical inference they gained from GVPT201. Topics include data collection, data cleaning, data analysis, and data visualization. By the time students complete this class, they will be able to do basic statistical modeling using OLS regression independently.

Math Requirement (one of the following):

STAT100 Elementary Statistics and Probability (3 Credits)
Simplest tests of statistical hypotheses; applications to before-and-after and matched pair studies. Events, probability, combinations, independence. Binomial probabilities, confidence limits. Random variables, expected values, median, variance. Tests based on ranks. Law of large numbers, normal approximation. Estimates of mean and variance.

MATH107 Introduction to Math Modeling and Probability (3 Credits)
A goal is to convey the power of mathematics as shown by a variety of problems which can be modeled and solved by quantitative means. Also included is an introduction to probability. Topics include data analysis, equations, systems of equations, inequalities, elementary linear programming, Venn diagrams, counting, basic probability, permutations, combinations, tree diagrams, standard normal and normal distributions. The mathematics of finance is covered. The course includes problem solving and decision making in economics, management, and social sciences.

MATH113 College Algebra and Trigonometry (3 Credits)
Topics include elementary functions including graphs and applications of: polynomial, rational, exponential, and logarithmic functions. Systems of equations and applications. Trigonometric functions: angle and radian measure, graphs and applications.

MATH115 Precalculus (3 Credits)
Preparation for MATH120, MATH130 or MATH140. Elementary functions and graphs: polynomials, rational functions, exponential and logarithmic functions, trigonometric functions. Algebraic techniques preparatory for calculus.

MATH120 Elementary Calculus I (3 Credits)
Basic ideas of differential and integral calculus, with emphasis on elementary techniques of differentiation and applications.

MATH121 Elementary Calculus II (3 Credits)
Trigonometric functions, techniques of integration, infinite series, differential equations, probability.

MATH135 Discrete Mathematics for Life Sciences (4 Credits)
Basic discrete mathematics, with emphasis on relevant models and techniques to the life sciences.

MATH136 Calculus for Life Sciences (4 Credits)
Continuation of MATH135, including basic ideas of differential and integral calculus, with emphasis on elementary techniques and applications to the life sciences.

MATH140 Calculus I (4 Credits)
Introduction to calculus, including functions, limits, continuity, derivatives and applications of the derivative, sketching of graphs of functions, definite and indefinite integrals, and calculation of area. The course is especially recommended for science, engineering and mathematics majors.

Skills Requirement:

ECON200 Principles of Microeconomics (3 Credits)
Introduces economic models used to analyze economic behavior by individuals and firms and consequent market outcomes. Applies conceptual analysis to several policy issues and surveys a variety of specific topics within the broad scope of microeconomics.

Possible Electives:

GVPT203 The Challenge of Authoritarianism (3 Credits)
An introduction to the persistent challenge of authoritarianism. The course explores the nature of authoritarianism and its evolution from ancient through modern times. Students will study how authoritarian regimes vary, why citizens sometimes comply with them, and when and how citizens rebel. The course concludes with a review of contemporary authoritarianism, focusing on its resilience in the Middle East and East Asia and its potential for a resurgence in the US and Europe.

GVPT204 Uncertain Partners: US and China in a Changing World (3 Credits)
The rapid ascent of the People's Republic of China (PRC) as a major political and economic power has meant that its relationship with the United States has become central in contemporary international politics. To an increasing extent, some of the biggest global challenges--ranging from nuclear proliferation, to climate change, to economic growth--require U.S.-China cooperation if they are to be managed effectively. Yet the U.S.-China relationship is at times turbulent, and its future remains highly uncertain. Will the U.S. and China be able to forge a closer partnership that will enable them to cooperate in dealing with some of the vexing challenges facing the international community? Or are they more likely to drift toward a more adversarial relationship, as China's growing power--and the US reaction--generate a vicious cycle of mutual mistrust? In this class, students will grapple with these questions as they learn about the history of U.S.-China relations, and about many of the current issues facing the relationship.

GVPT205 Special Topics in International Ethics, Conflict, and Immigration (3 Credits)
An examination of issues in international ethics, conflict generated at the international level, and problems in immigration policy and law, including theories of rights and immigration, and ideological sources of international violence.

GVPT206 Appetite for Change: Politics and the Globalization of Food (3 Credits)
An overview of the major forces transforming the food system--political, economic, technological, environmental--and the political debates surrounding them.

GVPT208 Political Science Topics in Study Abroad (3 Credits)
The study of topics in political science taken as part of an approved study abroad program.

GVPT210 Religions, Beliefs, and World Affairs (3 Credits)
Introduces students to an increasingly important question: what is the relationship between religion and politics around the world? For a long period in the 20th Century, religion seemed to be decreasing in importance. Eventually, it was thought, religion would simply go away and secularism, development, and rationality would rule the day. In the last generation, however, events like the Iranian Revolution, the rise of the Christian Right, 9/11, the Tibetan monks protest, the spread of Truth and Reconciliation Commissions, and numerous wars fought in the name of God have brought religion back to prominence in world affairs. In this course, we will explore the contemporary impact of religions on politics around the world, through four broad themes: how to understand religion in politics, the relationship between religion and the state, religious groups as sources of conflict and peace, and contemporary religio-political challenges.

GVPT241 The Study of Political Philosophy: Ancient and Modern (3 Credits)
Examines some of the salient continuities and breaks between the ancient and modern traditions in Western political philosophy.

GVPT258 Introduction to Political Science Topics in Study Abroad (3 Credits)
The study of topics in political science taken as part of an approve study abroad program.

GVPT273 Introduction to Environmental Politics (3 Credits)
An overview of modern environmental philosophy, politics, and policy, exploring environmental politics in the US by way of comparison with other developed and developing countries.

GVPT280 The Study of Comparative Politics (3 Credits)
An introduction to the comparative study of politics and governance, including the analytical concepts for studies of politics and a survey of the major types of regimes, including democratic and authoritarian/communist regimes.

GVPT282 The Politics of Global Development (3 Credits)
A study of the domestic governmental institutions; processes and problems such as conflict and economic development; and the socio-economic environments that are common to lower-income countries around the world.

GVPT289 Special Topics in Government and Politics (1-6 Credits)
Substantive issues of and theoretical approaches to political phenomenon. Topics and credit vary.

GVPT301 Identity and Conflict (3 Credits)
An examination of identity as a source of civil conflict. The course explores how identity is embedded in context, how identity is manipulated for political ends, and how identity conflict may be resolved.

GVPT306 Global Environmental Politics (3 Credits)
Focus on three processes of international environmental policy development- identifying problems, negotiating solutions, and implementing agreements- through a range of case studies, including global climate change.

GVPT308 Political Science Topics in Study Abroad II (3 Credits)
The study of topics in political science taken as part of an approved study abroad program.

GVPT309 Topics in International Relations (3 Credits)
The study of topics in international relations.

GVPT319 Topics in Social Advocacy (1-3 Credits)
Reading, research and discussion of variety of topics related to social advocacy.

GVPT349 Topics in Political Philosophy (3 Credits)
The study of topics in political philosophy.

GVPT351 Model United Nations (3 Credits)
Students are prepared for the model United Nations Conference.

GVPT354 International Development and Conflict Management (3 Credits)
Serves as the gateway course for the Minor in International Development and Conflict Management. Provides an introductory foundation in the theory and practice of international development and conflict management. Introduces the structures, key players, intersections, and main trends in the evolution of the fields. Explores causal factors that drive economic growth, poverty, inequality, and conflict, as well as the resources, methods, and tools available to track and address these issues.

GVPT355 Capstone in International Conflict Management (3 Credits)
Serves as one of the two capstone courses for the Minor in International Development and Conflict Management. Focuses on advanced theory and the practice and profession of international conflict management and is designed to provide students an introduction to, and a chance to engage with, a core set of practical skills relevant to the field.

GVPT356 Capstone in International Development (3 Credits)
Serves as one of the two capstone courses for the Minor in International Development and Conflict Management. Focuses on advanced theory and the practice and profession of international development and is designed to provide students an introduction to, and a chance to engage with, a core set of practical skills relevant to the field.

GVPT359 Topics in Comparative Politics (3 Credits)
The study of topics in comparative politics.

GVPT360 International Negotiations (3 Credits)
A study of the complexities of international negotiation and cross-cultural decision-making. Students will apply advanced computer technology in an interactive simulation involving actual negotiations.

GVPT368 Special Topics in Government and Politics (3 Credits)
The study of topics in government and politics.

GVPT373 Geographic Information Systems for Redistricting (3 Credits)
Local, state and federal governments must periodically draw and redraw political boundaries to account for shifts in the population. This course will be an introduction and overview of district drawing and redistricting as an important application of GIS research in political science and public policy. This class will equip students to use convenient GIS tools to create and consider alternative district scenarios to find the best possible solution. After

finishing this class students will be able to draw districts to define police beats, sales territories, congressional and state legislative districts, school and fire protection districts, and numerous other boundaries.

GVPT376 Applied Field Research in Government and Politics (3-6 Credits)
Students in this course participate as interns in an agency of government or in some other appropriate political organization. Assignments are arranged to provide students with insights into both theoretical and practical aspects of politics. Under the tutelage of the host agency and an academic advisor, students conduct a major research project of mutual interest to the student and his or her host agency in the field of government and politics.

GVPT377 Experiential Learning: Government and Politics Internship Program (3 Credits)
The application of major concepts of political science to the realities of the political process. The course connects internship experiences with larger themes of political science. Students must be admitted to the GVPT Internship Program.

GVPT379 Topics in American Politics (3 Credits)
The study of topics in American politics.

GVPT386 Experiential Learning (3-6 Credits)
Restriction: Permission of BSOS-Government & Politics department; and junior standing or higher.

GVPT388 Topical Investigations (1-3 Credits)
Independent research and writing on selected topics in government and politics.

GVPT389 Experiential Learning II (3-6 Credits)
Experiential credit for working in government & politics related internships, research, and teaching opportunities.

GVPT390 Game Theory (3 Credits)
Introduction to game theory with applications to political science, economics and sociology. Topics include preference theory, expected utility theory, Nash equilibria, subgame perfection, repeated games, folk theorems, and evolutionary stability.

GVPT392 Introduction to Geographic Information Systems for Social Science Research (3 Credits)
Introduction to the use of Geographic Information Systems for conducting research in the social sciences. Overview of spatially embedded nature of many social science phenomena and content of theories common to spatial thinking. Students will obtain hands-on experience with various GIS tools and methods most frequently employed by social scientists.

GVPT393 Intermediate Geographic Information Systems (3 Credits)
Part II of a two-semester course that integrates Geographic Information Systems with social science research. Lectures and readings will motivate the use of GIS by exposure to research applications in international relations; political and non-profit fundraising; environmental justice; public health; race relations; business and economics.

GVPT396 Introduction to Honors Research (3 Credits)
A required course for all honors students designed to emphasize library research, methodology, and writing skills in political science and political philosophy. A written proposal, bibliography and research design for an honors paper required of all students as a final project.

GVPT397 Honors Research (3 Credits)
Individual reading and research. Preparation of an original paper.

GVPT399 Seminar in Government and Politics (3 Credits)
Reading, research, discussion, analysis, and writing in the area of politics. Both substantive issues and methodological approaches will be considered. Primarily for government and politics undergraduate majors.

GVPT402 International Law (3 Credits)
A study of the basic character, general principles and specific rules of international law, with emphasis on recent and contemporary trends in the field and its relation to other aspects of international affairs.

GVPT404 Political Economy of Foreign Aid (3 Credits)
The world spends hundreds of billions of dollars on foreign aid every year. The effects of this aid spending are controversial. Research supports both pessimistic and optimistic views of foreign aid's effectiveness, with little consensus. Where does aid money go? What are the motivations of aid donors? Is foreign aid effective at achieving its goals? Why or why not? This course is designed to survey the promise and the challenges of foreign aid as a policy tool. The first half of the course will focus on the motivations and goals of foreign aid. We will consider various foreign aid donors, such as countries, institutions, and individuals, to understand the motivations behind and effects of foreign aid. We will create a typology of foreign aid agendas, motivations, and donors. The second half of the course will consider the challenges specific to foreign aid. This includes both technical challenges and political challenges. We will consider the strategies that aid donors and organizations have taken to try to overcome these challenges.

GVPT406 International Organizations (3 Credits)
A basic introduction to the full range of international organizations that have come into being over the past century and one-half, including those that aspire to be universal or global, those with a geopolitical or regional focus, and those that address specific structural or functional areas of human endeavor or issue areas.

GVPT407 International Political Economy (3 Credits)
Introduces the field of international political economy, which analyzes the ways in which economic and political changes produce both economic and political reactions.

GVPT409 Seminar in International Relations and World Politics (3 Credits)
Reading, writing, and research on topics in international relations and world politics. Both substantive issues and methodological approaches will be considered.

GVPT410 Politics of Nationalist and Ethnic Conflict (3 Credits)
An examination of the major causes and consequences of ethnic, nationalist, and separatist conflict. The course will focus on both theories of ethnicity and nationalism, as well as theories of conflict related to these issues. The course will also explore empirical trends in ethnic and nationalist politics.

GVPT411 Conflict in the International System (3 Credits)
In this course, we will examine conflict, peace, and conflict resolution in contemporary international politics. We will interrogate what we mean by concepts such as peace, conflict, and violence, the different forms that these phenomena can take, and how we can measure their occurrence. We will discuss theoretical explanations for why individuals and groups have disputes, why these actors choose to use violence (or not) in these disputes, and ways in which violent disputes can be resolved peacefully. We will examine these arguments in a detailed study of conflicts in the Middle East, as well as by evaluating published articles that examine the effectiveness of conflict management strategies such as peacekeeping.

GVPT413 Peace, Justice, and Conflict Resolution (3 Credits)
An examination of classic and contemporary perspectives on peace, justice, and conflict resolution after armed conflict. The goal of this course is to expose students to the advantages, risks, and challenges of the most prominent methods of conflict mitigation and resolution, including mediation and arbitration; peacekeeping, peacemaking, and peacebuilding; the protection of civilians, Responsibility to Protect, and humanitarian assistance; elections, democratization, and power-sharing; and transitional reconciliation and justice. We will do this by reading, discussing, and synthesizing classic and cutting-edge Political Science research on these topics.

GVPT414 International Relations of East Asia (3 Credits)
An examination of international relations in East Asia, focusing mostly on Northeast Asia. The course will provide some background on the evolution of international politics in the region over the past several decades, and will examine several contemporary issues--including the North Korean nuclear issue, the relationship across the Taiwan Strait, and maritime disputes in the East and South China Seas--in depth.

GVPT417 Seminar in Advanced Topics in Environmental Policy Analysis (3 Credits)
A series of critical tools and methods used to analyze environmental policy. This class should be of interest to students who are either considering a career or graduate studies in environmental protection.

GVPT420 The Logic and Practice of Measuring Political Behavior (3 Credits)
Introduction to concepts and practices used for measuring political behavior. Political analysis is an increasingly quantitative field. It is crucial for students of political behavior to learn how to define concepts in concrete ways, examine different methods of measuring concepts, learn how to test the quality of chosen measures, learn how to construct richer measures out of multiple questions, and finally how to examine the relationship between multiple measures of similar concepts. Common pitfalls, errors, bias, and ethics will be examined along the way.

GVPT421 Advanced Quantitative Methods (3 Credits)
Advanced quantitative methods for political science research.
2 Quantitative Political Analysis (3 Credits)
Introduction to quantitative methods of data analysis, including selected statistical methods, block analysis, content analysis, and scale construction.

GVPT424 Quantitative Study of International Relations (3 Credits)
A comprehensive introduction to the quantitative study of international conflict. Students will perform statistical analysis of international conflict data using the R software platform.

GVPT428 Topics in Formal Theories of Political Behavior and Politics (3 Credits)
An evaluation of theories of political behavior such as game, social choice and voting theory, and their applications to problems of distribution and social justice, community organizing, responsive public policy, institutional design, and alliance and coalition formation.

GVPT429 Problems in Political Behavior (3 Credits)
The problem approach to political behavior with emphasis on theoretical and empirical studies on selected aspects of the political process.

GVPT445 Marxism and Postmarxism (3 Credits)
The study of Marxist thought and an assessment of the critical transformations and reassessments of the theory and practice of Marxism.

GVPT448 Non-Western Political Thought (3 Credits)
Examination of works by major authors and general themes of political thought originating in Asia, the Middle East, and Africa. This is not a survey of all non-Western political thought, but a course to be limited by the professor with each offering.

GVPT449 Seminar in Political Philosophy (3 Credits)
Reading, writing, and research on topics in political philosophy. Both substantive issues and methodological approaches will be considered.

GVPT454 Seminar in the International Relations of China (3 Credits)
Explores the foreign relations behavior of the People's Republic of China, with focus on the contemporary era.

GVPT456 The Politics of Terrorism (3 Credits)
Examination of the definition, causes and organization of terrorist activity, along with key domestic and international counter- and anti-terrorism responses. Special emphasis on challanges and opportunities to the scientific study of terrorism.

GVPT457 American Foreign Relations (3 Credits)
The principles and machinery of the conduct of American foreign relations and an analysis of the major foreign policies of the United States.

GVPT459 Seminar in Comparative Politics (3 Credits)
Reading, writing, and research on topics in comparative politics. Both substantive issues and methodological approaches will be considered.

GVPT481 Government and Administration of Russia and the States of the Former Soviet Union (3 Credits)
A comparative study of the governmental systems and political processes of the states of the former Soviet Union.

GVPT482 Government and Politics of Latin America (3 Credits)
A comparative study of the governmental systems and political processes of the Latin American countries.

GVPT484 Government and Politics of Africa (3 Credits)
A comparative study of the governmental systems and political processes of the African countries, with special emphasis on the problems of nation-building in emergent countries.

GVPT485 Government and Politics of the Middle East (3 Credits)
A comparative study of the governmental systems and political processes of Middle Eastern countries, with special emphasis on the problems of nation-building in emergent countries.

GVPT487 Government and Politics of China (3 Credits)
Discussion of major issues in the study of the domestic politics of the People's Republic of China.

Appendix C Program Transfer Agreement Pathway with Montgomery College

Program Transfer Agreement Pathway: A.A. in International Studies—International Studies Area of Concentration at Montgomery College to B.S. in International Relations at the University of Maryland, College Park *(9/20/23)*

Montgomery College A.A. in International Studies						
	Fall Semester			**Spring Semester**		
	MC Course	**UMD Equivalent**	**Credits**	**MC Course**	**UMD Equivalent**	**Credits**
Year 1	ENGL101: Introduction to College Writing*		3	ENGL102 or ENGL103 (ENGF)	ENGL101	3
	MATH117: Statistics (MATF)+	STAT100	3	ECON202: Principles of Economics II (BSSD)**	ECON200	3
	POLI101: American Government (BSSD)**	GVPT170	3	POLI203: International Relations	GVPT200	3
	HIST114 or HIST116 or HIST117 (HUMD)		3	World Languages		3
	World Languages		3	Arts Distribution (ARTD)		3
	Total Credits		**15**	**Total Credits**		**15**
	Fall Semester			**Spring Semester**		
	MC Course	**UMD Equivalent**	**Credits**	**MC Course**	**UMD Equivalent**	**Credits**
Year 2	ANTH201 (see alternatives ±)		3	COMM108 or COMM112 (GEIR)	COMM107	3
	ENGL201 (see alternatives ±±)		3	Natural Sciences Distribution with Lab (NSLD)		4
	HIST245 OR HIST247 OR HIST250 OR HIST252 OR HIST266 (GEIR)		3	Electives		3
	POLI211: Comparative Politics and Government	GVPT280	3	Electives		3
	Natural Sciences Distribution (NSD)		3	Electives		2
	Total Credits		**15**	**Total Credits**		**15**
Apply to graduate from MC with an Associate of Arts in International Studies						
TOTAL MC credits prior to UMD transfer: 60						

*ENGL101/ENGL101A if needed for ENGL102/ENGL103, or select an elective.
**Behavioral and Social Sciences Distribution (BSSD) courses must come from different disciplines.
+ MATH117 recommended, but MATH150 or MATH181 are also acceptable. If lower math placement is achieved, student should work towards completion of one of these courses through elective space.
± ANTH256, ECON103, ECON201, GEOG101, GEOG105, GEOG113, GEOG124, GEOG130, GEOG211, PSYC100, SOCY105.
±± ENGL122, ENGL202, ENGL205, ENGL208, ENGL213, ENGL214, ENGL248, GHUM101, HIST255, PHIL209, additional world language course. Additional world language course may be recommended depending on course equivalencies at UMD.
Students should attempt ENGL and MATH foundation requirements at MC within completion of the first 24 credits of college-level work or at the completion of any prerequisite or non-credit coursework.
Effective for UMD students matriculating in Fall 2022 and beyond: No more than 70 credits earned at a 2-year institution shall be transferrable toward a bachelor's degree.

University of Maryland B.S. in International Relations				
	Fall Semester		**Spring Semester**	
	UMD Course	**Credits**	**UMD Course**	**Credits**
Year 3	GVPT201	3	GVPT320	3
	GVPT IR/Comparative Course 100/200	3	GVPT/INTR Methods Course 300/400	3
	Elementary Language++	4	Upper-level INTR Course 1	3
	Electives	6	Professional Writing (FSPW)	3
			Electives	3
	Total Credits	**16**	**Total Credits**	**15**
	Fall Semester		**Spring Semester**	
	UMD Course	**Credits**	**UMD Course**	**Credits**
	INTR Quantitative Methods Course 300/400	3	GVPT/INTR Quantitative Methods Course 300/400	3
	Upper-level INTR Course 2	3	Upper-level INTR Course 3	3
	Quantitative Skills	3	Additional Skills Course	3

Year 4	Electives	6	Electives	5
	Total Credits	**15**	**Total Credits**	**14**
			Total UMD credits	***60***

++ This plan assumes students are not beginning their language coursework until they matriculate to UMD. It also assumes students are taking a language in which one 4-credit course covers the entire elementary level of that language. Some languages at UMD require multiple courses between 4-6 credits to complete the entire elementary level. Students interested in taking language coursework at MC should consult the UMD transfer credit database to determine course equivalency, as their coursework may not transfer as a direct equivalent to language coursework at UMD. GVPT does not determine language placement.

A. Representations and Warranties of the Parties

Both Institutions represent and warrant that the following shall be true and correct as of the Effective Date of this Agreement, and shall continue to be true and correct during the term of this Agreement:

1. The Institutions are and shall remain in compliance with all applicable federal, state, and local statutes, laws, ordinances, and regulations relating to this Agreement, as amended from time to time.

2. Each Institution has taken all action necessary for the approval and execution of this Agreement.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed by their duly authorized representatives.

Montgomery College

By: ___________________________________
Name
President or Chief Academic Officer

____
Date

University of Maryland, College Park

By: ___________________________________
Jennifer King Rice
Senior Vice President and Provost

2/22/24
____
Date

Appendix D: B.S. in International Relations Four-Year Template (with General Education code)

Year 1	Fall		Spring	
Complete your graduation plan! **Benchmark 1 requirements must be completed within two semesters of entering the major.** GVPT170 with C– or higher GVPT201 with C– or higher One of STAT 100, MATH 107, 113, 115, 120, 135, 136, or 140 with C– or higher Academic Writing with C– or higher	Course	Credit	Course	Credit
	ENGL101 (Gen Ed AW and Benchmark)	3	Gen Ed Analytic Reasoning (AR)	3
	Math (Gen Ed MA and Benchmark) (Based on Placement)	3	Gen Ed Natural Sciences (NS)	3
	Gen Ed Humanities (HU)	3	GVPT201 (Gen Ed SP)	3
	GVPT170 (Gen Ed HS: and Benchmark)	3	Elective	3
	UNIV100	1	Elective	3
	Elective	3		
	Total	**16**	**Total**	**15**
Year 2	Fall		Spring	
Benchmark 2 requirements must be completed within one semester of completing Benchmark 1. GVPT320 with C– or higher	Course	Credit	Course	Credit
	Gen Ed Oral Communications (OC)	3	Gen Ed Cultural Competency (CC)	3
	GVPT200 (Gen Ed UP and 200-level Benchmark course)	3	Gen Ed Humanities (HU)	3
	GVPT320	3	GVPT280 or GVPT282	3
	ECON200 (Gen Ed HS)	3	Elementary Foreign Language Requirement	4
	Elective	3	Elective	3
	Total	**15**	**Total**	**16**
Year 3	Fall		Spring	
Complete an academic audit (review of academic record) between 75—89 credits!	Course	Credit	Course	Credit
	GVPT/INTR Course of Choice 100-200 level	3	INTR Quantitative Methods Course 300-400 level	3
	GVPT/INTR Methods Course 300-400 level	3	INTR Course of Choice 1 300-400 level	3
	Quantitative Skills Requirement	3	Additional Skills Course	3
	Gen Ed Natural Sciences (NL)*	4	Gen Ed Non-Major Scholarship in Practice (SP)*	3
	Elective	3	Elective	3
	Total	**16**	**Total**	**15**
Year 4	Fall		Spring	
Apply for graduation!	Course	Credit	Course	Credit
	Gen Ed Professional Writing (PW)	3	INTR Course of Choice 3 300-400 level	3
	GVPT/INTR Quantitative Methods Course 300-400 level	3	Elective	3
	INTR Course of Choice 2 300-400 level	3	Elective	3
	Elective	3	Elective	3
	Elective	3		
	Total	**15**	**Total**	**12**
			Total Credits	**120**

University of Maryland General Education Requirements Overview		
Fundamental Studies: 15 Credits		
Fundamental Studies Academic Writing	3	AW
Fundamental Studies Professional Writing	3	PW
Fundamental Studies Oral Communication	3	OC
Fundamental Studies Mathematics	3	MA
Fundamental Studies Analytic Reasoning[1]	3	AR

[1] If a student passes an Analytic Reasoning course that requires a Fundamental Studies Math course as a prerequisite, then the Fundamental Studies Math course is considered to be fulfilled (e.g., students who place into and pass a calculus course, which counts for FS-AR, do not need to take a less advanced Math course to fulfill the FS-MA requirement).

Distributive Studies: 25 Credits		
Distributive Studies Natural Sciences	3	NS
Distributive Studies Natural Science Lab Course[2]	4	NL
Distributive Studies History and Social Sciences	6	HS
Distributive Studies Humanities	6	HU
Distributive Studies Scholarship in Practice[3]	6	SP

[2] A second DS-NL course can fulfill the DS-NS course requirement.
[3] Students learn and practice skills of critical evaluation and participate in the process of applying knowledge in the pursuit of a tangible goal. At least one course must be outside of the major.

I-Series Courses: 6 Credits [4]

The signature courses of the UMD General Education program, I-Series courses investigate a significant issue in depth and demonstrate how particular disciplines and fields of study address problems.

I-Series Course	6	IS

[4] I-Series credits may be double-counted with courses taken for the Distributive Studies requirement.

Diversity: 4-6 Credits[5]		
Diversity Understanding Plural Societies[6] Courses examine how diverse cultural and ethnic groups co-exist.	3-6	UP
Diversity Cultural Competence Courses help students develop skills to succeed in a diverse world.	0-3	CC

[5] These credits may be double-counted with courses taken for the Distributive Studies requirement.
[6] Students may take either two DV-UP courses or one DV-UP course and one DV-CC course.

UNIVERSITY SYSTEM of MARYLAND

BOARD OF REGENTS
SUMMARY OF ITEM FOR ACTION,
INFORMATION, OR DISCUSSION

TOPIC: *University of Maryland, College Park propose Master of Science (M.S.) in Quantum Computing*

COMMITTEE: Education Policy and Student Life and Safety

DATE OF COMMITTEE MEETING: April 12, 2024

SUMMARY: The Master of Science in Quantum Computing will provide students with foundational, practical, and theoretical topics of quantum computing. Participants will discover current state-of-the-art quantum computing technology and areas of application, while also exploring its origins, evolution, and possible future states. The program consists of seven required 3-credit courses and nine credits of electives for a total of 30 credits. The program is a non-thesis program and will have both an in-person and distance education version. Course topics include quantum networks, quantum thermodynamics, quantum machine learning, quantum information theory, quantum Monte Carlo and simulations, and quantum computing hardware.

UMD currently offers this program as a Master of Professional Studies (MPS) program in Quantum Computing. The goal of this proposal is to move the existing curriculum out from under the MPS umbrella to create a standalone Master of Science (MS) degree program. The transition to an MS will allow the program to be properly designated with a STEM CIP code, which will in turn allow the program to appear on institutional, state, and national reports on STEM program offerings. This move will also allow students to benefit from being in a STEM program. For example, international students studying here on visas are allowed longer post-graduate work experiences in the United States by two years if they are in a STEM program.

