

Board of Regents
Committee on Education Policy and Student Life

Wednesday, November 29, 2023 ~ 9:30 a.m.

Zoom Details Provided to Committee
Public Listen-Only Access: 1-443-353-0686
Conference ID: 829 839 102#

Public Session Agenda

Meeting Announcement

Action Items

1. [Proposed Amendments: EPSL Committee Name Change and Related Revisions to Committee Bylaws and Charge and Role and Responsibilities](#)
2. [Proposed Policy Revisions to Establish: III-5.10 – Policy Concerning the Scheduling of Academic Assignments on Dates of Religious Observance; Campus Space for Faith-Based or Religious Practices](#)
3. [Proposed Amendments: III-6.00 – Policy on Academic Transcripts](#)
4. Academic Program Proposals
 - a. [University of Maryland, College Park: Bachelor of Science in Global Health](#)
 - b. [University of Maryland, College Park: Master of Science in Data Science](#)
 - c. [University of Maryland, College Park: Master of Science in Applied Machine Learning](#)
 - d. [University of Maryland, College Park: Master of Science in Bioinformatics and Computational Biology](#)
 - e. [University of Maryland Eastern Shore: Bachelor of Science in Gaming and Software Engineering](#)
 - f. [University of Maryland Eastern Shore: Doctor of Veterinary Medicine](#)

Information Items

5. [Update: Kirwan Center for Academic Innovation](#)
6. [Update: Maryland Center for Computing Education](#)
7. [Report on Extramural Funding – FY 2023](#)

Action Item

8. Motion to Adjourn

Meeting Announcement

OFFICE OF ACADEMIC AND STUDENT AFFAIRS

MEMORANDUM

TO: Michelle Gourdine, Chair Josiah Parker
Kevin Anderson Doug Peters
Linda Gooden Andrew Smarick
Farah Helal Bill Wood
Isiah Leggett

FROM: Alison Wrynn, Senior Vice Chancellor

DATE: Wednesday, November 22, 2023

SUBJECT: Wednesday, November 29th Meeting of the Committee on Education Policy and Student Life

The Committee on Education Policy and Student Life of the Board of Regents will meet in public session on Tuesday, November 29, 2023. The meeting will begin at 9:30 a.m.

The meeting will take place via Zoom for members of the Committee. An Outlook invitation with connection details has been sent. Public listen-only access is available via 443-353-0686, Conference ID: 829 839 102#.

The agenda is attached and supporting materials are posted on Nasdaq Boardvantage for members of the Board and the USM website at <https://www.usmd.edu/regents/agendas/>.

Committee members, please let me know if you are unable to participate on Wednesday and if you have any questions.

We look forward to engaging with you next week.

Enclosures

CC: Office of the Attorney General
Members of the Chancellor's Council
Academic Affairs Advisory Council (Provosts)
Vice Presidents for Student Affairs
Academic and Student Affairs Senior Staff
Office of Communications
Heather Haverback, Council of University System Faculty
Kalia Patricio, Council of University System Staff
Vainavi Gambhir, USM Student Council

1. Proposed Amendments: EPSL Committee Name Change and Related Revisions to Committee Bylaws and Charge and Role and Responsibilities

TOPIC: Proposed Amendments:
EPSL Committee Name Change and Related Revisions to Committee Bylaws and Charge and Role and Responsibilities

COMMITTEE: Education Policy and Student Life

DATE OF COMMITTEE MEETING: Wednesday, November 29, 2023

SUMMARY: A portion of the October 2023 USM Board of Regents retreat was dedicated to campus safety and security. After considering comments made by expert speakers and discussion by the regents, USM staff, and shared governance leaders, the regents began discussing ways the USM, its institutions, and the Board of Regents will build on the work already being done to address campus safety and security.

Since its inception, the Committee on Education Policy and Student Life has included an emphasis on safety and security, as evidenced by regular reports reviewing USM institutions' Clery statistics and updates by panels of vice presidents for student affairs and campus police chiefs. To better represent this work and to further entrench campus safety as a focus of the committee and board, the proposed amendment is to change the name of the Committee on Education Policy and Student Life to the Committee on Education Policy and Student Life and Safety.

ALTERNATIVE(S): Regents can offer recommendations that can be agreed upon during the meeting or taken back for further exploration and consideration.

FISCAL IMPACT: There is no fiscal impact.

CHANCELLOR'S RECOMMENDATION: The Chancellor recommends that the Committee on Education Policy and Student Life recommend that the Board of Regents approve the committee's name change to become the Committee on Education Policy and Student Life and Safety by approving amendments to (1) the EPSL section of the Board of Regents Bylaws and (2) the Committee Charge, Role, and Responsibilities guidance.

COMMITTEE RECOMMENDATION: DATE: November 29, 2023

BOARD ACTION: DATE:

SUBMITTED BY: Alison M. Wrynn 301-445-1992 awrynn@usmd.edu



BYLAWS OF THE BOARD OF REGENTS
OF THE UNIVERSITY SYSTEM OF MARYLAND

(Adopted by the Board of Regents, April 5, 1989; Amended, September 27, 1990; Amended February 27, 1991; Amended June 9, 1995; Amended August 25, 1995; Amended December 1, 1995; Amended April 12, 1996; Amended April 4, 1997, Amended December 8, 2000, Amended August 23, 2002; Amended September 12, 2003; Amended December 12, 2003, Amended October 21, 2005, Amended September, 2008, Amended April 15, 2011, Amended December 7, 2012, Amended April 11, 2014, Amended June 10, 2016, Amended December 9, 2016, Amended February 22, 2019; Amended April 6, 2020 to be effective immediately, Amended April 16, 2021 to be effective July 1, 2021, Amended November 10, 2023, [Amended _____](#))

Article X

Section 1. Standing Committees of the Board. The Standing Committees of the Board are the Committee on Audit, the Committee on Education Policy and Student Life [and Safety](#), the Committee on Finance, the Committee of the Whole, the Committee on Governance and Compensation, the Committee on Advancement, the Committee on Economic Development and Technology Commercialization, and the Committee on Intercollegiate Athletics and Student-Athlete Health and Welfare.

Section 4. Committee on Education Policy and Student Life [and Safety](#).

A. The Committee on Education Policy and Student Life [and Safety](#) shall consider and report or recommend to the Board on all matters relating to institutional mission statements and education policies and programs for all institutions and major units, and all issues relating to academic programs such as curriculum development, adequacy of instructional facilities and specialized centers and institutes, and institutional support for student academic services.

- a. This Committee shall consider and report or recommend to the Board proposals for new academic programs and review and report to the board on the review of existing academic programs that align with the institution's mission, strategic plan, and priorities.
- b. This Committee shall also consider and report or recommend to the Board on matters and policies relating to faculty, including but not limited to conditions affecting recruitment, appointment, rank, tenure, and retention, and issues brought to the Advisory Councils and USM Office of Academic and Student Affairs.

B. This Committee shall also consider and report or recommend to the Board matters and policies related to students and student support services including, but not limited to, college readiness, student enrollment, recruitment, retention, transfer, and articulation; financial aid; campus safety and security; student health and wellness; student government; and student organizations.

C. This Committee shall also consider and report or recommend to the Board matters and policies on inter-institutional cooperation, System-wide activities to include, but not limited to, training and public service, and collaborations with affiliated organizations.

D. This Committee shall also consider or report or recommend to the Board:

a. student-athlete health, wellness, and academic matters brought to it by the Committee on Intercollegiate Athletics and Student-Athlete Health and Welfare, the Chancellor, or the Board;

b. alumni engagement and related matters brought to it by the Committee on Advancement, the Chancellor, or the Board; and

c. research and related matters brought to it by the Committee on Economic Development & Technology Commercialization, the Chancellor, or the Board.



UNIVERSITY SYSTEM
of MARYLAND

Board of Regents
Committee on Education Policy and Student Life [and Safety](#)
Charge, Role, and Responsibilities

Charge:

The Committee on Education Policy and Student Life [and Safety](#) shall perform all necessary business and provide guidance to the Board of Regents on issues that pertain to academic affairs and student affairs functions at the institutions within the University System of Maryland.

Role and Responsibilities:

The Committee on Education Policy and Student Life [and Safety](#) shall consider and report or recommend to the Board of Regents on matters concerning academic and student affairs-related policies and programs for all institutions and major units including, but not limited to, all issues relating to academic programs such as curriculum development, adequacy of instructional facilities and specialized centers and institutes, and institutional support for student academic services; matters and policies relating to faculty; student enrollment, recruitment, retention, transfer, and articulation; financial aid; campus safety and security; student health and wellness; student government; and student organizations; and the overall intellectual, social, and emotional climate of the university.

Members of the Committee on Education Policy and Student Life [and Safety](#) are appointed annually by the Chairperson of the Board. The Committee holds at least five regularly scheduled meetings during the fiscal year. The members of the Committee may expect to receive information for review in order to consider and report or recommend to the Board of Regents on any of the following matters:

- A. Institutional mission statements and goals
- B. Establishment and disestablishment of schools and colleges
- C. Proposals for new academic programs
- D. Review of existing academic programs and enrollments within those programs
- E. P-20 partnerships and initiatives
- F. Academic transformation and innovation
- G. Academic integrity
- H. Libraries
- I. Civic education and civic engagement
- J. Student life and student services
- K. Diversity, equity, inclusion, and accessibility
- L. Global engagement
- M. Student enrollment, recruitment, and retention
- N. Transfer and articulation
- O. Access and affordability
- P. Student health and wellness
- Q. Campus safety and security

- R. Title IX and sexual misconduct
- S. Faculty life and faculty conduct
- T. Faculty policies and procedures including, but not limited to, appointments in rank and promotion to tenure
- U. Faculty workload
- V. Faculty awards nominations
- W. Student awards and scholarships
- X. Honorary degree nominations
- Y. Extramural funding
- Z. Relevant issues, reports, or requests as brought to the USM by the Maryland Higher Education Commission and other state agencies
- AA. Additional pertinent issues as raised by the student, staff, and faculty advisory councils; university administrators; USM officials; and regents

The Committee on Education Policy and Student Life [and Safety](#) may receive, for information purposes from the Committee on Intercollegiate Athletics and Student-Athlete Health and Welfare, reports on academic issues (including but not limited to Academic Progress Rate and mid-year academic indicators) for and the health and wellness of student athletes and/or athletics teams.

**2. Proposed Policy Revisions to Establish: III-5.10 –
Policy Concerning the Scheduling of Academic
Assignments on Dates of Religious Observance;
Campus Space for Faith-Based or Religious Practices**

TOPIC: Proposed Policy Revisions: Policy Concerning the Scheduling of Academic Assignments on Dates of Religious Observance (III-5.10)

COMMITTEE: Education Policy and Student Life

DATE OF COMMITTEE MEETING: Wednesday, November 29, 2023

SUMMARY: In 1990, the University System of Maryland adopted the Policy Concerning the Scheduling of Academic Assignments on Dates of Religious Observance.

During the 2023 legislative session, HB 923, Higher Education - Appointment of Secretary and Student Financial Assistance - Accommodations at Public Institutions for Religious Beliefs, passed, requiring public institutions of higher education to implement many requirements designed to provide reasonable academic accommodations for students to practice sincerely held faith-based or religious beliefs. Institutions must:

- Develop a written policy that allows reasonable academic accommodations;
- Establish grievance procedures to report noncompliance with the policy;
- Provide a space on campus to accommodate faith-based or religious practices (except for UMGC); and
- Prominently post the policy on the institution's website.

The proposed revisions were developed by the Office of the Attorney General. The Academic and Student Affairs staff socialized and vetted the proposed revisions with USM's presidents, provosts, vice presidents for student affairs, Diversity and Inclusion Council, USM Student Council, Council of University System Faculty, and Council of University System Staff. Generally, these stakeholders support the proposed revisions. Dr. Zakiya Lee, Associate Vice Chancellor for Student Affairs, will review the proposed revisions and share stakeholder feedback.

ALTERNATIVE(S): Revision of the policy is necessary to conform to HB 923, but the regents could suggest alternative wording consistent with the requirements of HB 923.

FISCAL IMPACT: None

CHANCELLOR'S RECOMMENDATION: That the Committee on Education Policy and Student Life recommend that the Board of Regents approve the revisions to USM policy III-5.10, the Policy Concerning the Scheduling of Academic Assignments on Dates of Religious Observance to become the Policy Concerning the Scheduling of Academic Assignments on Dates of Religious Observance; Campus Space for Faith-Based or Religious Practices.

COMMITTEE RECOMMENDATION:

DATE: November 29, 2023

BOARD ACTION:

DATE:

SUBMITTED BY: Alison Wrynn

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85.0 III-5.10-POLICY CONCERNING THE SCHEDULING OF ACADEMIC ASSIGNMENTS
ON DATES OF RELIGIOUS OBSERVANCE

(Approved by the Board of Regents, January 11, 1990)

It is the policy of the Board of Regents that the academic programs and services of each institution shall be available to all qualified students who have been admitted to its programs, regardless of their religious beliefs. Students shall not be penalized because of observances of their religious holidays and shall be given an opportunity, whenever feasible, to make up within a reasonable time any academic assignment that is missed due to individual participation in religious observances.

Each institution shall develop written policies and procedures for the implementation of this policy. The institution's policy in this matter shall be published regularly in the appropriate faculty and student media and other reasonable steps shall be taken to disseminate adequately this information to all members of the institution's community.

Replacement for: BOR I-2.00 and I-2.01

CURRENT POLICY

(A) EACH PUBLIC INSTITUTION OF HIGHER EDUCATION SHALL ADOPT A WRITTEN POLICY THAT PROVIDES REASONABLE ACADEMIC ACCOMMODATIONS FOR STUDENTS TO PRACTICE SINCERELY HELD FAITH-BASED OR RELIGIOUS BELIEFS.

(B) THE POLICY SHALL:

(1) PROVIDE AN ACCOMMODATION FOR A STUDENT, INCLUDING EXCUSED ABSENCES, FOR A STUDENT TO:

(i) OBSERVE FAITH-BASED OR RELIGIOUS HOLIDAYS; OR

(ii) PARTICIPATE IN ORGANIZED RELIGIOUS ACTIVITIES;

(2) PROVIDE THAT A STUDENT BE ALLOWED REASONABLE ALTERNATIVE ACCOMMODATIONS FOR MISSING AN EXAMINATION OR OTHER ACADEMIC REQUIREMENTS DUE TO AN EXCUSED ABSENCE UNDER ITEM (1) OF THIS SUBSECTION IF THE STUDENT'S SINCERELY HELD FAITH-BASED OR RELIGIOUS BELIEF OR PRACTICE AFFECTS THE STUDENT'S ABILITY TO TAKE AN EXAMINATION AS SCHEDULED OR MEET ANY OTHER ACADEMIC REQUIREMENT; AND

(3) INCLUDE A GRIEVANCE PROCEDURE TO REPORT NONCOMPLIANCE WITH THE POLICY.

(C) (1) EXCEPT AS PROVIDED IN PARAGRAPH (2) OF THIS SUBSECTION, EACH PUBLIC INSTITUTION OF HIGHER EDUCATION IS REQUIRED TO PROVIDE A SPACE ON CAMPUS TO ACCOMMODATE FAITH-BASED OR RELIGIOUS PRACTICES.

(2) THIS SUBSECTION DOES NOT APPLY TO THE UNIVERSITY OF MARYLAND GLOBAL CAMPUS.

(D) EACH PUBLIC INSTITUTION OF HIGHER EDUCATION SHALL POST PROMINENTLY ON ITS WEBSITE A COPY OF THE POLICY ADOPTED UNDER THIS SECTION.

18-303.

(a) Subject to subsection (e) of this section, each recipient of a Delegate Howard P. Rawlings Educational Excellence Award shall:

(1) Be accepted for admission in the regular undergraduate program at an eligible institution or be enrolled in a 2-year associate degree program in which the course work is acceptable for transfer credit for an accredited baccalaureate program in an eligible institution;

III-5.10-POLICY CONCERNING THE SCHEDULING OF ACADEMIC ASSIGNMENTS ON DATES OF RELIGIOUS OBSERVANCE; CAMPUS SPACE FOR FAITH-BASED OR RELIGIOUS PRACTICES

(Approved by the Board of Regents, January 11, 1990, Amended _____, 2023)

It is the policy of the Board of Regents that the academic programs and services of each institution shall be available to all qualified students who have been admitted to its programs, regardless of their sincerely held faith-based or religious beliefs. Students shall be given reasonable accommodation, including excused absences, to observe faith-based or religious holidays or participate in organized religious activities.

An accommodation requested under this policy shall be considered reasonable if it is required for the student to practice a sincerely held faith-based or religious belief and it does not impose an undue hardship upon the Institution or fundamentally alter the essential nature of the course or program (a "Reasonable Accommodation"). A student shall be provided reasonable alternative accommodations for missing an examination or other academic requirements due to an excused absence for sincerely held faith-based or religious belief or practice. Absences excused by any Reasonable Accommodation granted pursuant to this policy and institution policy and procedures should be counted toward the maximum number of excused absences permitted by applicable Institution or course policy but cannot impact participation grades or other measures of course assessment. There may be circumstances under which it may be a Reasonable Accommodation to increase the number of maximum allowed absences to accommodate sincerely held faith-based or religious beliefs or practices. Unless prohibited by program-specific attendance requirements, an institution should consider whether increasing the maximum allowed absences would be a reasonable accommodation for sincerely held faith-based or religious beliefs or practices.

Excluding the University of Maryland Global Campus, each institution shall also provide an on-campus space to accommodate faith-based or religious practices.

Each institution shall develop written policies and procedures for the implementation of this policy and a grievance procedure to report noncompliance with this policy and the institution's implementing policies and procedures. The institution's policy and procedures shall be published prominently on its website, and other reasonable steps shall be taken to disseminate adequately this information to all members of the institution's community.

Proposed Amendments: III-6.00 – Policy on Academic Transcripts

TOPIC: Proposed Amendments: Policy on Academic Transcripts (III-6.00)

COMMITTEE: Education Policy and Student Life

DATE OF COMMITTEE MEETING: Wednesday, November 29, 2023

SUMMARY: Policy on Academic Transcripts has allowed USM institutions to withhold student transcripts when a student has unpaid obligations. The rationale had been that if students enter a payment plan, they can both avoid collections and secure a transcript. State legislation proposed in 2023 and signed into law by Governor Wes Moore (Md. Code, Educ. §15-118b) now prohibits all institutions of higher education in Maryland from refusing to provide a current or former student with a transcript or taking other punitive measures regarding a student's transcript request because the student owes a debt to the institution. The proposed amendments simply bring the policy into alignment with the new statute.

All USM institutions were compliant with this State law by July 1, 2023. Although the transcript policy could be amended by simply deleting Section II, it seemed clearer for stakeholders to state the prohibitions. Institutions may continue to charge a fee for the actual costs of providing the transcript.

ALTERNATIVE(S): The regents could suggest alternative wording but cannot retain the current policy.

FISCAL IMPACT: The bill's fiscal note indicated that the exact impact on revenue is hard to estimate and depends on the percentage of debt that collections will return to institutions owed funds.

CHANCELLOR'S RECOMMENDATION: That the Committee on Education Policy and Student Life recommend that the Board of Regents approve the amendments to the USM Policy on Academic Transcripts (III-6.00).

COMMITTEE RECOMMENDATION:

DATE: November 29, 2023

BOARD ACTION:

DATE:

SUBMITTED BY: Alison Wrynn

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III-6.00 - POLICY ON ACADEMIC TRANSCRIPTS

(Approved by the Board of Regents, January 11, 1990; Technical amendments by the Board, December 12, 2014; amended June 19, 2020; amended xxxx, 2023)

I. ACADEMIC TRANSCRIPTS

Each institution in the University System of Maryland will maintain an academic transcript for each student who enrolls. The transcript will conform to standards as established by the American Association of Collegiate Registrars and Admissions Officers and will include courses and grades for each term of enrollment. Each institution will develop policies concerning resident credit and the calculation of grade point averages.

II. WITHHOLDING ACADEMIC TRANSCRIPTS¹

A USM institution may not:

- (1) refuse to provide a transcript to a student because the student owes a debt;
- (2) condition the issuance of a transcript on the payment of a debt;
- (3) charge a higher fee for obtaining a transcript because a student owes a debt;
- (4) provide less favorable treatment of a transcript request because a student owes a debt; or
- (5) use transcript issuance as a tool for debt collection.

III. Definitions

A. “Debt” means any money, obligation, claim, or sum due or owed by a student to an institution of higher education.

1. “Debt” includes:

- a. Credit extended by or on behalf of the institution that a student is obligated to repay; and
- b. A nonfederal loan or debt agreement that is issued expressly for postsecondary education expenses and that is guaranteed by (1) an institution of higher education or (2) a private educational lender that is affiliated with an institution of higher education.

2. “Debt” does not include the fee, if any, charged to a student for the actual costs of providing a transcript.

B. “Student” includes current students and former students of an institution of higher education.

¹ Md. Code, Educ. §15-118(b)

Replacement for: BOR II-4.10

Deleted: <#>Except as provided in Section II.B of this Policy and as otherwise provided by law, an institution may withhold copies of official academic transcripts requested by or on behalf of a student who is delinquent in his or her financial obligations. A student is defined as an individual who is or who has been in attendance at an institution in the University System of Maryland. Such delinquency may include delinquency in the payment of institutional charges and/or default on a Stafford Loan or any education loan made, guaranteed, or reinsured in whole or in part by the federal or Maryland State government made or received for attendance at an institution in the University System of Maryland.¶

¶ If a student has filed a bankruptcy petition, copies of official academic transcripts may be withheld only after consultation with the Office of the Attorney General.¶

University of Maryland, College Park: Bachelor of Science in Global Health

TOPIC: Academic Program Proposal:

University of Maryland, College Park: Bachelor of Science in Global Health

COMMITTEE: Education Policy and Student Life

DATE OF COMMITTEE MEETING: Wednesday, November 29, 2023

SUMMARY: Global health is a multidisciplinary field, encompassing not only health care systems, medical practices, and ideas about illness in cross-cultural contexts, but also contending with issues of health development, global health inequity, racism and other forms of discrimination, and human rights issues. The proposed Bachelor of Science in Global Health will train students to apply structurally competent, collaborative, and multidisciplinary perspectives to the understanding, assessment, and intervention of sustainable global health strategies. Outcomes include the ability to demonstrate critical thinking and basic research skills within the discipline of public health, including the ability to apply introductory statistical methodology and big data approaches to solve global health problems. Students will also employ effective communication skills across a wide range of target audiences, and they will critically analyze the qualitative and quantitative impacts of racism on the prevention, assessment, and treatment of illness around the world.