ALTERNATIVE(S): The Regents may not approve the program or may request further information.

FISCAL IMPACT: No additional funds are required. The program can be supported by the projected tuition and fee revenue.

CHANCELLOR'S RECOMMENDATION: That the Education Policy and Student Life and Safety Committee recommend that the Board of Regents approve the proposal from the University of Maryland, College Park for a Master of Science in Quantum Computing.

COMMITTEE RECOMMENDATION:	DATE:
BOARD ACTION:	DATE:
SUBMITTED BY: Alison M. Wrynn 301-445-1992	awrynn@usmd.edu

UNIVERSITY OF MARYLAND
OFFICE OF THE PRESIDENT

1101 Thomas V. Miller, Jr. Administration Building
College Park, Maryland 20742
301.405.5803 TEL
301.314.9560 FAX

February 29, 2024

Chancellor Jay A. Perman
University System of Maryland
3300 Metzerott Road
Adelphi, MD 20783

Dear Chancellor Perman:

I am writing to request approval for a new Master of Science program in Quantum Computing. The program will be offered both on-campus and through distance education. The proposal for the new program is attached. I am also submitting this proposal to the Maryland Higher Education Commission for approval.

The proposal was endorsed by the appropriate faculty and administrative committees. I also endorse this proposal and am pleased to submit it for your approval.

Sincerely,

Darryll J. Pines
President
Glenn L. Martin Professor of Aerospace Engineering

cc: Candace Caraco, Associate Vice Chancellor
Jennifer King Rice, Senior Vice President and Provost
Amitabh Varshney, Dean, College of Computer, Mathematical, and Natural Sciences

UNIVERSITY SYSTEM OF MARYLAND INSTITUTION PROPOSAL FOR

x	New Instructional Program
	Substantial Expansion/Major Modification
	Cooperative Degree Program
x	Within Existing Resources, or
	Requiring New Resources

University of Maryland, College Park
Institution Submitting Proposal

Quantum Computing
Title of Proposed Program

Master of Science	**Fall 2024**
Award to be Offered	Projected Implementation Date
070102	**27.0304**
Proposed HEGIS Code	Proposed CIP Code
College of Computer, Mathematical and Natural Sciences	Konstantina Trivisa
Department in which program will be located	Department Contact
301-405-4878	trivisa@umd.edu
Contact Phone Number	Contact E-Mail Address
	02-29-2024
Signature of President or Designee	Date

A. Centrality to the University's Mission and Planning Priorities

Description. The University of Maryland, College Park currently offers an iteration of its Master of Professional Studies (MPS) in Quantum Computing. The goal of this proposal is to move the existing curriculum out from under the MPS umbrella and create a standalone Master of Science (MS) degree program in Quantum Computing. The program curriculum is not changing. The program consists of 30-credit course work and will be offered both in-person and through a fully online modality.

The transition to an MS will allow the program to be properly designated with a STEM CIP code. CIP codes that classify programs as STEM programs have become increasingly important as the development of STEM programs has become more incentivized. The current MPS program does not appear in the results for STEM program searches based on CIP codes or in STEM program reports for the institution, and therefore the state, despite the program's STEM content. Current students will benefit from having their program associated with a STEM CIP code. In particular, current international students studying here on F-1 visas will be able to qualify for an extended optional practical training (OPT) after they graduate and will thereby be more marketable to prospective employers.

The program will continue to provide students with the foundational, practical, and theoretical topics of quantum computing. Participants will discover current state-of-the-art quantum computing technology and areas of application, while also exploring its origins, evolution, and possible future states of this technology.

Relation to Strategic Goals. As written in our mission statement, "UMD embraces its flagship status and land-grant mission to share its research, educational, cultural, and technological strengths to bolster economic development, sustainability, and quality of life in Maryland and beyond." The Master of Science in Quantum Computing aims to provide training and advanced knowledge in quantum computing with a focus on practical education for working professionals. This program will contribute to the development of the emerging labor market of quantum computing scientists and engineers in the state of Maryland, and the nation. Other countries, such as China, have invested greatly recently in these scientific and technological sectors. The potential benefits of early discoveries and implementation of technological solutions that use quantum computing promise to generate important societal and economic benefits in the long term.

UMD has made quantum research and training a priority. UMD has more than 30 years of involvement in quantum research, more than 200 quantum researchers, and has produced more than 100 Ph.D.'s in physics with a quantum science focus. UMD ranks in the top 10 nationally in quantum physics programs.[1] As UMD president Darryll J. Pines, who singled out Quantum Computing as one of UMD's "new frontiers," has said, "Quantum can be for us what silicon was for Silicon Valley. This is that big play for the state of Maryland and this entire region."[2]

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[1] https://www.usnews.com/best-graduate-schools/top-science-schools/quantum-physics-rankings
[2] https://quantum.umd.edu/

In our recently approved strategic plan, *Fearlessly Forward: In Pursuit of Excellence and Impact for the Public Good*, UMD promises to "partner to advance the public good." One of the goals of this commitment is to "Catalyze innovation and entrepreneurship for inclusive economic development." One of the specific objectives of this commitment is to "Improve the vitality of the state of Maryland by growing and supporting the next generation of diverse innovators, creators, entrepreneurs, artists, and small businesses." Establishing this master's program with a STEM CIP code will attract to Washington, D.C.'s Maryland suburbs more students who will advance their careers, enhance their organizations, and launch their own businesses, thereby bringing economic growth to the area.

Funding. Just as with the current MPS program, the MS program will be self-supporting with tuition revenue. Since the program already exists as a professional studies program, it does not require new resources. UMD already has the instructional, physical, and administrative resources to offer the program.

Institutional Commitment. UMD is committed to leveraging its strengths in technological and mathematical fields to provide highly skilled professionals for the state's workforce needs. In the unlikely event that the program is no longer financially viable, program faculty and staff would continue to support and teach the necessary courses to allow enrolled students to complete their degree within a reasonable and customary period of time.

B. Critical and Compelling Regional or Statewide Need as Identified in the State Plan

Need. The need for this program can be summed up in COMAR 13B.02.03.08B(3): *Occupational and professional needs relative to upgrading vocational/technical skills or meeting job market requirements.* The Washington, D.C. area is already one of the top areas in the country for organizations with quantum research activities. With many professionals already here or thinking of moving to this area, they will see this program as a way to upgrade their technical skills and career prospects. A program like this that produces a highly-technical set of graduates is an essential piece for a region and state that is trying to develop its economic strength in highly technical industries.

The National Institute of Standards and Technology has made substantial investments on UMD's campus to pursue research in quantum physics and technology over the past decades taking into account the vast faculty expertise in quantum physics and engineering. Campus has seen the creation of the Joint Quantum Institute (JQI), the Joint Center for Quantum Information and Computer Science (QuICS), and the Quantum Technology Center (QTC). This, combined with the need to create a skilled professional workforce in quantum computing, makes UMD a natural choice to create an educational offering for this workforce development.

State Plan. The proposed program aligns broadly with the 2022 *Maryland State Plan for Postsecondary Education*, specifically Priority 5, "Maintain the commitment to high-quality postsecondary education in Maryland," in particular, the Action Item to "Identify innovative fields of study." The main educational objective of the program is to prepare the individual to be ready to apply the principles and techniques of quantum computing to the solution of a variety of problems in optimization, secure communications, encryption, materials discovery and any such problems that require considerable computing resources. Students will be able to differentiate the many technologies currently used to implement quantum computers and compare their intrinsic strengths and limitations. Finally, students will gain the ability to make appropriate business decisions for success when quantum technologies reach maturity in the future. This program's ability to apply state-of-the-art scientific research in the physical sciences with technological and business development will be attractive for those in private industry, as well as for potential entrepreneurs.

C. Quantifiable and Reliable Evidence and Documentation of Market Supply and Demand in the Region and State

National and state projections show a dramatic increase in the number of computer and information research positions. The United States Bureau of Labor Statistics indicates a 23% increase in the next 10 years with more than 8,300 jobs being added. Maryland state occupational projections show a 16.78% increase from 2020-2030 with more than 470 positions being added. Computer and information research is just one related occupation. The National Center for Education Statistics indicates via its CIP SOC Crosswalk that Computational and Applied Mathematics programs (CIP: 27.0304) are directly linked to a variety of occupations: Natural Science Managers, Actuaries, Mathematicians, Statisticians, Data Scientists, and Postsecondary Teachers. This program is a highly technical program that will significantly enhance a professional's skills and abilities. The MS in Quantum Computing will qualify graduates for more highly specialized positions and provide highly technical areas to explore for emergent and experienced entrepreneurs.

D. Reasonableness of Program Duplication

Capitol Technology University is the only university that offers a master's level program in quantum computing. Its offering targets experienced professionals in the quantum computing field to train them in research techniques as they pertain to quantum computing. Its program is structured for experienced professionals in the quantum computing field who are looking to develop research skills in it. Contrasting with this focus, UMD's program targets recent undergraduate students or professionals with STEM backgrounds looking to enter the quantum computing field, for which we assume no prior experience in quantum computing. Otherwise, there are no master's programs in the Maryland state institutions that specifically focus on quantum computing. The State of Maryland is seeing tremendous expansion in organizations engaging in quantum computing activities and research and our offering will expand opportunities for state and regional professionals. For students living in the Washington, D.C. area in particular who want an in-person graduate program, only the University of Maryland, College Park location is within the national capital beltway and serviced by the Washington Metropolitan Area Transit Authority's bus and rail systems.

E. Relevance to Historically Black Institutions (HBIs)

As indicated above, only Capitol Technology University has a master's degree program in quantum computing, which serves a different audience and has a different focus compared to UMD's offering. Master's levels programs in computing exist at Morgan State (Advanced Computing) and Bowie State (Computer Science). The program offered by Morgan State is more general in nature and only offers one course specific to quantum computing (quantum cryptography). In the case of Bowie State, the courses offered in their master's program have no quantum computing specific content. UMD's program goes into greater depth in quantum computing, with core courses in the mathematics and physics of quantum computing and several electives specifically related to quantum computing. These range from the study of the hardware of quantum devices, to areas of application such as quantum networks, quantum cryptography, quantum machine learning, and in-depth study of current state of the art quantum computing hardware implementations and how these implementations guide quantum algorithm design. The UMD program would complement Morgan State's and Bowie State's offerings and provide an opportunity to strengthen the offerings in the state rather than competing.

F. Relevance to the identity of Historically Black Institutions (HBIs)

We do not anticipate any negative impacts on the special identities of the HBIs in the state of Maryland. As mentioned above, UMD has been engaged in quantum research for more than 30 years. We also believe that this is a growing field of significant importance to economic development in the Baltimore and Washington areas, and therefore a critical growth area for the state economy as a whole. The state should encourage the development of more highly specialized technical programs in different geographic areas to encourage inclusive economic development. Furthermore, our location within the national capital beltway that is serviced by the Washington Metropolitan Area Transit Authority has traditionally made UMD a favorable campus for professionals working in and around Washington, D.C.

G. Adequacy of Curriculum Design, Program Modality, and Related Learning Outcomes

Curricular Development. In recent years, the federal government and private sector have substantially increased funding for research and development of quantum technologies, including quantum computing. This new area of economic activity requires a highly trained and skilled labor force to take advantage of this technological era and contribute to the solution of problems at the local, regional, and national levels. Conversations with experts at the National Institute for Standards and Technology (NIST), as well as the Universities Space Research Association (USRA), have confirmed that there are skills gaps in the current workforce and more trained experts in these areas are required. UMD has seen an exponential growth in investments and the creation of multiple centers, institutes and departments bringing in research talent and economic resources in quantum physics and quantum computing. This program will take advantage of this ecosystem of quantum expertise on campus and complement UMDs development by adding an educational component.

Faculty Oversight. Appendix A includes a list of faculty that will be teaching in the program. Our faculty members come from a variety of technical backgrounds, including engineering, mathematics, computer science, physical sciences, and mathematics.

Educational Objectives and Learning Outcomes. The learning outcomes for the program are as follows:

1. Explain principles of quantum physics as they apply to quantum computing.
2. Develop quantum computing programs and implement them on quantum computing platforms.
3. Distinguish the elements of a quantum computing algorithm and differentiate it from a classical algorithm.
4. Describe current quantum computing hardware and examine the effects of its current state of maturity on the design of quantum computing algorithms.
5. Discuss and implement quantum computing paradigms to solve problems in quantum networks and quantum machine learning.
6. Compare quantum thermodynamics and quantum information theory and how they relate to classical information theory.

Institutional assessment and documentation of learning outcomes. Assessment for learning outcomes will be done via graded quizzes, exams, and assignments. Assignments will include a variety of professional focused work products where students will be applying learning to real life examples, such as quantum encryption and quantum key distribution, quantum chemistry, discrete combinatorial optimization, and quantum telecommunications. These applied learning and experiential opportunities will consist of case studies, simulations and oral presentations. To create this body of work students will need to demonstrate proficiency writing code in cloud quantum computing environments such as Amazon Braket, IBM Quantum, Azure Quantum, or similar cloud options.

Course requirements. The program requires seven three-credit courses for a total of 21 credits and three three-credit electives from a short list.

Course Number	Course Title	Credits
MSQC601	Mathematics and Methods of Quantum Computing	3
MSQC602	The Physics of Quantum Devices	3
MSQC603	Principles of Machine Learning	3
MSQC604	Quantum Computing Architectures and Algorithms	3
MSQC605	Advanced Topics in Quantum Computing	3
MSQC606	Practical Quantum Computing	3
MSQC607	Advanced Topics in Quantum Computing	3
Electives (Choose three)		9
MSQC610	Quantum Machine Learning	
MSQC611	Quantum Networks	

MSQC612	Quantum Computing Hardware	
MSQC613	Quantum Monte Carlo and Applications	
MSQC614	Quantum Information Theory	
MSQC615	Quantum Thermodynamics	

A list of courses and descriptions is included in Appendix B

General Education. Not applicable for our graduate programs.

Accreditation or Certification Requirements. No accreditation or licensure is required for the program.

Other Institutions or Organizations. The offering unit is not planning to contract with another institution or non-collegiate organization for this program.

Student Support. The Science Academy in the College of Computer, Mathematics and Natural Science will provide administrative coordination for the program, in collaboration with the Office of Extended Studies. Students will be supported through the Science Academy for academic guidance and advising. They will also have access to the Graduate School Counseling and the Counseling Center resources. The Science Academy Program Manager will be the first point of contact for students, while the Office of Extended Studies, which provides administrative services for a host of professional programs, provides student and program services, such as admission support, scheduling, registration, billing and payment, graduation, and appeals. Students will see admission criteria, financial aid resources, costs, and complaint procedures on both the Science Academy website and the Extended Studies program page. For technical aspects of both the in-person and online versions of the program, specific technological competence and equipment will be included in the admission criteria. Learning management information will also be included in these materials.

Marketing and Admissions Information. Students will see admission criteria, financial aid resources, and costs on both the Science Academy website and the Extended Studies program page.

H. Adequacy of Articulation

Not applicable for this graduate program.

I. Adequacy of Faculty Resources

Program faculty. Appendix A contains a list of faculty members who will teach in the program. Faculty will primarily be from engineering, mathematics, computer science, physical sciences, and mathematics backgrounds.

Faculty training. Faculty teaching in the program will use the university's learning management system along with its extensive electronic resources. They will have access to instructional development opportunities available across the College Park campus, including those offered as part of the Teaching and Learning Transformation Center, many of which are delivered in a virtual environment. Instructors will work with the learning design specialists on campus to incorporate best practices when teaching in the online environment.

J. Adequacy of Library Resources

The University of Maryland Libraries assessment concluded that the Libraries are able to meet, with current resources, the curricular and research needs of the program.

K. Adequacy of Physical Facilities, Infrastructure, and Instructional Resources

All physical facilities, infrastructure, and instructional equipment are already in place. No new facilities are required as this program already exists as an MPS program. For the online components of the coursework, UMD maintains an Enterprise Learning Management System (ELMS). ELMS is a Web-based platform for sharing course content, tracking assignments and grades, and enabling virtual collaboration and interaction. All students and faculty have access to UMD's electronic mailing system.

L. Adequacy of Financial Resources

Tables 1 and 2 contain the details of resources and expenditures.

Table 1 Resources:
The program will be self-supported through tuition revenue. There are no start up costs because the program is already in operation as a Master of Professional Studies.

1. Line 1 shows no reallocated funds since the program is supported by tuition from existing students.
2. Graduate students will be paying tuition by the credit. We anticipate that 9 full-time students will be taking 8 courses per year and 9 part-time students (term-based) will take 8 courses per year.
3. The tuition rate will be $4000 per three-credit course with an assumed annual increase of 3%.
4. No external sources of funding are assumed.
5. No other sources of funding are assumed.

Table 2 Expenditures:

1. Faculty salaries are based on cost per course.
2. We assume an annual increase of 3% in salaries with a corresponding 33% benefits rate.
3. Administrative positions include an academic director (1 FTE) who will provide administrative support.
4. Included is an annual 3% increase and a corresponding benefits rate of 33% for the academic director and program manager positions.

5. Other expenditures include an administrative fee for UMD's Office of Extended Studies and a modest budget for marketing, equipment, and travel and recruitment.

M. Adequacy of Program Evaluation

Formal program review is carried out according to the University of Maryland's policy for Periodic Review of Academic Units, which includes a review of the academic programs offered by, and the research and administration of, the academic unit (http://www.president.umd.edu/policies/2014-i-600a.html). Program Review is also monitored following the guidelines of the campus-wide cycle of Learning Outcomes Assessment (https://irpa.umd.edu/Assessment/loa_overview.html). Faculty within the department are reviewed according to the University's Policy on Periodic Evaluation of Faculty Performance (http://www.president.umd.edu/policies/2014-ii-120a.html). Since 2005, the University has used an online course feedback survey instrument for students that standardizes course feedback across campus. The course survey has standard, university-wide questions and allows for supplemental, specialized questions from the academic unit offering the course.

N. Consistency with Minority Student Achievement goals

The primary recruitment activities will be via the Science Academy, the offering unit for this program. The Science Academy uses a diverse, targeted approach when recruiting students. This digital strategy focuses on UMD alumni, current UMD graduating seniors, and working professionals in the Washington, D.C. metropolitan area. The admissions review process reviews for not only academic readiness, but also diversity in experiences, industries, backgrounds, and career aspirations to recruit a diverse student body.

To attract a diverse student population, we will engage in the following activities:

- Representing the program in educational fairs, conferences and events, e.g. the National Leadership Conference of the National Society of Black Engineers, GEM Grad Labs.
- Advertising the program to the National Society of Black Engineers (NSBE), the Society of Women Engineers (SWE), and the Association for Women in Computing (AWC).
- Direct mailing and email campaigns to domestic and international colleges
- Outreach to UMD Campus organizations and clubs
- Holding online (virtual) open houses, information sessions and career panels
- Outreach to US Military to attract veterans
- Social media and online advertising
- Exploring establishing graduate scholarships to provide financial aid to underrepresented minority applicants

Once enrolled, the Science Academy staff, and faculty are committed to creating and fostering a supportive environment for all students to thrive. The staff regularly shares resources and opportunities for counseling, support, and funding. All students are expected to complete and honor the TerrapinSTRONG orientation and initiatives. TerrapinSTRONG is an onboarding course for all new faculty, staff, and students that "introduces and infuses its vision of inclusion and our institutional values across the university to create a more cohesive identity and a stronger commitment to community, connection and inclusion" (see https://terrapinstrong.umd.edu/). Students in the program are encouraged to take part in Graduate School programs that address diversity and inclusion in higher education, build communities of support and success, and create meaningful dialogue among graduate students. Such programs include "Cultivating Community Conversations" and the "Annual Office of Graduate Diversity and Inclusion's Spring Speaker Services." Faculty that are involved in the Science Academy represent many departments, have a diversity of appointments (both tenure track, professional track, and adjunct) exposing students to many future career paths. The Science Academy and faculty provide student advising, academic support, and career guidance to students to retain all students and support timely graduation.

Our student retention efforts will consist of:
• Holding "Women in Engineering, Computing and STEM" seminars to address the obstacles faced by women in today's technical workplace and guide our women students to maneuver through the internship and job application process.
• Requiring students to attend mandatory advising sessions with the program adviser to ensure that the students' study plans are in line with their interests and career goals, and that the students make satisfactory progress toward meeting the degree requirements.
• Implementing an early warning system that detects students struggling with core courses and alerts the academic advisor, who meets with the students and designs a study plan to get them back on track.

O. Relationship to Low Productivity Programs Identified by the Commission

N/A

P. Adequacy of Distance Education Programs

The distance-education version of the program will be entirely online. This will allow the program to reach a wider audience, including those in the Washington, D.C. area whose professional commitments may not allow for regular travel to College Park. The online curriculum will be the same as the in-person curriculum. Learning outcomes, academic rigor and program curricula will be exactly the same for the online program as it is for the on-campus program. The program will go through periodic evaluations, at least every three years, by the Science Academy leadership and academic department chairs. Students will have access to the same services that online students and will be advised by both the Science Academy and the Office of Extended Studies.

Table 1: Resources

Resources Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1. Reallocated Funds	$0	$0	$0	$0	$0
2. Semester-Based Revenue (by year)	$288,000	$293,760	$299,635	$305,628	$311,740
a. Semester-based Annual Students	9	9	9	9	9
b. Semester-based Annual Courses	8	8	8	8	8
3. Term-Based Revenue (by year)	$288,000	$293,760	$299,635	$305,628	$311,740
c. Term-based Annual Students	9	9	9	9	9
d. Term-based Annual Courses	8	8	8	8	8
4. Tuition Per Course Rate (assumes 2% increase)	$4,000	$4,080	$4,162	$4,245	$4,330
5. Grants, Contracts, & Other External Sources	$0	$0	$0	$0	$0
6. Other Sources	$0	$0	$0	$0	$0
Total Tuition Revenue	**$576,000**	**$587,520**	**$599,270**	**$611,256**	**$623,481**

Table 2: Expenditures

Expenditure Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1. Faculty (b+c below)	$172,900	$178,087	$183,430	$188,932	$194,600
a. #FTE	1.0	1.0	1.0	1.0	1.0
b. Total Salary	$130,000	$133,900	$137,917	$142,055	$146,316
c. Total Benefits	$42,900	$44,187	$45,513	$46,878	$48,284
2. Admin. Staff (b+c below)	$52,663	$54,243	$55,870	$57,546	$59,272
a. #FTE	1.0	1.0	1.0	1.0	1.0
b. Total Salary	$39,596	$40,784	$42,007	$43,268	$44,566
c. Total Benefits	$13,067	$13,459	$13,862	$14,278	$14,707
3. Total Support Staff (b+c below)	$0	$0	$0	$0	$0
a. #FTE	0.0	0.0	0.0	0.0	0.0
b. Total Salary	$0	$0	$0	$0	$0
c. Total Benefits	$0	$0	$0	$0	$0
4. Graduate Assistants (b+c)	$0	$0	$0	$0	$0
a. #FTE	0.0	0.0	0.0	0.0	0.0
b. Stipend	$0	$0	$0	$0	$0
c. Tuition Remission	$0	$0.00	$0	$0.00	$0
5. Equipment	$3,000	$3,000	$3,000	$3,000	$3,000
6. Library	$1,500	$5,000	$5,000	$5,000	$5,000
7. Hourly Workers	$50,000	$51,500	$53,045	$54,636	$56,275
8. Other Expenses: Operational Expenses	$25,000	$25,750	$26,523	$27,318	$28,138
TOTAL (Add 1 - 8)	**$305,063**	**$317,580**	**$326,867**	**$336,433**	**$346,286**

Appendix A: Faculty Information- Bioinformatics and Computational Biology

The following faculty members are projected to teach in the program. All faculty are full-time unless otherwise indicated.

Name	Highest Degree Earned, Program, and Institution	University of Maryland, College Park Title (indicate if part-time)	Courses
Babak Azimi-Sadjadi	Ph.D., Electrical and Computer Engineering, UMD	Visiting Lecturer	DATA/MSML/BIOI/MSQC 603: Principles of Machine Learning
Maria Cameron	Ph.D., Mathematics, University of California - Berkeley	Associate Professor	Curriculum Advisor
Charles Clark	Ph.D., Physics, University of Chicago	Adjunct Professor	MSQC 602: Physics of quantum devices
Avik Dutt	Ph.D., Electrical and Computer Engineering, Cornell University	Assistant Professor	Curriculum Advisor
Nicole Yunger Halpern	Ph.D., Physics, California Institute of Technology	Adjunct Asst. Professor	Curriculum Advisor
Franz Klein	Ph.D., Physics, University of Bonn (Germany)	Engineer	MSQC 606: Practical Quantum Computing
Aaron Lott	Ph.D., Applied Mathematics and Scientific Computation, UMD	Adjunct Assoc. Professor	MSQC 604: Quantum Computing Architectures and Algorithms MSQC605: Advanced Quantum Computing and Applications
Alejandra Mercado	Ph.D., Electrical and Computer Engineering, UMD	Associate Director	DATA/MSML/BIOI/MSQC 603: Principles of Machine Learning
Alfredo Nava-Tudela	Ph.D., Applied Mathematics and Scientific Computation, UMD	Director	MSQC 601: The Mathematics and Methods of Quantum Computing
Pratyush Tiwary	Ph.D., Materials Science, California Institute of Technology	Associate Professor	Curriculum Advisor
Konstantina Trivisa	Ph.D., Applied Mathematics, Brown	Professor	MSQC 601: The

	University		Mathematics and Methods of Quantum Computing

Appendix B: Course Descriptions

Core Courses

MSQC601 The Mathematics and Methods of Quantum Computing (3 Credits)
This course will provide the student with the necessary mathematical tools and background knowledge to understand, model, and conceptualize quantum computing and its building blocks and systems. We shall review concepts of computation and how they translate to the microscopic world.

MSQC602 Physics of Quantum Devices (3 Credits)
An introduction to quantum physics with emphasis on topics at the frontiers of research. This course aims to build a bridge between natural principles such as light and atoms and a variety of modern applications. This course will provide the student with the necessary physical intuition and background information on quantum physics so that to be able to understand and appreciate a variety of applications in quantum computing such as quantum currency, encryption, random number generation.

MSQC603 Principles of Machine Learning (3 Credits)
A broad introduction to machine learning and statistical pattern recognition. Topics include the following. Supervised learning: Bayes decision theory; discriminant functions; maximum likelihood estimation; nearest neighbor rule; linear discriminant analysis; support vector machines; neural networks; deep learning networks. Unsupervised learning: clustering; dimensionality reduction; principal component analysis; auto-encoders. The course will also discuss recent applications of machine learning, such as computer vision, data mining, autonomous navigation, and speech recognition.

MSQC604 Quantum Computing Architectures and Algorithms (3 credits)
Quantum computing aims to utilize quantum properties of matter to efficiently solve problems that classical computing systems would take too long to solve. This course reviews modern noisy-intermediate scale quantum (NISQ) quantum computing architectures and algorithms for these platforms. We focus on mapping of optimization and machine learning problems onto NISQ architectures and also discuss how to leverage state-of-the-art classical simulation methods for these quantum-inspired algorithms. We review several NISQ architectures and associated software interfaces, we analyze performance for optimization and statistical sampling. We survey current literature to review and implement methods for mapping optimization and machine learning problems onto NISQ architectures and modern simulators and use them to solve and study example problems.

MSQC605 Advanced Quantum Computing and Applications (3 credits)
When Richard Feynman first introduced the concept of quantum computers it was posed for the purpose of simulating nature. Today quantum simulation remains one of the likely first applications to benefit from quantum computers. This course introduces key concepts required for

quantum simulation, and builds tools for performing quantum simulation using state-of-the- art architectures. We introduce classical schemes, like tensor networks, and machine learning approaches, that can be used for these simulations on CPU/GPU architecture. We survey current literature to review and implement methods of quantum simulation and use them to solve and study example problems.

MSQC606 Practical Quantum Computing (3 credits)
Quantum computation is a rapidly growing field at the intersection of physics and computer science, electrical engineering and applied math. While instrumentation of quantum computers is in its infancy, quantum algorithms are being developed to provide efficient solutions to various computational problems. This course covers basic quantum computing, including quantum circuits, significant quantum algorithms, and hybrid quantum-classical algorithms, with focus on applying the concepts to programming existing and near-future quantum computers. Example codes, homework assignments, and class projects will employ Python modules to handle the data exchange with quantum computers.

MSQC607 Advanced Topics in Quantum Computing (3 credits)
This course will showcase a variety of topics from which students can select one, or come up with one of their own, and proceed to study it in depth. The students will make presentations of their findings to class by citing literature and code implementations where appropriate, and culminate with the writing of a scholarly paper on the topic chosen.

Elective Courses

MSCQ610 Quantum Machine Learning (3 credits)
In this course we explore what quantum computing can contribute to data mining and machine learning. We focus on exploring what kind of speedups are possible using quantum computing as well as the storage capacity of quantum associative memories, for example.

MSQC611 Quantum Networks (3 credits)
The need to communicate in a network the quantum states of qubits will necessitate the existence of a “quantum Internet.” Quantum signals are weak and very fragile and in general cannot be copied or amplified. The area of quantum networking explores how to combine well established networking techniques with quantum repeaters to transmit quantum information over long distances. In this course we explore quantum repeaters and their applications to telecommunications.

MSQC612 Quantum Computing Hardware (3 credits)
There are a variety of technologies that implement qubits. In this course we explore these technologies.

MSQC613 Quantum Monte Carlo and Applications (3 credits)
In this course we study the quantum Monte Carlo method and explore applications in diverse areas ranging from correlated systems, chemistry, quantum mechanic systems simulations.

MSQC614 Quantum Information Theory (3 credits)
Quantum information theory synthesizes three major themes: quantum physics, computer science, and information theory. At the core of information theory lies the work of Claude E. Shannon, which we review in this course, and we present and study three problems related to his work and subsequent extension to quantum computing. These are, compressing quantum information, transmitting classical and quantum information through noisy quantum channels, and quantifying, characterizing, transforming, and using quantum entanglement.

MSQC615 Quantum Thermodynamics (3 credits)
Quantum thermodynamics is an emerging field that offers fundamental insights into energy, information, and their relationship. Thermodynamics originally described “classical” systems—everyday objects formed from many particles. The theory has recently extended to the quantum domain of single electrons and few atoms, which behave in ways impossible for everyday objects. For example, quantum particles correlate strongly through “entanglement,” which gives one particle a surprisingly large amount of information about others. We will explore how scientists are leveraging such quantum phenomena in technologies such as quantum computers.

UNIVERSITY SYSTEM of MARYLAND

BOARD OF REGENTS
SUMMARY OF ITEM FOR ACTION,
INFORMATION, OR DISCUSSION

TOPIC: *University of Maryland Eastern Shore proposed Bachelor of Science (B.S.) in Aviation Maintenance Management*

COMMITTEE: Education Policy and Student Life and Safety

DATE OF COMMITTEE MEETING: April 12, 2024

SUMMARY: The University of Maryland Eastern Shore proposes to establish a Bachelor of Science degree in Aviation Maintenance Management to provide students with the necessary competencies and skills to manage and maintain aircraft systems and equipment. The program has a total of 120 credits. The curriculum includes 41 credit hours of general education courses, 31 hours of Aviation Science core coursework, and 48 credit hours of Aviation Maintenance Technology courses that include the Upper Division Certificate in Aviation Maintenance Technology, Airframe (30 Credits), and the Upper Division Certificate in Aviation Maintenance Technology, Powerplant (18 credits).

This program will prepare graduates for high-demand careers in the aviation industry (Bureau of Labor Statistics data show the overall employment of aircraft and avionics equipment mechanics and technicians is projected to grow 6% during 2021-2031).

ALTERNATIVE(S): The Regents may not approve the program or may request further information.

FISCAL IMPACT: No additional funds are required. The program can be supported by the projected tuition and fee revenue.

CHANCELLOR'S RECOMMENDATION: That the Education Policy and Student Life and Safety Committee recommend that the Board of Regents approve the proposal from the University of Maryland Eastern Shore for a Bachelor of Science degree program in Aviation Maintenance Management.

COMMITTEE RECOMMENDATION:	DATE:
BOARD ACTION:	DATE:
SUBMITTED BY: Alison M. Wrynn 301-445-1992	awrynn@usmd.edu

UNIVERSITY OF MARYLAND EASTERN SHORE
Office of the President

March 15, 2024

Dr. Jay A. Perman
Chancellor
University System of Maryland
701 E. Pratt St., Baltimore, MD 21202

RE: New Academic Program Proposal – BS in Aviation Maintenance Management

Dear Dr. Perman:

The University of Maryland Eastern Shore hereby submits a new academic program proposal for a Bachelor of Science in Aviation Maintenance Management.

The proposed BS in Aviation Maintenance Management aims to produce the next generation of leaders in aviation maintenance and offer prospective students an academic program with strong foundations in a versatile and dynamic field that blends knowledge across multiple disciplines in aviation maintenance. The program's curriculum is devised to harness faculty expertise and experience in various technical fields in the Department of Engineering and Aviation Sciences at UMES. The program, if established, will facilitate and promote students to develop innovative technologies in emerging areas related to aviation that are critical to the economic development of the region and the state. If the proposal is approved, the program will be established at the Salisbury Maryland Airport, 5443 Airport Terminal Road, Salisbury, MD 21802.

The attached proposal has undergone the established UMES curriculum approval process, and I fully support the proposed program.

I greatly appreciate your considering this request.
Sincerely,

Heidi M. Anderson, Ph.D., FAPhA
President

Copy: Dr. Rondall Allen, Provost and Vice President for Academic Affairs
Dr. Derrek Dunn, Dean, School of Business and Technology
Dr. Yuanwei Jin, Professor and Chair, Department of Engineering and Aviation Sciences
Mr. Chris Hartman, Associate Professor and Coordinator of the Aviation Sciences program

UNIVERSITY SYSTEM OF MARYLAND INSTITUTION PROPOSAL FOR

X New Instructional Program

Substantial Expansion/Major Modification

Cooperative Degree Program

X Within Existing Resources, or

Requiring New Resources

University of Maryland Eastern Shore (UMES)

Institution Submitting Proposal

Aviation Maintenance Management

Title of Proposed Program

Bachelor of Science

Award to be Offered

Fall 2024

Projected Implementation Date

05-1001

Proposed HEGIS Code

42.0101

Proposed CIP Code

Department of Engineering and Aviation Sciences

Department in which program will be located

Mr. Chris Hartman

Department Contact

410-651-8317

Contact Phone Number

chartman@umes.edu

Contact E-Mail Address

Signature of President or Designee

March 15, 2024

Date

Proposal for a Bachelor of Science Degree: Aviation Maintenance Management

University of Maryland Eastern Shore
Engineering and Aviation Sciences Department
Aviation Science Program

CONTENTS

A. CENTRALITY TO INSTITUTIONAL MISSION STATEMENT AND PLANNING PRIORITIES

1. Provide a description of the program, including each area of concentration (if applicable), and how it relates to the institution's approved mission.

The Bachelor of Science degree in Aviation Maintenance Management is designed to provide students with the necessary knowledge and skills to manage and maintain aircraft systems and equipment. This program combines technical aviation maintenance and management coursework with general education coursework. The program covers various topics, including aviation laws and regulations, aviation safety, aircraft systems and structures, avionics systems, aviation maintenance management, aviation maintenance practices and procedures, logistics and supply chain management, and aviation human factors. The curriculum is designed to give students a comprehensive understanding of the aviation industry and the skills necessary to maintain aircraft safely and efficiently. Students will learn how to manage aviation maintenance operations, including scheduling maintenance, managing technicians, budgeting, and implementing quality assurance programs.

Upon graduation, students may pursue careers in a variety of aviation-related fields, including aviation maintenance management, aviation safety, quality assurance, logistics and supply chain management, and aircraft manufacturing. Graduates may also be prepared to pursue advanced degrees in aviation maintenance management or related fields.

Two Certificate programs are embedded within the Aviation Maintenance Management Program, comprising the Federal Aviation Administration (FAA) Part 147 Aviation Maintenance Training Program. Those components are:

Upper Division Certificate: Aviation Maintenance Technology, Airframe

Upper Division Certificate: Aviation Maintenance Technology, Powerplant

The FAA Part 147 Aviation Maintenance Training Program is a structured, comprehensive, training program that prepares students to become certified aircraft maintenance technicians and provides them with the knowledge and skills necessary to maintain and repair aircraft. After completing the general curriculum, the program is divided into two major areas: Airframe and Powerplant, each of which covers a range of topics related to aircraft maintenance.

The Aviation Maintenance Technology - Airframe Upper Division Certificate provides students with the knowledge and skills necessary to maintain and repair the structural components of an aircraft, such as the fuselage, wings, and control surfaces. The curriculum covers a wide range of subjects, including aerodynamics, aircraft materials, sheet metal work, composites, hydraulics, and pneumatics. Students will also learn how to interpret technical drawings and blueprints and how to use hand and power tools to perform maintenance and repair work.

The Aviation Maintenance Technology - Powerplant Upper Division Certificate focuses on aircraft engines and engine systems. Students will learn about the principles of engine operation, fuel systems, ignition systems, lubrication systems, and engine instrumentation. They will also learn how to diagnose problems, troubleshoot issues, and perform preventative maintenance on engines. The curriculum includes both classroom and practical instruction, which may consist of disassembly, inspection, repair, and reassembly of aircraft engines.

Upon completing the Airframe and Powerplant Certificate programs, students can take the FAA certification exams for the Airframe mechanic and Powerplant mechanic ratings. Passing these exams earns an Airframe and Powerplant (A&P) certificate from the FAA.

This program directly relates to the mission of UMES by providing an excellent educational opportunity to its students at the undergraduate, graduate, and professional levels. This program will empower students to achieve their full potential and contribute to society's betterment.

B.S., AVIATION MAINTENANCE MANAGEMENT PROGRAM DESCRIPTION

DEGREE REQUIREMENTS

The Bachelor of Science, Aviation Maintenance Management program consists of 120 total credit hours. The curricula include 41 credit hours of general education courses, 31 hours of Aviation Science core coursework, and 48 credit hours of Aviation Maintenance Technology Courses that include the Upper Division Certificate in Aviation Maintenance Technology, Airframe (30 Credits), and the Upper Division Certificate in Aviation Maintenance Technology, Powerplant (18 credits).

CURRICULUM GUIDE

I. General Education Courses — **41 Credits**

Curriculum Area I			**9 Credits**
ENGL	203	Fundamentals of Contemporary Speech	3
Arts and Humanities Course as approved by the University			3
Arts and Humanities Course as approved by the University			3
Curriculum Area II			**6 Credits**
Discipline A: Social Sciences course			3
Discipline B: Behavioral Sciences course			3
Curriculum Area III			**7 Credits**
Students must select two science courses, one of which must include a laboratory			
Curriculum Area IV			**6 Credits**
Students must take 6 credits of math, with at least one course at or above the level of MATH 109			
Curriculum Area V			**9 Credits**
ENGL	101	Basic Composition I	3
ENGL	102	Basic Composition II	3
ENGL	305	Technical Writing **or**	
ENGL	310	Advanced Composition	3
Curriculum Area VI			**4 Credits**
GNST	100	Freshman Experience	1
EXSC	111	Personalized Health Fitness **or**	
EDTE	111	Technology and Society **or**	
HUEC	203	Human Development: A Life Perspective **or**	
AVSC	XXX	Aviation Course as approved by Department	3

II. Aviation Science Core Requirements — **31 Credits**

AVSC	231	Airline Management I	3
AVSC	241	Aviation Safety	3
AVSC	261	Aviation Organization and Leadership	3
AVSC	305	Aviation Career Preparation	1
AVSC	331	Aviation Law	3

AVSC	421	Aviation Psychology	3
AVSC	431	Maintenance Management	3
AVSC	432	Airline Management II	3
AVSC	441	Human Factors in Aviation	3
AVSC	442	Safety Management Systems	3
AVSC	490	Senior Capstone in Aviation	3

III. <u>Aviation Maintenance Technology</u> **<u>48 Credits</u>**

Airframe Upper Division Certificate			**30 Credits**
AVMT	101	Aviation Math, Physics, Drawing, Weight, and Balance	3
AVMT	102	Aviation Fluid Lines, Fittings, Materials, Hardware, Processes, Cleaning, and Corrosion Control	3
AVMT	103	Aviation Ground Operations, Services, Human Factors, Electricity, and Electronics	3
AVMT	104	Aviation Inspection Concepts, Techniques, Regulations, Forms, Records, and Publications	3
AVMT	301	Airframe Systems and Components I	2
AVMT	302	Airframe Systems and Components II	2
AVMT	303	Airframe Systems and Components III	2
AVMT	304	Airframe Systems and Components IV	3
AVMT	305	Airframe Systems and Components V	2
AVMT	306	Airframe Systems and Components VI	2
AVMT	307	Airframe Structures I	2
AVMT	308	Airframe Structures II	3

Powerplant Upper Division Certificate			**18 Credits**
AVMT	401	Powerplant Theory and Maintenance I	2
AVMT	402	Powerplant Systems and Components I	3
AVMT	403	Powerplant Systems and Components II	3
AVMT	404	Powerplant Systems and Components III	2
AVMT	405	Powerplant Systems and Components IV	2
AVMT	406	Powerplant Systems and Components V	3
AVMT	407	Powerplant Systems and Components VI	2
AVMT	408	Powerplant Systems and Components VII	1

<u>Total</u> **<u>120 Credits</u>**

2. *Explain how the proposed program supports the institution's strategic goals and provide evidence that affirms it is an institutional priority.*

The proposed Aviation Maintenance Technology program at UMES supports the mission and strategic goals of the University by providing high-quality education in an in-demand career field and by preparing graduates to address challenges in a global knowledge-based economy. The program also meets the workforce and economic development needs of the Eastern Shore, the State, the nation, and the world.
UMES affirms its role as the State's 1890 land-grant institution by providing citizens with opportunities and access that will enhance their lives and enable them to develop intellectually, economically, socially, and culturally. The Aviation Maintenance Technology program offers students access to a holistic learning environment that fosters multicultural diversity, academic success, and intellectual and social growth.

3. *Provide a brief narrative of how the proposed program will be adequately funded for at least the first five years of program implementation. (Additional related information is required in section L.*

With the commission of the Engineering and Aviation Science Complex, a $103 million investment from the state, the proposed program will be supported by about two dozen state-of-the-art engineering laboratories such as Robotics and Automation Lab, MEMS Lab with a class ISO 5 cleanroom, and Microwave Anechoic Chamber Lab, etc. Additionally, the provision of funding for additional faculty lines and other resources required to implement this program will be derived from the $577 million settlement funds reached by the state and the HBCUs as a result of providing inequitable resources to its four historically black colleges and universities. UMES is expected to receive about 9 million dollars each year over the next ten years and funding for this initiative has already been assigned. By the beginning of the 2023 – 2024 academic year, it is expected that three faculty positions will be funded. This process will continue for the next five years.

4. *Provide a Description of the Institution's commitment to:*

   a. *ongoing administrative, financial, and technical support of the proposed program*

The University Administration is committed to adequately funding this program and has made it one of the priority areas for extending the institution's footprint. With the HBCU Lawsuit Settlement fund, UMES, the School of Business and Technology, and the Department of Engineering and Aviation Sciences are equipped with the needed resources and are committed to supporting the program in every way, including ongoing administrative support, financial support, and technical support of the program.

   b. *continuation of the program for a period of time sufficient to allow enrolled students to complete the program.*

This degree program is created by levering, in part, the existing faculty and staff in the Department of Engineering and Aviation Sciences at UMES and the state-of-the-art engineering laboratories in the Engineering and Aviation Science Complex on the UMES campus. Further, State of the art facilities will be renovated and developed to house the Aviation Maintenance Training program at the Salisbury Airport. A total of three additional faculty, a Program Director, and two support staff will be added over the first 5 years of the program. The University is fully committed to the proposed program's strong initiation and long-term sustainability.

B. Critical and Compelling Regional And Statewide Need as Identified in the State Plan

1. *Demonstrate demand and need for the program in terms of meeting present and future needs of the region and the State in general based on one or more of the following:*

   a. *The need for the advancement and evolution of knowledge*

There is a critical need for aviation maintenance technicians (AMTs) for the advancement and evolution of knowledge due to several factors:

1. The aviation industry is continually expanding, driven by increasing passenger traffic and the need for air transportation services. This growth demands a larger workforce of skilled AMTs to maintain aircraft and ensure the safe and efficient operation of the global aviation system.
2. Modern aircraft are becoming more technologically advanced, incorporating sophisticated systems and materials that require specialized knowledge and skills. AMTs must keep up with these advancements to maintain and troubleshoot aircraft effectively.
3. Aviation is a highly regulated industry, with strict safety standards set by the Federal Aviation Administration (FAA). Skilled AMTs are essential for ensuring aircraft meet these regulatory requirements, maintaining the industry's overall safety record.
4. A significant portion of the existing aviation maintenance workforce is approaching retirement age, resulting in new, qualified technicians needing to fill the gap and ensure continuity in maintaining aircraft and transferring knowledge.
5. The aviation industry is under increasing pressure to reduce its environmental impact. AMTs play a critical role in implementing new technologies and practices to make aircraft operations more environmentally friendly, such as working with advanced materials, more efficient engines, and alternative fuel sources.
6. The variety of aircraft types and the emergence of new technologies, such as unmanned aerial vehicles (UAVs) and electric aircraft, create a demand for AMTs with specialized skills to maintain and repair these systems.
7. Aviation is a global industry, and the demand for skilled AMTs extends beyond national borders. Having a well-trained workforce of aviation maintenance technicians contributes to the overall safety and efficiency of the international aviation system.

   b. *Societal needs, including expanding educational opportunities and choices for minority and educationally disadvantaged students at institutions of higher education*

There is a critical societal need for minorities and educationally disadvantaged students in the aviation maintenance technician (AMT) profession for several reasons:

1. Increasing diversity within the aviation maintenance workforce brings various perspectives and problem-solving approaches, fostering innovation and enhancing overall performance.
2. As the aviation industry expands, there is a growing need for skilled AMTs to maintain aircraft and ensure their safe operation. Encouraging minorities and educationally disadvantaged students to pursue careers in aviation maintenance can help address this demand by tapping into a broader talent pool.

3. Opportunities in the aviation maintenance profession offer stable, well-paying jobs with good career prospects. By encouraging and providing access to these opportunities for minorities and educationally disadvantaged students, the industry can reduce socio-economic disparities and promote social mobility.
4. Ensuring that the aviation maintenance workforce reflects the diversity of the broader population promotes equal representation and fairness. This can lead to a more inclusive work environment and help address the historical underrepresentation of certain groups in the industry.
5. Creating more educational and training opportunities for minorities and educationally disadvantaged students can help address barriers to entry, such as financial constraints or lack of access to information about the aviation maintenance profession. This will enable a broader range of individuals to pursue careers in the field.
6. Supporting minorities and educationally disadvantaged students in pursuing careers as AMTs can positively impact their communities. Increased representation in well-paying careers can lead to improved living standards, community pride, and the development of role models for future generations.

c. The need to strengthen and expand the capacity of historically black institutions to provide high-quality and unique educational programs

The Aviation Science program at UMES is unique in the State of Maryland as it is the only 4-year public degree in Aviation in the State. The Aviation Science program is already producing large numbers of in-demand pilots, which no other public entity in the State can claim. This unique institutional identity is furthered by enhancing the existing program with the high-demand AMT and Maintenance Manager programs.

2. Provide evidence that the perceived need is consistent with the Maryland State Plan for Postsecondary Education.

The proposed degree program is well aligned with the 2022 Maryland State Plan for Postsecondary Education in all three areas: Access, Success, and Innovation.

Access – Ensure equitable access to affordable and quality postsecondary education for all Maryland residents.

The academic program is intended to prepare highly trained technicians in an emerging area of aviation maintenance that is becoming increasingly important and relevant to our society. However, aviation maintenance is a specialized field with many barriers to student access. The proposed degree program will provide equitable access and quality education to all Maryland residents, including those with disadvantaged backgrounds, to develop a strong applied science and engineering workforce for the state.

Success – Promote and implement practices and policies that will ensure student success.

The practices and policies concerning the proposed academic program align with all existing policies at the University, which will ensure student success. By providing a carefully developed curriculum, sufficient aviation laboratory facilities, equipment, and adequate faculty members for advising and teaching, the proposed degree program will help ensure student graduation and successful job placement.

Specifically related to **Priority 6 on improving systems for timely completion**, the proposed academic program is designed innovatively, taking advantage of new FAA regulatory frameworks and leveraging existing synergies within the Aviation Sciences program. Additionally, the program will provide robust advising and support systems to ensure students stay on track for on-time completion. Overall, the program's student-centered design will promote practices and policies for student success and timely completion.

This accelerated AMT program will allow students to complete the Bachelor's Degree program proposed here in 3 years or less.

Innovation – Foster innovation in all aspects of Maryland higher education to improve access and student success

Specifically, the proposed academic program aligns with the goal of "Innovation" of the State Plan, which aims to "foster innovation in all aspects of Maryland higher education to improve access and student success." The proposed program will help achieve the goal of "Economic Growth and Vitality," which is centered on supporting a knowledge-based economy through increased education and training and is to ensure that Historically Black Institutions are "competitive, both in terms of program and infrastructure," with Maryland's other state institutions. Ultimately, the proposed program will prepare highly qualified technicians to contribute to the economic growth and vitality of Maryland by providing them with new knowledge and skill sets in emerging aviation technologies so they can maintain the skills they need to succeed in the workforce.

The proposed academic program strongly aligns with **Priority 8 of promoting a culture of risk-taking**. By designing an accelerated, industry-aligned degree curriculum that prepares students for emerging roles in aviation maintenance, the program fosters innovation in higher education curricula and instruction. Additionally, the focus is on an in-demand field that is not the traditional domain of 4-year University programs. The proposal reflects a willingness to take calculated risks in developing a non-traditional program that leverages regulatory changes and industry trends.

C. QUANTIFIABLE AND RELIABLE EVIDENCE AND DOCUMENTATION OF MARKET SUPPLY AND DEMAND IN THE REGION AND STATE

1. Describe potential industry or industries, employment opportunities, and expected level of entry (ex: mid-level management) for graduates of the proposed program.

Graduates of the program can expect to find employment opportunities in various industries and sectors. These technicians typically begin their careers as entry-level maintenance professionals, with the potential to advance to mid-level management positions with experience and additional training. Some potential industries and employment opportunities include:

1. Airlines and commercial aircraft operators require skilled aviation maintenance technicians to maintain their fleets. Job opportunities include line maintenance, heavy maintenance, and aircraft overhaul positions.

2. General aviation includes a wide range of aircraft, such as private jets, small piston-engine planes, and helicopters. Graduates can find employment with Fixed Base Operators (FBOs), maintenance facilities, and flight schools, working on various types of aircraft.
3. Aircraft and aerospace component manufacturers need aviation maintenance technicians to perform assembly, quality control, and testing tasks. This may involve working on engines, avionics, or airframe components.
4. Graduates can pursue opportunities with the military or defense contractors, maintaining and repairing a wide range of military aircraft, including fighter jets, transport planes, and helicopters.
5. Federal and State aviation agencies, such as the FAA or the National Transportation Safety Board (NTSB), may hire aviation maintenance professionals for positions related to aircraft inspection, accident investigation, or regulatory compliance.
6. MRO facilities provide comprehensive aircraft maintenance services, including routine inspections, structural repairs, and engine overhauls. Graduates can work as technicians or inspectors in these specialized facilities.
7. Large corporations with aircraft fleets require maintenance technicians to maintain and service their planes. These positions may involve working on high-end business jets or turboprop aircraft.
8. The growing drone industry offers opportunities for aviation maintenance technicians to work on the maintenance and repair of unmanned aerial vehicles and their associated systems.
9. Companies that lease aircraft to airlines and other operators require maintenance professionals to ensure their assets are properly maintained and comply with regulatory requirements.

2. Present data and analysis projecting market demand and the availability of openings in a job market to be served by the new program.

UMES commissioned a needs assessment study for an aviation technician maintenance training program for the areas served by UMES. From the report:

Examination of the local labor market trends in the aircraft maintenance industry revealed a shortage of qualified workers, high workforce turnover rates, and considerable demand for skilled labor in the Salisbury Region. Interviews with local businesses serving the region were conducted. Among those interviewed, the most informative data was obtained from representatives from the following large companies: Piedmont Airlines, Chesapeake Shipbuilders, Delaware Elevator, Ørsted, and NASA at Wallops Island. Interview data was coded and content-analyzed. Several themes emerged from the analysis.

Specifically, the most recurrent theme was a labor shortage of skilled maintenance technicians. Chesapeake Shipbuilders, for instance, indicated the need for an additional 50 to 100 technicians for the company and an additional 200 technicians when combined with the company's contractors. The company also noted the need to double its skilled labor force within the next few years. Several companies interviewed noted technician demand for aircraft maintenance workforce among their contractors and partner companies as well. Specifically, NASA at Wallops Island noted its 1200 contractors, many of whom needed skilled technician workers. Another theme that emerged from the interviews was a high turnover of maintenance technicians. For example, Chesapeake Shipbuilders revealed an extremely high attrition rate of approximately 80% among its skilled workers annually.

All companies interviewed showed interest in various partnerships with an FAA Part 147 Aviation Maintenance Training School (AMTS). Piedmont Airlines, for instance, indicated that the company could donate various training infrastructure and resources to the prospective technician training program, such as commercial aircraft and engines, or purchase tools for the school. Additionally, Piedmont Airlines expressed interest in subsidizing tuition and fees for select students on a multi-year commitment basis.

3. *Discuss and provide evidence of market surveys that provide quantifiable and reliable data on the educational and training needs and the anticipated number of vacancies expected over the next 5 years.*

The employment data from the Bureau of Labor Statistics (BLS) is typically used to determine market demand. The proposed degree program will produce aircraft and avionics equipment mechanics and technicians who repair and perform scheduled maintenance on aircraft. In particular, most aircraft and avionics equipment mechanics and technicians learn their trade at a Federal Aviation Administration (FAA)-approved aviation maintenance technician school or on the job. Some learn through training received in the military. The BLS states the median annual wage for aircraft mechanics and service technicians was $65,380 in May 2021 and the median annual wage for avionics technicians was $69,280 in May 2021. According to the BLS data, the overall employment of aircraft and avionics equipment mechanics and technicians is projected to grow 6 percent from 2021 to 2031, about as fast as the average for all occupations. Also, according to BLS data about 13,100 openings for aircraft and avionics equipment mechanics and technicians are projected each year, on average, over the decade. Many of those openings are expected to result from the need to replace workers who transfer to different occupations or exit the labor force, such as to retire.

4. *Provide data showing the current and projected supply of prospective graduates.*

UMES commissioned a needs assessment study for an aviation maintenance training program for the areas served by UMES. From the report:

Departments of Labor in Maryland and Delaware are tasked with developing official industry and occupational projections for local labor markets. As state-level data indicate, employment in the occupation of aircraft mechanics and service technicians is projected to add annually 390 new jobs in Maryland and 41 new jobs in Delaware between 2018 and 2028. Thus, the projected annual job openings in two states, a measure of annual demand, is 431 jobs.

In addition to state-level estimates, the Maryland Department of Labor (n.d.) prepares occupational projections based on workforce regions. The region where Salisbury is located, Lower Shore, consists of three counties: Somerset County, Wicomico County, and Worcester County. The department projects neither an increase nor decrease in aircraft mechanics and service technicians in the Lower Shore region between 2018 and 2028. In Upper Shore, a workforce region north of the Lower Shore region, no employment projections in this occupation (SOC code 49-3011) are included. Thus, the state-level projected annual job openings (390 jobs) are expected to occur in other areas of Maryland.

Similarly, the Delaware Department of Labor has 2018-2028 occupational projections by county available on its website (Delaware Department of Labor, n.d.). Of the 41 annual job openings in Delaware, no new jobs are projected in Sussex County (the closest to Salisbury, MD), 8 new jobs are projected in Kent County, with the rest of the projected annual jobs in New Castle County (the farthest from Salisbury, MD).

Real-time demand for occupations may be ascertained based on the frequencies of advertised positions in the region and the State. The search for aircraft mechanics and service technician jobs posted in Maryland and Delaware over the past 12 months (November 1, 2020 to October 31, 2021) has yielded 255 postings. The job postings may further be broken out by metropolitan statistical areas (MSA). The top seven MSAs with the most job postings are detailed in the Table below.