The curriculum will consist of 77-83 credits, with foundational courses in nutrition, government and politics, world languages, and biological sciences. Global Health core courses will consist of courses from public health, behavioral and community health, family science, environmental health, anthropology, epidemiology and biostatistics, and health policy and management. The program will also require at least six credits of experiential learning, which will enable students to develop a deeper understanding of professional and personal responsibility as they explore various career pathways.

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 B.S. in Global Health.

COMMITTEE RECOMMENDATION:

DATE: November 29, 2023

BOARD ACTION:

DATE:

SUBMITTED BY: Alison M. Wrynn

301-445-1992

awrynn@usmd.edu



UNIVERSITY OF
MARYLAND

OFFICE OF THE PRESIDENT

September 29, 2023

Chancellor Jay A. Perman
University System of Maryland
3300 Metzert Road
Adelphi, MD 20783

Dear Chancellor Perman:

I am writing to request approval for a new Bachelor of Science program in Global Health. 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,

A handwritten signature in cursive script that reads "Darryl J. Pines".

Darryl J. Pines
President
Glenn L. Martin Professor of Aerospace Engineering

DJP/mdc

cc: Candace Caraco, Associate Vice Chancellor for Academic Affairs
Jennifer King Rice, Senior Vice President and Provost
Boris Lushniak, Dean, School of Public Health

1101 Thomas V. Miller, Jr. Administration Building
College Park, Maryland 20742
301.405.5803 TEL
301.314.9560 FAX

UNIVERSITY SYSTEM OF MARYLAND INSTITUTION PROPOSAL FOR

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

University of Maryland, College Park
Institution Submitting Proposal

Global Health
Title of Proposed Program

Bachelor of Science
Award to be Offered

Fall 2024
Projected Implementation Date

121405
Proposed HEGIS Code

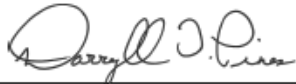
51.2210
Proposed CIP Code

School of Public Health
Department in which program will be located

Dr. Nicole Cousin-Gossett
Department Contact

301-405-6389
Contact Phone Number

cgossett@umd.edu
Contact E-Mail Address



Signature of President or Designee

09-29-2023
Date

A. Centrality to the University's Mission and Planning Priorities

Description. Improving health across populations across the globe is a grand challenge of our time. Global health challenges are immensely complex and underscore the multiple interconnections among social, economic, environmental, and biotechnological dimensions of health problems worldwide. Global health encompasses health care systems, medical practices, and ideas about illness in cross-cultural contexts, as well as issues of health development, global health inequity, racism and other discriminatory beliefs and practices, and human rights issues. The proposed new undergraduate program in Global Health will offer students a broad, interdisciplinary education that will provide 1) a strong foundation to address pressing global health issues through a multidisciplinary lens and in a structurally competent and sustainable manner, 2) access to a variety of post-baccalaureate specializations, including the Master of Public Health (MPH), and/or 3) access to compelling employment opportunities around the globe. Emphasis will focus on competence in multiple methodologies, including quantitative, qualitative, and mixed methods realms, as well as collaborative and applied engagement utilizing perspectives from the health, biological, and social sciences.

Relation to Strategic Goals. As Maryland's flagship campus and a national leader in higher education, the University of Maryland (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. The proposed B.S. in Global Health aligns with the four overarching pillars of UMD's 2022 Strategic Plan, "[Fearlessly Forward in Pursuit of the Public Good](#)." The major directly addresses the University's goal to increase the number of programs with definable global elements, connecting to Reimagining Learning. The foundational values of a Global Health curriculum are to produce graduates with intellectual breadth, problem-solving skills, a keen understanding of social and cultural skills, and an ability to thrive in diverse work settings, thus Investing in People and Communities. The major will directly address the university's goal of further diversifying our student populations and, thereby, the future workforce in the region. In this way, we are Partnering to Advance the Public Good. Finally, a critical component of successful and sustainable global health strategies is an actionable anti-racist perspective, which is addressed throughout the proposed curriculum. Students will be assessed on their ability to critically analyze the qualitative and quantitative impacts of racism on the prevention and treatment of acute and chronic illnesses specific to various countries. This approach aligns with the University's focus on tackling the Grand Challenges of our time.

Funding. Through careful attention to strategic planning and reallocation of university resources, internal funding has been identified to launch this new major. While we may see a modest increase in undergraduate enrollments, we do not include tuition revenue from majors in the program as a direct revenue source.

Institutional Commitment. The program will be administered by the Maryland School of Public Health, although participation in the delivery of the coursework will be shared among several academic units, as described further below.

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

Need. A Global Health major prepares students for leadership positions across the globe. The United States, in fact, shares many of the substantial challenges that all nations experience. We currently are experiencing health issues related to clean air and water, maternal and child healthcare, lack of access to affordable healthcare in both urban and rural areas, health literacy, health communication, political instability, a widening socio-economic gap between the rich and poor, social and racial inequities, a high unemployment rate, and climate-related

disasters, all of which disproportionately impact population health and point directly to a compelling need in the region and state. The curriculum in Global Health is intentionally broadly based and includes allied health sciences, biological and nutritional sciences, medicine, social justice, anti-racism, civic engagement, language acquisition, research, and effective cultural communication, all of which are needed in Africa, South America, India, as well as very locally in Prince George's County. The advancement of research-based public health measures to mitigate disease is crucial to our advancement of knowledge and overall societal needs. As the recent pandemic has shown with stark clarity, adverse health conditions are inextricably connected with poor quality of life while often exacerbating economic hardship.

A recent professional conference of the Association for Schools and Programs in Public Health dedicated over 50% of the three-day agenda to the burgeoning student demand for degrees in global health and spent considerable time discussing concepts, pedagogy, and action plans to meet the interests of both students and employers.

State Plan. The proposed program aligns broadly with all the priorities of the 2022 [Maryland State Plan for Postsecondary Education](#) through access to affordable education, a well-established infrastructure to support student success with a diverse audience, and an innovative, collaborative program to address a critical national and international need. UMD's School of Public Health (SPH) has a rich tradition of retaining and graduating a diverse undergraduate student body. Because Schools of Public Health traditionally focus on the application of research, many first-generation and/or diverse students gravitate toward fields in which there exists a strong expectation that their careers will broadly impact population health both locally and abroad. The SPH's Diverse Student Workforce Initiative provides support for a diverse population of students through academic peer mentoring, engagement of local alumni, and career mentoring infrastructure. As one example, the SPH has been a campus leader in UMD's "badging" initiative (<https://badging.umd.edu/>) to help students create a personalized portfolio of accomplishments that prepares them for a strong launch into their next steps after graduation.

The proposed academic program also aligns with the Strategic Plan's Priority 5, "Maintain the commitment to high-quality postsecondary education in Maryland," in particular, the Action Item to "Identify innovative fields of study." The pandemic showed that the nation and state are not immune to the effects of global health, and that global health requires knowledge and skills in not just one discipline, but several. This program is the result of a collaboration between several UMD academic colleges, not just the School of Public Health (SPHL), but with the Colleges of Agriculture and Natural Resources (AGNR), Arts and Humanities (ARHU), Behavioral and Natural Resources (BSOS), and Computer, Mathematical and Natural Sciences (CMNS), and Information Studies (INFO). This program will produce graduates who are well prepared to meet the challenges to preventing or mitigating the effects of the next pandemic.

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

Global Health as a discipline prepares a workforce that can effectively work with vulnerable populations at local, national, and global levels. Careers for Global Health majors include those familiar to majors in other disciplines of public health, but the focus is on issues that transcend borders, including health education, policymaking, research, and direct service with populations, as well as health systems in local, national, and global communities. As a result, there are a wide range of careers relevant to graduates. They include program evaluators, disaster relief-support technicians, field consultants, international aid workers, foreign service officers, or legislative assistants (explorehealthcareers.org, [Global Health Alliance](http://GlobalHealthAlliance.org)). Industries include government, non-profit, private sector, hospital/healthcare, and academia in agencies such as the Centers for Disease Control, the National Academies, the Council on Foreign Relations, Partners in Health, Bill and Melinda Gates Foundation, and FHI360.

From 2019 to 2020, an overall growth of 13% in the field of Global Health was observed, and there is an estimated 15% projected change in employment for community health workers, compared to a 4% increase in other occupations (bls.gov). A search from the Global Health Council's Job Board (jobboard.globalhealth.org) and devex.org for entry-level positions in global health revealed hundreds of positions, and a search on Indeed.com specifying "global health" resulted in 5,500 current open positions. Recent open positions include Health Officers in Nigeria and Bangladesh, Environmental Health and Safety Consultants in Belgium, and Public Health Officers in Canada. Of the top 20 careers, global health training directly pertains to 11, as ranked using criteria including employment opportunity, work-life balance, job security, and earning potential (careerprofiles.info). Given the increasing demand for trained global health professionals, the Global Health major will develop culturally competent, globally-minded graduates skilled to operate in the global arena.

At steady state, the School of Public Health estimates that the Global Health major will enroll approximately 100 students per year within the first three years of the program. Following this time and contingent upon student interest, the School of Public Health intends to grow the program, contributing to increased SPHL retention and graduation numbers.

D. Reasonableness of Program Duplication

We are unaware of any Global Health degree programs at the undergraduate level in the state. While other globally oriented programs exist at some schools, they are primarily aligned with international affairs, policy, and business contexts and are not focused on global public health. We do not see any duplication of an existing program across the state.

E. Relevance to Historically Black Institutions (HBIs)

There are no Historically Black Institutions within the state of Maryland that offer a Global Health major, and it appears unlikely that the proposed program would adversely affect any existing programs and/or the uniqueness or identity of a Maryland HBI.

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.

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

Curricular Development. The curriculum was developed collaboratively among all of the academic units involved in the delivery of instruction, led by the faculty in the School of Public Health. Of particular interest among the partners are the faculty in the School of Languages, Literatures, and Culture, who will support the World Language requirement in the major, and the Office of International Affairs, who bring expertise on possible international projects and partnerships.

Faculty Oversight. Appendix A includes a list of both tenure-line and clinical faculty who will be the core group overseeing and teaching in the program. As a campus-wide undergraduate program with a broad list of elective courses from which students may choose, we anticipate that there will be numerous other faculty members engaged in curriculum delivery across the campus. All full-time University of Maryland faculty have a terminal degree in their area of expertise.

Educational Objectives and Learning Outcomes. The learning outcomes for the Global Health major are specific and numerous and include the following:

1. Understand the concepts, theoretical frameworks, and analytical methodologies underlying successful and sustainable global health strategies.
2. Understand the scientific bases for infectious disease.
3. Demonstrate beginning and/or intermediate ability in a second language.
4. Demonstrate competence in the development, recognition, and utilization of big data within global health applications.
5. Understand the social and cultural complexities inherent in global collaborations.
6. Demonstrate the ability to establish respectful, trusting relationships with people, communities, and institutions around the globe.
7. Understand globalization and its social and political foundations, with particular emphasis on effects on health and healthcare among populations in distinct locations.
8. Apply a multidisciplinary perspective to the appreciation, understanding, assessment, intervention, and sustainability of strategies designed to effectively address global health issues.
9. Utilize ethical, structurally competent, collaborative approaches to understanding, researching, and contributing to community-supported interventions relevant to global health challenges.
10. Critically analyze the qualitative and quantitative impacts of racism on the prevention, assessment, and treatment of illness around the world.

11. Develop macro and micro strategies to combat racism and proactively promote health equity.
12. Reflect upon what it means to be anti-racist.
13. Demonstrate clear, incisive, verbal, and written communication skills within the context of specific cultures, languages, and sociopolitical systems.
14. Demonstrate proficiency in a variety of electronic and digital media.
15. Recognize and critically evaluate current theories and practices within the discipline of global health.
16. Utilize peer-reviewed literature and apply it to research and formulate effective program planning and evaluation strategies.
17. Apply introductory statistical methodology and big data approaches to solve global health problems.
18. Create and implement successful, novel approaches to global health issues based upon critical evaluations of historical underpinnings and previous challenges.
19. Reflect upon and integrate required academic experiential learning into a deeper understanding of professional and personal responsibility.
20. Understand the interconnected network and the major initiatives and priorities of global health organizations at the local, national, and world levels.
21. Recognize the various roles, responsibilities, and opportunities available throughout the public, private, and nonprofit sectors.
22. Implement a strategy to enhance long-term career development.

Institutional assessment and documentation of learning outcomes. A table with the Learning Outcomes Assessment plan can be found in Appendix D. The table outlines a rubric as to how each of the above learning objectives maps onto the required courses of the major. Outcomes will be evaluated by the Global Health Undergraduate Committee, with guidance and feedback provided by the Provost's Commission on Learning Outcomes Assessment.

Course requirements. The program will require 77-83 credits dedicated to Global Health. Students will take 19-25 credits of supporting courses, some of which will fulfill General Education requirements. Students will also take 40 credits of foundational work in global health, family science, and public health practice. Upper-level requirements include 12 credits of Global Health electives, and six credits of experiential learning that may include a Global Classroom experience or a Study Abroad opportunity and a Global Health field internship. A list of courses and descriptions is included in Appendix B. Courses in the table below that have titles in parentheses are new and are under development, thus not yet in the Undergraduate Catalog.

Course	Title	Credits
Global Health Core Courses (40 Credits)		
SPHL100	Foundations of Public Health	3
FMSC110	Families and Global Health	3
MIEH321	Environmental Determinants of Emerging Infectious Diseases	3
GBHL285	(Introduction to Global Health)	3
EPIB301	Epidemiology for Public Health Practice	3
EPIB315	Biostatistics for Public Health Practice	3
ANTH210	Introduction to Medical Anthropology and Global Health	3
ANTH310	Method & Theory in Medical Anthropology and Global Health	3
HLSA320	(Comparative Global Health Care Delivery Systems)	3
INST420	(Data Applications in Global Health)	3
HLTH230	Introduction to Health Behavior	3
GBHL210	(Careers in Global Health: Understanding the Public, Private, and Non-Profit Sectors)	1
GBHL310	(Introduction to Global Health Literacy)	3
GBHL497	(The Global Health Experience (Capstone))	3
Global Health Supporting Courses (19-25 credits)		
NFSC100	Elements of Nutrition	3
	World Language (Various languages other than English) ¹	6-12
GVPT200	International Political Relations	3
or GVPT282	The Politics of Global Development	
BSCI170	Principles of Molecular & Cellular Biology	3
BSCI171	Principles of Molecular & Cellular Biology Laboratory	1
BSCI213	(Microbiology for Global Health)	3
Global Health Experiential Learning (6 Credits)		
GBHL289	(Global Classroom)	3
GBHL389	(Education Abroad)	3
or GBHL489	(Global Health Field Experience)	
Global Health Option Courses (12 Credits)		12
Total Credits		77-83

¹At least two courses must be taken in the same language. The minimum number of credits for this requirement is 6, but most languages will require more credits (up to 12). Students may test out of this requirement. Students are encouraged to minor in a language.

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 E for how students in the program will fulfill their General Education requirements. The table below represents a sample 4-year plan for the major for a student who also pursues a minor in Spanish.

Accreditation or Certification Requirements. The Global Health major does not carry specific certification or specialized accreditation requirements, but it will be included in the School of Public Health’s accreditation by the Council on Education for Public Health (CEPH) in its next cycle. The SPH was just reaccredited in 2023 for seven years.

Other Institutions or Organizations. The department is not planning to contract with another institution or non-collegiate organization for this program.

Student Support. The Global Health major will be led by the School of Public Health. Educational decisions, including curriculum oversight, pedagogical considerations, learning outcome assessment, mentoring, and internships, will be made by the School of Public Health based upon advisory input from the Global Health Undergraduate Committee composed of SPHL, AGNR, ARHU, BSOS, CMNS, and INFO faculty. The additional representation will include the academic advisors, the Coordinator for Global Health Experiential Learning, the SPHL Assistant Dean for Undergraduate Affairs, the Office of International Affairs and Global Fellows. The committee will be chaired by the Global Health Program Director, who will reside in SPHL and will be responsible for day-to-day operations.

The Global Health Experiential Learning Coordinator plays a critical role in advising and supporting students in integrating international experiences into their Global Health curriculum. With 300 Global Health majors anticipated, the program coordinator plays a key role in expanding international educational experiences for students, increasing outreach efforts, and managing a portfolio of diverse programs. This person will liaise with the Office of International Affairs to optimize their activities based on best practices.

Marketing and Admissions Information. 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 over 100 possible undergraduate majors available to students. We anticipate that about half of the interested students may migrate from the existing very popular undergraduate major in Public Health Science and another 30% coming from other high-enrollment majors across the campus. The budget has been formulated such that this major is not expected to bring new enrollments to the University.

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 our most common partner for transfers. UMD and Montgomery College have developed a transfer articulation pathway with the proposed major and the A.A. in General Studies (focus on Social Sciences, Administration, and Health) at Montgomery College. See Appendix C.

I. Adequacy of Faculty Resources

Program faculty. Appendix A contains a list of faculty members who will be the core members responsible for the delivery of instruction. As noted, due to the multi-disciplinary nature of this program, we anticipate that several other faculty members will also contribute through electives and other course offerings as the program evolves.

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:

Year 1 is based on initial new freshmen enrolling in Fall 2025, with some internal transfer students beginning in Fall 2024.

1. Line 1 reflects the reallocated resources anticipated to support the program. These resources will come from a combination of reallocated central funds and from existing budgets within the participating colleges. For example, in year 1, the provost has committed to providing \$500,000 in support of the program, and the School of Public Health will absorb the remainder.
2. Our model assumes that most students will be full-time undergraduates enrolled at UMD. Currently, within the School of Public Health, over 90% of undergraduate students are full-time. 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:

While Year 1 is based on enrollments beginning in Fall 2025, several key personnel will need to be in place before the start of the program to complete the development of new courses and to begin marketing and advising efforts.

1. The School of Public Health has launched a search for a new senior faculty member who will take a leadership role in the delivery of the program. Additionally, subsequent hires will be made after the successful completion of this first hire.
2. Professional track faculty will be hired as needed over time as the program develops and as enrollments increase.
3. One full-time support staff member will be added to the School of Public Health to complement the SPH's existing infrastructure.
4. Graduate teaching assistants will be added as enrollments increase.
5. Equipment includes computer equipment for new staff.
6. Library resources are sufficient to support the major, with a modest addition to journal subscriptions.
7. No new space is required to support the major, although the establishment of high-quality teaching and research space for the School as a whole is a priority for the University.
8. Operational expenses include marketing and recruitment, faculty release time for course development, and modest travel.

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 evaluation instrument that standardizes course evaluations across campus. The course evaluation 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 School of Public Health has a rich tradition of retaining and graduating a diverse undergraduate student body. Currently, the School is characterized by Black and Hispanic enrollments of 21% and 13%, respectively, both exceeding the University averages and directly contributing to the diversity and inclusion goals defined within the University of Maryland and School of Public Health strategic plans.

The SPH Diverse Undergraduate Workforce Initiative has resulted in specific actions and strategies utilized to recruit, retain, and graduate a diverse student body within SPH. Two full-time staff, together with SPH-funded graduate assistants, are thoroughly engaged in all aspects of this effort. It is additionally supplemented by high-impact collaborations with the SPH Alumni Board, the Center for Academic Success and Achievement, the Career Services staff, and the College of Behavioral and Social Sciences.

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	\$569,813	\$1,953,375	\$2,550,036	\$2,614,380	\$2,687,921
2. Tuition/Fee Revenue (c+g below)	\$0	\$0	\$0	\$0	\$0
a. #FT Students	50	150	300	300	300
b. Annual Tuition/Fee Rate	\$12,769	\$13,152	\$13,547	\$13,953	\$14,372
c. Annual FT Revenue (a x b)	\$638,455	\$1,972,826	\$4,064,021	\$4,185,942	\$4,311,520
d. # PT Students	10	25	30	30	30
e. Credit Hour Rate	\$652	\$672	\$692	\$713	\$734
f. Annual Credit Hours	6	6	6	6	6
g. Total Part Time 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)	\$569,813	\$1,953,375	\$2,550,036	\$2,614,380	\$2,687,921

Table 2: Expenditures

Expenditure Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1. Faculty (b+c below)	\$379,050	\$1,109,054	\$1,272,380	\$1,306,561	\$1,341,768
a. #FTE	3.0	7.5	8.5	8.5	8.5
b. Total Salary	\$285,000	\$833,875	\$956,677	\$982,377	\$1,008,848
c. Total Benefits	\$94,050	\$275,179	\$315,703	\$324,184	\$332,920
2. Admin. Staff (b+c below)	\$96,425	\$99,318	\$204,595	\$203,466	\$209,570
a. #FTE	1.0	1.0	2.0	2.0	2.0
b. Total Salary	\$72,500	\$74,675	\$153,831	\$152,982	\$157,571
c. Total Benefits	\$23,925	\$24,643	\$50,764	\$50,484	\$51,999
3. Total Support Staff (b+c below)	\$0	\$99,318	\$102,297	\$105,366	\$108,527
a. #FTE	0.0	1.0	1.0	1.0	1.0
b. Total Salary	\$0	\$74,675	\$76,915	\$79,223	\$81,599
c. Total Benefits	\$0	\$24,643	\$25,382	\$26,143	\$26,928
4. Graduate Assistants (b+c)	\$44,338	\$593,686	\$940,764	\$968,987	\$998,056
a. #FTE	1.0	13.0	20.0	20.0	20.0
b. Stipend	\$28,100	\$376,259	\$596,226	\$614,113	\$632,536
c. Tuition Remission	\$16,238	\$217,427	\$344,538	\$354,874	\$365,520
5. Equipment	\$10,000	\$17,000	\$5,000	\$5,000	\$5,000
6. Library	\$0	\$5,000	\$5,000	\$5,000	\$5,000
7. New or Renovated Space	\$0	\$0	\$0	\$0	\$0
8. Operational Expenses	\$40,000	\$30,000	\$20,000	\$20,000	\$20,000
TOTAL (Add 1 - 8)	\$569,813	\$1,953,375	\$2,550,036	\$2,614,380	\$2,687,921

Appendix A: Core Faculty for the Global Health Major

Specific instructional responsibilities vary by semester. This list includes the core faculty of the program but numerous other faculty from varying departments also contribute to the elective and supporting courses. All faculty in the list are full-time except for two who contribute their expertise as needed.