MSA	Number of postings
1. California-Lexington Park, MD	75
2. Baltimore-Columbia-Towson, MD	55
3. Washington-Arlington-Alexandria, DC-VA-MD-WV	47
4. Salisbury-Cambridge, MD-DE	28
5. Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	26
6. Dover, DE	17
7. Hagerstown-Martinsburg, MD-WV	5

Demand indicators from state-level occupational projections and online vacancies in Maryland and Delaware differ by 431 annual job openings vs. 255 job postings, respectively. Given the COVID-19 epidemic and its influence on the labor market dynamics, state-based occupational projections may not reflect accurate demand for aircraft technicians at the moment and for the next few years. A more accurate indication of demand may be obtained through online vacancies posted over the past 12 months, which include 255 job postings.

Examining program completions (supply-side data) and job postings (demand-side data) for aircraft mechanics and service technicians in Maryland and Delaware point to a supply shortage compared to the demand. The demand, as evidenced by 255 job vacancies advertised in Maryland and Delaware over the past 12 months, clearly outstrips the potential supply of specialists (97 program completions) trained in this occupation at four vocational schools within the 180-mile radius of Salisbury, MD. The fact that no trained labor supply in this occupation is available in either of the two states examined here points to an urgent need to open an aviation maintenance technician school in the Salisbury area.

Data indicates that the region's higher education institutions are not providing needed labor, shifting the burden on the industries to find workers in other economies to fill the required occupations. Undersupply of the necessary human capital may lead to missed opportunities for economic growth and put stress on local businesses to find the workforce they need elsewhere.

D. Reasonableness of Program Duplication

1. *Identify similar programs in the State and/or same geographical area. Discuss similarities and differences between the proposed program and others in the same degree to be awarded.*

No other Bachelor's degree program in Aviation Maintenance Management exists in Maryland. The closest regional program is located at Liberty University in Virginia. Liberty is a private, not-for-profit Christian University whose mission and population differ substantially from UMES's.

The proposed undergraduate program in Aviation Maintenance Technology, Airframe, and Powerplant that comprise the proposed FAA Part 147 program here can only be found at one other location in the State of Maryland. That location is Hagerstown, delivered there by the Pittsburg

Institute of Technology (PIA). PIA offers a Part 147 certification program that does not culminate in any degree.

2. *Provide justification for the proposed program.*

Duplication is not considered to be a factor since no other programs for Aviation Maintenance Management bachelor's or associate degrees exist in the State.

E. RELEVANCE TO HIGH-DEMAND PROGRAMS AT HISTORICALLY BLACK INSTITUTIONS (HBIS)

1. *Discuss the program's potential impact on the implementation or maintenance of high-demand programs at HBIs.*

The program proposed enhances the high-demand Aviation Science program at UMES, an HBI. This will be both the first program of its kind in the State of Maryland and the first at an HBI in the region.

F. RELEVANCE TO THE IDENTITY OF HISTORICALLY BLACK INSTITUTIONS (HBIS)

1. *Discuss the program's potential impact on the uniqueness and institutional identities and missions of HBIs.*

The Aviation Science program at UMES is unique in the State of Maryland as it is the only 4-year public degree in Aviation in the State. The Aviation Science program is already producing large numbers of in-demand pilots, which no other public entity in the State can claim. This unique institutional identity is furthered by enhancing the existing program with the high-demand AMT program.

G. ADEQUACY OF CURRICULUM DESIGN AND DELIVERY TO RELATED LEARNING OUTCOMES (COMAR 13B.02.03.10)

1. *Describe how the proposed program was established, and also describe the faculty who will oversee the program.*

The program was established through a partnership between local industry, the University, and local economic development organizations. The University engaged the services of a Consultant in the conduct of a needs assessment and for the development of the curriculum and overall design of the program.

Faculty who will oversee the program are described below:

Faculty Member	**Rank**	**Degree or other Credentials**	**Courses**	**Other Role**
Maintenance Program Director TBD	Lecturer	FAA A&P, FAA Part 147 leadership	AVMT coursework	Part 147 program oversight
AMT Instructor TBD	Lecturer or Instructor	FAA A&P	AVMT coursework	Airframe Certificate Lead
AMT Instructor TBD	Lecturer or Instructor	FAA A&P	AVMT coursework	Powerplant Certificate Lead
Chris Hartman	Associate Professor	Aeronautics Terminal Degree, CFI-I, MEI	AVSC Coursework	Aviation Program Coordinator

Xavier Henry	Lecturer	PhD	AVSC Coursework	
Edward J. Brink III	Clinical Assistant Professor	Aeronautics Terminal Degree, CFI-I, MEI	AVSC Coursework	Chief Flight Instructor
Aviation Management Faculty TBD	Lecturer or Assistant Professor	Aeronautics Terminal Degree	AVSC Coursework	Aviation Management Concentration Lead

2. *Describe educational objectives and learning outcomes appropriate to the rigor, breadth, and (modality) of the program.*

The program's educational objectives and learning outcomes are designed to provide students with the knowledge and skills necessary to become competent and effective aircraft maintenance professionals. These objectives and outcomes are appropriate to the program's rigor, breadth, and modality, including academic and practical components.
Some of the educational objectives and learning outcomes of this program are:

1. Knowledge of aviation regulations: Students will thoroughly understand aviation regulations, including FAA regulations and guidelines. They can apply these regulations in their work as aircraft maintenance professionals.
2. Knowledge of aircraft systems: Students will have a comprehensive understanding of aircraft systems, including electrical, hydraulic, and pneumatic systems. They will be able to diagnose and repair problems with these systems.
3. Knowledge of aircraft maintenance practices: Students will be familiar with aircraft maintenance practices, including inspection, repair, and overhaul procedures. They can perform these procedures to ensure the safe and reliable operation of aircraft.
4. Critical thinking and problem-solving skills: Students will be able to think critically and solve problems related to aircraft maintenance. They can identify problems, evaluate possible solutions, and implement effective solutions.
5. Communication skills: Students can communicate effectively with colleagues, supervisors, and customers. They will be able to convey technical information clearly and accurately.
6. Safety awareness: Students will be aware of safety protocols and procedures related to aircraft maintenance. They will be able to work safely and identify potential safety hazards.

The educational objectives and learning outcomes appropriate to this program are designed to prepare students for successful careers as aircraft maintenance professionals. By achieving these objectives and outcomes, students will gain the knowledge and skills necessary to enter the aviation industry and advance in their careers.

3. *Explain how the institution will:*

   a. *Provide for assessment of student achievement of learning outcomes in the program*

Assessing student achievement of learning outcomes is an essential part of the program. Below are planned ways that student achievement of learning outcomes will be measured:

1. Written exams will be used to assess student achievement of learning outcomes. These exams will cover theoretical knowledge and may include multiple-choice, short-answer, and essay questions.

2. Practical exams will be used in assessing student achievement of learning outcomes. These exams will determine a student's ability to apply theoretical knowledge to real-world situations. For example, a practical exam may require a student to diagnose and repair a specific aircraft component.
3. Skills assessments will be used to evaluate a student's ability to perform specific tasks related to aircraft maintenance. For example, a skills assessment may require a student to demonstrate their ability to use specific tools or equipment.
4. Projects and assignments will provide a more comprehensive assessment of student achievement of learning outcomes. For example, a project may require a student to research and write a report on a specific aircraft system, demonstrating their ability to analyze and apply theoretical knowledge.
5. Performance evaluations will be used to assess a student's overall performance throughout the program. These evaluations will be based on factors such as attendance, participation, and attitude.

b. Document student achievement of learning outcomes in the program

Documenting student achievement of learning outcomes in the program requires a combination of assessment methods, tracking tools, and communication strategies. Below are methods that will be used to document student achievement of learning outcomes:

1. Will use a variety of assessment methods, such as written exams, practical exams, simulations, and group projects, to measure students' knowledge, skills, and abilities.
2. A competency matrix will be developed that maps learning outcomes to specific tasks or skill sets required for the program.
3. An LMS will be used to manage course content, track student progress, and store assessment data.
4. A record for each student will be used to document students' hands-on experience working on required skill projects.
5. UMES will keep detailed records of students' assessments, practical experience, and progress throughout the program.

4. Provide a list of courses with titles, semester credit hours, and course descriptions, along with a description of program requirements

Course Number	Course Title Brief Course Description	New Course	Credits
AVSC 231	**Airline Management I**	**No**	**3**
	This course studies the operational requirements of Part 135 and 121 carriers in the National Airspace System. Discussion includes value analysis of different aircraft types for various users, cost-effective operations, marketing considerations, facilities, equipment suitability, aircraft acquisition, and modernization. Typical subjects include aviation regulations, records, and documents associated with air carrier operations. The efficient flow of air traffic, and handling of		

	passengers, baggage, freight, and visitors. The configurations and designs of airports are discussed, which include aircraft types and features, cost-effective operations, marketing considerations, facility, equipment suitability, and modernization.		
AVSC 241	**Aviation Safety**	**No**	**3**
	Aviation Safety is designed to promote sound practice and an understanding of the safety net for commercial and general aviation. This course provides the student with a foundation and framework in aviation and transportation safety. The course objectives are: to gain an understanding of the knowledge, skills, and abilities required in aviation; to enhance the student's safety awareness; to familiarize the student with hazards associated with the aviation environment; and to impart to the student a broad understanding of the United States' safety system. Some typical areas are safety data, investigations, aviation maintenance, collision avoidance, Cockpit Resource Management (CRM), physiology, situation awareness, and human factors.		
AVSC 261	**Aviation Organization and Leadership**	**No**	**3**
	This course is a study of the various organizational theories as they apply to the aviation industry. The course will cover the topics of human resources management, labor relations, classical and rational theories of organizational structure and management, the evolution of business organization, and the economics of organizations.		
AVSC 305	**Aviation Career Preparation**	**No**	**1**
	This course is designed to prepare Aviation Science students for entry into the aviation career field. Topics and assignments will include resume writing, course portfolio creation, and the development of interview skills through the use of mock interviews. This course will prepare students to enter an Internship		
AVSC 331	**Aviation Law**	**No**	**3**
	This course is a study of the foreign and domestic legal system (federal, State, and local laws and regulations) concerning air transportation and implications as they relate to operations, contracts, insurance, liability, and regulatory status, in the field of aviation. Emphasis is on domestic and international legal aspects of air transportation.		
AVSC 421	**Aviation Psychology**	**No**	**3**
	This course is designed to introduce students to human factors and crew resource management theory in aviation that relate to diverse areas such as engineering, psychology,		

	physiology, aerospace safety, and flight training. Special attention will be paid to the flight crew's ergonomics, technology integration, human performance, pilot selection, and training.		
AVSC 431	**Maintenance Management**	**No**	**3**
	The aviation industries are concerned about the design and operation of maintenance control systems. The ratio of maintenance craftsmen to operators is higher than traditional industry standards. This fact leads to the realization that the effective management of production resources would yield more benefits to the organization. The emphasis of this course is placed on computer information systems. Seniors or Juniors will demonstrate the knowledge needed to set up and maintain a maintenance program.		
AVSC 432	**Airline Management II**	**No**	**3**
	This course is a study of the business practices, operations, and management principles used by domestic and international airlines. The following topics are discussed: regional airlines, fleet planning, customer services, routing the efficient flow of air traffic, domestic and foreign airline competition, and fare structuring.		
AVSC 441	**Human Factors in Aviation**	**No**	**3**
	Human factors, an interdisciplinary subject, is an empirical science that deals with human capabilities and behavior as applied to a given system. Technical disciplines contributing to human factors are anthropometry, biomechanics, engineering, mathematics, and psychology. This course is a study of the interface and relationship between humans and machines in the aviation environment. The outcome adjusts the things or ways people use them and the environment for a better match of capabilities, limits, or needs. Human Factors in Aviation is designed to bridge the gap between the theory and the practical application in aviation. The course material will include performance, design, human senses, information processing, workload, group interaction, fatigue, errors, memory allocation, introduction to control, displays, and this is a design course. Students will design their safety plan for the company of the student's choice. The course covers safety quantification, laws, regulations, and policies. Topics include OSHA, cost analysis, hazardous conditions, failure models, risk analysis, and performance measurements.		
AVSC 442	**Safety Management Systems**	**No**	**3**

	This course is a design course. Students will design their safety plan for the company of the student's choice. The course covers safety quantification, laws, regulations, and policies, topics include OSHA, cost analysis, hazardous conditions, failure modes, risk analysis, and performance measurements.		
AVSC 490	**Senior Capstone in Aviation**	**No**	**3**
	This is the capstone course for Aviation students. The capstone course is a partial requirement for graduation with a degree in Aviation Sciences or Aviation Maintenance Management. The course is a project or design course in an area of mutual interest to the student and faculty advisor and includes a comprehensive examination in the core aviation studies.		
AVMT 101	**Aviation Math, Physics, Drawing, Weight, and Balance**	Yes	**3**
	This course will prepare students to exhibit satisfactory knowledge, risk management, and skills associated with Mathematics, Physics for Aviation, Aircraft Drawing, and Weight and Balance in accordance with FAA General Airman Certification Standards.		
AVMT 102	**Aviation Fluid Lines, Fittings, Materials, Hardware, Processes, Cleaning, and Corrosion Control**	Yes	**3**
	This course will prepare students to exhibit satisfactory knowledge, risk management, and skills associated with Fluid Lines and Fittings, Aircraft Materials, Hardware, and Processes, and Cleaning and Corrosion Control in accordance with FAA General Airman Certification Standards.		
AVMT 103	**Aviation Ground Operations, Services, Human Factors, Electricity, and Electronics**	Yes	**3**
	This course will prepare students to exhibit satisfactory knowledge, risk management, and skills associated with ground operations and servicing, human factors, and fundamentals of electricity and electronics in accordance with FAA General Airman Certification Standards.		
AVMT 104	**Aviation Inspection Concepts, Techniques, Regulations, Forms, Records, and Publications**	Yes	**3**
	This course will prepare students to exhibit satisfactory knowledge, risk management, and skills associated with inspection concepts and techniques and regulations maintenance forms, records, and publications in accordance with FAA General Airman Certification Standards.		
	Airframe Systems and Components I	Yes	**2**

AVMT 301	This course will prepare students to exhibit satisfactory knowledge, risk management, and skills associated with landing gear, hydraulic, and pneumatic systems in accordance with FAA Airframe Airman Certification Standards.		
AVMT 302	**Airframe Systems and Components II**	Yes	**2**
	This course will prepare students to exhibit satisfactory knowledge, risk management, and skills associated with aircraft inspections and fuel systems in accordance with FAA Airframe Airman Certification Standards.		
AVMT 303	**Airframe Systems and Components III**	Yes	**2**
	This course will prepare students to exhibit satisfactory knowledge, risk management, and skills associated with aircraft flight controls in accordance with FAA Airframe Airman Certification Standards.		
AVMT 304	**Airframe Systems and Components IV**	Yes	**3**
	This course will prepare students to exhibit satisfactory knowledge, risk management, and skills associated with aircraft electrical, communications, and navigation systems in accordance with FAA Airframe Airman Certification Standards.		
AVMT 305	**Airframe Systems and Components V**	Yes	**2**
	This course will prepare students to exhibit satisfactory knowledge, risk management, and skills associated with aircraft instruments and environmental systems in accordance with FAA Airframe Airman Certification Standards.		
AVMT 306	**Airframe Systems and Components VI**	Yes	**2**
	This course will prepare students to exhibit satisfactory knowledge, risk management, and skills associated with aircraft systems and rotorcraft fundamentals in accordance with FAA Airframe Airman Certification Standards.		
AVMT 307	**Airframe Structures I**	Yes	**2**
	This course will prepare students to exhibit satisfactory knowledge, risk management, and skills associated with aircraft metallic structures in accordance with FAA Airframe Airman Certification Standards.		
AVMT 308	**Airframe Structures II**	Yes	**3**
	This course will prepare students to exhibit satisfactory knowledge, risk management, and skills associated with aircraft non-metallic structures in accordance with FAA Airframe Airman Certification Standards.		
AVMT 401	**Powerplant Theory and Maintenance I**	Yes	**2**
	This course will prepare students to exhibit satisfactory knowledge, risk management, and skills associated with		

	engine inspections and propellers in accordance with FAA Powerplant Airman Certification Standards.		
AVMT 402	**Powerplant Systems and Components I**	Yes	**3**
	This course will prepare students to exhibit satisfactory knowledge, risk management, and skills associated with reciprocating engines in accordance with FAA Powerplant Airman Certification Standards.		
AVMT 403	**Powerplant Systems and Components II**	Yes	**3**
	This course will prepare students to exhibit satisfactory knowledge, risk management, and skills associated with turbine engines in accordance with FAA Powerplant Airman Certification Standards.		
AVMT 404	**Powerplant Systems and Components III**	Yes	**2**
	This course will prepare students to exhibit satisfactory knowledge, risk management, and skills associated with engine electrical and instrument systems in accordance with FAA Powerplant Airman Certification Standards.		
AVMT 405	**Powerplant Systems and Components IV**	Yes	**2**
	This course will prepare students to exhibit satisfactory knowledge, risk management, and skills associated with engine fire protection, ignition and starting systems in accordance with FAA Powerplant Airman Certification Standards.		
AVMT 406	**Powerplant Systems and Components V**	Yes	**3**
	This course will prepare students to exhibit satisfactory knowledge, risk management, and skills associated with engine lubrication, fuel, and fuel metering systems in accordance with FAA Powerplant Airman Certification Standards.		
AVMT 407	**Powerplant Systems and Components VI**	Yes	**2**
	This course will prepare students to exhibit satisfactory knowledge, risk management, and skills associated with engine air, induction, and cooling systems in accordance with FAA Airframe Powerplant Certification Standards.		
AVMT 408	**Powerplant Systems and Components VII**	Yes	**1**
	This course will prepare student to exhibit satisfactory knowledge, risk management, and skills associated with engine exhaust and reverser systems in accordance with FAA Powerplant Airman Certification Standards.		

The program requirements for students in an FAA Part 147 maintenance training program are designed to ensure that they have the knowledge and skills necessary to become competent and effective aircraft maintenance professionals. By meeting these requirements, students can gain the qualifications required to enter the aviation industry and advance in their careers.
Program requirements include, but are not limited to:

1. Students must attend all required classes and complete all assignments to complete the program successfully.
2. Students must complete the program's academic portion, which includes coursework in aviation regulations, aircraft systems, mathematics, physics, and aircraft maintenance practices.
3. Students must complete the practical portion of the program, which includes hands-on training in the maintenance, repair, and inspection of aircraft components.
4. Students must pass written and practical exams to earn the FAA Airframe and Powerplant (A&P) mechanic certification.
5. Students must complete the required General Education requirements
6. Students must complete all Aviation Science Core courses

5. Discuss how general education requirements will be met, if applicable

The General Education requirements of the Bachelor of Science, Aviation Maintenance Management Degree program will be completed at UMES. The General Education requirements are as described below:

General Education Courses			**41 Credits**
Curriculum Area I			**9 Credits**
ENGL	203	Fundamentals of Contemporary Speech	3
Arts and Humanities Course as approved by the University			3
Arts and Humanities Course as approved by the University			3
Curriculum Area II			**6 Credits**
Discipline A: Social Sciences course			3
Discipline B: Behavioral Sciences course			3
Curriculum Area III			**7 Credits**
Students must select two science courses, one of which must include a laboratory			
Curriculum Area IV			**6 Credits**
6 credits of MATH, with at least one course at or above the level of MATH 109			
Curriculum Area V			**9 Credits**
ENGL	101	Basic Composition I	3
ENGL	102	Basic Composition II	3
ENGL	305	Technical Writing **or**	
ENGL	310	Advanced Composition	3
Curriculum Area VI			**4 Credits**
GNST	100	Freshman Experience	1
EXSC	111	Personalized Health Fitness or	
EDTE	111	Technology and Society or	
HUEC	203	Human Development: A Life Perspective or	
AVSC	XXX	Aviation Course as approved by Department	3

6. Identify any specialized accreditation or graduate certification requirements for this program and its students

To start the FAA Part 147 Aviation Maintenance Training Program, UMES will meet specific FAA requirements and obtain approval from the Federal Aviation Administration (FAA).

7. If contracting with another institution or non-collegiate organization, provide a copy of the written contract.

Not applicable

8. Provide assurance and any appropriate evidence that the proposed program will provide students with clear, complete, and timely information on the curriculum, course, and degree requirements, nature of faculty/student interaction, assumptions about technology competence and skills, technical *equipment requirements, learning management system, availability of academic support services and financial aid resources, and costs and payment policies.*

The program will:
The existing UMES Student Handbook and Academic Catalog includes information on costs and payment policies, academic support services, the nature of faculty and student interactions, and the availability of educational support services.
The program will develop a comprehensive aviation maintenance technician student handbook available on the website that is up-to-date and provides detailed information on the curriculum, course and degree requirements, faculty/student interaction, technology requirements, learning management system, academic support services, financial aid resources, and costs and payment policies.
Students will receive a detailed syllabus for each course that clearly outlines the course objectives, expectations, assignments, grading policies, and required readings or resources.
Orientation sessions will be conducted for new students that provide an overview of the program and its requirements and information on available academic support services and financial aid resources.
The program will utilize technology to provide students with timely and relevant information, such as regular email updates. It will conduct surveys and solicit feedback from students to ensure that the program is meeting their needs and receiving the necessary information in a clear and timely manner.

9. *Provide assurance and any appropriate evidence that advertising, recruiting, and admissions materials will clearly and accurately represent the proposed program and the services available.*

The program will:
Ensure that all marketing materials, including brochures, website content, and social media posts, are reviewed and approved by a designated authority to verify their accuracy and compliance with relevant laws, regulations, and ethical standards.
Use clear and concise language to describe the program and its services.
Provide detailed information about the program's curriculum, degree requirements, faculty qualifications, learning outcomes, and student support services.
Use testimonials and case studies from current or former students to illustrate the program's benefits, while ensuring that the testimonials are accurate and representative.
Clearly state any program limitations, such as enrollment caps or technical requirements, and any potential costs or fees associated with the program.
Use images, videos, or other multimedia content to visually represent the program and its services.
Maintain accurate and up-to-date information on the program's website and social media pages, regularly monitoring and responding to inquiries and feedback from prospective students.

H. ADEQUACY OF ARTICULATION (AS OUTLINED IN COMAR 13B.02.03.19)

1. *If applicable, discuss how the program supports articulation with programs at partner institutions. Provide all relevant articulation agreements.*

This new program will be established at the Salisbury Maryland Airport, located at 5443 Airport Terminal Road, Salisbury, MD 21802. UMES has existing articulation agreements with community colleges in the State, such as Wor-Wic Community College, and high schools. We will leverage the existing partnerships to develop, when appropriate, new articulation agreements with high schools in the local counties and community colleges for the proposed program.

I. ADEQUACY OF FACULTY RESOURCES (AS OUTLINED IN COMAR 13B.02.03.11)

1. *Provide a brief narrative demonstrating the quality of program faculty. Include a summary list of faculty with appointment type, terminal degree title and field, academic title/rank, status (full-time, part-time, adjunct), and the course(s) each faculty member will teach in the proposed program.*

Existing Aviation Science (AVSC) coursework in the degree program will be delivered by existing faculty that meet the educational and background requirements to teach the material as established by University and Department policy.

New AVMT coursework will only be taught by individuals who are qualified to teach within the FAA Part 147 aviation maintenance training program. Per the FAA, instructors must have an FAA-issued certificate as an Aircraft Mechanic with Airframe and Powerplant ratings. Instructors will have recent experience working on aircraft and its components.

Faculty Member	Rank	Full-Time, Part- Time, Adjunct	Degree or other Credentials	Other Role
Maintenance Program Director TBD	Lecturer	Full-time	FAA A&P, FAA Part 147 leadership	Part 147 program oversight
AMT Instructor TBD	Lecturer or Instructor	Full-time	FAA A&P	Airframe Certificate Lead
AMT Instructor TBD	Lecturer or Instructor	Full-time	FAA A&P	Powerplant Certificate Lead
Chris Hartman	Associate Professor	Full-time	Aeronautics Terminal Degree, CFI-I, MEI	Aviation Program Coordinator
Xavier Henry	Lecturer	Full-time	PhD	
Edward J. Brink III	Clinical Associate Professor	Full-time	Aeronautics Terminal Degree	Chief Flight Instructor
Aviation Management Faculty TBD	Lecturer or Assistant Professor	Full-time	Aeronautics Terminal Degree	Aviation Management Concentration Lead

Courses	Maintenance Program Manager	AMT Instructor 1	AMT Instructor 2	Chris Hartman	Xavier Henry	Edward J. Brink III	Aviation Management Faculty
AVMT 101	X	X	X				
AVMT 102	X	X	X				
AVMT 103	X	X	X				

AVMT 104	X	X	X				
AVMT 301	X	X	X				
AVMT 302	X	X	X				
AVMT 303	X	X	X				
AVMT 304	X	X	X				
AVMT 305	X	X	X				
AVMT 306	X	X	X				
AVMT 307	X	X	X				
AVMT 308	X	X	X				
AVMT 401	X	X	X				
AVMT 402	X	X	X				
AVMT 403	X	X	X				
AVMT 404	X	X	X				
AVMT 405	X	X	X				
AVMT 406	X	X	X				
AVMT 407	X	X	X				
AVMT 408	X	X	X				
AVSC 231							X
AVSC 241					X		
AVSC 261						X	
AVSC 305				X			
AVSC 331				X			
AVSC 421				X			
AVSC 431						X	
AVSC 432							X
AVSC 441				X			
AVSC 442					X		
AVSC 490					X		

2. *Demonstrate how the institution will provide ongoing pedagogy training for faculty in evidenced-based best practices, including training in:*

    a. *Pedagogy that meets the needs of the students*

UMES will offer regular professional development opportunities for faculty to stay up-to-date on the latest pedagogical techniques and technologies. These opportunities will include workshops, conferences, webinars, and online courses.

UMES will encourage a culture of collaboration and continuous improvement, where faculty can share best practices and learn from each other. This will be facilitated through regular meetings, peer observation and feedback, and the use of learning communities.

UMES will use data to inform pedagogical decision-making, such as analyzing student performance data, assessing student feedback, and using learning analytics to improve student engagement and retention. Faculty will receive regular feedback and evaluation on their teaching performance, including student feedback, peer observation, and supervisor evaluations. This will help identify areas for improvement and provide opportunities for ongoing training and development.
Faculty will be trained in evidence-based teaching strategies that are proven to be effective in improving student learning outcomes. These strategies will include active learning, flipped classrooms, problem-based learning, hands-on learning, and peer teaching.

b. The learning management system

The Center for Instructional Technology and Online Learning (CITOL) at UMES supports the development, design, and delivery of online and hybrid programs, classes, and workshops with a focus on flexibility, resiliency, equity, accessibility, privacy, and safety (FREAPS). CITOL assists faculty, staff, and students in all aspects of digital teaching and learning concerning pedagogy and technology. This includes the use of the Canvas Learning Management System, Echo360, Google Workspace, Respondus 4.0, and Respondus LockDown Browser. Evidenced-based best practices for distance education, if distance education is offered.

c. Evidenced-based best practices for distance education, if distance education is offered.

The Center for Instructional Technology and Online Learning (CITOL) at UMES supports the development, design, and delivery of online and hybrid programs, classes, and workshops with a focus on flexibility, resiliency, equity, accessibility, privacy, and safety (FREAPS). CITOL assists faculty, staff, and students in all aspects of digital teaching and learning concerning pedagogy and technology. This includes the use of the Canvas Learning Management System, Echo360, Google Workspace, Respondus 4.0, and Respondus LockDown Browser. Other Services offered by the Center for Instructional Technology and Online Learning include: supporting the Canvas Learning Management System (LMS) and other instructional software which can be found on the CITOL website: new resources; providing ongoing professional development through virtual workshops; conducting UMES Online Teaching Certification & Course Quality Review; developing interactive and assessment materials for classes; and helping troubleshoot student problems on LMS.

J. Adequacy of Library Resources (outlined in COMAR 13B.02.03.12).

1. Describe the library resources available and/or the measures to be taken to ensure resources are adequate to support the proposed program.

The University assures that institutional library resources meet the new program’s needs. Typically, library resources for the proposed degree program include textbooks, reference books, and technical papers. Additional resources that will be added for program use are technical manuals and publications as required by the FAA Part 147 AMT program.

K. Adequacy of Physical Facilities, Infrastructure, and Instructional Equipment

1. Provide an assurance that physical facilities, infrastructure and instruction equipment are adequate to initiate the program, particularly as related to spaces for classrooms, staff and faculty offices, and laboratories for studies in the technologies and sciences.