Name	Highest Degree Earned, Program, and Institution	UMD Title (indicate if part-time)	Courses
Sylvette La Touche-Howard	Ph.D., Behavioral & Community Health, University of Maryland	Associate Clinical Professor	SPHL100
Elisabeth Fost Maring	Ph.D., Family Science, University of Maryland	Clinical Professor, Family Science	Global Public Health, Education Abroad, College Park Scholars
Amir Sapkota	Ph.D., Environmental Health Sciences, Johns Hopkins University	Professor & Chair, Epidemiology & Biostatistics	GBHL285
Typhanye Dyer	Ph.D., Public Health, UCLA	Associate Professor, Epidemiology & Biostatistics	EPIB301
Jamie Trevitt	Ph.D., Public Health, Johns Hopkins University	Assistant Clinical Professor, Epidemiology & Biostatistics	EPIB315
Andrea Lopez	Ph.D., Anthropology, University of New Mexico	Assistant Professor, Anthropology	ANTH210, Medical Anthropology
Matthew Thomann	Ph.D., Anthropology, American University	Assistant Professor, Anthropology	ANTH310, Medical Anthropology
Negin Fouladi	Ph.D., Health Policy, University of Texas at Houston	Associate Professor, Health Policy & Management	HLSA320
Dina Borzekowski	Ed.D., Human Development & Psychology, Harvard University	Research Professor, Behavioral and Community Health	GBHL420, Director, Global Health Initiative
Zahra Saboori	Ph.D., Behavioral & Community Health, University of Maryland	Lecturer, Behavioral & Community Health	HLTH320
Kristen Stoebenau	Ph.D., Population & Family Health Sciences, Johns Hopkins University	Assistant Research Professor, Behavioral & Community Health	Student mentoring and research opportunities
Babak Fotouhi	Ph.D., Electrical Engineering, McGill University	Assistant Professor, College of Information Studies	INST420

Cynthia Baur	Ph.D., Communication, UC San Diego	Endowed Chair and Director, Horowitz Center for Health Literacy	GBHL310
Michael Bazaco	Ph.D., Epidemiology, University of Pittsburgh	Lecturer (research scholar at the US FDA) (PT)	MIEH321
Muhiuddin Haider	Ph.D., Population Education, University of Michigan	Clinical Professor, Maryland Institute for Applied Environmental Health	Research & Career mentorship
Amy Sapkota	Ph.D., Environmental Health Science, Johns Hopkins University	Professor & Director, Maryland Institute for Applied Environmental Health	Research & Career mentorship
Rianna Murray	Ph.D., Toxicology & Environmental Health, University of Maryland	Assistant Research Professor, Maryland Institute for Applied Environmental Health	Research & Career mentorship
Mona Mittal	Ph.D., Marriage & Family Therapy, Texas Tech University	Associate Professor, Family Science	Research & Career mentorship
Mitch Mokhtari	Ph.D., Economics, University of Houston	Professor, Family Science	Research & Career mentorship
Mariana Falconier	Ph.D., Family Studies, University of Maryland	Associate Professor, Family Science	Research & Career mentorship
Marie Thoma	Ph.D., Population, Family & Reproductive Health, Johns Hopkins University	Associate Professor, Family Science	Research & Career mentorship
Steven Ault	MPH, Ph.D. Entomology & Ecology, University of California	Lecturer, Epidemiology & Biostatistics (PT)	Research & Career mentorship

Appendix B: Course Descriptions

Acronyms at the end of the course name refers to General Education designation.

Global Health Core Courses (40 credits)

SPHL100 Foundations of Public Health (3 credits)

Pre-req: *None*

An overview of the goals, functions, and methods of public health. After an introduction to the core concepts and tools used in public health research and practice, applications of these methodologies are considered in the context of current controversies/problems in public health. Students work together to develop strategies for prevention and control that take into consideration different points of view, outside research, and impacts on individuals and communities.

FMSC110 Families and Global Health (3 credits) DSHS, DVCC Pre-req: *None*

Students will explore, define, and study global health, social determinants of health, health inequalities, gender inequality, family violence, and maternal and child health using a global perspective.

MIEH321 Environmental Determinants of Emerging Infectious Diseases (3 Credits) Pre-req:

Completion or concurrent enrollment in SPHL100

Examines the influences of environmental factors, economic development, migration, and land use changes on emergence and reemergence of infectious diseases. Explores how population growth, development, and climate change impact natural reservoirs of infectious diseases and how they are transmitted through human populations. Includes historical accounts, newly emerging and reemerging diseases.

GBHL285 Introduction to Global Health (3 credits) DVUP Pre-req:

Minimum of C- in SPHL100

Exploration of theoretical frameworks and practical perspectives on issues shaping the global health panorama. Determinants examined through biological and epidemiological; social, cultural, and economic; environmental and geographic; multi-section, legal and institutional perspectives with synopsis of how these issues are addressed by international and community organizations in developing countries.

EPIB301 Epidemiology for Public Health Practice (3 credits) Pre-req:

None

An examination of the discipline of epidemiology and its application to public health issues and practices, covering current epidemiological concepts and methods.

EPIB315 Biostatistics for Public Health Practice (3 credits) FSAR

Pre-req: *C- or better in EPIB301; or completion of or current enrollment in HLTH200*

An examination of biostatistical concepts and procedures as they relate to contemporary issues in public health. Focus on applications, hands-on-experience, and interpretations of

statistical findings in public health research.

ANTH210 Introduction to Medical Anthropology and Global Health (3 credits) DSHS, DVUP

Pre-req: *None*

An introduction to the central concepts in medical anthropology and the anthropology of global health. This course is a survey of anthropological notions of health, disease, and the body in cross-cultural and global contexts, including classic and contemporary texts. It will provide an examination of systems of knowledge and practice regarding illness, healing, and global health inequities.

ANTH310 Method & Theory in Medical Anthropology and Global Health (3 credits) DSSP, DVUP

Pre-req: *ANTH210*

Provides a critical perspective to global health that encompasses key political, economic, and cultural factors associated with the nature and magnitude of global health issues such as HIV/AIDS, tuberculosis, and malaria, paying particular attention to how poverty and inequalities within and between societies has accelerated current global health challenges. Introduces students to how medical anthropologists have contributed to the debates surrounding the globalization of health.

GBHL210 Careers in Global Health: Understanding the Public, Private, and Non-Profit Sectors (1 credit)

Pre-req: *None*

This course is designed to provide students with the information, resources, and skills necessary to make informed career decisions within the field of Global Health throughout their lives.

GBHL310 Introduction to Global Health Literacy (3 credits)

Pre-req: *Oral Communication*

The ability to access, understand, appraise, and use information is critical for the improved health and wellbeing of populations around the world. The Horowitz Center for Health Literacy developed this course to address how population health is affected by politics, culture, geography, and/or social determinants of health. The course will focus on contemporary global health challenges including climate-related disasters and pandemic preparedness. Students will explore and gain skills related to health communication and education.

HLSA320 Comparative Global Health Care Delivery Systems (3 credits)

Pre-req: *SPHL100*

This course addresses health care delivery systems with special emphasis upon relationships among the complex systems impacting human health. Students will engage in project-based learning about the impact of human service systems on a global scale exploring how corporations, multilateral aid, philanthropies, foundations, and private donors affect health

and interventions.

HLTH230 Introduction to Health Behavior (3 credits)

Pre-req.: Restricted to majors or non-majors with less than or equal to 45 credits.

Psychological, social psychological, and sociological approaches to the following health areas: development of health attitudes and behavior, patient-provider interaction, and the organization of health care.

INST420 Data Applications in Global Health (3 credits) Pre-req:

EPIB315

In this course, students will analyze and interpret real-world global health data. The course offers hands-on experience reading datasets, statistical output, and journal articles. This course is for global health students who are already familiar with basic statistical concepts; we will take biostatistics to the next level, exploring reasoning behind use of certain tests and models.

GBHL497 The Global Health Experience (3 credits) DSSP

Pre-req: *None*

Integrating course and field experiences, the Capstone offers Global Health majors an authentic and innovative way to apply competencies and skills. Students will draw from their classroom experiences to design a Capstone project that aligns with their interests and long-term career goals. The Capstone course also connects the students' field-based internship or other applied experiences. Integrating international experiences will be encouraged when possible.

Global Health Supporting Courses (19-25 credits)

NFSC100 Elements of Nutrition (3 credits) DSNS Pre-req:

None

Fundamentals of human nutrition. Nutrient requirements related to changing individual and family needs.

ARHU Language Courses (6-12 credits)

Pre-req: *Dependent on placement assessment or previous enrollment. See ARHU*

Students are required to take at least two language courses and encouraged to engage in a succession of courses in one (1) language.

GVPT200 International Political Relations (3 credits) DSHS, DVUP Pre-req: *None*

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.

GVPT282 Politics in the Developing World (3 credits) DSHS, DVUP Pre-req: *None*

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

developing countries of Africa, the Middle East, Asia, and Latin America.

BSCI170/171 Principles of Molecular & Cellular Biology/Laboratory (4 credits) DSNL Pre-req: *Math Eligibility of MATH120 or higher*

Basic principles of biology with special emphasis on cellular and molecular biology.

Basic laboratory principles of biology with special emphasis on cellular and molecular biology.

BSCI213 Microbiology for Global Health (3 credits) DSNL, SCIS

Pre-req: *BSCI170 and BSCI171*

Genetic principles underlying microbial abilities; microbial structure-function relationships; metabolism, physiology, and ecology of microorganisms; interactions between microorganisms (including pathogens) and their hosts. Special emphasis on global context and infectious disease transmission.

Global Health Experiential Learning (6 credits)

GBHL289 Global Classroom (3 credits)

Global Classrooms are an innovative way to gain international experience, virtually, from wherever students are. Forward-thinking students and faculty from UMD and international peer institutions gain real-world skills while collaborating on global challenges and designing contributive solutions for meaningful impact. GBHL289 will provide a mechanism for Global Classrooms to be developed within the GBHL major, or students may take other Signature Global Classroom courses to fulfill this requirement.

GBHL389 Study Abroad Opportunity (3 credits)

Students will choose from an approved list of Study Abroad courses. Study Abroad opportunities for Global Health Majors are widely available, with over 240 Education Abroad courses that are applicable to this requirement. Opportunities will change over time but will continue to include UMD originated and external opportunities. For example, a UMD originated opportunity is showcased below.

FMSC486 Law, Public Health, and the Cuban Family (4 credits) Summer Session Course. Our travel to Havana allows students a unique opportunity to travel to isolated Cuba and study the socialized systems that govern the Cuban family. Through personal engagement with Cuban leaders and professionals and locals, students will gain first-hand knowledge of the impact on Cuban families of socialized family law, and healthcare and the impacts of economic isolation during the US trade embargo and examine Cuba's promises of equality on family systems. Students will participate in panel discussions and guest lectures with leading Cuban government officials and ministers, medical and legal professionals. In our journey to Cuba students will learn valuable comparative and analytical skills as we immerse ourselves in many personal exchanges.

GBHL489 Global Health Field Internship (3-6 credits)

This independent field-based experience will provide the opportunity for students to work with individual mentors in applied global health, either in the United States or abroad. Students must identify a mentor prior to obtaining departmental permission.

Global Health Option Courses (12 credits)

(Additional GBHL courses are envisioned as future options.)

AASP200 African Civilization (3 credits) DSHU Pre-req:

None

A survey of African civilizations from 4500 B.C. to present. Analysis of traditional social systems. Discussion of the impact of European colonization on these civilizations. Analysis of the influence of traditional African social systems on modern African institutions as well as discussion of contemporary processes of Africanization. A survey of African civilizations from 4500 B.C. to present. Analysis of traditional social systems. Discussion of the impact of European colonization on these civilizations. Analysis of the influence of traditional African social systems on modern African institutions as well as discussion of contemporary processes of Africanization.

AGNR 301/ PLCY301 Sustainability (3 credits) Pre-req:

None

Designed for students whose academic majors would be enhanced by the complementary study of a widely shared but hard-to-operationalize aspiration: that present choices should preserve or improve future options rather than foreclose or degrade them. How should we understand sustainability? How might we achieve it? How would we know if we had achieved it? And how could sustainability activists of a rising generation lead by example?

ANTH265 Anthropology of Global Health (3 credits) DSHS, DVUP, SCIS

Pre-req: *None*

An overview of the growing field of global health including health care systems, medical practices, ideas about illness in cross-cultural contexts, issues of health development, global health inequity, and human rights issues. The course will focus on the history of global health, the critique of major international health agencies and their development paradigms, and the political economy of social inequalities and health.

ANTH472 Medical Anthropology (3 credits) Pre-req:

ANTH360 or departmental permission

An exploration of the cultural, social, economic, and political dimensions of health, disease, and illness. These dimensions will be examined through both the health-seeker's and the care-provider's perspectives.

AREC210 What Happens as Your Food Goes from Farm to Table (3 credits) DSHS, SCIS

Pre-req: *None*

Food supply chains link farms, input providers, traders, food processors, and retailers. We assess how supply chains are organized, how they use technologies, and how they are adapting their organization and technologies to meet the challenges facing the food system and society. The challenges include: 1) Producing enough food to meet a growing global population, while reducing damages to air, water, and soil resources; 2) Meeting the health challenges posed by obesity and food insecurity, while also meeting consumer preferences for how food should be produced; and 3) Doing all this in the face of climate change.

AREC345 Global Poverty and Economic Development (3 credits) DSHS, DVUP

Pre-req: *None*

This interdisciplinary course explores social and economic development around the world.

Topics include geography, democratization, political instability and conflict, health and education, agricultural development, micro-entrepreneurship, and an introduction to impact evaluation methods used to evaluate the efficacy of public policy aimed at alleviating poverty.

AREC365 World Hunger, Population, and Food Supplies (3 credits) DVUP

Pre-req: *None*

An introduction to the problem of world hunger and possible solutions to it. World demand, supply, and distribution of food. Alternatives for leveling off world food demand, increasing the supply of food, and improving its distribution. Environmental limitations to increasing world food production.

COMM382 Essentials of Intercultural Communication (3 credits) DVCC Pre-req: *None*

Introduction of major theories and concepts of intercultural communication; examination of processes that make up cultural differences; and use of intercultural communication competence skills.

ECON175 Inequality: Determinants and Policy Remedies (3 credits) DSHS, SCIS

Pre-req: *None*

History shows that the gap between the rich and the poor has varied over time within and between countries, most recently seeming to increase within many countries while somewhat decreasing between countries. This course challenges students to investigate why people make different amounts of money, why income inequality has changed dramatically in recent years, what public policy tools exist to counter inequality increases, and what different institutional arrangements different countries use to lower inequality. This course will introduce students to theoretical tools used by economists to understand the sources of inequality and will also examine various empirical measures of inequality.

ECON200 Principles of Microeconomics (3 credits) DSHS

Pre-req: *MATH107 or MATH110; or must have math eligibility of MATH113 or higher.*

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.

ECON201 Principles of Macroeconomics (3 credits) DSHS

Pre-req: *MATH107 or MATH110; or must have math eligibility of MATH113 or higher.*

An introduction to how market economies behave at the aggregate level. The determination of national income/output, and the problems of unemployment inflation, will be examined, along with monetary and fiscal policy.

ECON370 Global Economic Policies (3 credits)

Pre-req: *Minimum grade of C- in ECON200 and ECON201.*

Analysis of policy options and debates on fostering economic growth and development in a global economy where national boundaries are no longer relevant. Topics covered will include real loanable funds markets in both local and international contexts during normal conditions and during financial crises, the design of trade and industrial policies, and the role of the World Bank, IMF, WTO, and other international agencies as well as regional and

bilateral trade agreements. Emerging economies will be emphasized.

EPIB330 Introduction to Infectious Disease Epidemiology (3 credits) Pre-req:

EPIB301

Introduces students to the study of infectious disease through the application of epidemiologic methods. Students will review how infectious diseases impact global health, and examine epidemiological concepts related to infectious disease. These concepts include infectious disease transmission, prevention, and control; study design; and outbreak and epidemic investigations. Infectious disease topics of concern to public health professionals will be covered including the COVID-19 pandemic, sexually transmitted infections, foodborne infections, healthcare-acquired infections and neglected tropical diseases, and future trends in the field of infectious diseases.

FGSM350 Critical Regions and International Relations (3 credits) Pre-req: *Must*

be in Global Fellows Program

This course recognizes the importance of regional study within the field of international relations and is designed to examine key challenges. Media reporting on global events often concentrates on the policies and actions of individual countries while underplaying the regional context and the interactions of multiple countries or multilateral institutions. A central focus of this course will be the role of multilateral institutions in relation to critical regions. Thus, this course will look at the wide array of factors influencing global events and dynamics, and the various tools available to foreign policy practitioners to address challenges in such critical regions as the Near East, Central Asia, and Europe.

FGSM360 U.S. Diplomacy and Public Policymaking (3 credits) Pre-req:

Must be in Global Fellows Program

This course will examine how U.S. national security and diplomacy policies and strategy are formulated and executed in a contemporary context. The course will look at the underlying ideological perspectives that tend to shape how U.S. decision makers view foreign policy challenges and opportunities. It will look at the range of tools available to national security practitioners as they work to protect and advance U.S. national interests. The course will also examine the domestic context and process through which decisions about specific foreign policy objectives are set and actions are implemented. Throughout the course, the emphasis will be on the practical understanding and appreciation of how U.S. diplomacy is formulated and pursued. Team-taught by a Foreign Service Officer and a U.S. intelligence officer, the course will seek to build practical skills of students for application in professional experiences in the international arena. Thus, the course will emphasize the development of professional writing, presentation, and policy analysis skills, including through an interagency simulation. The course will also feature guest lecturers from Washington's international policymaking, think tank, media, and NGO communities.

FGSM370 Science Diplomacy: Foreign Policy and Science, Technology, and Innovation (3 credits)

Pre-req: *Must be in Global Fellows Program*

This course will explore the science and technology/foreign policy nexus with specific

sectoral assessments to include energy and climate change, public health, space and innovation, and economic development. Our world is increasingly defined by scientific advancements and technological innovation. Solutions to today's global challenges — in economic growth/poverty reduction, climate change, food security, and health — will rely on developments in science and technology. Science is now a global endeavor. Developing countries are investing heavily in their science and technology infrastructure. The United States and many other countries view S&T as the means to achieve economic goals and to ensure the well-being of their populations. The pursuit of knowledge and technology development relies on national level efforts and extends beyond national jurisdictions. As a result, the links between foreign policy and S&T have never been stronger. Science Diplomacy integrates foreign policy and scientific and technological communities. The U.S. integrates scientific and technological knowledge into our diplomacy to help ensure that our policies are technically sound, programmatically viable, and politically feasible. Students, through expert speakers, presentations, readings, and negotiation exercises, will explore the critical roles scientific knowledge and technological innovation play in the formation and implementation of foreign policy issues.

FGSM380 Responses to Global Challenges: A Practitioner's Perspective (3 credits)

Pre-req: *Must be in Global Fellows Program*

This course will examine global issues and responses primarily from the perspective of the practitioner, as a means of providing students with practical insight into the challenges and crises that exist worldwide. The focus will be on a range of social, humanitarian, and human rights issues set in different global contexts. Class topics may include humanitarian assistance and international humanitarian law, refugees and vulnerable populations, human rights, global health, environmental and human security policy, the role of Congress and the Executive branch, U.S. and U.N. relations, and good governance initiatives. The class will utilize public institution publications and government documents, as well as academic literature, in the readings. Practitioners with experience in the field will share their knowledge and expertise with students and participate in class discussions. Class attendance and active participation is crucial to the course. The guest speakers, representing different organizations, will provide students with a better understanding of the range of possible responses to global challenges. This seminar will also focus on the practical knowledge needed for careers in the international arena.

FGSM390 Water Security and Global Health Challenges (3 credits) Pre-req: *Must*

be in Global Fellows Program

This course will examine water challenges and health threats, the major actors as well as mechanisms and initiatives involved in responding, and the factors that governments need to consider as they develop global water and health strategies. Water scarcity, poor water quality and inadequate sanitation negatively impact food security, health, and livelihood for families across the world. Water and sanitation related diseases remain among the major causes of death in children under five. The inter-connectedness between water and health,

energy, food security, ecosystems, and climate change makes water a key foundation for achieving country-level sustainable development goals.

FMSC280 Global Child and Family Health: Getting There Via E-Communications (3 credits) DSHS, SCIS

Pre-req: *None*

Students will learn about global maternal, child and family health issues and how these issues may affect their lives. Interdisciplinary teams of students will collaborate to develop programs aimed at improving global family health using information and communications technologies.

FMSC310 Maternal, Child, and Family Health (3 credits) Pre-req:

None

Overview of the major issues in Maternal, Child, and Family Health in the U.S. and the world. The course will cover the social, political, environmental, and economic factors that shape the health of women, children, and families throughout the life course. It will employ the core disciplines of public health -- 1) epidemiology/biostatistics, 2) environmental health, 3) health policy and administration, and 4) social and behavioral health -- to examine these factors. The course introduces specific issues and interventions and places these issues and interventions within their broad socio-historical context.

FMSC330 Family Health: Health Happens in Families (3 credits) Pre-req:

None

The objective of this gateway course is to help you understand and apply basic theories and empirical data on family health. The course is designed to provide you with skills to think critically about theories including Life Course Theory, the Bio-Ecological and Social-Ecological Models, and Systems Theory. We will ask questions about the distinct qualities and intersections of contexts and characteristics that impact the functioning of families. We will apply theory and research to topical issues in family health that are impacted by social structures such as conflict, crisis, migration, incarceration, and inequalities.

FMSC383 Health and Human Services Delivery and Evaluation (3 credits) Pre-req:

FMSC330

Processes of service delivery with special emphasis upon relationships among managers, service providers and clients. The impact of human service systems on families.

GEOG140 Natural Disasters: Earthquakes, Floods and Fires (3 credits) DSNS, SCIS

Pre-req: *None*

Catastrophic Environmental Events (CCE) that are becoming more common in this time of global environmental change and it is essential that today's students be equipped with the knowledge and skills to be leaders as we, as a society, understand the upheaval that these CCEs are causing. Students will examine how CCEs shape human society and ecosystem from the interdisciplinary perspective afforded by the field of Geography. Students will use the latest geographic science concepts and techniques in exploring these events. Using satellite imagery they will gain a multi-scale perspective of the ecological and societal aspects of the events.