The plan for facilities, infrastructure and instruction equipment was developed in cooperation with a Consultant and used input from Industry partners. Classroom spaces, faculty and staff offices, and laboratories are integral to this plan. Further, the Federal Aviation Administration sets standards for the facilities that must be met or exceeded for program certification. The proposed plan of action provides for the adequacy of these facilities and FAA certification.

2. Provide assurance and any appropriate evidence that the institution will ensure students enrolled in and faculty teaching in distance education will have adequate access to:

d. An institutional electronic mailing system, and

e. A learning management system that provides the necessary technological support for distance education

(a) and (b): The Center for Instructional Technology (CITOL) and Academic Computing Unit professionals provide faculty support for the development and instruction. Consultation is available for issues such as instructional design, software development, educational research, Canvas learning management system, etc. These technologies and opportunities ensure that students enrolled in and faculty teaching have adequate access to learning resources.

L. ADEQUACY OF FINANCIAL RESOURCES WITH DOCUMENTATION (OUTLINED IN COMAR 13B.02.03.14)

1. *Complete Table 1: Resources and Narrative Rationale. Provide finance data for the first five years of program implementation. Enter figures into each cell and provide a total for each year. Also, provide a narrative rationale for each resource category. If resources have been or will be reallocated to support the proposed program, briefly discuss the sources of those funds.*

TABLE 1: PROGRAM RESOURCES					
Resource Categories	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
1. Reallocated Funds	$0	$0	$0	$0	$0
2. Tuition/Fee Revenue	$608,600	$644,600	$1,089,600	$1,089,600	$1,089,600
a. Number of F/T Students	35	35	60	60	60
b. Annual Tuition/Fee Rate	$16,360	$16,360	$16,360	$16,360	$16,360
c. Total F/T Revenue (a x b)	$572,600	$572,600	$981,600	$981,600	$981,600
d. Number of P/T Students	10	20	30	30	30
e. Credit Hour Rate	$600	$600	$600	$600	$600
f. Annual Credit Hour Rate	$3,600	$3,600	$3,600	$3,600	$3,600
g. Total P/T Revenue (d x e x f)	$36,000	$72,000	$108,000	$108,000	$108,000
3. Grants, Contracts & Other External Sources	$2,900,000	$0	$0	$0	$0
4. Other Sources	$0	$0	$0	$0	$0
TOTAL (Add 1 – 4)	$3,508,600	$644,600	$1,089,600	$1,089,600	$1,089,600

TABLE 1 NARRATIVE

a) Reallocated Funds

There are no reallocated funds associated with this proposal.

b) Tuition/Fee Revenue

Projected enrollment numbers are based on the maximum of 25 students that can be approved in a new FAA 147 AMT program. These students will pay a special tuition/fee rate equal to $452/credit hour for the AVMT coursework associated with the FAA Part 147 program. The total number of credits in this area is 48, for a total cost of the Airframe and Powerplant Upper Division Certificates of $21,700. In Year 3, the program is expected to expand to accommodate 50 students per cohort. Students enrolled in AVSC and General Education coursework toward the Bachelor of Science, Aviation Maintenance Management Degree program will pay standard UMES tuition and fee rates. There are expected to be approximately 10 of these students per year beyond students enrolled in the Certificate programs. For these students, an average cost per credit hour is calculated at $304 (UMES Eastern Shore Region Rate)

The tuition rate is calculated based on the weighted breakdown of students pursuing AVMT coursework versus students pursuing AVSC coursework ($409 per credit hour). The expected average weighted credit load is 40 per year.

c) Grants, Contracts & Other External Sources

$2,900,000 has been awarded for developing this program through a Rural Development Grant in cooperation with Salisbury Wicomico Economic Development (SWED). SWED is the facilitator of these funds available now for consultants, facilities, equipment, and all other costs associated with program startup.

d) Other Sources

No other sources of revenue have currently been identified.

2. *Complete Table 2: Program Expenditures and Narrative Rationale. Provide finance data for the first five years of program implementation. Enter figures into each cell and provide a total for each year. Also, provide a narrative rationale for each expenditure category.*

TABLE 2: PROGRAM EXPENDITURES					
Expenditure Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1. Faculty (b+c below)	$198,000	$302,940	$510,028	$525,329	$541,089
a. Number of FTE	2	3	4	4	4
b. Total Salary	$150,000	$229,500	$386,385	$397,977	$409,916
c. Total Benefits	$48,000	$73,440	$123,643	$127,352	$131,173

2. Admin. Staff (b+ c below)	$132,000	$135,960	$140,039	$144,240	$148,567
a. Number of FTE	1	1	1	1	1
b. Total Salary	$100,000	$103,000	$106,090	$109,273	$112,551
c. Total Benefits	$32,000	$32,960	$33,949	$34,967	$36,016
3. Support Staff (b + c below)	$59,400	$133,782	$137,795	$141,929	$146,187
a. Number of FTE	1	2	2	2	2
b. Total Salary	$45,000	$101,350	$104,391	$107,522	$110,748
c. Total Benefits	$14,400	$32,432	$33,405	$34,407	$35,439
4. Technical Support and Equipment	$2,000,000	$0	$0	$0	$0
5. Library	$0	$0	$0	$0	$0
6. New or Renovated Space	$600,000	$0	$0	$0	$0
7. Other Expenses	$375,000	$35,000	$35,000	$35,000	$35,000
TOTAL (Add 1-7)	$3,364,400	$607,682	$822,862	$846,498	$870,843

Narrative Rationale for Table 2: Expenditures

1. Faculty

Two full-time faculty are required to start the program at a salary of $75,000 each. Years 2 and 3 add one additional faculty member to support program expansion from 25 to 50 students. Salaries increase at a rate of 3% per year. Benefits are calculated at the fringe rate of 32%.

2. Admin. Staff

One Maintenance Program Director is required to administer the FAA Part 147 program associated with the Aviation Maintenance Technology Coursework. The salary is $100,000. Salary increases by 3% per year. Benefits are calculated at 32%.

3. Support Staff

One full-time administrative assistant is required for program support at a starting salary of $45,000. A parts clerk is added in Year 2 at a starting salary of $55,000. Benefits and Fringe are calculated as with other positions.

4. Technical Support and Equipment

Consultant and Equipment costs for the startup of the FAA Part 147 AMT program is budgeted at $2.0 Million. All equipment costs are allocated to Year 1. The University's consultant created this estimate.

5. Library

No additional costs are allocated for Library resources.

6. New or Renovated Space

Renovation of the space required for the FAA Part 147 AMT program in Salisbury Airport Hangar 1 is budgeted at $600,000. This includes the renovation of restrooms and classroom spaces as well as the development and design of laboratories. The University's consultant created this estimate.

7. Other Expenses

Other expenses include tools, software purchases (Year 1), and subscription costs in Years 2 - 5. This estimate was created by the University's consultant.

M. Adequacy of Provisions for Evaluation of the Program (outlined in COMAR 13B.02.03.15).

1. Discuss procedures for evaluating courses, faculty and student learning outcomes.

Procedures will be implemented to ensure that the program will be effective and that students can achieve their learning objectives.

Regular course evaluations are an important tool for assessing the effectiveness of individual courses. These evaluations will be conducted through surveys or other feedback mechanisms and administered to students at the end of each course. The results of course evaluations will be used to improve the course content, teaching methods, and other aspects of the course.

Evaluating faculty is important for ensuring that they are providing high-quality instruction to their students. Faculty evaluations will be conducted through student surveys, peer evaluations, and other mechanisms. These evaluations will help identify areas where faculty may need additional training or support and can be used to recognize outstanding performance.

Assessing student learning outcomes is an essential part of evaluating the program's effectiveness. This will be done through pre-and post-testing and other assessment methods such as essays, presentations, and projects. By evaluating student learning outcomes, faculty will identify areas where students may be struggling and make recommended changes to the curriculum and teaching methods to better meet their needs.

2. Explain how the institution will evaluate the proposed program's educational effectiveness, including assessments of student learning outcomes, student retention, student and faculty satisfaction, and cost-effectiveness.

UMES will evaluate the program's effectiveness annually, including assessments of student learning outcomes, student retention, student and faculty satisfaction, and cost-effectiveness.

UMES will use assessment tools such as standardized tests, course-specific exams, and performance evaluations to evaluate student learning outcomes. By analyzing the data from these assessments, UMES will determine how well students are mastering the material covered in the program.

UMES will track the retention rates of students enrolled in the program over time. This can provide insight into whether students are completing the program or dropping out before completion.

UMES will administer surveys to students to gather feedback on their experiences in the program. These surveys can assess student satisfaction with the curriculum, teaching methods, resources, and overall program experience.

Like student satisfaction surveys, UMES will administer surveys to faculty members to gather feedback on their teaching experiences in the program. This will provide insight into faculty satisfaction with the curriculum, teaching resources, support from the administration, and other factors that may impact the quality of education offered.
UMES will conduct a cost-effectiveness analysis to determine whether the program is cost-effectively delivering educational value. This analysis will consider the program's costs, including tuition, fees, and resources required to provide the program, as well as the outcomes achieved by graduates.

N. CONSISTENCY WITH THE STATE'S MINORITY STUDENT ACHIEVEMENT GOALS (OUTLINED IN COMAR 13B.02.03.05 AND IN THE STATE PLAN FOR POSTSECONDARY EDUCATION).

1. *Discuss how the proposed program addresses minority student access & success, and the institution's cultural diversity goals and initiatives.*

The UMES mission is compatible with the State of Maryland's minority achievement goals. UMES is an 1890 land grant HBCU. Our programs attract a diverse set of students, with the majority of the student population being African-American and those who are multiethnic and multicultural. The University actively recruits minority populations for all undergraduate and graduate-level degrees. Special attention is also provided to recruit females into the STEM and multidisciplinary programs at all degree levels – undergraduate, Master's, and doctoral. The same attention will be given to the program proposed here.

O. RELATIONSHIP TO LOW-PRODUCTIVITY PROGRAMS IDENTIFIED BY THE COMMISSION

1. *If the proposed program is directly related to an identified low-productivity program, discuss how the fiscal resources (including faculty, administration, library resources, and general operating expenses) may be redistributed to this program.*

The proposed program is not directly related to an identified low-productivity program at UMES.

P. IF PROPOSING A DISTANCE EDUCATION PROGRAM, PLEASE PROVIDE EVIDENCE OF THE PRINCIPLES OF GOOD PRACTICE (OUTLINED IN COMAR 13B.02.03.22C).

1. *Provide affirmation and any appropriate evidence that the institution is eligible to provide Distance Education.*

At UMES, we are committed to continually improving our online courses and our distance education program. UMES participates in The State Authorization Reciprocity Agreement. Some of the benefits for students of our institutional participation in SARA include greater access to online programs, improved quality of distance education, and reduced institutional costs (which keeps everyone's costs lower). Currently, 47 states and the District of Columbia participate in SARA. "The State Authorization Reciprocity Agreement is a voluntary agreement among its member states and U.S. territories that establishes comparable national standards for interstate offering of postsecondary distance-education courses and programs. It is intended to make it easier for students to take online courses offered by postsecondary institutions based in another state" (NC-SARA.org).

2. *Provide assurance and any appropriate evidence that the institution complies with the C-RAC guidelines, particularly as it relates to the proposed program.*

UMES' commitment to online teaching is demonstrated by the resources of its Center for Instructional Technology and Online Learning (CITOL) founded in 2006, which provides a faculty computer lab, course development, and instructional, and technical support to new and current faculty. The Center for Instructional Technology and Online Learning (CITOL) at UMES supports the development, design, and delivery of online and hybrid programs, classes, and workshops with a focus on flexibility, resiliency, equity, accessibility, privacy, and safety (FREAPS). CITOL assists faculty, staff, and students in all digital teaching and learning aspects concerning pedagogy and technology. This includes using the Canvas Learning Management System, Echo360, Google Workspace, Respondus 4.0, and Respondus LockDown Browser. As C-RAC 2021 requires programs to provide details about practices to engage and assist distance education students; CITOL facilitates student-centered training and workshops, provides students mentoring and help desk support, and hosts a repository of student-centered LMS and online learning resources. The School of Business and Technology and the Center for Instructional Technology and Online Learning will ensure the degree program adheres to C-RAC Guidelines for the Evaluation of Distance Education.

SALISBURY-WICOMICO ECONOMIC DEVELOPMENT

Maryland Higher Education Commission
6 N Liberty St
Baltimore, MD 21201

September 15, 2023

RE: Aviation Maintenance Technician Program at the University of Maryland Eastern Shore

To Whom It May Concern,

Please accept this letter in support of the University of Maryland Eastern Shore (UMES) establishing an Aviation Maintenance Technician (AMT) program at the Salisbury-Ocean City: Wicomico Regional Airport (SBY).

Salisbury-Wicomico Economic Development, Inc. has long advocated for regional partnerships to help sustain and grow our local economy. The proposed AMT program offered by UMES provides a solid collaborative effort for further growth at SBY and creates a strong partnership between Wicomico County, the University of Maryland Eastern Shore, Piedmont Airlines and other industry sector partners throughout our region. This initiative preserves hundreds of local jobs, creates the possibility for more jobs in the future and maintains and enhances scheduled airline service for our region.

Please give favorable support to UMES' request for curriculum and program approval and as always, please let me know should you wish to further discuss.

Very Truly Yours,

David Ryan
Executive Director

ONE PLAZA EAST, SUITE 501 | P.O. BOX 4700 | SALISBURY, MD 21803
410.749.1251
SWED.ORG | INFO@SWED.ORG

Maryland Higher Education Commission
6 N Liberty St
Baltimore, MD 21201

September 15, 2023

RE: Aviation Maintenance Technician Program at the University of Maryland Eastern Shore

To Whom It May Concern,

Please accept this letter in support of the University of Maryland Eastern Shore (UMES) establishing an Aviation Maintenance Technician (AMT) program at the Salisbury-Ocean City: Wicomico Regional Airport (SBY).

The Salisbury-Ocean City: Wicomico Regional Airport is the only airport on Maryland's Eastern Shore with scheduled airline service, offered by Piedmont Airlines (dba American Eagle). The AMT program at UMES will provide the airlines as well as other industries throughout our region a trained workforce while giving area residents great career opportunities. For SBY, the robust offerings of an Aviation Science, Pilot Training and Aviation Maintenance provides more incentives to attract additional aviation and aeronautical companies and jobs to SBY.

SBY has an estimated $150 million economic impact on our regional economy and this program can be the catalyst to grow that impact. Please give favorable support to UMES' request for curriculum and program approval and as always, please let me know should you wish to further discuss.

Very Truly Yours,

Tony Rudy, A.A.E.
Airport Director

5485 Airport Terminal Rd., Unit A • Salisbury, MD 21804 • 410.548.4827
flySBYairport.com

Maryland Higher Education Commission
6 N Liberty St
Baltimore, MD 21201

September 15, 2023

RE: Aviation Maintenance Technician Program at the University of Maryland Eastern Shore

To Whom It May Concern,

Please accept this letter in support of the University of Maryland Eastern Shore (UMES) establishing an Aviation Maintenance Technician (AMT) program at the Salisbury-Ocean City: Wicomico Regional Airport (SBY).

The airline industry as a whole and Piedmont Airlines in particular face critical pilot and aviation mechanic shortages now and for the foreseeable future. The proposed AMT program at SBY will create a pipeline of trained workers capable of filling good jobs in our industry as well as others in our region with similar needs for trained maintenance technicians. The new AMT program, coupled with UMES' other aviation programs, is a robust offering that will help fill needs for skilled and licensed workers in the engineering, maintenance, and flight fields, and provide great jobs for area residents. The graduates of these programs will certainly help to fuel growth of the aviation and aeronautics sector on Maryland's Eastern Shore.

Please give favorable support to UMES' request for curriculum and program approval and as always, please let me know should you wish to further discuss.

Very Truly Yours,

Eric Morgan

Eric Morgan
President and CEO

(PROVISIONALLY SIGNED)

ACADEMIC PROGRAM ARTICULATION AGREEMENT BETWEEN WOR-WIC COMMUNITY COLLEGE AND UNIVERSITY OF MARYLAND EASTERN SHORE REGARDING TRANSFER FROM ASSOCIATE OF SCIENCE IN STEM TRANSFER TO BACHELOR OF SCIENCE IN AVIATION MAINTENANCE MANAGEMENT

This (Provisionally Signed) Academic Program Articulation Agreement ("Agreement") is entered into by and between Wor-Wic Community College (the "Sending Institution") and the University of Maryland Eastern Shore (the "Receiving Institution") (collectively, the "Institutions") to facilitate the transfer of academic credits from STEM Transfer, Associate degree, for the completion of Aviation Maintenance Management, Bachelor degree (the "Program(s)"):

Institution	HEGIS Program Title	Award Type	Statewide CIP
Wor-Wic Community College	490200 – STEM Transfer	Associate Degree	419999
University of Maryland Eastern Shore	051001 – Aviation Maintenance Management	Bachelor's Degree	529999

A. Qualifying Students

This Agreement pertains to the transfer of "Qualifying Students", *i.e.*, those students who:
1. Have successfully completed the program at the Wor-Wic Community College;
2. Are enrolled in the Wor-Wic Community College in good standing; and
3. Are accepted for admission to the University of Maryland Eastern Shore.

B. Responsibilities of the Institutions

The Institutions agree to implement the transfer of Qualifying Students in accordance with applicable law and the following requirements and protocols:

1. A Qualifying Student may transfer into from the Wor-Wic Community College into the University of Maryland Eastern Shore for the completion of the Bachelor of Science in Aviation Maintenance Management.

2. Courses that the University of Maryland Eastern Shore will accept credits for towards completion of the Bachelor of Science in Aviation Maintenance Management include:

Wor-Wic Community College			**University of Maryland Eastern Shore Comparable Course**			
Course Number	**Course Name**	**Credits**	**Course Number**	**Course Name**	**Credits**	**Applied to***
SDV 100	Fundamentals of College Study	1	ASVC 100	First Year Orientation with Aviation	3	General Education
ENG 101	Fundamentals of English I	3	ENGL 101	Principles of Composition I	3	General Education
MTH 121	Precalculus	3	MATH 109	College Algebra	3	General Education
General Education I	Arts / Humanities Course	6	General Education I	Arts / Humanities Course	6	General Education
SOC 101 ***OR*** PSY 101	Introduction to Sociology ***OR*** Introduction to Psychology	3	SOCI 100 ***OR*** PSY 101	Introduction to Sociology *OR* Introduction to Psychology	3	General Education
ENG 151	Fundamentals of English II	3	ENGL 102	Principles of Composition II	3	General Education
COM 101 ***OR*** COM 200	Introduction to Public Speaking ***OR*** Interpersonal Communications	3	ENGL 203	Fundamentals of Contemporary Speech	3	General Education
	Biological / Physical Science	4		Biological / Physical Science	4	General Education
PHE 106	Integrated Health and Fitness	3	EXSC 111	Personal Health and Fitness	3	General Education
MATH 252	Elementary Statistics	3	MATH 210	Elementary Statistics	3	General Education
ENV 101	Environmental Science	4	ENVS 101	Introduction to Environmental Science w/1 credit Elective	4	General Education
OFT 155	Word Processing	3	BUED 212	Computer / Concepts Applications I	3	General Education

*Receiving Institution must indicate if course is applied to General Education, Program/Major requirements, or General Elective.

3. The Receiving Institution shall designate, and shall provide to the Sending Institution, the contact information for a staff person at the Receiving Institution who is responsible for the oversight of the transfer of Qualifying Students. The Sending Institution shall designate, and shall provide to the Receiving Institution, the contact information for a staff person at the Sending Institution who is responsible for the oversight of the transfer of Qualifying Students.

	Wor-Wic Community College	**University of Maryland Eastern Shore**
Name of staff person responsible for oversight	Rhoda Lukens	Dr. Willie L. Brown, Jr.
Title of staff person	Registrar	Vice Provost for Faculty Affairs
Email address	rlukens@worwic.edu	wlbrown@umes.edu
Telephone Number	410-334-2800	410-651-6038

Should the staff person or position change, the institution will promptly provide new contact information to the partner institution and inform the Maryland Higher Education Commission of the change.

Additional contact information:

Direct Points of Contact for Articulation Agreement	**Wor-Wic Community College**	**University of Maryland Eastern Shore**
Name of person	TBD	Dr. Etahe Johnson
Title of person		Academic Support Associate
Email address		ejohnson2@umes.edu
Telephone Number		(410) 651-6131

4. If the Qualifying Student is using federal Title 38 VA Education Benefits (GI Bill® Education Benefits), the Institutions shall adhere to all applicable U.S. Department of Veterans Affairs' regulations, including the regulations governing the awarding prior credit, as regulated under Title 38, Code of Federal Regulations, Sections 21.4253(d)(3) and 21.4254(c)(4).

5. Each Institution shall adhere to all applicable transfer requirements set forth in the Annotated Code of Maryland and the Code of Maryland Regulations.

6. Each Institution shall advise students regarding transfer opportunities under this Agreement and shall advise students of financial aid opportunities and implications associated with the transfer.

7. Should either Institution make changes to program requirements, the institution will inform the partner institution immediately. The articulation agreement should be updated to reflect the changes and forwarded to the Maryland Higher Education Commission.

C. Term and Termination

1. This agreement shall be effective on the date that it is signed by the appropriate and authorized representatives of each Institution.

2. Either Institution may, at its sole discretion, terminate this Agreement upon delivering 30 days written notice to the other Institution and the Maryland Higher Education Commission.

3. Both Institutions agree to meet once every 5 year(s) to review the terms of this agreement.

D. Amendment

1. This Agreement constitutes the entire understanding and agreement of the Institutions with respect to their rights and obligations in carrying out the terms of the Agreement and supersedes any prior or contemporaneous agreements or understandings.

2. This Agreement may be modified only by written amendment executed by both Institutions.

E. Governing Law

This Agreement shall be governed by, and construed in accordance with, the laws of the State of Maryland.

F. Counterparts

This Agreement may be executed in counterparts, each of which shall be deemed to be an original, but all of which, taken together, shall constitute one and the same agreement.

G. Notice of Agreement

1. The Institutions agree to provide a copy of this Agreement, with any amendments, to the Maryland Higher Education Commission.

2. The Institutions agree to provide copies of this Agreement to all relevant individuals and departments of the Institutions, including but not limited to students, academic department chairs participating in the transfer, offices of the president, registrar's offices, and financial aid offices.

H. No Third-Party Beneficiaries

There are no third-party beneficiaries to this Agreement.

I. Representations and Warranties of the Parties

Both Institutions represent and warrant that the following shall be true and correct as of the Effective Date of this Agreement, and shall continue to be true and correct during the term of this Agreement:

1. The Institutions are and shall remain in compliance with all applicable federal, state, and local statutes, laws, ordinances, and regulations relating to this Agreement, as amended from time to time.

2. Each Institution has taken all action necessary for the approval and execution of this Agreement.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed by their duly authorized representatives.

University of Maryland Eastern Shore

By: ______________________________

Dr. Rondall Allen, Provost and Vice President for Academic Affairs

03 / 02 / 2024

Date

Dropbox Sign

Audit trail

Title	Provisionally Signed Articulation Agreement: UMES Aviation...
File name	Aviation Maintena...nally_Signed.docx
Document ID	bcfab3347d69d23752728e13743e82242c221fd0
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UNIVERSITY SYSTEM of MARYLAND

BOARD OF REGENTS
SUMMARY OF ITEM FOR ACTION,
INFORMATION, OR DISCUSSION

TOPIC: Results of Periodic Reviews of Academic Programs, 2022-2023

COMMITTEE: Education Policy and Student Life and Safety

DATE OF COMMITTEE MEETING: Friday, April 12, 2024

SUMMARY: At its meeting in June 2003, the Board of Regents delegated to the Chancellor the authority to approve institutional reports on the review of existing academic programs. Existing academic programs are required to submit a report every seven years. Each USM institution follows a review process that was approved previously by the Regents. A format for the reports is standardized and includes information on enrollments and degrees awarded, internal and external reviews, and institutional recommendations and actions.

The periodic program review process includes an internal self-study that is conducted by the program the academic year before the summary report is submitted to USM. The self-study is reviewed by external reviewers who then submit a report that becomes a part of the draft full periodic program review report. The respective dean for the program and the provost review the draft full report prior to submission of material to USM.

Drafts of each report are reviewed by staff in the USM Office of the Senior Vice Chancellor for Academic and Student Affairs, and any questions or requests are shared with the institutions for appropriate action prior to final submission to the Chancellor. These requests may be for additional information or for additional action following program accreditation reviews.

The reports demonstrate the seriousness with which the reviews are taken. Institutional action plans are decided upon primarily by the provost or dean, both of whom are responsible to monitor academic quality and use of resources. The following narratives and data tables provide information on enrollment and degrees awarded during the five years prior to the report submission. Copies of the complete program review summaries are available from the USM Office of Academic and Student Affairs.

ALTERNATIVE(S): This is an information item.

FISCAL IMPACT: This is an information item.

CHANCELLOR'S RECOMMENDATION: This is an information item.

COMMITTEE RECOMMENDATION: Information Only	**DATE**: April 12, 2024
BOARD ACTION:	**DATE**:
SUBMITTED BY: Alison Wrynn 301-445-1992	**EMAIL**: awrynn@usmd.edu

AY 2022-23 Periodic Review of Academic Programs Summary

Existing academic programs are required to submit a report every seven years. A format for the reports is standardized and includes information on enrollments and degrees awarded, internal and external reviews, and institutional recommendations and actions. Drafts of each report are reviewed by staff in the USM Office of the Senior Vice Chancellor for Academic and Student Affairs, and any special comments for action are shared prior to final submission to the Chancellor. A total of 110 academic programs were reviewed during the 2022-2023 period program review period. This number is less than last year's, but the total number of programs reviewed by year can easily vary by double-digit percentage points from year to year, in either direction, without there necessarily being a meaningful pattern.

Number of Programs Reviewed

Associate Degrees[1]:	0
Bachelor's:	44 (with BA/BS options treated as one program)
Master's:	39
Doctorates:	14
Certificates:	13

(These certificates are stackable into other degrees.)

[1] The University of Maryland Global Campus is the single USM institution approved by the Maryland Higher Education Commission (MHEC) to offer the associate degree.

Results of Program Accreditation Reviews

Specialized accreditation may be available to individual programs or to groups of programs in departments or schools. Not all programs have such an option available to them. This kind of designation is usually associated with professional programs. Specialized accreditation in general requires documentation of continuous improvement toward clear program and student achievement outcomes, and standards may be related to the licensure of professionals. Of the 110 programs reviewed for this cycle, 30 have specialized accreditation through the program or school. Others are preparing to seek specialized accreditation in coming years.

Bowie State University

BS Computer Science – This program's Accreditation Board for Engineering and Technology (ABET) accreditation was reaffirmed in the summer of 2022. This review was conducted outside accreditation review, but the program's standards and practices are guided by ABET. The program has grown considerably in 2016, and the review notes a need to hire faculty to serve the student population, which doubled in the review period.

BS Computer Technology – Computing Accreditation Council of ABET – 2020-21 review cycle with accreditation through the next cycle, which begins at the end of 2024; National Center of Academic Excellence in Cyber Defense (NCAE-CD) – review for designation completed summer 2023.

Coppin State University

BS Nursing – The Commission on Collegiate Nursing Education (CCNE) with the Maryland Board of Nursing reviewed the BSN, MSN, DNP, and post-graduate Advanced Practice RN offerings of the

Helene Fuld School of Nursing. The programs are CCNE accredited. There was found to be high enrollment for the faculty size, and additional faculty have been and are being hired; faculty overloads have been reduced. The Maryland Board of Nursing accepted the school's NCLEX-RN Action Plan at its June 2023 meeting. Admission standards have been reevaluated through the overall self-study and program evaluation process.

BS Health Information Management – The program is accredited by the Commission on Accreditation for Health Informatics and Information Management Education (CAHIIM), which conducted its last external review in the spring semester of 2023 and requires an annual report from the program. All standards were met except one, which is being addressed by the program adjusting the curriculum to help students focus on certification examination preparation in the last semester of the program.

Frostburg State University

BS Accounting, BS Business Administration, BS Economics – Business Economics Concentration, and the MBA - These four programs fall under the accreditation of the Association to Advance Collegiate Schools of Business (AACSB International). The online MBA is undergoing Quality Matters review for its 8 core courses. The College of Business, Engineering, Computational & Mathematical Sciences and several of its programs received an extension of accreditation in October 2020. The areas identified by the external review team through AACSB International were complimentary toward the relationship the college has with the advisory board, experiential learning in the classroom, and global experiences. The areas identified as in need of improvement revolve around strengthening faculty intellectual contributions, mission alignment, curricula management and assurance of learning, and resource allocation. An action plan is in place to address the recommendations.

The BS Mechanical Engineering is a collaborative program with the University of Maryland, College Park. The degree is awarded by Frostburg, but its accreditation is through College Park, which underwent its ABET review, but the Frostburg program is not in the program review.

Towson University

MS Occupational Therapy, Entry-Level Occupational Therapy Doctorate (ELOTD) - The most recent on-site accreditation visit by the Accreditation Council for Occupational Therapy Education (ACOTE) for the MSOT and ELOTD programs occurred in AY 2021-22. The programs were found to be in compliance with all standards. The ELOTD program was granted a seven-year initial accreditation, the longest any new program can receive. Each year, programs must submit program evaluation reports to ACOTE to demonstrate ongoing analysis of program goals. The ELOTD only launched in 2019. Aligned with Towson's aim to achieve R-2 status, the action plan based on evaluator and self-study recommendations calls for elevating the scholarly endeavors and products of students within and across the curriculum. The expectations of scholarship and leadership distinguish this route to entry-level practice. Elevating the scholarship experience and outcomes will occur through multiple mechanisms. The program will build upon student publication of capstone projects through ongoing mentoring for dissemination as a structured expectation, including a re-visioning of the internal dissemination process and the development of an online repository of capstone projects. Finally, the ELOTD program has initiated a new peer review process for student capstone project proposals to encourage rigor at all phases. The action plan also calls for cultivating a strong doctoral student body via marketing and recruitment strategy. There is ongoing work to differentiate the MSOT and the ELOTD programs as the dual entry point *for practice, including the addition of language that explicitly delineates the programs by length, curriculum, and professional trajectory.*

University of Maryland, Baltimore County

BA Design, BA/BFA Visual Arts, MFA Intermedia and Digital Arts – The Department of Visual Arts hosted the team site visit for the National Association of Schools of Art and Design (NASAD). The team determined that the MFA and most concentrations for Visual Arts met standards. Findings to be addressed by the undergraduate programs included ventilation, number of hours of studio time, student access to facilities outside of class time, and ventilation in the print media studio. These items are all in the action plan.

University of Maryland, College Park

BS Mechanical Engineering (UMCP, Frostburg, USMSM); MS, PhD Mechanical Engineering; and MS, PhD Reliability Engineering - Accreditation Board for Engineering and Technology (ABET) – The accreditation visit took place in Fall 2023, and a final report is expected in Fall 2024. Three external reviewers participated in the program review; recommendations pertain to diversifying the faculty and enhancing stipends for graduate students to attract top talent.

MS/PhD Psychology – the Clinical Counseling concentration is accredited by the American Psychological Association (APA). The external reviewers complimented the strength of the graduate programs. Minimum stipends for graduate assistants have been increased campus-wide, which addresses one of the recommendations. The department will continue to enhance opportunities for professional development of non-tenure-track faculty, as well as develop onboarding processes for all categories of department constituents to enhance structure and cohesion in the academic programs.

BA, MJ, MA –The undergraduate and master's degree programs in the Philip Merrill College of Journalism are professionally accredited by the Accrediting Council on Education in Journalism and Mass Communications (ACEJMC). The doctoral program is not formally accredited, but it was considered as part of the 2022 review of the College overall, which resulted in renewed accreditation of the school's programs.

University of Maryland Eastern Shore

BS Hospitality and Tourism Management – The program is accredited through the Accreditation Commission for Programs in Hospitality Administration (ACHPA). The action plan includes several steps tied to ACPHA standards: reestablish an advisory board; implement a full assessment plan using vertical rubrics from ACPHA tied to each program track; create a 5-year strategic plan; shape a formal shared governance structure; recruit for key positions; and expand alumni and experiential learning engagement opportunities. Reviews also pointed to renovating certain spaces of the Henson Center.

BS Human Ecology – The department is accredited through the American Association of Family and Consumer Sciences. The BS was reviewed, and there is a newly approved MS in Human Ecology. The bachelor's has several concentrations: Child Development, Family and Consumer Sciences, Family and Consumer Sciences Education, Fashion Merchandising, Nutrition and Dietetics, and a Dietetic Internship Program. The Accreditation Council for Education in Nutrition *and Dietetics (ACEND) granted the Didactic Program in Dietetics and the Dietic Internship full accreditation.*

PharmD - The UMES School of Pharmacy completed a comprehensive self-study from 2018-2019, which culminated in an on-site evaluation by a team from the Accreditation Council for Pharmacy Education (ACPE) on April 9-11, 2019. Based on the recommendations from the site visit team, the ACPE Board of Directors approved the continued accreditation of the Doctor of Pharmacy program for a full, eight-year cycle, extending through June 30, 2027. Actions are in place to address recommendations related to inter-professional education and to pre-advanced pharmacy practical experiences.

Low Degree Productivity

MHEC Definition
Bachelor's: < 5 in most recent year or a total of 15 in last three years
Master's: < 2 in most recent year or a total of 6 in last three years
Doctorate: < 1 in most recent year or a total of 3 in last three years

By the aforementioned definition and without other context, nine (9) programs are considered to demonstrate "low productivity." The types of programs identified in this report as low productivity include four (5) bachelor's degree (B) programs and four (4) master's degrees. Arguably, however, three of the master's programs could be exempted from this description based on more recent data or the program's close curricular relationship to a doctoral program.

The following brief summaries highlight the strategies being undertaken by the identified programs to address low enrollment and the low number of degrees awarded.

Coppin State University

- *BS Chemistry – recruitment to the program has been steady, but loss of students from the major requires more review. External reviewers provided several recommendations related to degree attainment, including expanding student research opportunities and the review of analytical chemistry instruction.*

- *BA Urban Arts – the program is a public face of the university's service to the community in which it is located. Program retention is high, and there have been high-profile student successes. The program name is being reviewed, and there is a plan to seek specialized accreditation (National Association of Schools of Theater). There are internal conversations about program resources.*

- *BA Urban Studies – the program lost its director a few years ago, and new (non-interim) director began in 2022, who is working on a program strategic plan, a curriculum review, and a recruitment plan. There is a plan to update an MOU with Anne Arundel Community College and to review the program name.*

Frostburg State University

- *BA Foreign Literatures & Language - Special circumstances impacting the program include the COVID-19 pandemic, staffing issues (online French professor), and additional language requirements for Bachelor of Arts majors (2 semesters of French or Spanish for all BA majors). The program courses serve many majors, and the major has an action plan that* *includes developing a strategic enrollment plan, partnering with student groups on campus, partnering with the DEI and international students offices, and evaluating a French minor, as well as the sustainability of the current programming.*

Towson University

- *MA Global Humanities – The program launched in 2018 and has grown. In AY2022-2023, 6 students earned the MA, which is not reflected in the Degrees Awarded timetable. Thus, with the most recent data available, this program does not qualify as a low degree productivity program. The program is also an Advisory Board to follow up on continuous improvement steps, including partnership and curriculum reviews.*

- *BA Religious Studies – The pandemic impacted enrollments, and the department expects a return to pre-pandemic numbers with in-person operations. Religious Studies is typically a "found" major, one that students discover and add later in their college careers. Many students find that it complements majors in other fields, adding a degree of cultural competency; however, double majors are not included in MHEC data sets. About 6 more enrollments per year are double majors. The program will actively support the student-led World Religions Roundtable and help them organize social events for majors, minors, and other interested students, including film screenings and guest speakers. The program will develop new thematic courses, like "Religion and Baltimore," which will serve as a hub to explore a common research project and have a significant digital humanities component. The program will also commit to tenured and tenure-track faculty teaching lower-level courses. Faculty will develop a marketing plan to help spread information about the program throughout the university and will develop a yearly open house to promote the program, promote internship opportunities, and encourage double majoring, highlighting how a degree in Religious Studies can complement popular majors like health sciences.*

University of Maryland, Baltimore

- *MS Pharmaceutical Health Services Research – This is a master's associated with a doctoral program that has steady enrollment with a growing number of annual graduates. By design, few students leave with a terminal master's because they earn the doctorate.*

University of Maryland, College Park

- *The MA in Journalism is intended to be a very limited program for experienced journalists seeking a research-focused degree with a goal of future teaching or a Ph.D. program. The related graduate journalism programs in the Merrill School have solid enrollment.*

University of Maryland Eastern Shore

- *MEd Special Education – Enrollment in this program has been small but steady and doubled in 2022. A comprehensive action plan will be executed Winter 2025 to include: curriculum mapping to reevaluate curriculum and adopt teaching tools; creating exit surveys so students can evaluate instruction and ease of admission and exit from the university (which would also be an asset to the curriculum mapping process); and developing recruitment strategies to include formal and informal opportunities where faculty network with high school and college early childhood centers and academic programs, and recruit from K-12 public school teaching pool. There is an upper-division certificate and a post-baccalaureate certificate; these share courses with the BS and MS but unlike the degrees, do not lead to initial certification. The reviewers recommended that their curricula be revised to be complementary to the degree programs.*

Bowie State University										
Program Title (Degree)	2018		2019		2020		2021		2022	
	Enrolled	Degrees	Enrolled	Degrees	Enrolled	Degrees	Enrolled	Degrees	Enrolled	Degrees
(B) Communication Media	401	107	351	113	327	89	316	88	294	100
(B) Computer Science	162	11	189	11	193	17	242	16	332	11
(M) Computer Science	31	12	28	12	26	15	31	6	28	8
(D) Computer Science	40	4	47	2	52	2	58	2	54	2
(B) Computer Technology	322	36	340	48	350	47	360	58	342	81
(M) Human Resource Development	138	33	101	57	75	43	66	37	50	27
(M) Organizational Communications	51	20	55	24	54	22	66	24	56	19

Notes:

1. *BA/BS Communication Media* – The faculty agree with the external findings, which support its application for specialized accreditation through the Accrediting Council on Journalism and Mass Communication (ACEJMC). The action plan has recruitment strategies to recover from pandemic impacts. The department will move into the new Martin Luther King Jr. Communication Arts & Humanities building in 2024, which will host BSU-TV, WBSU Radio, The Spectrum student news site, FLOW digital magazine, and PR Pulse E-Newsletter, plus a 1,500-seat auditorium, two TV and two radio studios, two large tiered classrooms, 18 collaborative instructional spaces, an ROTC plaza, and a recording studio and screening room.
2. *BA/BS Computer Science* – The program secured Cybersecurity Center of Excellence status and has grown quickly, but more faculty will need to be hired. The action plan includes greater focus on retention. The department is committed to doing the following: Regularly assessing and evaluating the program's effectiveness through ABET external review, student feedback and surveys, alumni feedback, and employer satisfaction surveys; Using assessment results to identify areas for improvement and implementing necessary changes to ensure program quality and relevance; Engaging external advisors comprised of industry professionals to provide insights and recommendations for program enhancements.
3. *MS Computer Science* – Implemented new accelerated BS/MS and is undergoing broader curriculum review to reduce credits in the MS and to provide some more specialization options, including for stackable PBCs. Program is strong but could use more faculty for the number of students.
4. *DSc. Computer Science* – The external review commended the curriculum but recommended more full-time faculty to serve the large BS, MS, and DSc. Enrollment; four have been hired. Additional grant funding and early research publishing opportunities are encouraged; a research methodologies course is being developed, along with more comprehensive exams support. Assessment procedures and advisory participation by industry professionals will contribute to continuous improvement.
5. *BS Computer Technology* – CAC-ABET accreditation and Natl. Ctr of Academic Excellence – Cyber Defense; addressing ABET criteria for Students and Continuous Improvement, implementing standardized rubrics and using Blackboard to document timely feedback. Enhanced course assessment overall is being implemented to assure more uniform student outcomes and better documented assessment.
6. *MA Human Resource Development* – Pandemic limits on foreign students impacted enrollment. The action plan includes updating the curriculum with some revision of sequence, reinstating the project management program, revising the assessment process, and considering online format.

7. *MA Organizational Communications* – Some courses have been moved online and into 8-week formats to be more attractive to adult students; the included graduate certificate will be revised; the program will move into the new MLK Building with its numerous advantages, and faculty will continue to participate in recruitment activities. Courses may be added in summer and winterim. The program is preparing for first-time ACEJMC accreditation. The associated team visit is likely in 2025.

Coppin State University										
Program Title (Degree)	2018		2019		2020		2021		2022	
	Enrolled	Degrees	Enrolled	Degrees	Enrolled	Degrees	Enrolled	Degrees	Enrolled	Degrees
(B) Biology & Life Sciences	121	30	139	24	130	15	111	15	117	12
(B) Chemistry	15	1	19	3	22	3	22	1	17	4
(B) Health Information Management	84	25	55	22	44	15	57	12	44	8
(PBC) Investigative Sciences*	27	4	30	2	34	8	31	7	26	3
(B) Nursing	624	47	571	67	505	60	447	52	332	55
(PBC) Policing Strategies*	0	0	0	0	1	0	0	1	0	0
(B) Urban Arts	27	4	30	2	30	8	31	6	25	3
(B) Urban Studies	11	2	9	0	11	1	2	2	1	0

Notes:

1. BS Biology & Life Sciences – Recommendations include expanding the ASCEND program to develop more vigorous collaborations/initiatives with K-12 schools, especially middle and high schools, in Baltimore city, which can both help prepare students and advertise the program to teachers and counsellors; continue to increase articulation agreements with community colleges; introduce a concentration/minor in environmental science/geosciences; and explore developing specialized undergraduate certificates. Faculty will be encouraged to seek more grants, including to support graduate assistants. Preparation and retention strategies will be assessed. Facilities are state-of-the-art.
2. BS Chemistry – excellent facilities but need a faculty member in analytic chemistry per external review; retention factors to be studied; recruitment to the program has been steady, but loss of students from the major requires more review. External reviewers provided several recommendations related to degree attainment, including expanding student research opportunities and the review of analytical chemistry instruction.
3. BS Health Information Management - The program is accredited by the Commission on Accreditation for Health Informatics and Information Management Education (CAHIIM, which conducted its last external review in the spring semester of 2023. All standards were met. The program has reordered the curriculum to help students focus on certification examination preparation in the last semester of the BS.
4. PBC Investigative Services - *This is a stackable certificate within the MS in Criminal Justice, and its courses are well enrolled as part of the MS. An ad hoc committee on the certificate has been formed to do a needs assessment with local law enforcement agencies, to evaluate marketing, and to review the internal assessment process to help grow the program as a stand-alone option for working professionals.
5. BS Nursing – The Commission on Collegiate Nursing Education (CCNE) with the Maryland Board of Nursing reviewed the BSN, MSN, DNP, and post-graduate Advanced Practice RN offerings of the Helene Fuld School of Nursing. The programs are CCNE accredited. There was found to be high enrollment for the faculty size, and additional faculty have been and are being hired; faculty overloads have been reduced. The Maryland Board of Nursing accepted the school's NCLEX-RN Action Plan at its June 2023 meeting. Admission standards have been reevaluated through the overall self-study and program evaluation process.
6. PBC Policing Strategies - *This is a stackable certificate within the MS in Criminal Justice, and its courses are well enrolled as part of the MS. An ad hoc work group, inclusive of chair and faculty teaching courses for certificate program, has been established within the department to plan, implement, and periodically assess corrective action strategies with the goal to improve certificate program enrollment and retention efforts.

7. BA Urban Arts – The program is a public face of the university's service to the community in which it is located. Program retention is high, and there have been high-profile student successes. The program name is being reviewed, and there is a plan to seek specialized accreditation (National Association of Schools of Theater). There are internal conversations about program resources.
8. BA Urban Studies – The program lost its director, and a new director began in 2022, and she is working on a program strategic plan, a curriculum review, and a recruitment plan. There is a plan to update an MOU with Anne Arundel Community College and to review the program name.

Frostburg State University										
Program Title (Degree)	2018		2019		2020		2021		2022	
	Enrolled	Degrees	Enrolled	Degrees	Enrolled	Degrees	Enrolled	Degrees	Enrolled	Degrees
(B) Accounting	128	27	117	25	93	27	70	18	59	21
(B) Business Administration	455	106	411	125	377	91	318	89	280	66
(M) Business Administration	174	70	185	80	154	67	155	56	136	57
(M) Applied Computer Science	47	27	70	11	58	20	49	26	64	24
(B) Computer Science	164	23	156	23	138	19	106	18	102	21
(B) Economics	72	11	103	8	52	12	25	165	29	81
(B) Foreign Languages & Literature	17	8	13	4	7	6	4	4	6	0
(B) Secure Computing & Information Assurance	85	14	92	15	84	16	64	15	55	30

Notes:

1. BS Accounting, BS Business Administration, MBA, BS Economics (Business Economics area of concentration) –The College of Business, Engineering, Computational & Mathematical Sciences and several of its programs received renewed accreditation in October 2020. The AACSB International team was complimentary of the college relationship with its advisory board, experiential learning in the classroom, and global experiences. Areas identified for improvement revolve around strengthening faculty intellectual contributions, mission alignment, curricula management and assurance of learning, and resource allocation. An action plan is in place. The online MBA is undergoing Quality Matters review. A 4+1 accelerated BS/MBA is planned.
2. MS Applied Computer Science – The reviewers praised the program and its regional role, noted the robust online enrollment, but recommended a more sustainable faculty staffing model (hire faculty) and improving on-campus enrollment. A capstone and assessment steps will be added.
3. BS Economics – A partnership with Hunan University of Technology and Business has sharply increased enrollment and completions. The major is being reconfigured, aligned with AACSB recommendations: switch business economics to Business Administration as a concentration; eliminate public policy and quantitative concentrations; and alter the general economics concentration. Faculty are to be recruited.
4. BA Foreign Languages & Literature – Special circumstances impacting the program include the effects of the COVID-19 pandemic (e.g., online delivery of courses), staffing issues (online French professor), and BA service requirements. The program courses serve many majors, and the major has an action plan that includes developing a strategic enrollment plan, partnering with student groups on campus, partnering with the DEI and international students offices, and evaluating a French minor, as well as the sustainability of the current programming.
5. BS Secure Computing & Information Assurance – The program has strong facilities, good experiential opportunities, and strong job placement. A clear action plan with milestones is laid out to review the curriculum so it will facilitate more certification opportunities within the degree and expand the ethics and DEI elements of the program; actions will be taken to replace recent faculty departures.
6. BS Computer Science – The BS is aligned with the Association of Computing Machinery standards and will be updated when those new standards are released in the near term. A more sustainable faculty staffing model is being developed; student orgs and diverse recruitment will be promoted more.

Degree Codes: (B) Bachelor; (M) Master; (D) Doctorate; (BFA) Bachelor of Fine Arts; (BTS) Bachelor of Technical Studies; (BPS) Bachelor of Professional Studies; (UDC) Upper Division Certificate; (PBC) Post-Baccalaureate Certificate; (MAT) Master of Arts in Teaching; Master of Professional Studies (MPS); (PMC) Post-Master Certificate; (CAS) Certificate in Advanced Study.

Salisbury University										
Program Title (Degree)	2018		2019		2020		2021		2022	
	Enrolled	Degrees	Enrolled	Degrees	Enrolled	Degrees	Enrolled	Degrees	Enrolled	Degrees
(B) Biology	488	107	457	104	407	102	382	91	363	88
(M) Applied Biology	11	4	9	2	9	6	11	3	8	3
(B) Communication	489	145	478	138	445	174	398	157	344	156
(B) Computer Science	218	36	232	36	209	39	180	26	216	29
(B) Economics	40	26	48	10	48	22	49	18	29	8
(B) Interdisciplinary Studies	98	54	95	55	79	66	107	50	106	43
(B) Mathematics	114	26	106	27	113	21	88	36	65	21
(M) Mathematics Education	12	1	12	1	17	0	10	6	7	3
(B) Urban and Regional Planning	15	1	20	2	20	7	18	2	16	6

Notes:

1. BA/BS Biology, MS Applied Biology – Strengths include student research opportunities (6 Fulbright winners), assessment, and focus on inclusive learning. The action plan with milestones includes attention alignment to the new Gen Ed curriculum, addressing faculty retention, increasing students' sense of belonging with expanded DEI efforts, continued attention to curriculum, and additional support for graduate assistants.
2. BA Communication - Several actions to take and opportunities to realize were identified in the self-study, external review, and dean's recommendations: (1) Align faculty and advising staffing and workload to meet program's current and future needs. (2) Expand recruitment and retention efforts. (3) Implement meaningful assessment including routine curriculum review in various tracks. (4) Fully leverage opportunities available through the new General Education (GE) curriculum. (5) Develop a proposal for a M.A. in Public Communication and submit through required approval processes. (6) Expand alumni and external outreach. (7) Formalize advising processes to ensure better and more accurate communication of program/track requirements
3. BS Computer Science – The program has 3 tracks, good facilities, and a strong curriculum. Challenges include the need for faculty, staff, curriculum and facilities to keep pace with this constantly changing field that serves critical workforce needs. The following recommended actions are from the departmental self-study, external reviewer's report, and dean's summary: (1) Develop a long-term plan to address faculty staffing and to mitigate faculty burnout; (2) develop strategies to increase retention of students in the major (~50%), which is much lower than other, similarly rigorous programs at SU; (3) establish a program advisory committee, starting with program alumni and then expanding to include non-alumni representatives from industry, R&D, etc.; (4) identify needed physical spaces for the program and create a plan to secure them; (5) continue well-established assessment of student learning with attention to closing-the-loop activities that respond to trends revealed in the assessment efforts; (6) consider the value of and path to accreditation by the Accreditation Board for Engineering and Technology (ABET); (7) attend to policy development in this newly formed academic department.

Degree Codes: (B) Bachelor; (M) Master; (D) Doctorate; (BFA) Bachelor of Fine Arts; (BTS) Bachelor of Technical Studies; (BPS) Bachelor of Professional Studies; (UDC) Upper Division Certificate; (PBC) Post-Baccalaureate Certificate; (MAT) Master of Arts in Teaching; Master of Professional Studies (MPS); (PMC) Post-Master Certificate; (CAS) Certificate in Advanced Study.

4. BA Economics – The Economics program has committed to: (1) developing a mission/vision statements; (2) developing a plan to gather Assurance of Learning data regularly for use in continuous improvement and future program reviews; (3) developing Diversity, Equity, and Inclusion initiatives within the Department; (4) exploring possibilities for building relationships with other departments to attract additional students who might be interested in pursuing an Economics minor or major; (4) initiating conversations with stakeholders across campus on how to build relationships to bring more international students into the Economics B.A; (5) exploring potential experiential learning opportunities for Economics B.A. majors with existing programs on campus, such as the Perdue School's Business, Economic, and Community Outreach Network (BEACON), the Innovation, Entrepreneurship, and Economic Development Hub (The HUB), and the Rommel Center for Entrepreneurship; (6) continuing to invite outside speakers and investigating potential opportunities for faculty to participate in seminar series at other universities; (7) revising, as needed, and submitting key introductory level courses for approval for inclusion in the University's new General Education curriculum (starts Fall 2024); and (8) developing a First-Year Seminar Course (FYS is a new component of the new General Education curriculum).
5. BA/BS Interdisciplinary Studies – The IDIS programs includes 17 distinct academic offerings ranging from concentrations in Gender & Sexuality Studies to the Individually-Designed track to minors in Asian Studies, Cognitive Studies, and Law, Justice & Advocacy among others. IDIS does not have any dedicated faculty and relies on a team of 50+ faculty and staff to support its varied programs. The action plan calls for more comprehensive leadership and personnel support (create an IDIS Program Coordinator position; expand Individually-Designed concentration advising support; increase support/incentives for IDIS concentration/track directors); more marketing; identifying ways to align with and leverage the new Gen Ed curriculum; more outreach and collaboration with other SU academic units to increase awareness of IDIS programs as options for students who may not be satisfied/successful in their chosen major; and strategic planning and enhanced assessment of student learning outcomes (aligned with AASCU).
6. BS Mathematics, MS in Mathematics Education – Internal and external recommendations were aligned and are addressed by an action plan with clear milestones to address recruitment and student support efforts; declining student preparation; faculty workload, engagement, and staffing; administrative support; program space, including computer labs; engagement with the new Gen Ed curriculum; and new opportunities for the MSME as a result of the Blueprint for Maryland's Future. Both programs' strengths included student focus, student options, and curriculum.
7. BS Urban and Regional Planning - The curriculum was recently revised to better align with requirements of the Planning Accreditation Board (PAB). The URPL program will seek initial accreditation in the future. The URPL B.S. is a unique offering in the State and a professional program that has the opportunity to engage not only traditional students but also working professionals seeking career advancement/change. As the University considers additional investments in the program, it will be important to evaluate the State-wide landscape and how we can best serve prospective students, some of which may be place-bound. Actions recommended by the program director, the external reviewer, and/or the Dean of the Henson School of Science & Technology included: (1) Develop a long-term vision and strategic plan. (2) Develop and implement strategies to increase program enrollment. (3) Hire a new full-time faculty member to support the program. (4) Increase program autonomy and parity with other academic majors. (5) Increase dedicated space and administrative support available to the program. (6) Require a planning internship as part of the major. (7) Establish a URPL Advisory Board.

Towson University										
Program Title (Degree)	2018		2019		2020		2021		2022	
	Enrolled	Degrees	Enrolled	Degrees	Enrolled	Degrees	Enrolled	Degrees	Enrolled	Degrees
(B) English	327	116	308	90	288	80	259	75	239	81
(B) Geography & Environmental Planning/Land Surveying	75	25	77	18	71	40	70	13	53	29
(M) Geography and Environmental Planning	15	6	14	4	13	7	13	7	11	4
(M) Global Humanities	9	3	10	3	8	2	11	3	12	1
(M) Human Resource Development	76	33	65	32	62	21	50	27	38	15
(M) Occupational Therapy	159	73	139	77	124	39	120	112	84	62
(D) Entry Level Occupational Therapy	0	0	20	0	37	0	63	0	58	19
(D) Occupational Science	8	3	9	1	10	0	8	0	8	4
(M) Occupational Therapy	159	73	139	77	124	39	120	112	84	62
(D) Occupational Therapy (post-professional) *only launched 2018	4	-	20	-	18	1	15	5	19	6
(B) Philosophy	71	12	63	17	55	18	36	13	49	12
(M) Professional Writing	40	23	42	17	41	13	42	12	35	18
(B) Psychology	1256	393	1336	376	1445	392	1441	381	1419	421
(B) Religious Studies	17	2	12	9	6	7	6	4	8	2

Notes:

1. BA English – Mirroring national trends, enrollment has dipped, but the major graduates students at the same rate and serves all undergraduates through Gen Ed. The action plan includes the following steps: (1) Curriculum revision: By January 2025. the department will submit a revised English major curriculum for review at the institutional level. (2) Professionalization opportunities in the major: The department will offer at least three events each year dedicated to professionalization opportunities in the major. The department will deploy exit surveys to evaluate effectiveness and accessibility. (3) Pre-tenure mentoring and clarification of tenure and promotion review requirements: The department will assess through third-year and tenure review materials. (4) Diversity in hiring practices: The department will continue to use best practices in diverse and inclusive hiring strategies as outlined by the university. (5) Building community: The department will host at least four Towson Reading Series events.
2. BA/BS Geography & Environmental Planning/Land Surveying; MS Geography and Environmental Planning – To attract students, the creation of certificates in geospatial technologies/GIS at the graduate and undergraduate level will be developed. The program will assess greater focus on environmental justice with a climate change component and also focus on the social science skills needed for policy analysis rather than natural science. At the least, this proposal will be a roadmap for future curriculum development and faculty hires. Faculty will continue to develop an urban geography focus. The last two faculty hires have an urban geography focus and enrollment in fall 2023 in the Introduction to Urban Planning course is

double the average enrollment over the last six years. Geography departments across the country are experimenting with name changes because students often cannot discern the course content from the course title. The external reviewer also suggested creating generic courses that multiple instructors can use to teach slightly different topics. For example, urban social geography could encompass housing issues, urban climate policy, race and gender in the city, security in the city, all under one course title without the need to create multiple specialized courses that only one faculty can teach. The program will work with the college building coordinator to create a GIS lab and a space for students. The geography computer lab is used for teaching. A small separate lab would allow for students and faculty to work on GIS projects without interrupting teaching.