GEOL120 Environmental Geology (3 credits) DSNS Pre-req:

None

A review of geologic factors underlying many environmental problems and the interactions between population and physical environment: geologic hazards, land-use planning, conservation, mineral resources, waste disposal, land reclamation, and the geologic aspects of health and disease. The course is aimed at lower division students in education and liberal arts and should be useful to any student concerned with geologic perspectives of environmental problems.

GBHL388_ Research Internship in Global Health (1-6 credits) Pre-req:

None

GVPT200 International Political Relations (3 credits) DSHS, DVUP Pre-req: *None*

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. *This course only counts as an option if GVPT282 is taken as a Supporting Course.*

GVPT282 Politics in the Developing World (3 credits) DSHS, DVUP Pre-req: *None*

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 developing countries of Africa, the Middle East, Asia, and Latin America. *This course only counts as an option if GVPT200 is taken as a Supporting Course.*

HLSA484 Redesigning Health Care: Developing a Clinic to Meet Community Needs (3 credits)

Pre-req: *60 credits*

Provides an opportunity for students to learn a key entrepreneurial skill, Design Thinking, while helping to build, reshape, redesign, and transform delivery of health care in the Mona Center, a new community center and clinic in Prince George's County. This new, modern vision for a health and wellness clinic embraces student involvement in designing, planning, and contributing to innovative programs, solutions, and processes to improve the clinic's ability to meet community and patient needs by addressing the social determinants of health as well as traditional clinical health status. Students in the class will develop empathy for patients, providers, and other stakeholders, define problems, select a specific problem for intervention, understand problems based on stakeholder input, ideate, reframe and suggest options to solve or address the problem, prototype solutions, test ideas, and make recommendations to inform implementation and ongoing measurement and monitoring of impact.

HLTH234 Global Health Messages: Understanding Exposure and Impact (3 credits) DSHS, DVCC, SCIS

Pre-req: *None*

Using a global perspective, this course teaches students to be critical consumers of current and historical health communication interventions. It also provides students with the skills to develop media interventions that target specific and general populations. Students will discover the array of diverse media messages that influence the health and well-being of individuals and communities.

HLTH264 Tweets and Likes: Digital Health and Social Media (3 credits) DSHS, SCIS

Pre-req: *None*

Examines the current and potential use of digital health and social media to influence public health. Provides an overview of knowledge, skills, and terminology necessary to optimize the effectiveness of these technologies to contribute to the enhancement of individual and

community health.

HLTH434 Introduction to Public Health Informatics (3 credits) Pre-req:

Minimum of 60 credits

Provides an overview of the field of public health informatics and the influence of technology on the public's health and well-being. Emphasizes the application of various technologies and computer/internet applications to support public health research and practice, including strategies to address new and emerging threats.

HLTH460 Multicultural Population Health (3 credits)

Pre-req: *HLTH140, HLTH230, or HLTH366; or departmental permission*

Health concerns of U.S. ethnic minority groups and factors placing them at elevated risk for disease and injury. Health education concepts and strategies to reduce disparities between their health status and the health status of the general population.

HLTH490 Professional Preparation in Community Health (3 credits)

Pre-req: *BSCI 170/171; BSCI 213; SPHL 100; GBHL 285; EPIB 301 & 315; ANTH 210 & 310; HLTH 230*

The development of skills necessary for joining the public health work force post-graduation, as well as assistance in obtaining an appropriate internship that will serve as a final semester, capstone experience. Students will be exposed to various relevant professional experiences and will be afforded the opportunity to strengthen their own individual skills by selecting from a menu of skills-based learning modules that best suit their perceived needs.

KNES260 Science of Physical Activity and Cardiovascular Health (3 credits) DSNS Pre-req: *None*

Course details (1) the public health importance of and the processes underlying cardiovascular disease, (2) the risk factors for cardiovascular disease and the methods whereby they were identified, and (3) the principles of the scientific evidence supporting the use of physical activity to prevent cardiovascular disease.

NFSC220 Diet: Is it a Cause or a Solution (3 credits) DSSP, SCIS

Pre-req: *None*

If diet is a very straightforward topic; then why and how does this simple matter result in complicated health problems? Diet can provide a simple solution to numerous health issues. So, why do many people fail to follow this seemingly simple solution and still suffer from obesity and other diet-related diseases? Diet is a topic that most people know but few people understand. In addition, diet has become one of the most important lenses for looking at a variety of social, economic, and cultural issues. Since the concept of diet is continuum and has multifaceted aspects, we need to understand it in broad and multidisciplinary perspectives including social, cultural, and economic aspects.

NFSC230 Global Nutrition Sensitive Food Systems (3 credits) Pre-Req:

Recommended NFSC100 and NFSC112

This course will seek to build on the momentum created by these and similar conversations

and initiatives to prepare students and participants to develop global solutions fit for local contexts that bridge the gap between agricultural development and its largely unfulfilled health and nutritional benefits. Our focus will be on Ghana, Africa. The course will be taught online by the faculty from the University of Maryland and Kwame Nkrumah University of Science and Technology (KNUST), Kumasi Ghana.

NFSC425 International Nutrition (3 credits)

Pre-Req: *Must have completed one course in basic nutrition.*

Nutritional status of world population; consequences of malnutrition on health and mental development; and local, national, and international programs for nutritional improvement.

NFSC430 Food Microbiology (3 credits)

Pre-Req: *BSCI223; or permission of instructor*

A study of microorganisms of major importance to the food industry with emphasis on food-borne outbreaks, public health significance, bioprocessing of foods, disease control, and the microbial spoilage of foods.

NFSC470 Community Nutrition (3 credits) DSSP, DVCC Pre-Req:

NFSC315

Perspectives underlying the practice of nutrition services in community settings. Assessment of needs, program planning and evaluation. Programs and strategies to meet nutrition needs outside the acute care setting, such as nutrition education and food assistance. National nutrition policy and federal initiatives in nutrition will be examined. Students will be required to travel to local community nutrition sites during the semester.

NFSC498K Gut Microbiota Health and Metabolic Disease (3 credits) Pre-req: *None*

Analysis of topics related to gut microbiota health, diet and nutrition. An introduction to the gut microbiota and its acquisition; How the microbiome is studied; Techniques for analyzing microbiome data; Gut microbiome changes in obesity and associated comorbidities: liver disease, insulin resistance and diabetes; Links between the microbiota, intestinal immune system, and adipose tissue immune system; Effects of diet on the gut microbiota; Potential of the gut microbiome in treating obesity and related diseases.

PHSC401 History of Public Health (3 credits) Pre-req:

Minimum of 45 credits

Emphasis is on the history of public health in the Western world from antiquity to the present. Also examines the influence of public health developments as they relate to the Western world as well as throughout diverse cultures and societies across the globe. Analysis focuses on the interaction among Western and non-Western cultures with respect to health issues, including science, policies, prevention, and treatment.

PHSC402 Emergency Preparedness (3 credits) Pre-req:

None

Intensive introduction to public health emergency preparedness. Course will provide students with an overview of the role of public health in planning, prevention, preparedness, response,

and recovery from disasters, both manmade and natural.

PHSC410 Public Health Program Planning and Evaluation (3 credits) Pre-req: *None*

Students will become familiar with the dynamics of public health program planning, and the basic process of identifying unmet needs. They will be able to identify different types of program evaluation, including needs assessment, formative research, process evaluation, impact assessment, and cost analysis.

PHSC412 Food, Policy and Public Health (3 credits) Pre-req: *C- or better in HLSA300*

Broad overview of the impact of food and food policy on public health. Course covers topics such as access to food, food systems, influence of food policies on the individual, the cost of food, influences on food selection, food safety risks and responses, nutrition-related health challenges, and a comparison of US food/nutrition issues with those of other nations.

PHSC415 Essentials of Public Health Biology: The Cell, The Individual, and Disease (3 credits)

Pre-req: *C- or better in BSCI202*

Presents the basic scientific and biomedical concepts of modern public health problems and explores in depth mechanisms and models of the major categories of disease. The biologic principles presented are foundations to public health disease prevention, control, or management programs.

PHSC426 Climate Change and Health (3credits) Pre-req:

C- or better in MIEH300

Climate changes pose significant risks to population health by affecting air quality, the availability of safe drinking water, infectious disease transmission, food security, and access to housing, land, and livelihoods. Students examine the relationship between climate change and human health, focusing on how climate change vulnerability varies between populations by geographic, demographic, and socioeconomic characteristics.

PHSC430 Special Topics in Public Health; Public Health in the City: Global and Domestic Perspectives on the Urban Environment (3 credits) DSHS, DVUP, SCIS

Pre-req: *C- or better in BSCI202 and MIEH300*

Exposure to issues related to city habitation and the health of the public, including how the urban environment impacts the lives and health of city dwellers, including discussion of the social determinants of health. Students are encouraged to think about urban health and policy, and to question the current state of urban public health. Issues of race, class, and equality will be discussed throughout the course as they relate to each of these topics.

PLCY213 Foundations of Nonprofit Leadership and Social Innovation (3 credits)

Pre-req: *None*

Through discussions of contemporary trends, challenges and issues, this course provides an introduction to the nonprofit and NGO sectors, social innovation, and the leadership and management skills required to achieve social impact. The course will explore the history, theories, and roles of philanthropy, the nonprofit sector, and social innovation in societies and cultures. Students will be able to demonstrate an understanding of the process and principles of social entrepreneurship and social innovation. Additionally, the course will

introduce students to topics in leadership, social innovation, resource development, community mobilization through networks, the role of policymaking in creating change, project management, and overall strategies for achieving social impact. The course will include mini hands-on learning experiences that allow them to apply key learning outcomes.

PLSC125 Feeding Ten Billion by 2050: Food Security and Crop Production (3 credits) DSNS, SCIS

Pre-req: *None*

An introduction to the global food system and its agricultural, biophysical, and socioeconomic domains. The problems and potentials for increasing world food supply based on current agronomic knowledge. Emphasis on international aspects of food crop production as its interrelationships with people and the environment in the developing world.

PLSC303 Global Food Systems (3 credits) DSNS Pre-req:

BSCI170 and BSCI171

An introduction to the global food system and its agricultural, biophysical, and socioeconomic domains. The problems and potentials for increasing world food supply based on current agronomic knowledge. Emphasis on international aspects of food crop production as its interrelationships with people and the environment in the developing world.

SPHL260 Public Health Beyond Borders (3 Credits)

Pre-req: *None*

The skills learned in this course are intended to engage students in critical thinking prior to a study abroad, global health project, or other international service experience in such a way that adds depth for the student and minimizes unintended negative consequences for local communities. The course is designed in three parts to prepare students to think critically about reciprocity in international service projects and develop scholarship in practice. Community members are viewed as partners, educators, and trusted advisors. Furthermore, since global health projects begin long before the plane lands, money is exchanged, and the first of many plastic bottles of water is purchased, the course begins with broad definitions of key concepts to heighten awareness of unintended consequences of well-meaning volunteers, then leads students through reflection and writing to apply these concepts and provides opportunity to integrate key concepts into plans for projects that serve global communities with cultural competence. Students will explore the needs of global communities, design interventions, and reflect on the potential outcomes in improving health in the communities served, while also focusing on their own subjective experience.

USLT320 Afro-Latinx Diasporas (3 credits) Pre-req:

None

Examines the history of the African diaspora and the Afro-Latinx populations in the United States. Explores transnational migrations, comparative slave systems, labor, community formation, gender, sexuality, popular culture, and the changing meanings of blackness and latinidad.

Appendix C Program Transfer Agreement Pathway with Montgomery College

Program Transfer Agreement Pathway: A.A. in General Studies—Social Sciences, Administration, and Health (SSAH) at Montgomery College to B.S. in Global Health at the University of Maryland, College Park (9/12/23)

Montgomery College A.A. in General Studies: Social Sciences, Administration, and Health (SSAH)						
	Fall Semester			Spring Semester		
	MC Course	UMD Equivalent	Credits	MC Course	UMD Equivalent	Credits
Year 1	ENG101: Introduction to College Writing*	Elective	3	ENGL102: Critical Reading, Writing, and Research (ENGF)	ENGL101	3
	MATH117: Statistics OR MATH150: Elementary Applied Calculus I (MATF)+	Gen Ed FSMA	4	HLTH160: The Science and Theory of Health (BSSD)	Elective	3
	POLI203: International Relations OR POLI256: Politics of the Developing World (BSSD)**	GVPT200 or GVPT282	3	World Language (HUMD)	World Language (100-400)	3
	NUTR101: Introduction to Nutrition (NSND)	NFSC100	3	BIOL150: Principles of Biology I (NSLD)	BSCI170/171	4
	General Education Institutional Requirement (GEIR)	Elective	3	Elective ++	Elective	3
	Total Credits			16	Total Credits	
	Fall Semester			Spring Semester		
	MC Course	UMD Equivalent	Credits	MC Course	UMD Equivalent	Credits
Year 2	Arts Distribution (ARTD)	Elective	3	SSAH Core Course 3>	ECON201 (GPHL Option 1)	3
	HLTH225: Intro to Health Behaviors (SSAH Core Course 1)	HLTH230	3	SSAH Core Course 4>	ECON202 (GBHL Option 2)	3
	HLTH298: Global Health Capstone (SSAH Core Course 2)	GBHL285	3	SSAH Core Course 5	Elective	3
	World Language (GEIR)	World Language (100-400)	3	BIOL210: General Microbiology	BSCI223<>	4
	Elective++	Elective	3			
	Total Credits			15	Total Credits	
Apply to graduate from MC with an Associate of Arts in General Studies: Social Sciences, Administration, and Health (SSAH)						
TOTAL MC credits prior to UMD transfer: 60						

*ENGL101/ENGL011 if needed for ENGL102/ENGL103, or select an elective

**Behavioral and Social Sciences Distribution (BSSD) courses must come from different disciplines

+Students planning to complete BIOL150 at MC may take MATH117 or higher. Students wishing to take the BIOL150 equivalent upon transfer to UMD will need math placement in elementary calculus or higher. Please speak with a program advisor or counselor for more information.

++Any credit hours beyond the minimum General Education credit hours (31) or core courses are counted toward elective credit hours.

>Students can take ECON201 and ECON202 to satisfy SSAH Core Course requirements and UMD GBHL Option requirements.

<> UMD will accept BSCI223 in place of the program requirement BSCI213 for students transferring from MC.

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.

University of Maryland B.S. in Global Health				
	Fall Semester		Spring Semester	
	UMD Course	Credits	UMD Course	Credits
Year 3	ANTH210: Introduction to Medical Anthropology and Global Health (DSHS, DVUP)	3	EPID301: Epidemiology for Public Health Practice	3
	GBHL210: Careers in Global Health—Understanding the Public, Private, and Non-Profit Sectors	1	GBHL310: Introduction to Global Health Literacy	3
	SPHL100: Foundations of Public Health	3	INST420: Data Applications in Global Health	3
	FMSC110: Families and Global Health (DSHS, DVCC)	3	GBHL289: Global Classroom OR GBHL389: Study Abroad	3
	Elective	3	Elective	2
	Elective	3		
Total Credits		16	Total Credits	14
	Fall Semester		Spring Semester	

	UMD Course	Credits	UMD Course	Credits
Year 4	EPIB315: Biostatistics for Public Health Practice (FSAR)	3	GBHL497: The Global Health Experience Capstone (DSSP)	3
	MIEH321: Environmental Determinants of Emerging Infectious Diseases	3	GBHL Option 3 (300-400 level)	3
	GBHL489: Global Health Field Experience	3	GBHL Option 4 (300-400 level)	3
	HLSA320: Comparative Global Health Care Delivery Systems	3	ANTH310: Method and Theory in Medical Anthropology and Global Health	3
	Professional Writing (FSPW)	3	Elective	3
	Total Credits	15	Total Credits	15
<i>Total UMD credits</i>				60

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.

ACCEPTED AND AGREED TO:

MONTGOMERY COLLEGE

By: _____

Dr. Sharon Fletcher, Interim Senior Vice President for Academic Affairs

Date:

UNIVERSITY OF MARYLAND, COLLEGE PARK

By: _____

Dr. Jennifer King Rice, Senior Vice-President and Provost

Date: 9/13/2023

Appendix D: Learning Outcomes Assessment (Page 1 of 3)		Supporting Courses	SPHL100	FMSC110	MIEH321	GBHL285	EPIB301
Learning Outcomes (Black X indicates emphasis) (Red X indicates major emphasis)		AGNR, ARHU, BSOS, CMNS, EDUC, INST	Foundations of Public Health	Families and Global Health	Env. Determinants of Emerging Infectious Diseases	Introduction to Global Health	Epidemiology for Public Health Practice
Knowledge Base							
	Global Health Strategies	X	X	X	X	X	X
	Scientific Bases	X			X	X	X
	Proficiency in Second Language	X					
	Big Data Applications						X
	Social and Cultural Complexities	X	X	X	X	X	
	Relationship Building	X		X			
Critical Thinking Skills							
	Understand Globalization	X		X	X	X	X
	Application of Multidisciplinary Perspective		X	X	X	X	X
	Utilization of Collaborative Approaches	X	X	X	X	X	
Impacts of Racism							
	Analyze impacts of racism in global health	X	X	X		X	
	Develop strategies to combat racism		X	X		X	
	Reflection of anti-racism	X	X	X	X	X	X
Professional Communication Skills							
	Demonstration of Verbal and Written Skills	X	X	X		X	
	Proficiency in Multi-media	X					
Basic Research Skills							
	Critically Evaluate Current Theories	X			X	X	X
	Literature Application	X			X	X	
	Statistical Application						X
	Approach Implementation	X		X	X		
World View							
	Reflection	X		X			
Career Pathways							
	Network Understanding		X				
	Roles and Opportunities						
	Career Development						

Appendix D: Learning Outcomes Assessment (Page 2 of 3)		EPIB315	ANTH210	ANTH310	HLSA320	HLTH230	GBHL210
Learning Outcomes (Black X indicates emphasis) (Red X indicates major emphasis)		Biostatistics for Public Health Practice	Medical Anthropology and Global Health	Method & Theory Medical Anthropology and Global Health	Comparative Global Health Care Delivery Systems	Introduction to Health Behavior	Careers in Global Health
Knowledge Base							
	Global Health Strategies	X	X	X			
	Scientific Bases						
	Proficiency in Second Language						
	Big Data Applications	X					
	Social and Cultural Complexities		X	X	X	X	
	Relationship Building		X	X		X	
Critical Thinking Skills							
	Understand Globalization		X	X	X		
	Application of Multidisciplinary Perspective		X	X	X		
	Utilization of Collaborative Approaches		X	X	X	X	
Impacts of Racism							
	Analyze impacts of racism in global health		X	X			
	Develop strategies to combat racism			X	X	X	
	Reflection of anti-racism		X	X		X	
Professional Communication Skills							
	Demonstration of Verbal and Written Skills		X	X		X	
	Proficiency in Multi-media		X	X			X
Basic Research Skills							
	Critically Evaluate Current Theories		X	X			
	Literature Application		X	X			
	Statistical Application	X					
	Approach Implementation		X	X	X		
World View							
	Reflection		X	X			
Career Pathways							
	Network Understanding			X	X		X
	Roles and Opportunities						X
	Career Development						X

Appendix D: Learning Outcomes Assessment (Page 3 of 3)		GBHL310	INST420	GBHL497	GBHL289_	GBHL389_	GBHL489_
Learning Outcomes (Black X indicates emphasis) (Red X indicates major emphasis)		Introduction to Global Health Literacy	Data Applications in Global Health	The Global Health Experience	Global Classroom	Study Abroad	Global Health Field Internship
Knowledge Base							
	Global Health Strategies		X	X	X	X	X
	Scientific Bases			X			
	Proficiency in Second Language	X					
	Big Data Applications		X				
	Social and Cultural Complexities			X			
	Relationship Building						
Critical Thinking Skills							
	Understand Globalization		X	X	X	X	X
	Application of Multidisciplinary Perspective		X	X	X	X	X
	Utilization of Collaborative Approaches	X	X	X	X	X	X
Impacts of Racism							
	Analyze impacts of racism in global health	X					
	Develop strategies to combat racism	X					
	Reflection of anti-racism	X		X			
Professional Communication Skills							
	Demonstration of Verbal and Written Skills	X		X			
	Proficiency in Multi-media	X		X			
Basic Research Skills							
	Critically Evaluate Current Theories			X			
	Literature Application			X			
	Statistical Application		X				
	Approach Implementation			X			
World View							
	Reflection			X	X	X	X
Career Pathways							
	Network Understanding						
	Roles and Opportunities	X					
	Career Development						

Appendix E: Global Health Four-Year Template – General Education

Requirements	Year 1: Fall	Credit	Year 1: Spring	Credit
Benchmark 1 Requirements BSCI170/171 course must be completed by the end of two semesters into the major.	ENGL101 (AW)	3	FMSC110 (HS,CC)	3
	ANTH210 (HS)	3	SPHL100	3
	BSCI170/171 (NL)	4	ANTH310 (SP,UP)	3
	UNIV100	1	Elective/GenEd (MA)	3
	World Language (100-400)	3-6	World Language (100-400)	3-6
	GBHL210	1		
	<i>Total</i>	<i>15-18</i>		<i>Total</i>
Benchmark 2 Requirements One World Language course must be completed by the end of three semesters into the major. Benchmark 3 Requirements Two World Language courses must be completed by the end of four semesters into the major.	Year 2: Fall	Credit	Year 2: Spring	Credit
	Elective	3	Elective	3
	GBHL285 (UP)	3	NFSC100 (NS)	3
	Oral Communication (OC)	3	EPIB301	3
	BSCI213 (IS)	3	GVPT200/282	3
	Humanities (HU)	3	HLTH230	3
	<i>Total</i>	<i>15</i>		<i>Total</i>
Major Requirements BSCI170/171 requires MATH120 placement. Prerequisite courses must be completed with a C- or higher: BSCI2__ requires completion of BSCI170/171. EPIB315 requires completion of EPIB301.	Year 3: Fall	Credit	Year 3: Spring	Credit
	MIEH321	3	GBHL389_/Study Abroad	3
	EPIB315 (AR)	3	Scholarship and Practice (SP)	3
	GBHL310	3	INST420	3
	GBHL Option (100-400)	3	GBHL Option (100-400)	3
	Humanities (HU/IS)	3	Elective	3
	<i>Total</i>	<i>15</i>		<i>Total</i>
Major Requirements ANTH310 requires completion of ANTH210. It is highly recommended that students complete two courses in the same language. A grade of C- or higher must be earned in all major requirements.	Year 4: Fall	Credit	Year 4: Spring	Credit
	Professional Writing (PW)	3	GBHL497 (SP)	3
	Elective	3	GBHL Option (300-400)	3
	GBHL489	3-6	GBHL Option (300-400)	3
	GBHL289_	3	Elective	3
	HLSA320	3	Elective	3
	<i>Total</i>	<i>15</i>		<i>Total</i>
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 Credits⁴

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
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⁴ I-Series credits may be double-counted with courses taken for the Distributive Studies requirement.

Diversity: 4-6 Credits⁵

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.

The following Student Plan is for students who will [minor](#) in Spanish:

Global Health Four-Year Template – Sample Spanish Minor				
Requirements	Year 1: Fall	Credit	Year 1: Spring	Credit
Benchmark 1 Requirements BSCI170/171 course must be completed by the end of two semesters into the major.	ENGL101 (AW)	3	FMSC110 (HS,CC)	3
	ANTH210 (HS)	3	SPAN203	4
	BSCI170/171 (NL)	4	ANTH310 (SP, UP)	3
	UNIV100	1	Elective/GenEd	3
	SPAN103	4	SPHL100	3
	GBHL210	1		
	<i>Total</i>	16		<i>Total</i>
Benchmark 2 Requirements One World Language course must be completed by the end of three semesters into the major. Benchmark 3 Requirements Two World Language courses must be completed by the end of four semesters into the major.	Year 2: Fall	Credit	Year 2: Spring	Credit
	SPAN204	3	SPAN207 (HU)	3
	GBHL285 (UP)	3	NFSC100 (NS)	3
	Oral Communication (OC)	3	EPIB301	3
	BSCI2__(IS)	4	HLTH230	3
	I-Series	3	GVPT200/282	3
	<i>Total</i>	16		<i>Total</i>
Major Requirements BSCI170/171 requires MATH120 placement. Prerequisite courses must be completed with a C- or higher: BSCI2_requires completion of BSCI 170/171. EPIB315 requires completion of EPIB301.	Year 3: Fall	Credit	Year 3: Spring	Credit
	SPAN301	3	GBHL389_/Study Abroad	3
	EPIB315 (AR)	3	INST420	3
	MIEH321	3	GBHL Option (100-400)	3
	GBHL310	3	SPAN303 (HU)	3
	GBHL Option (100-400)	3	GBHLOption (300-400)	3
	<i>Total</i>	15		<i>Total</i>
Major Requirements ANTH310 requires completion of ANTH210. It is highly recommended that students complete two courses in the same language. A grade of C- or higher must be earned in all major requirements.	Year 4: Fall	Credit	Year 4: Spring	Credit
	Professional Writing (PW)	3	GBHL497 (SP)	3
	SPAN311	3	GBHL Option (300-400)	3
	GBHL489	3-6	SPAN4XX	3
	GBHL289_	3	SPAN33_	3
	HLSA320	3		
	<i>Total</i>	15		<i>Total</i>
TOTAL Credits = 120				

University of Maryland, College Park: Master of Science in Data Science

TOPIC: Academic Program Proposal:
University of Maryland, College Park: Master of Science in Data Science

COMMITTEE: Education Policy and Student Life

DATE OF COMMITTEE MEETING: Wednesday, November 29, 2023

SUMMARY: The Master of Science (MS) in Data Science provides students with the theory and practice of data science, including mathematical and statistical foundations, computational approaches, and communication. In addition to the fundamentals of data science, the program covers data science-relevant probability and statistics, algorithms, big data systems, machine learning, data mining, and analysis of networks. This multidisciplinary program brings together faculty from computer science, applied mathematics, and engineering as it focuses on the science and mathematics of data science. The program consists of 30 credits and will be offered both in-person and online.

UMD has been offering this same program as a Master of Professional Studies (MPS) program in Data Science and Analytics since 2019. The goal of this proposal is to move the existing curriculum out from under the MPS umbrella to create a standalone MS degree program, under the shortened name Data Science. The transition to a 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 Committee recommend that the Board of Regents approve the proposal from the University of Maryland, College Park to offer an M.S. in Data Science.

COMMITTEE RECOMMENDATION:

DATE: November 29, 2023

BOARD ACTION:

DATE:

SUBMITTED BY: Alison M. Wrynn 301-445-1992

awrynn@usmd.edu



UNIVERSITY OF
MARYLAND

OFFICE OF THE PRESIDENT

November 15, 2023

1101 Thomas V. Miller, Jr. Administration Building
College Park, Maryland 20742
301.405.5803 TEL
301.314.9560 FAX

Chancellor Jay A. Perman
University System of Maryland
3300 Metzgerott Road
Adelphi, MD 20783

Dear Chancellor Perman:

I am writing to request approval for a new Master of Science program in Data Science. 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,

A handwritten signature in black ink that reads "Darryll J. Pines".

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

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

University of Maryland, College Park
Institution Submitting Proposal

Data Science
Title of Proposed Program

Master of Science
Award to be Offered

Fall 2024
Projected Implementation Date

070102
Proposed HEGIS Code

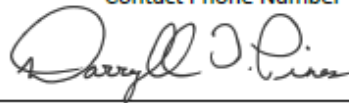
30.7001
Proposed CIP Code

College of Computer, Mathematics and
Natural Sciences
Department in which program will be located

Dr. Michael Cummings
Department Contact

301-405-9903
Contact Phone Number

mcummin1@umd.edu
Contact E-Mail Address



Signature of President or Designee

11-15-2023
Date

A. Centrality to the University's Mission and Planning Priorities

Description. Since 2019, the University of Maryland, College Park has been offering an iteration of its Master of Professional Studies (MPS) in Data Science and Analytics. 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, under the shortened name Data Science. The program curriculum is not changing. 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 an education in the theory and practice of data science including mathematical and statistical foundations, computational approaches, and communication. In addition to the fundamentals of data science, the program covers data science-relevant probability and statistics, algorithms, big data systems, machine learning, data mining, and analysis of networks. The program consists of 30-credit course work and will be offered both in-person and through a fully online modality.

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 explosion of data and computing power has placed data science at the forefront of a much broader wave of new research areas requiring professional training that includes machine learning and immersive media. Data science is a fundamental area and provides a basis for a range of new knowledge and skills that can be broadly applied. UMD is the best place in the Washington, DC metropolitan region for professionals to gain these skills, as our programs rank among the nation's leaders in both [computer science](#) (17th overall) and [applied mathematics](#) (15th overall) graduate education. No school in the region ranks higher than UMD in these areas.

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, DC'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, which has been in existence with viable enrollment levels since 2019.

Institutional Commitment. UMD is committed to leveraging its strengths in technological and mathematical fields to providing highly skilled professionals for the state’s workforce needs. The program has already proven to be successful with increased enrollments each year. 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.* Data science has become pervasive in many fields and industries. As computing power also increases, there is a distinct need for data scientists with a high level of technical skill. This program incorporates statistics, machine learning, computing, communication, and research and project design. Data science has many applications and entire academic programs can be dedicated to a particular field’s analytics, such as business or marketing analytics. This program, however, focuses on the science and math of data science.

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.” This program leverages the strengths of not just one academic department at UMD, but multiple departments—computer science, mathematics, and computer and electrical engineering—so that the program is comprehensive treatment of the technical fields involved in data science. The program combines both expert research faculty and industry leaders to bring students the foundational knowledge and industry expertise necessary to thrive in this field.

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 data scientist positions. The [United States Bureau of Labor Statistics](#) indicates a 35% increase in the next 10 years with more than 59,000 jobs being added. Maryland state [occupational projections](#) show a 30.46% increase from 2020-2030 with more than 700 positions being added. UMD’s existing MPS program currently has 115 students registered this fall term and has increased each year since the program’s inception. Data scientist is just one related occupation. The National Center for Education Statistics indicates via its [CIP SOC Crosswalk](#) that Data Science, General programs (CIP:

30.7001) are directly linked to a variety of occupations: Computer and Information Systems Managers, Natural Sciences Managers, Computer and Information Research Scientists, Database Architects, Software Developers, Statisticians, and Postsecondary Teachers. Beyond this list, having data science skills gives professionals an important competitive edge when we consider the applications of data science in a broad array of fields, such as business, health, entertainment, government and politics.

D. Reasonableness of Program Duplication

With data science becoming such a pervasive activity in so many different fields, it is not surprising that most Maryland institutions already have a master's program in or related to data science or analytics. Capitol Technology University, Johns Hopkins, Loyola, MICA, McDaniel, Morgan State, Notre Dame of Maryland University, UMGC all have Data Science programs listed on the state's inventory. Bowie State and Towson have a specialization in Data Science within their Computer Science master's programs. UMBC also has a professional studies program in Data Science. UMD even has a Survey and Data Science master's program that focuses on survey methodology and data science. Despite all of these existing programs, UMD's MPS program in Data Science and Analytics still has more than 100 registered students. This speaks to the great demand for a skill set that has a wide array of applications. Even in the Washington, DC metropolitan area, where UMD is located, American University, Catholic University, Georgetown, George Washington, and Howard University all have data science or analytics master's program. Again, UMD's program has been thriving in spite of the number of other programs. Our program is different from others and particularly attractive to professionals because of its applied nature and the technical expertise of our computer science, applied mathematics, and engineering faculty. We argue that data science, particularly at the graduate level, has become a core academic area that will only grow in importance not only in terms of demand but also an economic driver for the state and region.

E. Relevance to Historically Black Institutions (HBIs)

As indicated above, Bowie State and Morgan State both have related programs. We argue that data science, particularly at the graduate level, has become a core academic area that will only grow in importance not only in terms of demand, but also as an economic driver for the state and region.

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 so many other institutions in the state offer data science programs.

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

Curricular Development. The factors that were considered in developing the proposed curriculum derive largely from our professional experiences working in areas related to data science, careful

study of other data science curricula at other institutions, and educational/training needs articulated by major employers.

Faculty Oversight. Appendix A includes a list of faculty will be teaching in the program. The faculty come from a variety of technical backgrounds, including electrical engineering, computer engineering, mathematics, biology, computer science, mathematics, and transportation engineering.

Educational Objectives and Learning Outcomes. The learning outcomes for the program are as follows:

1. Design, conduct and interpret data analysis tasks.
2. Communicate data analysis tasks and findings.
3. Apply methods and tools of statistics, machine learning, computer science, to data studies.

Institutional assessment and documentation of learning outcomes. The learning outcomes for the program will be assessed using a combination of formative and summative assessments during and at the completion of each semester. Each course in the program will have homework assignments, practice sets, and other assessments that will be graded with feedback to help assess the student's learning. Midterms and final exams or projects will be cumulative assessments to determine if and to what level the student mastered the learning outcomes for each course.

The assessments will be appropriate to the nature of the course content and the course learning objectives. Both individual assessments and group assessments will be required in the program. This type of variation best mimics the work and industry expectations. The assessments of the program will mirror work products in the industry and prepare students for jobs in industry. For example, many of the elective courses include final projects, presentations and assignments where students have to work with real data sets. Students will be expected to process the data, and perform tasks and make recommendations that are expected of an entry level data scientist or Artificial Intelligence (AI) engineer.

Lastly, students will also be challenged to complete reflective assessments to apply knowledge and skills in their future professional work. This work will assist students in the job search process and enable them to identify, apply to, and earn positions in this field. The assessments will all follow best practices for adult and professional students. As the student progresses through the curriculum and satisfies learning objectives, they will align with and accomplish the program-level learning outcomes.

Course requirements. The program requires the following ten three-credit courses for a total of 30 credits.

Course Number	Course Title	Credits
DATA601	Probability and Statistics	3
DATA602	Principles of Data Science	3

DATA603	Principles of Machine Learning	3
DATA604	Data Representation and Modeling	3
DATA605	Big Data Systems	3
DATA606	Algorithms for Data Science	3
DATA607	Communication in Data Science and Analytics	3
DATA612	Deep Learning	3
DATA641	Natural Language Processing	3
DATA698	Research Methods and Study Design	3

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 computer science, mathematics, and engineering 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

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)	\$3,680,000	\$3,753,600	\$3,828,672	\$3,905,245	\$3,983,350
a. Semester-based Annual Students	115	115	115	115	115
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	\$3,968,000	\$4,047,360	\$4,128,307	\$4,210,873	\$4,295,091

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 115 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

Expenditure Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1. Faculty (b+c below)	\$1,729,000	\$1,780,870	\$1,834,296	\$1,889,325	\$1,946,005
a. #FTE	10.0	10.0	10.0	10.0	10.0
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)	\$105,325	\$108,485	\$111,740	\$115,092	\$118,545
a. #FTE	2.0	2.0	2.0	2.0	2.0
b. Total Salary	\$79,192	\$81,568	\$84,015	\$86,535	\$89,131
c. Total Benefits	\$26,133	\$26,917	\$27,725	\$28,557	\$29,413
3. Total Support Staff (b+c below)	\$103,740	\$106,852	\$110,058	\$113,359	\$116,760
a. #FTE	3.0	3.0	3.0	3.0	3.0
b. Total Salary	\$78,000	\$80,340	\$82,750	\$85,233	\$87,790
c. Total Benefits	\$25,740	\$26,512	\$27,308	\$28,127	\$28,971
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	\$200,000	\$204,000	\$208,080	\$212,242	\$216,486
TOTAL (Add 1 - 8)	\$2,192,565	\$2,259,707	\$2,325,219	\$2,392,654	\$2,462,072

Table 2 Expenditures:

1. Faculty salaries are based on cost per course (some courses will have multiple sections).
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), a program manager (1 FTE), along with other administrative support (1 FTE).
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 evaluation instrument that standardizes course evaluations across campus. The course evaluation 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, DC 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, DC 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.

Appendix A: Faculty for Data Science Program

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
Babak Azimi-Sadjadi	Ph.D., Electrical and Computer Engineering, University of Maryland	Visiting Lecturer	DATA/MSML 603: Principles of Machine Learning
Sandra Cerrai	Ph.D., Mathematics, Scuola Normale Superiore of Pisa	Prof & Assoc Chair	DATA/MSML 601: Probability and Statistics
Michael Cummings	Ph.D., Organismic and Evolutionary Biology, Harvard University	Professor	DATA698: Research Methods and Study Design
Wojtek Czaja	Ph.D., Mathematics, Washington University, St. Louis	Professor	DATA 604: Data Representation and Modeling
Mohammad Taghi Hajiaghayi	Ph.D., Computer Science, MIT	Professor	DATA/MSML 602: Principles of Data Science
Leonid Korolov	Ph.D., Mathematics, SUNY at Stony Brook	Prof & Assoc Chair	DATA/MSML 601: Probability and Statistics
Alejandra Mercado	Ph.D., Electrical and Computer Engineering, University of Maryland	Associate Director	DATA/MSML 603: Principles of Machine Learning
Abdirisak Mohamed	Ph.D. Mathematics, Karlsruhe institute of Technology	Lecturer	DATA 606: Algorithms for Data Structures
Vincent Paul Lyzinski	Ph.D. in Applied Mathematics and Statistics, Johns Hopkins University	Associate Professor	DATA607: Communication in Data Science and Analytics
Arefeh A Nasri	Ph.D., Transportation Engineering, University of Maryland	Visiting Lecturer	DATA/MSML 602: Principles of Data Science
Zoltan Safar	Ph.D., ECE, University of Maryland	Director	DATA/MSML650: Cloud Computing
Giacinto Saggese	Ph.D. ECE, University of Illinois Urbana-Champaign	Lecturer	DATA 605: Big Data Systems
Shabnam Tafreshi	Ph.D., Computer Science, George Washington University	Asst Research Scientist, ARLIS	MSML641- Natural Language Processing
Jerry Wu	Ph.D., RF MEMS, George Washington University	Lecturer	MSML642: Robotics

Appendix B: Course Descriptions

DATA601 Probability and Statistics (3 Credits)

Provides a solid understanding of the fundamental concepts of probability theory and statistics. The course covers the basic probabilistic concepts such as probability space, random variables and vectors, expectation, covariance, correlation, probability distribution functions, etc. Important classes of discrete and continuous random variables, their inter-relation, and relevance to applications are discussed. Conditional probabilities, the Bayes formula, and properties of jointly distributed random variables are covered. Limit theorems, which investigate the behavior of a sum of a large number of random variables, are discussed. The main concepts random processes are then introduced. The latter part of the course concerns the basic problems of mathematical statistics, in particular, point and interval estimation and hypothesis testing.

DATA602 Principles of Data Science (3 Credits)

An introduction to the data science pipeline, i.e., the end-to-end process of going from unstructured, messy data to knowledge and actionable insights. Provides a broad overview of what data science means and systems and tools commonly used for data science, and illustrates the principles of data science through several case studies.

DATA603 Principles of Machine Learning (3 Credits)

A broad introduction to machine learning and statistical pattern recognition. Topics include: 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, PCA, auto-encoders. The course will also discuss recent applications of machine learning, such as computer vision, data mining, autonomous navigation, and speech recognition.

DATA604 Data Representation and Modeling (3 Credits)

An introductory course connecting students to the most recent developments in the field of data science. It covers several fundamental mathematical concepts which form the foundations of Big Data theory. Among the topics included are Principal Component Analysis, metric learning and nearest neighbor search, elementary spectral graph theory, minimum and maximum graph cuts, graph partitions, Laplacian Eigenmaps, manifold learning and dimension reduction concepts, clustering and classification techniques such as k-means, kernel methods, Mercer's theorem, and Support Vector Machines. Some relevant concepts from geometry and topology will be also covered.

DATA605 Big Data Systems (3 Credits)

An overview of data management systems for performing data science on large volumes of data, including relational databases, and NoSQL systems. The topics covered include: different types of data management systems, their pros and cons, how and when to use those systems, and best practices for data modeling.

DATA606 Algorithms for Data Science (3 Credits)

Provides an in-depth understanding of some of the key data structures and algorithms essential for advanced data science. Topics include random sampling, graph algorithms, network science, data streams, and optimization.

DATA607 Communication in Data Science and Analytics (3 Credits)

Expected learning outcomes include that, in the context of data science and analytics, students should be able to: summarize, report, organize prose, statistics, graphics, and presentations; explain uncertainty, sensitivity/robustness, limitations; describe model generation and representation; discuss interpretations and implications; communicate effectively to diverse audiences within a business organization, and possibly other outcomes.

DATA612 Deep Learning (3 Credits)

Provides an introduction to the construction and use of deep neural networks: models that are composed of several layers of nonlinear processing. The class will focus on the main features in deep neural nets structures. Specific topics include backpropagation and its importance to reduce the computational cost of the training of the neural nets, various coding tools available and how they use parallelization, and convolutional neural networks. Additional topics may include autoencoders, variational autoencoders, convolutional neural networks, recurrent and recursive neural

networks, generative adversarial networks, and attention-based models. The concepts introduced will be illustrated by examples of applications chosen among various classification/clustering questions, computer vision, natural language processing.

DATA641 Natural Language Processing (3 Credits)

Introduces fundamental concepts and techniques involved in getting computers to deal more intelligently with human language. Focused primarily on text (as opposed to speech), the class will offer a grounding in core NLP methods for text processing (such as lexical analysis, sequential tagging, syntactic parsing, semantic representations, text classification, unsupervised discovery of latent structure), key ideas in the application of deep learning to language tasks, and consideration of the role of language technology in modern society.

DATA650 Cloud Computing (3 Credits)

Presents the state of the art in cloud computing technologies and applications. Topics will include: telecommunications needs, architectural models for cloud computing, cloud computing platforms and services. Data center networking, server, network and storage virtualization technologies, and containerization. Cloud operating and orchestration systems. Security, privacy, and trust management; resource allocation and quality of service; interoperability and internetworking.

DATA698 Research Methods and Study Design (3 Credits)

Expected learning outcomes include that students should be able to: compose problem specifications relevant to work environment, create project descriptions, determine data and resource requirements, propose appropriate methods analytical methods, construct research plans; determine reporting requirements appropriate to various employment situations, identify intended audiences and uses, propose supporting documentation, and possibly other outcomes. Includes ethical and legal considerations in data science.

University of Maryland, College Park: Master of Science in Applied Machine Learning

TOPIC: Academic Program Proposal:

University of Maryland, College Park: Master of Science in Applied Machine Learning

COMMITTEE: Education Policy and Student Life

DATE OF COMMITTEE MEETING: Wednesday, November 29, 2023

SUMMARY: The Master of Science in Applied Machine Learning will provide students with cutting edge technical course work in machine learning. Students will develop their problem-solving skills in the art and science of processing and extracting information from data, particularly large amounts of data. This multidisciplinary program brings together faculty from computer science, applied mathematics, and engineering as it focuses on learning from data in different applications such as robotics and natural language processing. The program consists of 30 credits and will be offered both in-person and online.

UMD has been offering this same program as a Master of Professional Studies (MPS) program in Machine Learning since 2019. 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, under the revised name of Applied Machine Learning. The transition to a 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 Committee recommend that the Board of Regents approve the proposal from the University of Maryland, College Park to offer an M.S. in Applied Machine Learning.

COMMITTEE RECOMMENDATION:

DATE: November 29, 2023

BOARD ACTION:

DATE:

SUBMITTED BY: Alison M. Wrynn

301-445-1992

awrynn@usmd.edu



UNIVERSITY OF
MARYLAND

OFFICE OF THE PRESIDENT

November 15, 2023

1101 Thomas V. Miller, Jr. Administration Building
College Park, Maryland 20742
301.405.5803 TEL
301.314.9560 FAX

Chancellor Jay A. Perman
University System of Maryland
3300 Metzert Road
Adelphi, MD 20783

Dear Chancellor Perman:

I am writing to request approval for a new Master of Science program in Applied Machine Learning. 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,

A handwritten signature in black ink that reads "Darryll J. Pines".