3. MA Global Humanities – the program launched in 2018 and despite the pandemic has grown in enrollment. In AY2022-2023, 6 students earned the MA, which is not reflected in the section III.B Degrees Awarded table. Thus, with the most recent data available, this program does not qualify as a low degree productivity program. The pandemic impacted student progression in the program, as evidenced by the “bump” in the number of degrees awarded in the most recent academic year. The program is also adding an Advisory Board to follow up on continuous improvement steps
4. MS Human Resource Development – The program earned the ‘Academic Alignment Badge’ from the Society for Human Resource Management, which gives further credibility to the program. The hybrid format of the program gives needed flexibility to students. To address the recommendation related to increasing enrollments to pre-pandemic levels, the program director and faculty will continue to work with university partners in marketing, graduate recruitment, and other supporting units to maintain and enhance awareness about the HRD program in the Greater Baltimore region.
5. MS (MSOT), DS Occupational Therapy (post professional), Entry Level Occupational Therapy Doctorate (ELOTD), MS and DSc (now PhD) Occupational Therapy - The most recent on-site accreditation visit by the Accreditation Council for Occupational Therapy Education (ACOTE) for the MSOT and ELOTD programs occurred in AY 2021-22. The programs were found to be in compliance with all standards. The ELOTD program was granted a seven-year initial accreditation, the longest any new program can receive; the MSOT received a ten-year reaccreditation. Each year, programs must submit program evaluation reports to ACOTE to demonstrate ongoing analysis of program goals. Aligned with Towson’s aim to achieve R-2 status, the action plan based on evaluator and self-study recommendations calls for elevating the scholarly endeavors and products of students within and across the curriculum. The expectations of scholarship and leadership distinguish this route to entry-level practice. Elevating the scholarship experience and outcomes will occur through multiple mechanisms. The program will build upon student publication of capstone projects through ongoing mentoring for dissemination as a structured expectation, including a re-visioning of the internal dissemination process and the development of an online repository of capstone projects. Finally, the ELOTD program has initiated a new peer review process for student capstone project proposals to encourage rigor at all phases. The action plan also calls for cultivating a strong doctoral student body via marketing and recruitment strategy. There is ongoing work to differentiate the MSOT and the ELOTD programs as the dual entry point for practice, including the addition of language that explicitly delineates the programs by length, curriculum, and professional trajectory.

   The focus for the Ph.D. in Occupational Science (formerly Sc.D.) for the past seven years has been to address curricular needs to strengthen the program and to differentiate it from the newly established Post-Professional Occupational Therapy Doctoral (PPOTD) program, which is a clinical doctorate. The number of students that expressed interest in, applied to, and were accepted into the Ph.D. program has declined over the past seven years. Reasons for this decline include the addition of OTOS’ online, clinical PPOTD program, which can be completed in two years, increased post-professional and entry-level doctorate programs across the country, and the impacts of the global pandemic. Based on the 2016 external review, as well as national trends and student and faculty feedback, the Ph.D. program modified the admission criteria and comprehensive assessment process and developed a three-paper dissertation alternative. In addition, a directed readings in occupational science course and a discipline-specific mixed methods data analysis course were developed and delivered. With the pandemic requiring more faculty to develop skill competence in online teaching, more electives were made available for those students enrolled online. Faculty, administration, and students all voiced the struggle with

balancing engagement of online students with the flexibility that online programming offers. This will need to be an ongoing consideration to ensure that OTOS is flexible and responsive to the needs of students. Considerations could include regular check-ins with students, an Advisory Board, optional peer meeting groups, etc.
Overall, these are strong programs, state leaders, with a focus on expanding research in some programs while maintaining options for professional practice advancement.

6. BA Philosophy - The internal self-study and external review process identified strengths in high-quality teaching and a diverse range of philosophical perspectives. To further enhance the program, a targeted action plan has been devised, incorporating recommendations from the external review, which includes: intensified recruitment through a dedicated committee to track enrollment and propose effective strategies; a new track in philosophy and social justice will diversify offerings; funding opportunities, including the NEH Humanities Connections Grant, will be explored; a committee will address diversity and equity, proposing curriculum changes and inclusive teaching methodologies; virtual teaching changes will be utilized for student exchanges and collaborations with overseas universities; an alumni outreach program will foster community through event calendars, email lists, and newsletters; advising improvements will be made based on a survey of current majors.
7. MA Professional Writing – The program has several tracks, including creative writing and non-profit writing, with award-winning faculty who publish in varied venues. The program revised its curriculum and published a two-year schedule, which addressed questions about predictability of offerings. Greater marketing and promotion of the program is a goal. Program goals and mission are clear to all stakeholders.
8. BA/BS Psychology – The action plan supporting internal and external findings for this large major include hiring additional FT faculty to allow for more faculty research and fewer adjuncts; use diversity-centered hiring that emphasize inclusive teaching practices; develop a more robust faculty mentoring program; and advocate for more graduate assistants; explore full-time professional advisor; develop peer-support program to supplement team approach to advising; consider web-based advising; implement a comprehensive assessment of curriculum; do a needs assessment at The TUNE campus; provide professional development activities and resources for faculty to enhance diversity and inclusion in their teaching and research, such as hosting speakers and/or trainings for faculty on topics related to inclusive teaching and research practices; and develop a faculty climate survey to assess DEIJ culture within the department.
9. BA Religious Studies - The program will actively support the student-led World Religions Roundtable and help them organize social events for majors, minors, and other interested students, including film screenings and guest speakers. The program will develop new thematic courses, like “Religion and Baltimore,” which will serve as a hub to explore a common research project and have a significant digital humanities component. The program will also commit to tenured and tenure-track faculty teaching lower-level courses and to offering more regular TSEMs, as these are primary gateways into the major. Faculty will develop a marketing plan to help spread information about the program more effectively throughout the university. This will include hiring a student to create and maintain a social media presence. Faculty will create concentrations and certifications within the major (such as Religion and Ethics) to help create more focused paths for students through the degree. Faculty will also develop clear policies about how to count topically relevant courses from other departments towards the degree, so that students can complete the major efficiently. Faculty will develop a yearly open house to promote the program, promote internship opportunities, and encourage double majoring, highlighting how a degree in Religious Studies can complement popular majors like health sciences and business. This will be done in conjunction with the Philosophy (student) Recruitment Committee, making it a joint Philosophy-Religious Studies committee.

University of Baltimore										
Program Title (Degree)	2018		2019		2020		2021		2022	
	Enrolled	Degrees	Enrolled	Degrees	Enrolled	Degrees	Enrolled	Degrees	Enrolled	Degrees
(D) information and Interaction Design	13	2	14	1	17	3	16	1	14	1
(B) Philosophy, Law, and Ethics	20	6	29	7	36	11	25	8	29	9

Notes:

1. DSc Information and Interaction Design – The external reviewers praised the program but recommended more interdisciplinary connections across campus and more options for doctoral student support. The D.Sc. IID program will convene several meetings of the program faculty during AY23-24 to explore potential opportunities for collaboration with law, psychology, gaming, and cybersecurity, as well as with the undergraduate Applied Information Technology program. The program also has a new proposal for graduate students related to teaching and research options.
2. BA Philosophy, Law, and Ethics – External reviewers from JHU, Richmond, and Carnegie-Mellon all praised the strength of this interdisciplinary program, which is grounded in philosophy and has significant elements of civic engagement and community-based ethics. Graduates have done well in JD programs after completing this degree, but exit interviews and further follow-up with graduates is recommended for marketing and continuous improvement. Other recommendations include the addition of a faculty line, an explicit leadership element of the program, possibly adding a sustainability element, and the development of internships tied explicitly to the degree.

University of Maryland, Baltimore										
Program Title (Degree)	2018		2019		2020		2021		2022	
	Enrolled	Degrees	Enrolled	Degrees	Enrolled	Degrees	Enrolled	Degrees	Enrolled	Degrees
(M) Pharmaceutical Health Services Research	3	0	2	2	1	1	5	1	3	0
(D) Pharmaceutical Health Services Research	26	4	28	4	27	1	28	4	28	7

Notes:

1. MS Pharmaceutical Health Services Research, PhD Pharmaceutical Health Services Research – This MS/PhD program is known nationally for producing highly qualified graduates who are well published. The curriculum committee will review recommendations to refine curricular tracks, particularly in light of recent faculty changes. A program specialist has been identified who can have 0.8 FTE dedicated to assist faculty with the program. It should be noted that while the master's program has a low number of graduates, the typical student is seeking the PhD rather than the MS.

University of Maryland, Baltimore County										
Program Title (Degree)	2018		2019		2020		2021		2022	
	Enrolled	Degrees	Enrolled	Degrees	Enrolled	Degrees	Enrolled	Degrees	Enrolled	Degrees
(B) Media and Communication Studies	261	83	258	64	260	68	230	76	207	75
(UDC) Media and Communications Studies	6	2	6	1	4	2	7	3	10	1
(BFA) Design	80	27	66	32	54	28	49	15	73	25
(B) Visual Arts	178	25	196	25	254	26	274	27	244	41
(BFA) Visual Arts	142	39	140	36	123	30	134	32	137	30
(M) Intermedia and Digital Arts	16	7	16	5	16	4	15	7	14	5

Notes:

1. BA, UDC Media and Communication Studies – Reviewers praised the program, the largest humanities major at UMBC. But rapid growth brought some resource challenges to be addressed. Recommendations included re-evaluating the curriculum, focusing on integrating multimedia storytelling and analysis across method and production courses, and review the capstone experience to ensure that it continues to meet the needs and interests of students and faculty. School and program faculty will explore developing a laptop-based virtual lab that facilitates student access to primary software licenses and, as resources allow, work to hire another faculty member.
2. BFA Design, BA, BFA Visual Arts, Intermedia and Digital Arts – In response to the team visit recommendations from the National Association of Schools of Art and Design, the Department will work with CAHSS to create a professional student gallery space. The ventilation project in the Print Media facility will be completed. The Department and College will identify a secure space for Graphic Design students to work outside of scheduled class time. Visual Arts will work to convert three-credit studio courses from 220 minutes to 300 minutes per week. The Department and College will reduce the Undergraduate Program Coordinator's caseload and responsibilities and reduce general advising duties assigned to faculty. VARTs will work with the administration to determine if its classroom spaces are scheduled, used, and equipped to meet VARTs' curricular needs based on current enrollment figures. The reliance on adjunct faculty will be reduced to maintain curricular consistency across multi-section courses, maintain the Department's cultural mission, and reduce the adjunct mentoring and recruitment service load on full-time faculty. The Department will monitor the student-to-faculty ratios so that the Department meets the recommended ratio for studio classes. Student access to existing studio classrooms with specialized equipment will be increased outside of scheduled class times.

Degree Codes: (B) Bachelor; (M) Master; (D) Doctorate; (BFA) Bachelor of Fine Arts; (BTS) Bachelor of Technical Studies; (BPS) Bachelor of Professional Studies; (UDC) Upper Division Certificate; (PBC) Post-Baccalaureate Certificate; (MAT) Master of Arts in Teaching; Master of Professional Studies (MPS); (PMC) Post-Master Certificate; (CAS) Certificate in Advanced Study.

University of Maryland, College Park										
Program Title (Degree)	2018		2019		2020		2021		2022	
	Enrolled	Degrees	Enrolled	Degrees	Enrolled	Degrees	Enrolled	Degrees	Enrolled	Degrees
(B) Computer Science	3404	507	3380	656	3238	735	3258	797	3329	943
(M) (D) Computer Science	298	54	382	67	398	93	437	118	437	101
(C) Data Science	13	-	1	7	22	4	37	7	53	40
(BA) Economics	869	390	770	351	705	327	628	294	528	245
(BS) Economics	398	119	372	115	363	100	328	95	278	107
(M) Applied Economics	48	18	36	16	122	54	167	29	149	57
(M) (D) Economics	115	31	108	26	112	23	115	34	110	33
(C) Economic Analysis	3	1	1	2	1	8	1	16	-	7
(B) Mechanical Engineering – College Park & USMSM	1159	339	1185	306	1224	325	1205	319	1124	352
(B) Mechanical Engineering - Frostburg	19	11	19	6	20	11	24	11	29	8
(M)(D) Mechanical Engineering	217	54	203	71	195	46	183	39	195	98
(M) (D) Reliability Engineering	40	12	39	10	34	9	36	6	31	13
(M) Historic Preservation	25	4	21	8	21	9	25	7	24	9
(PBC) Historic Preservation	-	-	-	3	-	-	-	1	-	1
(B) Information Science – College Park	709	51	937	208	1130	310	186	361	1358	391
(B) Information Science – Shady Grove	22	n/a	58	n/a	86	n/a	86	2	99	6
(B) Technology & Information Design	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	11	n/a
(M) Information Management	70	51	54	34	46	27	49	24	71	18
(M) Human Computer Interaction	62	17	70	26	78	30	122	28	141	42
(M) Library and Information Science	223	83	262	59	278	86	209	103	301	105
(D) Information Studies	50	7	53	4	67	5	74	8	85	5
(M) Game Entertainment & Media analytics	n/a	n/a	n/a	n/a	n/a	n/a	2	n/a	6	n/a
(C) School Librarianship	18	-	9	7	5	4	3	2	-	4
(C) Youth Experience	2	-	-	8	-	1	-	-	-	--
(B) Journalism	486	141	495	119	469	132	469	109	451	142
(MJ) Journalism	28	12	51	6	51	19	50	30	50	18

Degree Codes: (B) Bachelor; (M) Master; (D) Doctorate; (BFA) Bachelor of Fine Arts; (BTS) Bachelor of Technical Studies; (BPS) Bachelor of Professional Studies; (UDC) Upper Division Certificate; (PBC) Post-Baccalaureate Certificate; (MAT) Master of Arts in Teaching; Master of Professional Studies (MPS); (PMC) Post-Master Certificate; (CAS) Certificate in Advanced Study.

(M) Journalism	8	-	7	2	5	2	6	-	3	2
(D) Journalism Studies	25	7	25	3	26	3	26	3	26	1
(M) Data Journalism * (New Program)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2	-
(C) Multimedia Journalism	12	7	11	6	11	3	7	5	9	2
(M) (D) Neuroscience & Cognitive Science	45	10	52	3	51	8	50	8	49	13
(BS) Psychology	67	n/a	344	120	483	148	573	148	514	151
(BA) Psychology	945	293	791	168	710	317	787	329	836	379
(BS) Neuroscience: Behavioral & Cognitive Track	n/a	--	n/a	-	6	-	15	-	16	7
(M) (D) Psychology	74	20	71	27	74	21	66	18	71	14
(M) Industrial/Organizational Psychology	49	26	50	26	83	22	74	52	65	50
(M) Clinical Psychological Science	66	28	63	34	60	29	58	33	60	27
(M) Real Estate Development	62	25	52	22	48	19	41	16	45	11
(C) Professional Studies	9	2	2	7	1	2	5	-	2	2

Notes:

1. BS, MS, PhD Computer Science, PBC Data Science - The review team noted the department's world-class research and outstanding academic programs at both undergraduate and graduate levels. The programs have had rapid and even explosive growth, which has strained resources. The team recommended strategic planning to create a stronger shared vision and consensus-building approach. Faculty recruitment continues, which was challenging during pandemic; recruitment will also take advantage of campus-level diversity initiatives. The university is developing an action plan to control the growth of the undergraduate population, but any strategy will require years to take effect. The department is also working with community college partners to strengthen pathways into the major for transfer students.
2. BA/BS Economics, MS Applied Economics, MS, PhD Economics, PBC Economic Analysis - The external team noted that the department has been consistently ranked among the top 20-25 departments nationally. Next steps include the development of a multi-year hiring plan that the department, college, and central administration can support. This may include the possibility of joint appointments with other units to diversify research opportunities. The department has developed a vision statement that has been adopted by the faculty that includes hiring strategies, a rightsizing of the PhD program, growth of the master's program, and regular surveys of faculty, staff, and students that can contribute to continuous review.
3. BS, MS, PhD Mechanical Engineering, MS, PhD Reliability Engineering - The department is acquiring new research space with the opening of Zupnick Hall. It will continue to develop partnerships with industry, which provides opportunities for both graduate and undergraduate research. The department is working on a plan to provide more attractive stipend packages to graduate students as a means of recruiting top students. The department is also continuing to work on diversifying the student body, as well as the faculty through initiatives at the campus level.
4. Master of Historic Preservation, PBC Historic Preservation – The program is undergoing a leadership change; the faculty will then review recommendations to have more advanced training in tolls like GIS, assess the distinction of the tracks, and look to enhance urban and regional planning, as well as expanding recruitment in DC.
5. BS Information Science (College Park, Shady Grove), BA Technology & Information Design, MS Information Management, MS Human Computer Interaction, MS Library and Information Science, MPS Game, Entertainment, & Media Analytics, PhD Information Studies, Grad Cert in Professional

Studies (GCPS) - School Librarianship, GCPS - Youth Experience - The team praised the School of Information Sciences in a number of areas: its ability to attract a diverse student body, its focus on the societal aspects of technology, its excellent placement of graduates, and its creative and outward-facing curricula. The external team focused on making recommendations on larger structural issues such as space, governance, and organization. The Provost's office is working closely with the Dean on a comprehensive space place, including a major renovation to Hornbake Library, which is the primary home of the School of Information Sciences. The School's faculty continues to innovate with its curricula as the field changes rapidly and to expand its research and programming in response to societal and community needs and interests.

6. BA, MJ, MA, Journalism, PhD Journalism Studies, PBC Multimedia Journalism - The 2022 review team comments included: "Merrill College is strong in many ways. Strong leadership brought the unit greater prominence, financial stability, and opportunities to grow. The professional world recognizes the quality of the graduates and seeks to hire them. The College came through the pandemic well with few mentions of lasting impact during the site team visit. The professional master's program also benefits from strong leadership." The College has a new dean as of July 2023, after the prior dean completed 11 years of excellent leadership. The new dean considers growth of the undergraduate program to be an important goal, as well as continuing to enhance their strengths in data journalism and investigative reporting. The College also plans to work on strengthening its research portfolio, which will provide more opportunities for doctoral students. Note that the MA in Journalism is intentionally small and for professional journalists who wish to transition to research or teaching.
7. MS, PhD Neuroscience & Cognitive Science – This is a multi-college collaborative doctoral program administered by the College of Behavioral and Social Sciences, with participation by 8 academic units. Training is offered in 7 research areas: Cellular & Molecular, Cognition & Emotion, Computational Modeling & Theory, Development & Aging, Disorders & Treatment, Language & Speech, and Sensory & Motor Systems. Reviewers praised the collegiality of faculty. Cognitive Neuroscience as a particular strength. They encourage more aggressive pursuit of NIH training grants to support graduate students. The research animal care team is in the process of modernizing training and creating a more centralized approach to care, which will support the research enterprise. The Brain and Behavior Institute will have new leadership this fall because of the departure of the current Executive Director as of August 2023. The engaged colleges are in the process of considering the strategic direction of BBI, and this presents an opportunity to strengthen the ties between NACS and BBI.
8. BA/BS Psychology, BS Neuroscience: Behavioral & Cognitive Track, MS, PhD Psychology, MPS Industrial/Organizational Psychology, MPS Clinical Psychological Science - Minimum stipends for graduate assistants have been increased campus-wide. The department will continue to enhance opportunities for professional development of its non-tenure-track faculty and develop onboarding processes for all categories of department constituents to enhance structure and cohesion in the academic programs. The large growth in undergraduate majors, which is a national trend, is managed through a limited enrollment process.
9. Master of Real Estate Development, PBC Real Estate Development – The reviewers noted the affordable housing emphasis as one of several strengths. As the undergraduate program develops, the RDEV leadership and dean will continue to shape a comprehensive vision for both the undergraduate and graduate curricula and will review and implement the recommendations of the external review team as resources allow. The review team had several very specific recommendations that will help promote continuous program improvement as well as its visibility to the regional market.

University of Maryland Eastern Shore										
Program Title (Degree)	2018		2019		2020		2021		2022	
	Enrolled	Degrees	Enrolled	Degrees	Enrolled	Degrees	Enrolled	Degrees	Enrolled	Degrees
(UDC) (PBC) Special Education	0	-	0	-	6	0	6	6	3	0
(M) Special Education, Education	3	3	4	0	3	3	2	1	5	2
(B) Exercise Science	188	46	164	30	161	35	133	32	123	26
(B) Human Ecology [new MS in 2023]	148	30	135	29	111	36	99	21	82	17
(B) Aviation Science	61	11	72	11	69	16	62	10	79	9
(B) English	77	17	53	26	42	17	31	18	25	8
(B) Hospitality and Tourism Management	110	44	91	22	73	27	53	25	48	17
(D) Pharmacy	61	51	61	62	48	47	31	28	49	44
(B) Rehabilitation Psychology	72	12	67	15	67	13	73	10	79	8
(B) Rehabilitation Services	82	19	57	32	34	24	35	19	32	9
(M) Rehabilitation Counseling	40	10	30	12	33	11	37	6	37	11

Notes:

1. UDC, PBC Special Education; MA Special Education, Education; the BS was also part of departmental review – the two 18-credit certificates share courses with the BS and MS; the BS and MS lead to initial certification, but the certificates do not. Enrollment in the graduate program and related certificates is low, and the action plan addresses making the delivery options more flexible for working professionals. The curriculum should be updated to better balance relevant theory and practice which may include structured teaching, teaching models of inclusivity, co-teaching strategies, teaching strategies specific to disability and culturally responsive and trauma-informed teaching. The reviewers recommended that the certificate programs should be distinctly different from courses which lead to a bachelor's or master's degree. The certificates should be complementary. Teacher recruitment and retention are taxing when nationally the teaching pool is diminishing, and interest is dwindling. Creating intentional opportunities to recruit formally and informally will be necessary to attract more students.
1. BS Exercise Science - The strengths of the program include having supportive upper administration aligned in the health sciences, dedicated faculty and staff, curriculum offerings, and articulation agreements to increase the incoming student pipeline. Challenges of the program include enrollment/retention of students, infrastructure support, and the development of online classes. Future directions for improvement include the movement of the program into the new pharmacy and health professions building to increase infrastructure support, increase in budget allocation, and implementing online coursework to attract potential students.
2. BS Human Ecology – The department is accredited through the American Association of Family and Consumer Sciences. The BS was reviewed, and there is a newly approved MS in Human Ecology. The bachelor's has several concentrations: Child Development, Family and Consumer Sciences, Family and Consumer Sciences Education, Fashion Merchandising, Nutrition and Dietetics, and a Dietetic Internship Program. The Accreditation Council for Education in Nutrition and Dietetics (ACEND) granted the Didactic Program in Dietetics and the Dietic Internship full accreditation. Actions

include developing an advisory council, expanding community college pipelines and partnerships, working on retention in some tracks, building out the alumni network, update labs, and build out the assessment plan for the new master's.

3. BS Aviation Science – The recommendations of the two external reviews are categorized into the areas of Accreditation, Faculty Recruitment and Retention, Strategic Planning, Safety Culture and Program, and Industry Collaboration. In each of these areas, the Department has defined specific actions in response to the recommendations. It will pursue Aviation Accreditation Board International accreditation and appoint a Safety Culture and Program officer.
4. BA English – The program's self-study also included a new program in Digital Media, which has launched with strong enrollment and pulled some majors away. The department also serves English Education and Foreign Languages. The action plan includes a retreat; curriculum revision based on wide stakeholder input; partnering with STEM programs on campus, English programs at other institutions, and local high schools to build pipelines; build alum networks. External reviewers noted it would be beneficial to co-locate the two groups from the department.
5. BS Hospitality and Tourism Management – This program is accredited through the Accreditation Commission for Programs in Hospitality Administration (ACPHA). The action plan includes several steps tied to ACPHA standards: reestablish an advisory board; implement a full assessment plan using vertical rubrics from ACPHA tied to each program track; create a 5-year strategic plan; shape a formal shared governance structure; recruit for key positions; expand alumni and experiential learning engagement opportunities; and renovate elements of the Henson Center.
6. PharmD – Note the delayed graduations account for high number in 2019. The UMES School of Pharmacy completed a comprehensive self-study from 2018-2019, which culminated in an on-site evaluation by a team from the Accreditation Council for Pharmacy Education (ACPE) on April 9-11, 2019. Based on the recommendations from the site visit team, the ACPE Board of Directors approved the continued accreditation of the Doctor of Pharmacy program for a full, eight-year cycle, extending through June 30, 2027. Actions are in place to address recommendations related to inter-professional education and to pre-advanced pharmacy practical experiences.
7. BS Rehabilitation Services, BS Rehabilitation Psychology, MS Rehabilitation Counseling – The Dept. of Rehabilitation is in the School of Pharmacy and Health Professions, with steady enrollment in 2 of 3 programs; a program name change is under consideration. Faculty have a 4-4 teaching load; in various ways more resources are needed to enhance research. Student preparation post Covid has challenges, so work with Starfish on retention is underway. The 60-credit Master's in Rehabilitation Counseling qualifies graduates to seek national certification to become a Certified Rehabilitation Counselor (CRCC) and apply to the Maryland Board of Professional Counselors and Therapists to become a Licensed Professional Counselor (LPC).

University of Maryland Global Campus										
Program Title (Degree)	2018		2019		2020		2021		2022	
	Enrolled	Degrees	Enrolled	Degrees	Enrolled	Degrees	Enrolled	Degrees	Enrolled	Degrees
(B) Cybersecurity Management and Policy	1861	367	1559	348	1492	322	1280	292	1219	277
(M) Instructional Technology	140	44	145	42	133	38	110	41	84	26
(PBC) Instructional Technology	13	9	8	11	13	9	3	6	2	6
(M) Learning Design and Technology	87	26	93	48	75	40	97	54	61	40
(PBC) Learning Design and Technology	16	8	22	16	25	23	16	13	19	14
(M) Secondary Teaching	109	36	88	37	62	28	65	28	71	26

Notes:

1. BS Cybersecurity Management and Policy – External reviewers praised the continued pioneering in online cyber education. Recommendations suggested the curriculum may not need to be tied to so many certifications, which graduates may not need for employment. The action plan includes these steps: Increase retention and graduation rates by 10% by first identifying the reasons for the declines, and then, working with instructional designers make changes to the courses within the program; map program and course goals to applicable standards, integrate such standards within the curriculum, and model graded assignments and projects on tasks being performed in the workplace; strengthen and add content in selected courses by modeling graded activities on actual cyber-related tasks being performed in the workplace.
2. MEd, PBC Instructional Technology – The certificate is stackable within the MEd degree. (Completions exceeding enrollment could be a function of when the data are pulled for each.) The program director will focus on curricular changes and incorporation of local stakeholders. First, the program will continue with course redesign and the integration and alignment with the ISTE Standards for Educators and ISTE Standards for Coaches. Second, the program will conduct a feasibility study of the potential courses that could be aligned with the National Board Certification Standards. The initial step toward course work applying towards National Board Certification is highlighted in the Blueprint for Maryland's Future. Any potential changes to courses can be integrated with current redesign efforts. Finally, the program director will work on developing deeper relationships with district educational leadership. Increased pathways to leadership offer potential for partnership/cohort opportunities as well as promoting UMGC as an educational technology opportunity in Maryland.
3. MS, PBC Learning Design and Technology - The certificate is stackable within the MS degree. the program will focus on three areas: course topics, resources and integration of professional authorware. First, the external review highlighted the need to review and update course topics such as in demand soft skills and "special topics" options for emerging technologies such as Artificial Intelligence and their potential impact on instructional design. The program director, in conjunction with UMGC's Integrative Learning Design (ILD) will explore opportunities to integrate these options in the curriculum. Second, the program director will undertake a deep dive into the currency and variation of course resources. The self-study indicated a drop in course completion rates may be due to course materials. Reviewers pointed out a need for updating, as well as a heavy reliance on text-based resources. The program will identify opportunities to update and upgrade course resources.

4. MAT Secondary Teaching - The MAT program will implement the following recommendations: (1) Enhancing the infrastructure and capacity of the program to support increased recruitment and enrollment goals. Specifically, more administrative support is needed to review applications/transcripts and provide student-centered advising and facilitate field experiences. (2) Creating separate program tracks for conditionally certified and pre-service teachers to address their distinct needs. The university should invest resources into bringing together adjunct faculty and other stakeholders to curate the differentiated tracks. (3) Offering a broader range of certification options, such as Special Education and Health Education. The university should support these program development activities by providing funding for subject matter experts and curriculum development. (4) Partnering with other stakeholders, IHEs to support new initiatives. The university can support these collaborations by enabling the program director to have dedicated time to cultivate and manage stakeholder relationships and initiatives.