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

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

University of Maryland, College Park
Institution Submitting Proposal

Applied Machine Learning
Title of Proposed Program

Master of Science
Award to be Offered

Fall 2024
Projected Implementation Date

070103
Proposed HEGIS Code

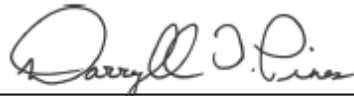
30.7101
Proposed CIP Code

College of Computer, Mathematics and
Natural Sciences
Department in which program will be located

Dr. Amol Deshpande
Department Contact

301-405-2703
Contact Phone Number

amol@umd.edu
Contact E-Mail Address



Signature of President or Designee

11-15-2023
Date

A. Centrality to the University's Mission and Planning Priorities

Description. Since 2019, the University of Maryland, College Park has been offering an iteration of its Master of Professional Studies (MPS) in Machine Learning. 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, under the more apt name Applied Machine Learning. 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 engage students in cutting edge technical course work in machine learning and develop their problem-solving skills in the art and science of processing and extracting information from data with special emphasis on large amounts of data. Students will learn the methods and the techniques of creating models and algorithms that learn from, and make decisions or predictions based on data. Students will apply these tools and techniques to a wide variety of real world problems. Examples of machine learning applications include the way email programs self-learn to distinguish spam from legitimate email, or how intrusion detection systems learn to differentiate between legitimate computer network traffic and malicious cyber-attacks, or how medical detection devices learn to distinguish healthy tissue and flag potentially dangerous tissue, or self-learning to detect stealth attacks in a smart grid; the number of applications of automated data-driven learning is growing at an ever increasing rate.

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." This program focuses on offering advanced education in the field of machine learning and aims to provide the skills and knowledge necessary to become a successful technologist in our information-based society. Its rigorous technical curriculum has been designed to prepare students for careers in information engineering, data science, or data mining engineering. Graduates of this program will be able to apply the learned tools and techniques to a wide variety of real world problems in areas such as marketing, finance, medicine, telecommunications, biology, security, engineering, social networking and information technology.

UMD is the best place in the Washington, DC metropolitan region for professionals to gain these skills, as our programs rank among the nation's leaders in both [computer science](#) (17th overall)

and [applied mathematics](#) (15th overall) graduate education. No school in the region ranks higher than UMD in these areas. Artificial Intelligence (AI) has been an important aspect of Maryland's Computer Science department since the department's creation. Historically, and continuing at present, UMD has had strong groups in computer vision, natural language processing, and game theory. During the last several years, a strong presence has also emerged in two more areas, machine learning and robotics, in part due to intense faculty recruiting efforts supported by the campus administration.

The Electrical and Computer Engineering (ECE) Department offers one of the strongest and most highly-ranked programs in the nation in electrical and computer engineering. The ECE Department covers a wide spectrum of teaching and research activities in the areas of communications and networking, information and signal processing, control, robotics and dynamical systems, computer engineering and electric, electronic and electromagnetic materials, devices and systems.

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, DC'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, which has been in existence with viable enrollment levels since 2019.

Institutional Commitment. UMD is committed to leveraging its strengths in technological and mathematical fields to providing highly skilled professionals for the state's workforce needs. The program has already proven to be successful with increased enrollments each year. 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.* Data science in general has become pervasive in many fields and industries. As computing power also increases, there is a distinct need for data scientists with a high level of technical skill. This program in Applied Machine Learning goes even deeper into the technical aspects of learning from data, such as optimization, robotics, natural language processing, deep

learning, and computer vision. This program is for professionals who already have a computational background but are looking to remain competitive in quickly evolving technical field. 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.

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.” This program leverages the strengths of not just one academic department of UMD, but multiple departments: computer science, mathematics, and computer and electrical engineering. The program will not only train students in high-level technical and computational areas involved machine learning. Taking an industry-oriented approach, the program will not only teach students how to use state-of-the-art tools, but it will provide opportunities for hands-on experimentation and project-based learning.

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. UMD’s existing MPS program currently has 64 students registered this fall term and has increased each year since the program’s inception. Computer and information research is just one related occupation. The National Center for Education Statistics indicates via its [CIP SOC Crosswalk](#) that Data Analytics, General programs (CIP: 30.7101) are directly linked to a variety of occupations: Management Analysts, Computer Programmers, Statisticians, Data Scientists, and Postsecondary Teachers. This particular program is a highly technical program that will significantly enhance a professional’s skills and abilities. This program will qualify graduates for more highly specialized positions.

D. Reasonableness of Program Duplication

There are no master’s programs in the Maryland state institutions that specifically focus on machine learning. Bowie State’s MS in Computer Science has a specialization in Artificial Intelligence/Machine Learning. Morgan State has an Advanced Computing MS program with an Artificial Intelligence area, and Johns Hopkins has an Artificial Intelligence MS program. We believe that the importance of this emerging field to economic development in the state of Maryland, particularly in the Washington, DC metropolitan area, warrants the establishment of this STEM program. We also note that this program already exists as a professional studies program with enrollments increasing each year of its inception.

E. Relevance to Historically Black Institutions (HBIs)

As indicated above, Bowie State and Morgan State both have related programs. In both cases, however, these are specializations within a broader curriculum and a set of core requirements that include other areas that this proposed program will not include in its curriculum, such as cloud computing and network security. These degree programs are geared toward students who would be employed in various areas of computer science. Our degree program is geared toward data-informed or data-driven employment opportunities and emphasizes the interdisciplinary nature of machine learning.

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. First, we 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. Global investment in artificial intelligence has been increasing dramatically every year. We believe that the state should encourage the development of more highly-specialized technical programs in different geographic areas to encourage inclusive economic development in this important field. Moreover, as mentioned above, UMD's computer science department has been working for many years in the area of artificial intelligence.

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

Curricular Development. The curriculum was inspired by similar, already existing programs at Carnegie Mellon University, New York University, and Columbia University. A Machine Learning Advisory Committee was formed from Computer Science and Electrical and Computer Engineering faculty members and the Engineering Telecommunications Staff program staff, and the proposal was put together based on the suggestions and recommendations of the committee.

Faculty Oversight. Appendix A includes a list of faculty will be teaching in the program. The faculty come from a variety of technical backgrounds, including engineering, mathematics, computer science, and mathematics.

Educational Objectives and Learning Outcomes. The learning outcomes for the program are as follows:

1. Students will be able to understand the fundamental concepts of machine learning.
2. Students will be able to explain applied mathematics and statistics necessary for the thorough understanding of machine learning algorithms and methods.
3. Students will be able to implement problem-solving and analytical skills necessary to succeed in industry, including scripting and programming, and will be familiar with state-of-the-art machine learning tools and high-performance computing platforms.
4. Students will be able to demonstrate written and oral communication skills appropriate to engineering professionals.

- Students will be able to work in teams to solve problems.

Institutional assessment and documentation of learning outcomes. The learning outcomes for the program will be assessed using a combination of formative and summative assessments during and at the completion of each semester. Each course in the program will have homework assignments, practice sets, and other assessments that will be graded with feedback to help assess the student’s learning. Midterms and final exams or projects will be cumulative assessments to determine if and to what level the student mastered the learning outcomes for each course.

The assessments will be appropriate to the nature of the course content and the course learning objectives. Both individual assessments and group assessments will be required in the program. This type of variation best mimics the work and industry expectations. The assessments of the program will mirror work products in the industry and prepare students for jobs in industry. For example, many of the elective courses include final projects, presentations and assignments where students have to work with real data sets. Students will be expected to process the data, and perform tasks and make recommendations that are expected of an entry level data scientist/AI engineer.

Lastly, students will also be challenged to complete reflective assessments to apply knowledge and skills in their future professional work. This work will assist students in the job search process and enable them to identify, apply to, and earn positions in this field. The assessments will all follow best practices for adult and professional students. As the student progresses through the curriculum and satisfies learning objectives, they will align with and accomplish the program-level learning outcomes.

Course requirements. The program requires six three-credit courses for a total of 18 credits and twelve credits of electives.

Course Number	Course Title	Credits
MSML601	Probability and Statistics	3
MSML602	Principles of Data Science	3
MSML603	Principles of Machine Learning	3
MSML604	Introduction to Optimization	3
MSML605	Computing Systems for Machine Learning	3
MSML606	Algorithms and Data Structures for Machine Learning	3
Elective Requirement (Choose four of the following 3-credit courses)		12
MSML612	Deep Learning	
MSML640	Computer Vision	
MSML641	Natural Language Processing	
MSML642	Robotics	
MSML650	Cloud Computing	
MSML651	Big Data Analytics	

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 computer science, mathematics, and engineering 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

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)	\$2,048,000	\$2,088,960	\$2,130,739	\$2,173,354	\$2,216,821
a. Semester-based Annual Students	64	64	64	64	64
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	\$2,336,000	\$2,382,720	\$2,430,374	\$2,478,982	\$2,528,562

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 64 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

Expenditure Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1. Faculty (b+c below)	\$691,600	\$712,348	\$733,718	\$755,730	\$778,402
a. #FTE	4.0	4.0	4.0	4.0	4.0
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)	\$69,160	\$71,235	\$73,372	\$75,573	\$77,840
a. #FTE	2.0	2.0	2.0	2.0	2.0
b. Total Salary	\$52,000	\$53,560	\$55,167	\$56,822	\$58,526
c. Total Benefits	\$17,160	\$17,675	\$18,205	\$18,751	\$19,314
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	\$200,000	\$204,000	\$208,080	\$212,242	\$216,486

Table 2 Expenditures:

1. Faculty salaries are based on cost per course (some courses will have multiple sections).
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), a program manager (1 FTE), along with other administrative support (1 FTE).
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 evaluation instrument that standardizes course evaluations across campus. The course evaluation 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, DC 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, DC 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.

Appendix A: Faculty Information- Applied Machine Learning Program

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, University of Maryland, College Park	Visiting Lecturer	DATA/MSML 603: Principles of Machine Learning
Sandra Cerrai	Ph.D., Mathematics, Scuola Normale Superiore of Pisa	Prof & Assoc Chair	DATA/MSML 601: Probability and Statistics
Manoj Franklin	Ph.D., Computer Science, University of Wisconsin- Madison	Associate Professor	MSML 605: Computing Systems for Machine Learning
Mohammad Taghi Hajiaghayi	Ph.D., Computer Science, MIT	Professor	DATA/MSML 602: Principles of Data Science
Leonid Koralov	Ph.D., Mathematics, SUNY at Stony Brook	Prof & Assoc Chair	DATA/MSML 601: Probability and Statistics
Yuntao Liu	Ph.D., Electrical and Computer Engineering, University of Maryland, College Park	Asst Research Scientist	MSML604: Introduction to Optimization
Alejandra Mercado	Ph.D., Electrical and Computer Engineering, University of Maryland, College Park	Associate Director	DATA/MSML 603: Principles of Machine Learning
Arefeh A Nasri	Ph.D., Transportation Engineering, University of Maryland, College Park	Visiting Lecturer	DATA/MSML 602: Principles of Data Science
Paul Rodrigues	Ph.D., Linguistics, Indiana University Bloomington	Visiting Assoc Res Scientist, ARLIS	MSML:651: Big Data Analytics
Zoltan Safar	Ph.D., Electrical and Computer Engineering, University of Maryland, College Park	Director	DATA/MSML650: Cloud Computing
Shabnam Tafreshi	Ph.D., Computer Science, George Washington University	Asst Research Scientist, ARLIS	MSML641- Natural Language Processing

Jerry Wu	Ph.D., Electrical Engineering, George Washington University	Lecturer	MSML642: Robotics
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Appendix B: Course Descriptions

Core courses:

MSML601 Probability and Statistics (3 credits)

Provides a solid understanding of the fundamental concepts of probability theory and statistics. The course covers the basic probabilistic concepts such as probability space, random variables and vectors, expectation, covariance, correlation, probability distribution functions, etc. Important classes of discrete and continuous random variables, their inter-relation, and relevance to applications are discussed. Conditional probabilities, the Bayes formula, and properties of jointly distributed random variables are covered. Limit theorems, which investigate the behavior of a sum of a large number of random variables, are discussed. The main concepts random processes are then introduced. The latter part of the course concerns the basic problems of mathematical statistics, in particular, point and interval estimation and hypothesis testing. Prerequisite: Undergraduate courses in calculus and basic linear algebra.

MSML602 Principles of Data Science (3 credits)

An introduction to the data science pipeline, i.e., the end-to-end process of going from unstructured, messy data to knowledge and actionable insights. Provides a broad overview of what data science means and systems and tools commonly used for data science, and illustrates the principles of data science through several case studies.

Restriction: Must be in one of the following programs: (Data Science Post-Baccalaureate Certificate, Master of Professional Studies in Data Science and Analytics, or Master of Professional Studies in Machine Learning).

MSML603 Principles of Machine Learning (3 credits)

A broad introduction to machine learning and statistical pattern recognition. Topics include: 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, PCA, auto-encoders. The course will also discuss recent applications of machine learning, such as computer vision, data mining, autonomous navigation, and speech recognition. Restriction: Must be in one of the following programs: (Data Science Post-Baccalaureate Certificate, Master of Professional Studies in Data Science and Analytics, or Master of Professional Studies in Machine Learning). Cross-listed with: DATA603, BIOI603, MSQC603. Credit Only Granted for: BIOI603, DATA603, MSML603, MSQC603 or CMSC643. Formerly: CMSC643.

MSML604 Introduction to Optimization (3 credits)

Focuses on recognizing, solving, and analyzing optimization problems. Linear algebra overview: vector spaces and matrices, linear transformations, matrix algebra, projections, similarity transformations, norms, eigen-decomposition and SVD. Convex sets, convex functions, duality theory and optimality conditions. Unconstrained optimization: 1D search, steepest descent, Newton's method, conjugate gradient method, DFP and BFGS methods, stochastic gradient descent. Constrained optimization: projected gradient methods, linear programming, quadratic programming, penalty functions, and interior-point methods. Global search methods: simulated annealing, genetic algorithms, particle swarm optimization. Prerequisite: Undergraduate courses in calculus and basic linear algebra.

MSML605 Computing Systems for Machine Learning (3 credits)

Programming, software and hardware design and implementation issues of computing systems for machine learning. Topics in the programming/software domain will include: basic Python program structure, variables and assignment, built-in data types, flow control, functions and modules; basic I/O, and file operations. Classes, object-oriented programming and exceptions. Regular expressions, database access, network programming and sockets. Introduction to the Numpy, Scipy and Matplotlib libraries. Topics in the hardware domain include computer architecture, CPUs, single- and multi-core architectures, GPUs, memory and I/O systems, persistent storage, and virtual memory. Parallel processing architectures, multiprocessing and cluster processing.

MSML606 Algorithms and Data Structures for Machine Learning (3 credits)

Provides both a broad coverage of basic algorithms and data structures. Topics include sorting, searching, graph and string algorithms; greedy algorithm, branch-and-bound, dynamic programming and job scheduling; Arrays, linked lists,

queues, stacks, and hash tables; Algorithm complexity, best/average/worst case analysis. Applications selected from machine learning problems.

Elective courses:

MSML612 Deep Learning (3 credits)

Provides an introduction to the construction and use of deep neural networks: models that are composed of several layers of nonlinear processing. The class will focus on the main features in deep neural nets structures. Specific topics include backpropagation and its importance to reduce the computational cost of the training of the neural nets, various coding tools available and how they use parallelization, and convolutional neural networks. Additional topics may include autoencoders, variational autoencoders, convolutional neural networks, recurrent and recursive neural networks, generative adversarial networks, and attention-based models. The concepts introduced will be illustrated by examples of applications chosen among various classification/clustering questions, computer vision, natural language processing.

MSML640 Computer Vision (3 Credits)

An introduction to basic concepts and techniques in computer vision. Topics include low-level operations such as image filtering, correlation, edge detection and Fourier analysis. Image segmentation, texture and color analysis. Perspective, cameras and 3D reconstruction of scenes using stereo and structure from motion. Deep learning for object detection, recognition and classification in images and video.

MSML641 Natural Language Processing (3 credits)

Introduces fundamental concepts and techniques involved in getting computers to deal more intelligently with human language. Focused primarily on text (as opposed to speech), the class will offer a grounding in core NLP methods for text processing (such as lexical analysis, sequential tagging, syntactic parsing, semantic representations, text classification, unsupervised discovery of latent structure), key ideas in the application of deep learning to language tasks, and consideration of the role of language technology in modern society.

MSML642 Robotics (3 credits)

This course offers an introduction to the design and programming of robotics systems. Topics include kinematics, differential motion and velocity, dynamics and forces. Sensors, actuators and drive systems. Trajectory planning and motion control systems, open-loop and closed-loop controllers, state estimation and Kalman filters. It will also discuss recent applications of machine learning to motion planning, grasping, manipulation, and related areas.

MSML650 Cloud Computing (3 credits)

Presents the state of the art in cloud computing technologies and applications. Topics will include: telecommunications needs, architectural models for cloud computing, cloud computing platforms and services. Data center networking, server, network and storage virtualization technologies, and containerization. Cloud operating and orchestration systems. Security, privacy, and trust management; resource allocation and quality of service; interoperability and internetworking.

MSML651 Big Data Analytics (3 credits)

The course will focus on the challenges, tools and methods to design and implement machine learning algorithms for very large datasets, and the configuration and operation of distributed computing platforms to execute them. Topics include scalable learning techniques, data streaming and data flow analytics, machine learning on large graphs. Massively parallel computing models such as map-reduce, and techniques to reduce the memory, disk storage and/or communication requirements of parallel machine learning algorithms. SQL and no-SQL database systems, distributed file systems, key-value stores, document databases, graph databases and large dataset visualization.

**d. University of Maryland, College Park: Master of
Science in Bioinformatics and Computational Biology**

TOPIC: Academic Program Proposal:
University of Maryland, College Park: Master of Science in Bioinformatics and
Computational Biology

COMMITTEE: Education Policy and Student Life

DATE OF COMMITTEE MEETING: Wednesday, November 29, 2023

SUMMARY: The Master of Science in Bioinformatics and Computational Biology provides students with the theory and practice in biological problem contexts, mathematical and statistical foundations, computational approaches, communication, and ethical, privacy and legal considerations. In addition to the fundamentals of bioinformatics and computational biology, the program covers relevant probability and statistics, data structures and algorithms, and machine learning. This multidisciplinary program brings together faculty from computer science, applied mathematics, biological sciences, and engineering as it focuses on the science and mathematics of bioinformatics. The program consists of 30 credits and will be offered both in-person and online.

UMD currently offers this program as a Master of Professional Studies (MPS) program in Bioinformatics and Computational Biology. 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 a 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 Committee recommend that the Board of Regents approve the proposal from the University of Maryland, College Park to offer a MS in Bioinformatics and Computational Biology.

COMMITTEE RECOMMENDATION: DATE: November 29, 2023

BOARD ACTION: DATE:

SUBMITTED BY: Alison M. Wrynn 301-445-1992 awrynn@usmd.edu



UNIVERSITY OF
MARYLAND

OFFICE OF THE PRESIDENT

November 15, 2023

1101 Thomas V. Miller, Jr. Administration Building
College Park, Maryland 20742
301.405.5803 TEL
301.314.9560 FAX

Chancellor Jay A. Perman
University System of Maryland
3300 Metzgerott Road
Adelphi, MD 20783

Dear Chancellor Perman:

I am writing to request approval for a new Master of Science program in Bioinformatics and Computational Biology. 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,

A handwritten signature in black ink that reads "Darryll J. Pines".

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

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

University of Maryland, College Park
Institution Submitting Proposal

Bioinformatics and Computational Biology
Title of Proposed Program

Master of Science
Award to be Offered

Fall 2024
Projected Implementation Date

041900
Proposed HEGIS Code

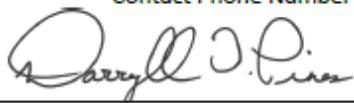
26.1199
Proposed CIP Code

College of Computer, Mathematics and
Natural Sciences
Department in which program will be located

Dr. Michael Cummings
Department Contact

301-405-9903
Contact Phone Number

mcummin1@umd.edu
Contact E-Mail Address



Signature of President or Designee

11-15-2023
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 Bioinformatics and Computational Biology. 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 Bioinformatics and Computational Biology. 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 education in the theory and practice of the major current areas in the field including problem contexts, mathematical and statistical foundations, computational approaches, communication, and ethical, privacy and legal considerations. In addition to the fundamentals of bioinformatics and computational biology, the program covers relevant probability and statistics, data structures and algorithms, and machine learning. Students who successfully complete the MS in Bioinformatics and Computational Biology will be able to identify, choose, describe, explain, and apply bioinformatics and computational biology methods to problems in biology and biomedical research.

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." Bioinformatics and computational biology are critical areas at the nexus of life sciences, computer science, and data science. Maryland is among the top locations in the nation for biomedical research, the home of the National Institutes of Health, and home to numerous pharmaceutical and biotechnology companies. There is a tremendous need for graduate-level training at the local, national, and international levels.

This program will allow UMD to leverage strengths in multiple areas. Our programs rank among the nation's leaders in [computer science](#) (17th overall), [applied mathematics](#) (15th overall), and [biological sciences](#) (68th overall) graduate education. UMD is ranked number three in the country for Bioinformatics and Computational Biology based on objective criteria by [CSRankings.org](#). The [UMD Center for Bioinformatics and Computational Biology](#) is a multidisciplinary research center that enables collaboration among faculty from across the computer, mathematical, and natural sciences. As stated on the Center's website: Research "areas include pathogen genomics,

microbiome research, epigenetics, molecular evolution, transcriptional regulation, metabolic modeling, proteomics, etc. Underlying these activities is a strong focus on fundamental computational research in statistics and machine learning, string algorithms, graph theory, and combinatorial optimization.”

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, DC'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, which has its inaugural class of students this fall.

Institutional Commitment. UMD is committed to leveraging its strengths in technological and mathematical fields to providing 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, DC, area is already one of the top areas in the country for biological sciences and biotechnology organizations. 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, whether they are from a biological background and looking to develop their computational skills, or they from a statistical background looking to move into the realm of biotechnology. 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.

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.” This program leverages the strengths of not just one academic department of UMD, but multiple departments: computer science, mathematics, biological sciences, and computer and

electrical engineering. This program ability to integrate various technical areas will be attractive for federal workers, those in private industry, as well as potential biotechnology entrepreneurs.