University System of Maryland

Board of Regents

Summary of Item for Action, Information, or Discussion

TOPIC: New Programs 5-Year Enrollment Reviews, Fall 2019 – Fall 2023

COMMITTEE: Education Policy and Student Life and Safety

DATE OF COMMITTEE MEETING: April 12, 2024

SUMMARY: As part of the ongoing review process of academic programs, the attached data have been updated with the Fall 2023 enrollments of programs continuing in the five-year review period. The information provides the Committee with the actual enrollments in new programs approved since Fall 2019, as well as the projections submitted with the initial proposal. It is important to note that not all programs are implemented in the year they are approved. Depending on the approval dates from the Board of Regents and MHEC, recruitment and admission to the program may not begin until the next academic year. In addition, admission to (and so enrollment in) an undergraduate program may not occur until the students have completed the required lower-division General Education or core courses, with the result that enrollments are reported two or even three years after initial approval. With those caveats in mind, the enrollment data reflect the relative accuracy for the projected enrollment submitted with the program proposal and provide an opportunity to judge the long-term viability of a new program prior to its first seven-year periodic program review. For this period, it should also be noted that programs were widely impacted by the Covid 19 pandemic.

ALTERNATIVE(S): This report is for information only.

FISCAL IMPACT: This report is for information only.

CHANCELLOR'S RECOMMENDATION: This report is for information only.

COMMITTEE RECOMMENDATION:		DATE:
BOARD ACTION:		DATE:
SUBMITTED BY: Alison Wrynn	301-445-1992	awrynn@usmd.edu
Ellen Herbst	301-445-1923	eherbst@usmd.edu

NEW PROGRAM 5-YEAR ENROLLMENT REVIEW
FALL 2019 – FALL 2023

New academic program enrollments are reviewed annually for a period of five years. The Fall 2019 – Fall 2023 review comprises enrollment data for 87 approved new academic programs. The format for the review is standardized and includes the projected and actual enrollments for each program.

The projected enrollments are taken from the program proposals approved by the Board of Regents and MHEC, and the actual enrollments are those achieved and reported each year by the programs. Attention in the review is given to the relationship between the projected and the yearly actual program enrollments.

Programs that began reviews in Fall 2019, Fall 2020, and Fall 2021 reflect actual enrollments for the third year of the programs and beyond. The most recent programs in review, with Fall 2022 and Fall 2023 starts, have varying degrees of actual enrollments as they progress through the first and second years of implementation. It is not unusual for programs to begin enrolling in the academic year following approval. Undergraduate programs may begin but not have enrollments recorded until the point when students can declare the major after early core requirements are completed. Also, these enrollment figures capture only students' primary major.

The subsequent sections will present the number of degrees offered and the enrollment performance of the new programs. Note that combined degrees may be created internally without requesting a new degree. This report records only those combinations brought forward together as (or with) new degree programs.

Number of Degrees Offered in the New Programs

Degrees	**No. of Degrees**
Bachelor's (35 are BS)	43
Bachelor's / Master's (BS/MS)	3
Master's (26 are MS)	34
Doctorate	7
Total	**87**

New Program Enrollment Review Fall 2019- Fall 2022

Inst.	HEGIS	Program Name	Degree Level	Approved	Enrollments									
					Fall 2019		Fall 2020		Fall 2021		Fall 2022		Fall 2023	
					Projected	Actual	Projected	Actual	Projected	Actual	Projected	Actual	Projected	Actual
BSU	190500	Chemistry [1]	BS	6/21/2019	13	0	25	6	38	7	50	14	63	27
FSU	083505	Exercise and Sports Science / Athletic Training [2]	BS / MS	2/22/2019	10	41	10	12	10	1	10	0	10	0
FSU	083506	Athletic Training	MS	2/22/2019	2	0	23	0	35	9	38	14	41	10
TU	100801	Dance Education [3]	MA	6/21/2019	10	0	20	0	20	6	20	10	10	7
TU	100402	Music Pedagogy [4]	MM	6/21/2019	3	0	3	2	4	3	4	2	5	2
TU	081100	Gifted and Creative Education [5]	M.Ed	2/22/2019	10	0	20	17	30	19	30	19	30	17
UBalt	079900	Cybersecurity Leadership [6]	MS	12/14/2018	10	0	30	2	40	2	45	3	55	5
UMB	129960	Accelerated Health Science / Health Science with AOC in Physician Assistant [7]	BS / MS	12/14/2018	73	117	111	111	76	113	76	104	76	119
UMB	121301	Clinical Dental Hygiene Leader [8]	BS / MS	12/14/2018	4	0	10	0	12	9	12	11	12	7
UMB	019900	Medical Cannabis Science and Therapeutics [9]	MS	6/21/2019	26	148	37	384	42	451	21	395	53	239
UMB	129903	Health Professions Education [10]	PhD	2/22/2019	6	0	12	11	18	18	18	19	18	23
UMBC	080400	Middle Grades STEM Education [11]	BS	2/22/2019	15	0	34	0	49	2	60	3	65	4
UMCP	150902	Philosophy, Politics, and Economics [12]	BA	2/22/2019	25	3	50	56	90	106	110	142	110	167
UMCP	079900	Cyber-Physical Systems Engineering [13]	BS	2/22/2019	25	0	50	6	100	10	125	7	150	10
UMCP	200900	Human Development [14]	BS	2/22/2019	40	0	80	22	125	38	125	66	125	80
UMCP	042500	Neuroscience [15]	BS	2/22/2019	155	0	360	94	520	203	520	285	520	357
UMCP	220401	Applied Economics [16]	MS	4/19/2019	15	2	15	122	15	167	15	149	15	105
UMCP	220601	Geospatial Information Sciences [17]	MS	4/19/2019	40	46	40	73	40	100	40	89	40	76
UMCP	220602	Geospatial Intelligence [18]	MS	4/19/2019	20	10	26	24	37	29	45	37	45	25

Note: All enrollments are the students' primary major as reported in the MHEC EIS files. Administrative coding changes at campuses may lag actual program enrollment in initial years.

[1] The BSU B.S. in Chemistry began in 2020 and is expected to meet projected enrollment.

[2] The combined FSU B.S./M.S. in Exercise and Sports Science/Athletic Training includes graduate students, and the enrollment count reported in the table was based only on the count of students included in the campus report to MHEC for the approved (UG) HEGIS Code. (New requirements call for a master's.)
The FSU M.S. in Athletic Training first cohort was in 2021. A new chair was hired in 2023.

[3] The TU M.A. in Dance Education was approved by MHEC in June 2019, secured accreditor approval in Sept. 2020, and opened for admissions in November 2020 to commence in spring 2021.

[4] The TU M.M. in Music Pedagogy opened for admissions in February 2020 to commence fall 2020.

[5] The TU M.Ed. in Gifted and Creative Education opened for admissions in spring 2019 to commence in spring 2020.

[6] The UB M.S. in Cybersecurity Management launched later than anticipated because of program director turnover and further program developments resulting in new out-year projections of 30.

[7] UMB the BS/MS Accelerated Health Science/AOC in Physician Assistant begins in Fall of 2020 at AACC. Current enrollment in the PA program was 78 students in Fall 2019. (Without the

[8] UMB the BS/MS Clinical Dental Hygiene Leader program begins in Fall 2020 and is expected to meet projected enrollment.

[9] UMB the MS Medical Cannabis Science and Therapeutics program has substaintially exceeded projected enrollments and will continue to do so into the foreseeable future.

(continued)

[10] UMB the PhD Health Professions Education begins in Fall 2020 and is expected to meet projected enrollment.

[11] The UMBC BS in Middle Grades STEM Education was approved by MSDE in December 2020 and could not launch until Fall 2021. Community college students are a primary feeder, and future projections are revised to 30 with 7-10 completers per year.

[12] UMCP BA in Philosophy, Politics, and Economics: The Fall 2019 primary major count was 3, Count of all majors is 6 (includes double majors). The enrollment count reported in the table was based only on the count of students included in the campus's MHEC EIS with the MHEC approved HEGIS Code.

[13] The UMCP B.S. in Embedded Systems started fall 2020 at Shady Grove with a challenging start due to COVID. The program name changed to Cyber-Physical Systems Engineering.

[14] The UMCP B.S. in Human Development started fall 2020.

[15] The UMCP B.S. in Neuroscience started fall 2020 and is experiencing continued student transition to this new program from the oversubscribed Neurobiology track in Psychology (across colleges).

[16] UMCP MS in Applied Economics: This is a transition in credential from MPS to MS. The MPS/MS combined Fall 2019 enrollment was 89 (54 at the DC location and 35 on campus). The enrollment count reported in the table was based only on the count of students included in the campus's MHEC EIS with the MHEC approved HEGIS Code.

[17] UMCP MS in Geospatial Information Sciences: This is a transition in credential from MPS to MS. The MPS/MS combined Fall 2019 enrollment was 46 as noted. The enrollment count reported in the table was based only on the count of students included in the campus's MHEC EIS with the MHEC approved HEGIS Code.

[18] UMCP MS in Geospatial Intelligence: This is a transition in credential from MPS to MS. The MPS/MS combined Fall 2019 enrollment was 18. The enrollment count reported in the table was based only on the count of students included in the campus's MHEC EIS with the MHEC approved HEGIS Code.

Updated: March 2024 -- University System of Maryland Office of Institutional Research

New Program Enrollment Review Fall 2020 - Fall 2024

Inst.	HEGIS	Program Name	Degree Level	Approved	Enrollments									
					Fall 2020		Fall 2021		Fall 2022		Fall 2023		Fall 2024	
					Projected	Actual	Projected	Actual	Projected	Actual	Projected	Actual	Projected	Actual
BSU	089900	Culturally Responsive Teacher Leadership [1]	M.Ed	6/19/2020	7	**0**	12	**23**	20	**19**	25	**20**	30	
FSU	099900	Life-Cycle Facilities Management [2]	B.S.	6/19/2020	10	**0**	15	**3**	20	**5**	25	**9**	30	
SU	490200	Integrated Science [3]	B.S.	6/19/2020	17	**0**	21	**3**	26	**11**	30	**18**	36	
SU	170101	Data Science	B.S.	9/20/2019	17	**9**	21	**13**	26	**20**	30	**24**	36	
SU	082800	Outdoor Education Leadership	B.A.	9/20/2019	17	**13**	18	**12**	24	**30**	25	**33**	30	
UBalt	210510	Cyber Forensics [4]	B.S.	6/19/2020	21	**0**	25	**13**	33	**21**	37	**19**	39	
UBalt	149903	Legal Studies [5]	B.A.	11/22/2019	9	**16**	16	**57**	20	**69**	25	**63**	32	
TU	083505	Athletic Training [6]	M.S.	6/19/2020	10	**0**	25	**10**	35	**24**	40	**27**	40	
UMB	121404	Global Health	M.S.	6/19/2020	10	**0**	24	**4**	33	**13**	37	**23**	40	
UMB	121412	Vulnerability and Violence Reduction [7]	M.S.	6/19/2020	12	**0**	15	**0**	18	**0**	21	**0**	21	
UMCP	070400/070401	Immersive Media Design [8]	B.A./B.S.	11/22/2019	55	**0**	110	**9**	270	**42**	320	**85**	320	
UMCP	151000	Religions of the Ancient Middle East [9]	B.A.	11/22/2019	6	**0**	16	**0**	21	**1**	31	**0**	41	
UMCP	051100	Real Estate and the Built Environment [10]	B.A.	2/21/2020	55	**0**	110	**0**	270	**5**	270	**58**	270	
UMCP	090500	Biocomputational Engineering [11]	B.S.	5/1/2020	20	**0**	40	**5**	70	**11**	80	**8**	80	
UMCP	221000	International Relations [12]	M.A.	5/1/2020	10	**0**	30	**14**	40	**26**	40	**26**	40	
UMCP	220701	Applied Political Analytics [13]	M.S.	5/1/2020	10	**0**	25	**7**	35	**15**	45	**13**	50	

Note: All enrollments are the students' primary major as reported in the MHEC EIS files. Administrative coding changes at campuses may lag actual program enrollment in initial years.

[1] The BSU M.Ed. in Culturally Responsive Teacher Leadership began in fall 2021 and is expected to meet projected enrollment.

[2] The FSU B.S. in Life-Cycle Facilities Management launched in Fall 2021. The name has been changed to Sustainable Construction Management to improve clarity and marketing.

[3] The SU B.S. in Integrated Science was approved July, 2020 during pandemic making it difficult to recruit for Fall 2020 and 2021.

[4] The UBalt B.S. in Cyber Forensics program was approved in summer 2020 and launched in 2021.

[5] The UBalt B.A. in Legal Studies program exceeded enrollment projections.

[6] The TU M.S. in Athletic Training was approved in July 2020 and began accepting admission in summer 2021.

[7] The UMB MS in Vulnerability and Violence Reduction deferred launch to fall 2024 to review graduate division affiliation for greatest impact.

[8] The UMCP B.A./B.S. in Immersive Media Design had a fall 2021 start.

[9] The UMCP B.A. in Religions of Ancient Middle East had a fall 2021 start. Classics, Persian Studies, Arabic Studies, and Jewish Studies have solid enrollments; projections will be reviewed.

[10] The UMCP B.A. in Real Estate Development program delayed start during the pandemic and was securing funding; it began enrolling in Fall 2022.

[11] The UMCP B.S. in Biocomputational Engineering started Fall 2021 at Shady Grove. This is a degree completion program; low enrollments largely reflect Fall 2022 enrollments at Montgomery College.

[12] The UMCP M.A. in International Relations: program is operating as a "4+1" BA/MA program only. Students admitted in Fall 2020 are in the 4th year of BA thus not counted yet in the MA program.

[13] The UMCP M.S. in Applied Political Analytics anticipates fall 2021 start for 1st cohort of MS students. Program intended to be both stand-alone MS program and "4+1" BS/MS program.

Updated: March 2024 -- University System of Maryland Office of Institutional Research

New Program Enrollment Review Fall 2021 - Fall 2025

Inst.	HEGIS	Program Name	Degree Level	Approved	Enrollments									
					Fall 2021		Fall 2022		Fall 2023		Fall 2024		Fall 2025	
					Projected	Actual	Projected	Actual	Projected	Actual	Projected	Actual	Projected	Actual
CSU	170300	Data Science [1]	B.S.	6/17/2021	15	0	31	2	47	6	63		84	
CSU	041400	Applied Molecular Biology and Biochemistry	M.S.	9/18/2020	5	2	10	1	15	5	22		27	
CSU	091500	Polymers and Materials Sciences	M.S.	9/18/2020	4	2	7	5	12	6	18		24	
CSU	120101	Health Information Management [2]	M.S.	6/17/2021	15	0	22	1	30	1	42		51	
UMB	129903	Health Professions Education	M.S.	2/19/2021	6	0	10	6	15	12	20		26	
UMB	220100	Diversity Equity and Inclusion Leadership	M.S.	4/16/2021	9	0	14	11	20	35	24		24	
UMB	120101	Palliative Care	PhD	6/17/2021	15	12	45	22	60	34	60		15	
UMCP	079901	Social Data Science [3]	B.S.	6/17/2021	50	0	100	25	400	67	800		1200	
UMCP/USG	011200	Fermentation Science[4]	B.S.	6/17/2021	12	0	23	0	46	0	52		58	
UMCP	010101	Extension Education	M.Ed	4/16/2021	10	0	20	6	20	6	20		20	
UMES	060501	Digital Media Studies[5]	B.A.	9/18/2021	20	16	25	32	30	54	40		50	
UMES	083503	Sport Management	B.S.	2/19/2021	15	0	27	31	38	60	48		48	
UMGC	070300	Data Science	B.S.	4/16/2021	50	0	75	335	100	658	125		125	

Note: All enrollments are the students' primary major as reported in the MHEC EIS files. Administrative coding changes at campuses may lag actual program enrollment in initial years.

[1] The CSU BS in Data Science launched in Fall 2022. The program is being promoted to lower-division undergraduates who have not yet declared a major and to transfer students.

[2] The CSU MS Health Information Management program began in Fall 2022. The pandemic may have impacted health care workers' time for a master's. Out-year projections are being reviewed.

[3] The UMCP Social Data Science program did not launch until Fall 2022.

[4] The UMCP BS in Fermentation Science is to launch in Fall 2024. MHEC approval for USG was not until Dec. 2021.

[5] The UMES Digital Media Studies B.S. is listed as "Digital Media Arts" in the State program taxonomy and needs to be amended.

Updated: March 2024 -- University System of Maryland Office of Institutional Research

New Program Enrollment Review Fall 2022 - Fall 2026

Inst.	HEGIS	Program Name	Degree Level	Approved	Enrollments									
					Fall 2022		Fall 2023		Fall 2024		Fall 2025		Fall 2026	
					Projected	Actual	Projected	Actual	Projected	Actual	Projected	Actual	Projected	Actual
BSU	070221	Cyber Operations Engineering [1]	B.S.	5/10/2022	9	0	13	5	19		29		39	
BSU	170220	Data Science	B.S.	5/10/2022	11	0	21	2	31		41		51	
BSU	150900	Philosophy, Politics, and Economics	B.S.	5/10/2022	5	0	8	1	11		14		17	
BSU	070121	Software Engineering	B.S.	5/10/2022	11	0	16	5	21		31		41	
BSU	041600	Applied Biotechnology and Molecular Biology [2]	M.S.	5/10/2022	9	0	18	3	18		27		27	
BSU	079900	Internet of Things and Internet Technology	M.S.	5/10/2022	10	0	12	14	14		16		18	
CSU	082700	Teacher Leadership	M.Ed.	5/10/2022	5	0	12	21	19		24		36	
FSU	229921	Multidisciplinary Studies	B.S.	5/10/2022	16	3	20	9	25		28		32	
FSU	120321	Nursing	B.S.	5/10/2022	30	0	60	22	60		60		60	
FSU	120323	Licensed Practical Nurse/Nursing [3]	B.S.	5/10/2022	40	0	80	25	80		80		80	
SU	121201	Health Science	B.S.	5/10/2022	8	0	18	0	30		44		52	
TU	210321	Fitness and Wellness Leadership [4]	B.S.	5/10/2022	80	7	150	45	230		320		420	
TU	083321	Computer and Mathematical Sciences	B.S.	9/14/2021	11	3	16	12	21		24		25	
UMB	120123	Clinical Informatics [5]	M.S.	9/14/2021	9	0	20	5	25		30		30	
UMCP	070221	Technology and Information Design [6]	B.A.	9/14/2021		10		67						
UMCP	050101	Business Administration [7]	D.B.A.	11/8/2021	17	0	34	0	51		51		51	

Note: All enrollments are the students' primary major as reported in the MHEC EIS files. Administrative coding changes at campuses may lag actual program enrollment in initial years.

[1] The four new BSU bachelor's programs launched in Fall 2023, and students are being advised about the new programs.

[2] The BSU Applied Biotechnology master's launched in Fall 2023. Marketing materials are being adjusted.

[3] The FSU Licensed Practical Nurse/Nursing B.S. is an online, part-time program. Both new nursing programs launched in fall 2023 and are expected to reach projections.

[4] The TU Fitness and Wellness Leadership program launched in Fall 2022 with no lead time for advertizing.

[5] The UMB program launched in 2023. It is expected to meet enrollment projections over time.

[6] The UMCP Technology and Information Design B.A. does not have enrollment projections in the program approval. Program launched in Fall 2023.

[7] The UMCP DBA program launched in Fall 2023. It has 6 students as of spring 2024. It is expected to meet projections.

Updated: March 2024 – University System of Maryland Office of Institutional Research

New Program Enrollment Review Fall 2023 - Fall 2027

Inst.	HEGIS	Program Name	Degree Level	Approved	Enrollments									
					Fall 2023		Fall 2024		Fall 2025		Fall 2026		Fall 2027	
					Projected	Actual	Projected	Actual	Projected	Actual	Projected	Actual	Projected	Actual
BSU	120100	Public Health Informatics and Technology	B.S.	1/10/2023	16	15	31		47		62		78	
BSU	120200	Health Services Administration	B.S.	1/10/2023	16	16	31		47		62		78	
BSU	082800	Counselor Education and Supervision [1]	Ph.D.	5/11/2023	6	0	12		18		24		30	
CSU	092500	Cybersecurity Engineering	B.S.	1/10/2023	20	2	34		56		76		99	
FSU	080800	Elementary/Special Education Dual Certification [2]	B.S.	1/10/2023	5	0	15		25		35		55	
FSU	042001	Environmental Science [3]	B.S.	3/14/2023	11	4	11		16		17		22	
FSU	042000	Environmental Management and Sustainability [4]	M.S.	1/10/2023	5	2	7		9		11		12	
SU	080201	Elementary Education w/ Dual Cert. in Early Childhood Education	B.S.	9/20/2022	14	40	17		21		25		29	
TU	220400	Economic Analytics [5]	M.S.	1/10/2023	10	0	20		24		27		31	
TU	060103	Communication and Advocacy [6]	M.A.	5/11/2023	18	0	35		38		42		50	
TU	129900	Autism Studies [7]	Ph.D.	3/14/2023	7	0	14		21		21		21	
UBalt	200103	Industrial and Organizational Psychology [8]	M.S.	3/14/2023	35	0	40		44		48		52	
UBalt	200102	Counseling [9]	M.S.	3/14/2023	97	0	99		99		101		101	
UMB	120700	Medical Science	D.M.Sc.	11/15/2022	10	8	20		30		40		40	
UMBC	070101	Cybersecurity [10]	M.S.	6/5/2023	111	0	134		137		157		168	
UMCP	122004	Hearing and Speech Sciences [11]	M.A.	1/10/2023	1	0	1		1		1		1	
UMES	090500	Biomedical Engineering [12]	B.S.	11/15/2022	18	0	35		52		69		86	
UMES	130300	Fashion Merchandising and Design [13]	B.S.	11/15/2022	45	7	50		55		60		75	
UMES	130100	Human Ecology [14]	M.S.	11/15/2022	15	0	20		25		30		40	
UMES	079900	Data Science and Analytics Engineering [15]	M.S.	11/15/2022	10	0	15		20		25		30	
UMES	090900	Electrical and Mechatronics Engineering [16]	M.S.	11/15/2022	11	0	17		23		29		36	
UMES	090100	Applied Computing and Engineering [17]	Ph.D.	11/15/2022	10	0	15		25		30		35	
UMGC	070102	Applied Technology	B.S.	1/10/2023	25	69	100		200		300		400	
UMGC	200400	Clinical Professional Counseling [18]	M.S.	5/11/2023	25	0	49		71		93		111	

Note: All enrollments are the students' primary major as reported in the MHEC EIS files. Administrative coding changes at campuses may lag actual program enrollment in initial years.

[1] The BSU PhD in Counselor Ed. and Supervision program is to launch in Fall 2024.

[2] The FSU elementary/special education dual certification program is set to launch in Fall 2024.

[3] The UMBC MS Cybersecurity program is transitioning from an MPS, which has robust enrollment.

[4] The FSU MS Environmentl Management and Sustainability (partnered with UMCES) is expected to meet enrollment.

[5] The TU MS in Economic Analytics is to launch in Fall 2024.

[6] The TU MS in Communication and Advocacy will launch in Fall 2024.

[7] TheTU PhD in Autism Studies will launch in Fall 2024.

[8] This UBaltprogram has robust enrollment as part of an MS that split; MHEC has not provided a unique HEGIS for reporting enrollment.

[9] This UBaltprogram has robust enrollment as part of an MS that split; MHEC has not provided a unique HEGIS for reporting enrollment.

[10] This UMBC mater's has robust enrollment in the MPS that is transitioning to the MS. Projections are expected to be met.

[11] The UMCP MA in Hearing and Speech Sciences is designed to be a terminal degree if someone opts not to complete the PhD, so enrollment not expected to be large

[12] The UMES BS in Biomedical Engineering is to launch in Fall 2024.

(continued)

[13] The UMES BS in Fashion Merchandising and Design is expected to meet enrollment over time after students have time to reach the major.
[14] The UMES MS in Human Ecology is to launch in Fall 2024.
[15] The UMES MS in Data Science and Analytics Engineering is to launch in Fall 2024.
[16] The UMES MS in Electrical and Mechatronics Engineering is to launch in Fall 2024.
[17] The UMES PhD in Applied Computing and Engineering is to launch in Fall 2024.
[18] The UMGC MS in Clinical Professional Counseling was approved with a fall 2024 launch date.

Updated: March 2024 -- University System of Maryland Office of Institutional Research

BOARD OF REGENTS

SUMMARY OF ITEM FOR ACTION,
INFORMATION OR DISCUSSION

TOPIC: Convening Closed Session

COMMITTEE: Committee on Education Policy and Student Life and Safety

DATE OF MEETING: April 12, 2024

SUMMARY: The Open Meetings Act permits public bodies to close their meetings to the public in special circumstances outlined in §3-305 of the Act and to carry out administrative functions exempted by §3-103 of the Act. The Board of Regents will now vote to reconvene in closed session. As required by law, the vote on the closing of the session will be recorded. A written statement of the reason(s) for closing the meeting, including a citation of the authority under §3-305 and a listing of the topics to be discussed, is available for public review.

It is possible that an issue could arise during a closed session that the Board determines should be discussed in open session or added to the closed session agenda for discussion. In that event, the Board would reconvene in open session to discuss the open session topic or to vote to reconvene in closed session to discuss the additional closed session topic.

ALTERNATIVE(S): No alternative is suggested.

FISCAL IMPACT: There is no fiscal impact

CHANCELLOR'S RECOMMENDATION: The Chancellor recommends that the Committee vote to reconvene in closed session.

COMMITTEE ACTION:	DATE:
BOARD ACTION:	DATE:

SUBMITTED BY: Alison Wrynn, awrynn@usmd.edu, 301-445-1992

University System of Maryland

STATEMENT REGARDING CLOSING A MEETING
OF THE USM BOARD OF REGENTS

Date: April 12, 2024
Time: Approximately 11:15 a.m.
Location: Via Zoom

STATUTORY AUTHORITY TO CLOSE A SESSION

Md. Code, General Provisions Article §3-305(b):

(1) To discuss:

[X] (i) The appointment, employment, assignment, promotion, discipline, demotion, compensation, removal, resignation, or performance evaluation of appointees, employees, or officials over whom it has jurisdiction; or

[ ] (ii) Any other personnel matter that affects one or more specific individuals.

(2) [X] To protect the privacy or reputation of individuals with respect to a matter that is not related to public business.

(3) [ ] To consider the acquisition of real property for a public purpose and matters directly related thereto.

(4) [ ] To consider a preliminary matter that concerns the proposal for a business or industrial organization to locate, expand, or remain in the State.

(5) [ ] To consider the investment of public funds.

(6) [ ] To consider the marketing of public securities.

(7) [ ] To consult with counsel to obtain legal advice on a legal matter.

(8) [ ] To consult with staff, consultants, or other individuals about pending or potential litigation.

(9) [ ] To conduct collective bargaining negotiations or consider matters that relate to the negotiations.

(10) [ ] To discuss public security, if the public body determines that public discussions would constitute a risk to the public or public security, including:

(i) the deployment of fire and police services and staff; and

(ii) the development and implementation of emergency plans.

(11) [ ] To prepare, administer or grade a scholastic, licensing, or qualifying examination.

(12) [ ] To conduct or discuss an investigative proceeding on actual or possible criminal conduct.

(13) [X] To comply with a specific constitutional, statutory, or judicially imposed requirement that prevents public disclosures about a particular proceeding or matter.

(14) [ ] Before a contract is awarded or bids are opened, to discuss a matter directly related to a negotiation strategy or the contents of a bid or proposal, if public discussion or disclosure would adversely impact the ability of the public body to participate in the competitive bidding or proposal process.

(15) [ ] To discuss cybersecurity, if the public body determines that public discussion would constitute a risk to:

(i) security assessments or deployments relating to information resources technology;

(ii) network security information, including information that is:

1. related to passwords, personal identification numbers, access codes, encryption, or other components of the security system of a governmental entity;

2. collected, assembled, or maintained by or for a governmental entity to prevent, detect, or investigate criminal activity; or

3. related to an assessment, made by or for a governmental entity or maintained by a governmental entity, of the vulnerability of a network to criminal activity; or

(iii) deployments or implementation of security personnel, critical infrastructure, or security devices.

<u>Md. Code, General Provisions Article §3-103(a)(1)(i):</u>

[ ] Administrative Matters

TOPICS TO BE DISCUSSED:

1. Recommendations for Regents' Student Excellence Scholarships

REASON FOR CLOSING:

1. To maintain confidentiality of personnel-related and personal information of candidates for student scholarships and to comply with federal law protecting privacy of student education records. (§3-305(b)(1), (2) and (13)).