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

Specific job data for graduates for this type of degree program are not available since it is a interdisciplinary program that bridges biological sciences with computational science. In looking at related data, we see that the United States Bureau of Labor Statistics indicates that jobs for [biological technicians](#) and [bioengineers](#) are supposed to increase at faster than average rate of about 5%. both National and state projections show a dramatic increase in the number of computer and information research positions. Maryland state [occupational projections](#) show similar rates for biological technicians (5.93) and biomedical engineers (4.35%). We see how much more demand there will be for those with data science skills. The [United States Bureau of Labor Statistics](#) indicates a 23% increase in the next 10 years with more than 8,300 jobs being added for computer and information research scientists. 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 Biomathematics and Bioinformatics programs (CIP: 26.1199) are directly linked to a variety of occupations: Natural Sciences Managers, Mathematicians, and Postsecondary Teachers. This particular program is a highly technical program that will significantly enhance a professional's skills and abilities. This program will qualify graduates for more highly specialized positions.

D. Reasonableness of Program Duplication

Hood College, Johns Hopkins, and Morgan State University each have Master of Science programs in Bioinformatics. Mount Saint Mary's has Biotechnology and Management M.S. University of Maryland, Baltimore has a Clinical Informatics, MS, and University of Maryland Global Campus has an online Biotechnology M.S. with Bioinformatics Specialization. Most of these programs are either clinical focused and or only available in an online or blended space. The UMD program will be available both in person and online with an applied and experiential approach. For students living in the Washington, DC 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.

E. Relevance to Historically Black Institutions (HBIs)

As indicated above, Morgan State has a related program. The UMD program would complement the Morgan State program and provide an opportunity to strengthen the offerings in the state rather than competing. The State of Maryland is seeing tremendous growth in this area and our offering will expand opportunities for state and regional professionals. Morgan State's program is a thesis degree program, whereas the UMD program is a non-thesis program that has much broader topical coverage within bioinformatics and computational biology, and provides a deeper

foundation in data science, machine learning, data structures, and other areas, which are increasingly important in the field.

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. First, we 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, UMD 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, DC.

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

Curricular Development. The proposed curriculum was developed through extensive discussions with the faculty in the aforementioned Center for Bioinformatics and Computational Biology, each of whom has domain science expertise in different areas of the field and extensive collaborative research experience including with non-academic partners. Furthermore, many of our PhD students have been placed in various academic, government and industry settings and we are familiar with the training relevant for those positions.

Faculty Oversight. Appendix A includes a list of faculty will be teaching in the program. Our faculty members come from a variety of technical backgrounds, including engineering, mathematics, biology, computer science, and mathematics.

Educational Objectives and Learning Outcomes. The learning outcomes for the program are as follows:

1. Explain multiple problem-solving methods in bioinformatics and computational biology.
2. Apply bioinformatics and computational biology methods to problems in biology and biomedical research.
3. Interpret and infer results of bioinformatics and computational biology analyses to different audiences.
4. Communicate results of analyses with considerations of ethical, privacy and legal issues.

Institutional assessment and documentation of learning outcomes. The learning outcomes for the program will be assessed using a combination of formative and summative assessments during and at the completion of each semester. Each course in the program will have homework assignments, practice sets, and other assessments that will be graded with feedback to help assess the student's learning. Midterms and final exams or projects will be cumulative assessments to determine if and to what level the student mastered the learning outcomes for each course.

The assessments will be appropriate to the nature of the course content and the course learning objectives. Both individual assessments and group assessments will be required in the program. This type of variation best mimics the work and industry expectations. The assessments of the program will mirror work products in the industry and prepare students for jobs in industry. For example, many of the elective courses include final projects, presentations and assignments where students have to work with real data sets. Students will be expected to process the data, and perform tasks and make recommendations that are expected of an entry level data scientist/AI engineer in the field of bioinformatics and computational biology.

Lastly, students will also be challenged to complete reflective assessments to apply knowledge and skills in their future professional work. This work will assist students in the job search process and enable them to identify, apply to, and earn positions in this field. The assessments will all follow best practices for adult and professional students. As the student progresses through the curriculum and satisfies learning objectives, they will align with and accomplish the program-level learning outcomes.

Course requirements. The program requires nine three-credit courses for a total of 27 credits and one three-credit elective from a short list.

Course Number	Course Title	Credits
BIOI601	Probability and Statistics	3
BIOI602	Principles of Data Science	3
BIOI603	Principles of Machine Learning	3
BIOI604	Principles of Molecular Biology, Genetics, and Genomics	3
BIOI605	Data Sources and Data Management in Bioinformatics	3
BIOI606	Sequence and Alignment	3
BIOI607	Data Structures and Algorithms for Bioinformatics	3
BIOI610	Genome Annotation	3
BIOI611	Analysis of Gene Expression Data	3
Elective Requirement (Choose one of the following 3-credit courses)		3
BIOI621	Genome Assembly and Annotation	
BIOI622	Metagenomics Data Analysis	
BIOI699	Capstone Research	

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 computer science, mathematics, biological sciences, and engineering 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

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 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

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

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 evaluation instrument that standardizes course evaluations across campus. The course evaluation 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, DC 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, DC 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.

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
Stephen Altschul	Ph.D., Mathematics, MIT	Adjunct Professor	BIOI606 Sequence Alignment
Babak Azimi-Sadjadi	Ph.D., Electrical and Computer Engineering, University of Maryland, College Park	Visiting Lecturer	DATA/MSML/BIOI 603: Principles of Machine Learning
Sandra Cerrai	Ph.D., Mathematics, Scuola Normale Superiore of Pisa	Prof & Assoc Chair	DATA/MSML/BIOI 601: Probability and Statistics
Michael Cummings	Ph.D., Organismic and Evolutionary Biology, Harvard University	Professor	BIOI605: Data Sources and Data Management in Bioinformatics
Najib M. El-Sayed	Ph.D., Molecular Parasitology, Yale	Professor	BIOI604: Principles of Molecular Biology, Genetics, and Genomics BIOI610: Genome Annotation
Mohammad Taghi Hajiaghayi	Ph.D., Computer Science, MIT	Professor	DATA/MSML/BIOI 602: Principles of Data Science
Brantley Hall	Ph.D. Genomics, Bioinformatics, and Computational Biology, Virginia Tech	Assistant Professor	BIOI622 Metagenomics Data Analysis
Leonid Koralov	Ph.D., Mathematics, SUNY at Stony Brook	Prof & Assoc Chair	DATA/MSML/BIOI 601: Probability and Statistics
Alejandra Mercado	Ph.D., Electrical and Computer Engineering, University of Maryland, College Park	Associate Director	DATA/MSML/BIOI 603: Principles of Machine Learning
Arefeh A Nasri	Ph.D., Transportation Engineering, University of Maryland, College Park	Visiting Lecturer	DATA/MSML/BIOI 602: Principles of Data Science
Rob Patro	Ph.D., Computer Science, University of Maryland, College Park	Associate Professor	BIOI607 Data Structures and Algorithms for Bioinformatics

			BIOI611 Analysis of Gene Expression Data
Mihai Pop	Ph.D., Computer Science, Johns Hopkins University	Professor	BIOI621 Genome Assembly and Annotation

Appendix B: Course Descriptions

Core Courses

BIOI601 Probability and Statistics (3 Credits)

An introduction to the fundamental concepts of probability theory and statistics. The course covers the basic probabilistic concepts such as probability space, random variables and vectors, expectation, covariance, correlation, probability distribution functions, etc. Important classes of discrete and continuous random variables, their interrelation, and relevance to applications are discussed. Conditional probabilities, the Bayes formula, and properties of jointly distributed random variables are covered. Limit theorems, which investigate the behavior of a sum of random variables, are discussed. The main concepts of random processes are then introduced. The latter part of the course concerns the basic problems of mathematical statistics of point and interval estimation and hypothesis testing.

BIOI602 Principles of Data Science (3 Credits)

An introduction to the data science pipeline, i.e., the end-to-end process of going from unstructured, messy data to knowledge and actionable insights. Provides a broad overview of what data science means and systems and tools commonly used for data science and illustrates the principles of data science through several case studies.

BIOI603 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.

BIO604 Principles of Molecular Biology, Genetics and Genomics (3 credits)

Provides a review of basic concepts in molecular biology, genetics, and genomics. Topics include the following: prokaryotic and eukaryotic genome structure and organization (including 3D architecture); Mendelian genetics, recombination, linkage and linkage disequilibrium, genome-wide association studies; review of genome projects, comparative genomics, genome variation, single nucleotide polymorphisms and genotyping; gene expression and the transcriptome, transcriptional regulation, gene regulatory networks; translation and translational regulation; proteomics approaches; integrative genomics.

BIOI605 Data Sources and Data Management in Bioinformatics (3 credits)

An introduction to the different types of data generated for bioinformatics analyses and data management principles required for scientific rigor and reproducibility. Data sources include, but are not limited to, sequencing data, 'omics data (e.g., proteomics, metabolomics, lipidomics), imaging data, and clinical data. Data organization will cover topics such as management and curation of metadata, downloading data from and submitting data to public repositories, and using databases versus spreadsheets and tables.

BIOI606 Sequence Alignment (3 credits)

In-depth coverage of biological sequence alignment including the following: definitions, algorithms, and statistics for local, global, pairwise, and multiple alignments; scoring schemes; BLAST, BLAST variants, and similar programs; motif finding; and related topics.

BIOI607 Data Structures and Algorithms for Bioinformatics (3 credits)

An introduction to the fundamental data structures and algorithms underlying many parts of Bioinformatics. Standard data structures for efficient indexing and sequence search will be covered, including the suffix array and the FM-index, as will alignment-free methods for sequence comparison. This course will also introduce the fundamental algorithms in computational phylogenomics and biological network analysis. Finally, bioinformatics oriented applications of classic unsupervised learning algorithms (e.g., clustering and dimensionality reduction) and database techniques (e.g.,

sorting, selection, joining) will be examined. The focus will be both on formal understanding of computational efficiency as well as the practical applications of these concepts.

BIOI610 Genome Annotation (3 credits)

An introduction to approaches for the structural and functional annotation of genome content. Topics covered include the following: ab initio gene/coding sequence discovery; signals and signal sensors (including regulatory sequences); non-protein coding genes and other structural features of genome sequences; similarity searches (orthologs, paralogs, xenologs); clustering of genes by sequence similarity; clusters of orthologous genes; phylogenetic classification of genes; gene ontologies, gene set enrichment analyses; next generation sequencing functional assays; integrated genomics circuits; and annotation databases.

BIOI611 Analysis of Gene Expression Data (3 credits)

This course focuses on the analysis of transcriptomics data, and specifically on the analysis of gene and transcript level expression. Material covered includes transcript and gene expression estimation from RNA-seq data (short and long-read), basic experimental design and statistical methods for differential expression analysis, discovery of novel transcripts via reference-guided and de novo assembly, and the analysis of single-cell gene expression data (e.g., single-cell expression quantification, dimensionality reduction, clustering, pseudotime analysis).

Elective courses

BIOI621 Genome Assembly and Annotation (3 credits)

An introduction to the algorithms and tools used to reconstruct genome sequences from shotgun sequencing data and to annotate the resulting sequence. The first part of the course will cover the theoretical underpinnings of core assembly paradigms and discuss the practical use of these paradigms in the context of current sequencing technologies. Also discussed will be approaches for scaffolding the reconstructed sequences along chromosomes using mate-pair and other types of information such as mapping data. An important focus of the course will be on approaches for validating the output of sequence assemblers, also discussing the impact assembly errors can have on downstream analyses such as genome annotation and comparative analyses. The second part of the course will discuss approaches for interpreting sequence annotations in the context of a reconstructed genome, focusing on genome browsers and other visualization and analytical tools and approaches for analyzing and interpreting gene synteny information. A particular focus will be on the impact of repetitive sequences on the quality of genome assemblies and ability to effectively analyze gene synteny and to conduct comparative genomic analyses.

BIOI622 Metagenomics Data Analysis (3 credits)

An introduction to metagenomics, the study of sequence data derived from environmental samples without the cultivation of individual organisms. The course will provide an overview of the entire process of obtaining and analyzing metagenomic data including sample collection, DNA isolation strategies, sequencing strategies, and initial data processing. Additionally, taxonomic analysis, the determination of the identity of organisms within a metagenomic sample and the analysis of whole metagenome shotgun sequencing with metagenomic assembly and functional annotation will be discussed. Diversity metrics used to summarize the ecological structure of microbial communities in terms of richness or distance as well as the visualization of these metrics will be discussed. Finally, methods to identify features that differ between microbial communities will be reviewed.

BIO699 Capstone Research (3 credits)

Provides an opportunity for a more in-depth research experience focusing on an original research project. Expected learning outcomes include that the student should be able to: design and conduct a bioinformatics or computational biology project; place the research in the context of biological problems; develop a written report and other deliverables if applicable.

e. University of Maryland Eastern Shore: Bachelor of Science in Gaming and Software Engineering

TOPIC: Academic Program Proposal:
University of Maryland Eastern Shore: Bachelor of Science in Gaming and Software Engineering

COMMITTEE: Education Policy and Student Life

DATE OF COMMITTEE MEETING: Wednesday, November 29, 2023

SUMMARY: The University of Maryland Eastern Shore (UMES) proposes to establish a new Bachelor of Science in Gaming and Software Engineering (BSGASE) degree. The BSGASE aims to offer prospective students an academic program with strong foundations in simulation technology and practice to meet the needs of technical professionals with more advanced learning in the rapidly developing field of simulation technology and game development. The 124-credit program is intended to produce individuals who are video game software or hardware developers. According to the Maryland Department of Labor Licensing and Regulation (DLLR) website, there is a current need for over 2,700 positions in Maryland with degrees to fill jobs related to game development. Similarly, according to the United States Bureau of Labor Statistics (BLS), currently, there are 2,295,400 positions nationally for persons with an education background, i.e., undergraduate degree, to fill jobs related to game development.

The proposed program will build upon the Accreditation Board for Engineering and Technology, Inc. (ABET) 2023-2024 Criteria for Accrediting Computing programs. It contains courses including Game Design, Game Programming (I&II), Data Structures, 3D Modeling & Simulation, Artificial Intelligence for Game Environment, Computer Architecture, Advanced Programming (OOP), in addition to Senior Projects.

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 Eastern Shore to offer the B.S. in Gaming and Software Engineering.

COMMITTEE RECOMMENDATION:

DATE: November 29, 2023

BOARD ACTION:

DATE:

SUBMITTED BY: Alison M. Wrynn 301-445-1992

awrynn@usmd.edu



UNIVERSITY OF MARYLAND EASTERN SHORE
Office of the President

October 15, 2023

Dr. Jay Perman, Chancellor
University System of Maryland
701 E. Pratt Street
Baltimore, MD 21202

Re: New Program Proposal – BS Gaming and Software Engineering

Dear Dr. Perman:

The University of Maryland Eastern Shore hereby submits a proposal for the approval of a BS degree in Gaming and Software Engineering.

The proposed program would be housed in the School of Business and Technology's Department of Computer Science and Engineering Technology at UMES and will be crucial in preparing engineers to work in various positions related to the gaming industry.

The proposed Bachelor of Science in Gaming and Software Engineering aims to produce the next generation of leaders in software engineering and offer prospective students an academic program with strong foundations in a versatile and dynamic field that blends knowledge across multiple disciplines in the gaming industry. The program's curriculum is devised to harness faculty expertise and experience in various technical areas in the Department of Computer Science and Engineering Technology at UMES. The program, if established, will facilitate and promote students to develop innovative technologies in emerging areas related to gaming that are critical to the economic development of the region and the state.

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

UNIVERSITY SYSTEM OF MARYLAND INSTITUTION PROPOSAL FOR

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

University of Maryland Eastern Shore (UMES)
Institution Submitting Proposal

Bachelor of Science in Gaming and Software Engineering
Title of Proposed Program

Bachelor of Science
Award to be Offered

Fall 2024
Projected Implementation Date

070121
Proposed HEGIS Code

14.0903
Proposed CIP Code

Department of Department of Computer
Science and Engineering Technology
Department in which program will be located

Dr. Derrek Dunn
Department Contact

410-651-6348
Contact Phone Number

ddunn@umes.edu
Contact E-Mail Address



10/15/2023

Signature of President or Designee

Date

Proposal for New Undergraduate Degree Program
Bachelor of Science in Gaming & Software Engineering (BSGASE)
Proposal Executive Summary

The School of Business and Technology at the University of Maryland Eastern Shore (UMES) proposes to establish a **Bachelor of Science in Gaming and Software Engineering (BSGASE)** degree at the University of Maryland Eastern Shore (UMES). The BSGASE aims to offer prospective students an academic program with strong foundations in simulation technology and practice to meet the needs of technical professionals, including those in the Eastern Shore of Maryland with more advanced learning in the rapidly developing field of simulation technology and game development. The program, if approved, will help students develop new technologies in emerging fields related to game development for a wide range of applications, including agriculture, automotive, aerospace, clean energy systems, construction, finance, health care, and hospitality management. It will also prepare them, especially those with disadvantaged backgrounds, with the knowledge and tools necessary to take on leadership roles to shape the future of technology advancement. According to ESA (www.theesa.com), software engineering and computer science primarily support the video game industry. However, it can include artificial intelligence, electrical and electronic engineering, ergonomics, cybernetics, robotics, automation control systems, hardware architecture, and telecommunications. Therefore, the proposed B.S. in Gaming and Software Engineering is designed to allow enrolled to have a solid foundation in computer science and software engineering topics, coupled with advanced classes in various areas of technology, to round out their academic program.

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 proposed Bachelor of Science in Gaming and Software Engineering (BSGASE) degree program comprises 124 credits. The mission of the BSGASE program is to provide students or working professionals with advanced knowledge in the field of simulation technology; to promote innovation and technology development in the emerging field of game development for UMES academic enterprise; and to contribute to the economic growth in the State of Maryland, especially in the Eastern Shore region where learning opportunities in game development is severely lacking.

The objective of the proposed degree program aligns with the mission of UMES. The UMES's mission statement states, "University of Maryland Eastern Shore (UMES), the State's Historically Black 1890 Land-Grant institution, emphasizes baccalaureate and graduate programs in the liberal arts. Keeping with its land-grant mandate, the University's purpose and uniqueness are grounded in distinctive learning, discovery, and engagement opportunities in agriculture, marine and environmental sciences, technology, engineering, aviation sciences, health professions, and hospitality management. Degrees are offered at the bachelor's, master's, and doctoral levels." The establishment of the BSGASE program at UMES will aid it in fulfilling the mission of UMES as a historically black, 1890 land-grant institution and serves to support the university's goal of maintaining its Carnegie Research University classification.

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

Consistent with its mission, UMES seeks to expand its capacity to offer unique and/or critical certificate and degree programs. As such, the University has been working towards the development of a bachelor's program in Gaming and Software Engineering to complement its undergraduate programs in Hospitality and Tourism Management, Engineering Technology with a concentration in Electrical/Electronic Engineering Technology, Computer Science, Engineering with specializations in Electrical and Computer, and Business program which offers Bachelor's Degrees in Accounting, Business Administration, Finance, and Marketing.

The proposed undergraduate program supports the institution's strategic goals. According to the UMES Strategic Plan (<https://wwwcp.umes.edu/president/strategic-plan/>), the proposed undergraduate program will support the following goals:

- *Goal III: Become a leading USM partner in research, innovation, and economic competitiveness, Sub-Goal 3.1 Increase innovation in academic programs and delivery methods and 3.2 Align academic programs, educational centers, and enterprises, and co-curricular activities with workforce development needs.;*
- *Goal IV: Meet the educational needs of the state of Maryland with high-quality and innovative academic programming, Sub-Goal 4.1 Align academic programs with the educational needs of the state of Maryland; and*

- *Goal VI: Achieve and Maintain National Eminence and Global Impact, Sub-Goal 6.1*
Create signature academic programs to prepare students for careers nationally and internationally, and 6.5 Compete for national recognition of academic programs.

The proposed degree program will substantially help the institution achieve its strategic goals listed above and position UMES at the forefront of emerging research in critical areas of computer science. The proposed BSGASE program is expected to enable more robust and multi-disciplinary research collaboration across the campus community, thus fueling research forward in many other disciplines beyond computer science and creating a much broader impact on the entire campus community.

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.

UMES will provide the proposed program with adequate resources, facilities, and faculty, as it currently has for its other Department of Computer Science and Engineering Technology academic programs. Also, the proposed program will receive funding for the HBCU lawsuit settlement to support hiring new faculty for the proposed program.

4. Provide a description of the institution's commitment to:

a) ongoing administrative, financial, and technical support of the proposed program

This degree program is created by leveraging, in part, the existing faculty and staff in the Department of Computer Science and Engineering Technology at UMES. The internal approval procedure for programmatic modification indicates UMES' commitment to ongoing administrative, financial, and technical support of the proposed program. The proposed bachelor's program in Gaming and Software Engineering has been vetted by the faculty in the Department of Computer Science and Engineering Technology, the chairperson for the Department of Computer Science and Engineering Technology, the Dean of the School of Business and Technology, Faculty Assembly Curriculum Committee, UMES Faculty Assembly (institution-wide shared governance body), the Provost and Vice President for Academic Affairs, as well as UMES President - indicating that the institution has affirmed the proposed program. Technical support from UMES Information Technology has been ongoing for several decades, and no change is expected in the established processes for the proposed academic programs needing IT support.

b) continuation of the program for a period of time sufficient to allow enrolled students to complete the program.

UMES is committed to supporting the program with sufficient time for enrolled students to complete the Bachelor of Science in Gaming and Software Engineering degree. To satisfactorily achieve strategic goals and maintain quality and excellence, the continuous support of the Gaming and Software Engineering program (e.g., students) through graduation is essential to the UMES mission and goals.

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

The field of simulation has existed for over seventy-five (75) years as the first simulation game was created around 1947 by Thoams T. Goldsmith Jr. However, due to advances in video technology and

the computational power of computing devices, simulation and game design have increased importance to human society. Simulation as a field is interdisciplinary and can be applied to many applications in such fields as construction, geoprocessing and tracking, predictive systems, finance, and healthcare.

One recent example of simulation application in the healthcare field was understanding the spread of COVID-19. According to Ghaffarzadegan, et al. (2020), the simulation technology was an estimation of the early spread of COVID-19 in Iran and predicted the magnitude of the outbreak.

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

According to the United States Census Bureau, UMES is located in Maryland's Somerset County, among the poorest counties in the state (<https://www.census.gov/quickfacts/somersetcountymaryland>). UMES offers the only undergraduate engineering degree program on the Eastern Shore of Maryland and there is a strong demand for undergraduate education in game development in the region. As such, offering the proposed bachelor's degree program is critical to the local economy's needs.

The need for an undergraduate program in Gaming and Software Engineering on the Eastern Shore region will allow STEM students at secondary institutions to enroll in an undergraduate program which will serve a fast-growing field and hence serve the societal and economic needs of the Eastern Shore of Maryland in particular and the State of Maryland in general.

c) The need to strengthen and expand the capacity of historically black institutions to provide high-quality and unique educational programs

UMES is the only post-secondary institution on the Eastern Shore of Maryland to offer computer science and engineering bachelor's degree programs. The proposed bachelor's program in Gaming and Software Engineering will significantly strengthen and expand the capability of UMES, one of the four HBIs in the state, to provide students with high-quality and unique educational experiences.

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

The proposed bachelor's degree program is well aligned with the 2017-2021 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 bachelor's degree program is intended to prepare highly trained simulation technologists at the undergraduate level with applications in construction, geoprocessing, tracking, predictive systems, finance, and health care which are becoming increasingly important and relevant to our society. However, post-secondary education can present barriers to students' access. The proposed undergraduate degree program will provide equitable access and quality education to all Maryland residents, including those with disadvantaged backgrounds, to develop a strong game development workforce for Maryland.

Success – Promote and implement practices and policies that will ensure student success.

The practices and policies concerning the proposed bachelor's degree program align with all existing policies at the University, which will ensure student success. By providing a carefully developed curriculum, sufficient laboratory facilities, equipment, and adequate faculty members for advising

and teaching, the proposed degree program will help ensure student graduation and successful job placement.

Innovation – Foster innovation in all aspects of Maryland higher education to improve access and student success

Specifically, the proposed bachelor’s degree program aligns with the Innovation of the State Plan goal, which aims to *foster innovation in all aspects of Maryland’s higher education to improve access and student success*. The proposed program will help achieve the purpose of *Economic Growth and Vitality*, which is centered on supporting a knowledge-based economy through increased education and training. The proposed approach is to ensure that Historically Black Institutions (HBIs) are *competitive in terms of programs and infrastructure* with Maryland’s other state institutions. Ultimately, the proposed degree program will prepare highly qualified data scientists and engineers to contribute to Maryland’s economic growth and vitality by providing them with new knowledge and skills in emerging technologies to maintain the skills they need to succeed in the workforce.

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.

It is anticipated that corporations such as Nintendo of America, Sega of America, Microsoft Corporation, and Warner Brother Entertainment Group would be strongly interested in hiring graduates of the proposed program. By leveraging UMES School of Business and Technology’s affiliation with the Advancing Minorities’ Interest in Engineering (AMIE) and its corporate partners, it is expected that graduates of the proposed bachelor’s degree program will lead to entry-level to mid-level technical and management jobs in industry and the government sectors where game development workforce is highly sought.

Our current graduates of the academic programs in the School of Business and Technology are working for various companies from small to large, including Microsoft, General Electric, and Amazon, to name a few. Some work for government sectors such as NASA and the Department of Defense.

Letters of support from industry or governmental organizations that describe potential industry employment opportunities or needs can be found at the [following link](#).

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 the U.S. Video Game Industry’s Economic Impact, published by the Entertainment Software Association (ESA, www.theesa.com), the following are direct impacts of the gaming industry:

- \$121,459 in compensation per worker
- \$90.3 Billion in Economic Output
- Over 143,000 jobs due to the video game industry

Source: <https://www.theesa.com/industries/economic-impact/> (accessed March 11, 2022).

The table below presents the results of ESA analysis of the microfilm database and determined:

Category	# of Establishments	# of Positions (Employment)
Total Video Game Industry	11,247	143,045
Developer	1,518	40,676
Developer/Publisher	86	16,921

Publisher	61	3,633
Interactive Platforms & Media	60	2,263
Hardware	60	27,283
Distribution (Physical)	1,671	5,259
Retail – Brick & Mortar (B&M) and Online	6,0002	39,224
Arcades/Vidoe Gaming Establishments	1,886	6,978
All Other	68	808

Source: TEconomy analysis of 2019 Video Game Industry Microfirm Database.

As the table above demonstrates, there are many career opportunities related to the video game industry; however, the B.S. in Gaming and Software Engineering is intended to produce individuals who are video game software or hardware developers. According to ESA (www.theesa.com), the software and video game developer and publishing components of the industry account for 61,230 jobs (42.8% of video game industry employment), and hardware accounts for 27,283 jobs (19.1% of industry employment).

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.

The Maryland Department of Labor Licensing and Regulation (DLLR) website does not have a specific job category for game development. However, the umbrella categories of computer programmers, software developers, web developers, multimedia artists, and animators represent the field. Therefore, according to the Maryland Department of Labor Licensing and Regulation (DLLR) website, there is a current need for over 2,700 positions in the State of Maryland for a person with an educational background, i.e. graduate degree, to fill jobs related to game development.

Job Title	# of Maryland Positions (2018)	# of Maryland Positions (2028)	Percentage Growth
Computer programmers	4,525	4,341	-4.07 %
Software developers, applications	9,311	11,773	26.44%
Software developers, systems software	13,025	14,762	13.34%
Multimedia artists and animators	1,042	1,095	5.09%
Web developers	2,993	4,420	14.27%

Source: <http://www.dllr.state.md.us/lmi/iandoproj/maryland.shtml> (accessed March 11, 2022).

Also, the United States Bureau of Labor Statistics (USBLS) website does not have a specific job category for Gaming Engineering. However, the umbrella categories of computer programmers, software developers, web developers, multimedia artists, and animators represent the field. Therefore, according to the United States Bureau of Labor Statistics (USBLS) website, currently, there are 2,295,400 positions nationally for persons with an education background, i.e. undergraduate degree, to fill jobs related to Game Development.

Job Title	# of Positions (2020)	# of Positions (2030)	Percentage Growth
Computer programmers	185,700	167,400	-10%

Software developers, applications	1,847,900	2,257,400	22%
Multimedia artists and animators	62,400	72,300	16%
Web developers	199,400	224,900	13%

Source: <https://www.bls.gov/ooh/> (accessed March 11, 2022).

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

The following table presents 2021 Career and Technology Education (CTE) participant enrollment data courses for public secondary institutions in the State of Maryland.

SCED	Course Title	Course Enrollment
10911	Principles of Arts, Media and Communication	772
10912	Interactive Media and Design Level I	456
10913	Interactive Media and Design Level II	242
10914	Interactive Media Portfolio Capstone	135
10951	Introduction to Programming and Applications	210
10952	Advanced Computing Concepts and Information Technologies	45
10970	Foundation of Computer Science	4,216
10971	Computer Science Essentials	4,397
Total		10,473

Source: <https://www.mdctedata.org/dashboards/enrollment.php>

Based on the above number of 2021 CTE participant enrollments in secondary courses similar to the proposed B.S. in Gaming and Software Engineering, the projected supply of prospective students to apply for admission and enroll in the proposed program is estimated to be **20** in the first year with a projection of **10** new students per year for the initial five years of the program’s operation.

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.

As one of the fastest-growing fields of the technology industry and the entertainment industry, the gaming market is worth \$545.98 Billion by 2021-2028 by Fortune Business Insights™ [1]. Meanwhile, the State of Maryland has become the east-coast hub of the gaming and simulation industry. It boasts the largest concentration of computer game developers outside of California, with more than 100 game-development companies and agencies in Maryland. From our research, however, only a few universities and colleges in the State of Maryland currently offer similar game development programs, and most of them provide Associate degrees. The current few Bachelor's programs have different focuses. In addition, these programs are provided in west/north/central of Maryland, and none is provided on the Eastern Shore. At this moment, the University of Maryland Eastern Shore proposes a Bachelor of Science in Gaming and Software Engineering. The program has been carefully designed with four core programming courses and over 15 courses on simulation and game design to prepare students for a computer gaming and simulation career in a prime location for the field.

The table below captures the current institutional name with program title, description, and geographical area as discussed in the requirements.

Institution	Program Title	Description	Geographical Area (w/Delivery Method Assessment)
Bowie State University	Bachelor of Science in Software Engineering	Prepare for a successful and lucrative career with a bachelor’s degree in software engineering. This innovative program exposes students to state-of-the-art technologies for developing complex software applications for business corporations, government systems, mobile systems, web systems, and embedded systems.	The program is offered in Bowie, Maryland, while the proposed program will be offered on the eastern shore of Maryland. The program focuses on “general software engineering,” while our program focuses on “game development engineering.”
Capitol Technology University	Bachelor of Science in Software Engineering	A Bachelor of Science in Software Engineering (BSSE) serves as the foundation for this fulfilling career, offering an all-encompassing education that sets graduates up for success in the tech industry and beyond.	The program is offered in Laurel, Maryland, while the proposed program will be offered on the eastern shore of Maryland. The program focuses on “general software engineering,” while our program focuses on “game development engineering.”
University of Baltimore	Bachelor of Science Simulation and Game Design	The program prepares you for graduate study or a career in information technology, computer science, and business and visual design. It provides two specified areas: Technical Art and Level Design.	The program focuses on “design,” while our program focuses on “game development engineering.”
Old Dominion University	Bachelor of Modeling and Simulation Engineering	The program will prepare students as modeling and simulation engineers of engineering systems with analog and digital hardware components and software aspects at its	The program focuses on “engineering,” while our program focuses on “game development.”

		technical core, with the advantage to extend the knowledge to other engineering and sciences applications.	
University of Maryland Baltimore County	Bachelor of Science in Game Development Track	The track prepares a Computer Science major for technical positions in the game industry. At the same time, it emphasizes fundamentals that will be equally valuable in other types of positions.	The program's core courses are all the computer science B.S. requirement, the elective courses related to game development, according to its online curriculum, are less than 4 courses, while our program provides 6 core courses and 7 elective courses on "simulation and game development."
Montgomery College	Associate Science of Computer Gaming and Simulation	The program provides Interactive technology courses that will help students develop marketable skills for various applications, including vocational interests, earning an associate's degree or certificate, or preparing for an advanced degree at a four-year institution.	<ol style="list-style-type: none"> 1. The program provides an associate degree, while ours is a bachelor's degree. 2. It locates in Rockville, the west of Maryland, while we locate at the Eastern Shore.
Frederick Community College	Associate of Science in Computer & Simulation Development	The program prepares graduates for a career in interactive technology capacities, such as Multimedia Artist, Visual Effects Artist, Interactive Content Designer, Interactive Media Designer, Digital Animator, Graphic Designer, etc. Skills covered include animation, graphics, 3D modeling and simulation, game engines, user interfaces, game scripting, and game programming.	<ol style="list-style-type: none"> 1. The program provides an associate degree, while ours is a bachelor's degree. 2. It locates at the Frederick, the north of Maryland, while we locate at the Eastern Shore.

Howard Community College	Associate Science of Gaming and Simulation Development	The main emphasis in the Gaming and Simulation Development area of study is the development of fundamental principles, conceptual abilities, and technical skills in visual art, game and simulation design, and production, demonstrated in a student's transfer portfolio.	<ol style="list-style-type: none"> 1. The program provides an associate degree, while ours is a bachelor's degree. 2. It locates at the Howard, the center of Maryland, while we locate at the Eastern Shore.
Maryland Institute College of Art	Bachelor of Game Design	The curriculum, which expands upon MICA's successful concentration in-game arts, reflects the multidisciplinary nature of game development and draws upon the College's renowned faculty in interactive arts, illustration, and animation so that students gain an outstanding technical and conceptual skillset in preparation for a career in game design.	The program focuses on game design, while ours focuses on the development
Hagerstown Community College	Associate of Science in Interactive Design and Game Development	It provides students with the skills to design and develop computer games for fun, advertising, education, and simulations. Students can break down complex ideas into a visual medium where they can be seen easily and understandably.	<ol style="list-style-type: none"> 1. The program provides an associate degree, while ours is a bachelor's degree. 2. It locates in the northwest of Maryland, while we locate at the Eastern Shore.
Cecil College	Associate of Science in Simulation Design and Gaming	The Simulation Design and Gaming degree provides high-quality, hands-on, career education in the areas of interactive and 3D	<ol style="list-style-type: none"> 1. The program provides an associate program, while we provide a bachelor's degree.

		design. Students will complete the process of developing 3D animation, visualization, simulation, and interactive experience. The program will prepare students for initial employment, career advancement, and transfer to four-year colleges and universities.	2. It locates in the northeast of Maryland, while we locate at the Eastern Shore of Maryland.
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2. Provide justification for the proposed program.

In the proposed program justification, out of the nine (9) institutions with similar program offerings in the State, no Bachelor’s degree programs or Associate’s degree programs were offered in the same geographical area. Through the methods of experiential learning that have been emphasized, the undergraduate program at the University of Maryland Eastern Shore will be the first Gaming and Software Engineering on the Eastern Shore of the State of Maryland. The offerings will benefit the Eastern Shore community, the State, and the Nation as the geographical area location welcomes the opportunity to promote interdisciplinary teachings, research, and service. Henceforth, as the only current classified R2: Doctoral Universities – high research activity, as of July 2023, in the Eastern Shore region of Maryland, this will support any emerging studies in the same geographical area for advancement at the undergraduate level offerings.

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 uniqueness of the proposed high-demand program at the University of Maryland Eastern Shore is from the standpoint of the first academic program, within the School of Business and Technology to have an interdisciplinary approach that directly impacts the effectiveness of educational program operational efficiency to advance innovation involving HBIs. As a result, the multidisciplinary approach to implementing and maintaining current offerings reveals the need to explore such efforts at underrepresented minority institutions. The program offerings of interdisciplinary efforts at HBIs are not usually considered in previous developments; hence, the challenge in STEM practices encourages learners to be diverse in education and research concepts. According to the table above that identifies the reasonableness of program duplication with other HBCUs, our findings do not present a bachelor-level program with the offering of keyword titles within the State of Maryland. These keywords in the program title include engineering, simulation, data visualization, and game development. This is vital to the education trend in assessing and implementing to maintain high-demand programs at HBIs.

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

1. Discuss the program’s potential impact on the uniqueness and institutional identities and mission of HBIs.

The relevance of the University of Maryland Eastern Shore as a Historically Black 1890 land-grant institution serves a distinctive identity for HBIs in the State of Maryland. As such, the University of Maryland Eastern Shore is the State of Maryland's only Historically 1890 Land-grant with programs unique to the State as a four-year serving institution. The University of Maryland Eastern Shore mentioned the mission of a student-centered, doctoral research degree-granting university known for its nationally accredited undergraduate and graduate programs, applied research, and highly valued graduates: to prepare graduates to address challenges in a global knowledge-based economy while maintaining its commitment to meeting the workforce and economic development needs of the Eastern Shore, the state, the nation, and the world. The proposed program is vital to developing anticipated higher education demands that benefit the University of Maryland Eastern Shore by promoting research, teaching, and service.

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

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

How Was the Proposed Program Established?

The decision to develop an academic proposal in Gaming and Software Engineering was made after a review of the needs of related industries and the lack of diversity at companies in the simulation and gaming area. By implementing the proposed program, UMES will positively impact the diversity of the gaming workforce.

Describe the Faculty Whom Will Oversee the Program

The proposed program will be overseen and supported by full-time and part-time faculty from the Department of Computer Science and Engineering Technology. Details of the contributions of the School of Business and Technology faculty who can make such contributions to the program development and implementation are discussed in a later section of this document.

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

In terms of educational objectives, it is the goal of the proposed program to:

1. Develop independent judgment and sound ethical values in expediting a project without jeopardizing its effectiveness or cost;
2. Demonstrate effective communication of ideas utilizing spoken and written language;
3. Improve the professional technical practice of the game development field through continuing education and community service; and
4. Demonstrate humanistic values and responsibilities that promote active participation as productive citizens.

Regarding learning outcomes, the proposed program will build upon the Accreditation Board for Engineering and Technology, Inc. (ABET) 2023-2024 Criteria for Accrediting Computing programs. Graduates of the program will have the ability to:

- 1) Analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify solutions;
- 2) Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline;
- 3) Communicate effectively in a variety of professional contexts;
- 4) Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles;

- 5) Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline

3. Explain how the institution will:

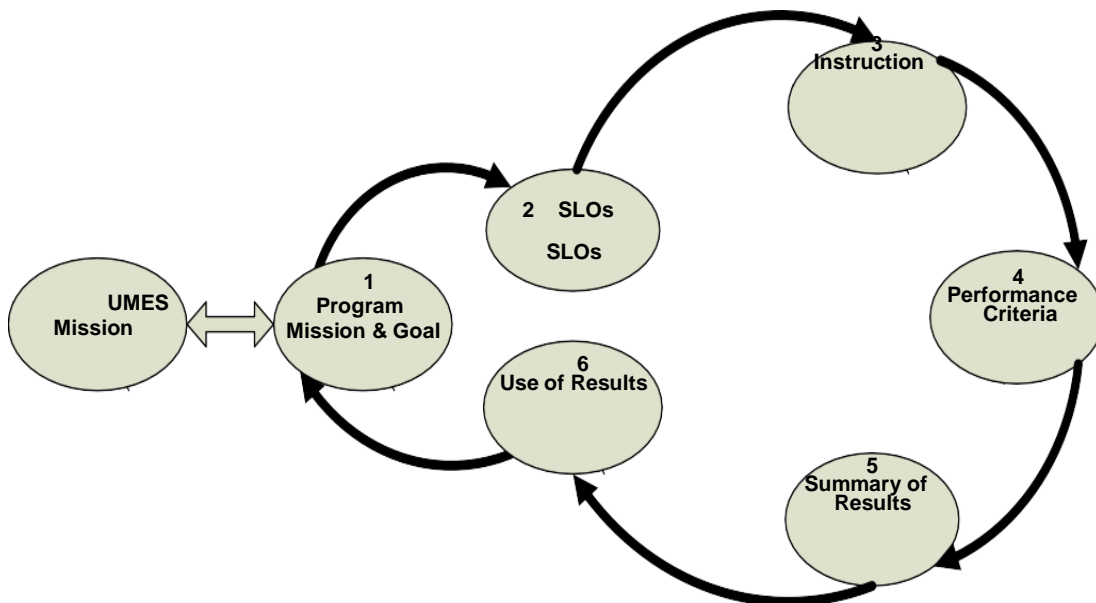
a) provide for assessment of student achievement of learning outcomes in the program

Periodic assessment of the impact of the proposed program will be monitored as part of the institutional assessment process and include an evaluation program operation against budget and enrollment projects with primary benchmarks dictated by the parameters of the semester and academic year. Data on the program's process (enrollment, student-credit-hour production, expenses, and revenue), included in an annual assessment report, will be used to improve the quality and relevance of educational opportunities offered by the School of Business and Technology at UMES. Assessment methods for student achievement of learning outcomes will be based on established school and departmental standards and will include the following:

1. Assess written and oral student presentations, written assignments, and research projects;
2. Evaluate student performance on exams, quizzes, and assignments in required major courses; and
3. Assess comprehensive thesis or research project report by presenting at regional and national conferences.

The Student Learning Outcomes Assessment Process (SLOAP) is the degree program's procedure to determine if the program's mission, objectives, and learning outcomes are being met. It explains the required assessment data to be collected, the frequency, and evaluation methods to be used to examine that the performance criteria, which have been discussed previously and below, are being met.

Student Learning Outcomes Assessment Process (SLOAP)



b) document student achievement of learning outcomes in the program

The proposed program will document student achievement of the learning outcomes similarly to other currently accredited programs in the School of Business and Technology. Assessment Methods based on previously established educational objectives and learning outcomes for the proposed program would include the following:

1. assess written and oral student presentations, written assignments, and research projects;
2. evaluate student performance in exams, quizzes, and assignments in required courses of the program; and
3. Evaluate students through a comprehensive exam and course-based projects.

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

Courses and General Requirements for Degree

All students in the proposed Bachelor of Science in Gaming and Software Engineering program will be required to take **124** semester credit hours, and students must obtain a minimum grade of C for all courses counted towards graduation. Due to the degree program being designed to meet the professional accreditation of ABET, the program requires a higher number of credit hours or requires course work that can not be completed in 120 credit hours per COMAR 13B.02.02.16(B)(1)(c)(ii).

Proposed Course Assigned Program Structure

Part I General Education Requirements

40 Credits

A.	<u>Curriculum Area I (Art and Humanities)</u>			<u>9 Credits</u>	
	<i>Course</i>	<i>No</i>	<i>Title</i>	<i>Credits</i>	
	ARTS	101	Exploration of the Visual Arts	3	
	MUSI	100	Rudiment of Music		3
	Select one course from the following languages.				
	ENGL	203	Fundamentals of Contemporary Speech	3	
	FREN	101	Fundamentals of French I	3	
	SPAN	101	Fundamentals of Spanish I	3	
	CHIN	101	Fundamentals of Chinese I		3
	ARAB	101	Fundamentals of Arabic I		3
	JAPN	101	Fundamentals of Japanese I		3
B.	<u>Curriculum Area II (Social & Behavioral Science)</u>			<u>6 Credits</u>	
	Select one course from each of two categories.				
	Social Sciences: ECON 201/201H, ECON 202/202H, GEOG 201/202, HIST 101/111H, HIST 102/112H, POLI 200/200H, POLI 342, SOCI 101/111H			3	
	Behavioral Sciences: CRJS 101, HUEC 203, HUEDC 220, HUEC 361, PSYC 100, SOCI 201, SOWK 200/200H				3
C.	<u>Curriculum Area III (Physical Sciences)</u>			<u>8 Credits</u>	
	PHYS	121	General College Physics I	3	
	PHYS	123	General College Physics I Laboratory	1	
	PHYS	122	General College Physics II	3	
	PHYS	124	General College Physics II Laboratory	1	
D.	<u>Curriculum Area IV (Mathematics)</u>			<u>4 Credits</u>	
	MATH	112	Calculus I		4
E.	<u>Curriculum Area V (English composition)</u>			<u>9 Credits</u>	
	ENGL	101	Basic Composition I or	3	
	ENGL	101H	Basic Composition I (Honors)	3	
	ENGL	102	Basic composition II or	3	
	ENGL	102	Basic composition II (Honors)	3	
	ENGL	305/W	Technical Writing or	3	
	ENGL	310/W	Advanced Composition	3	
F.	<u>Curriculum Area VI (Emerging Issues)</u>			<u>4 Credits</u>	
	CSDP	101	Intro to Computer Science	1	
	EXSC	111	Personalized Health Fitness	3	
	EDTE	111	Technology and Society	3	

Part II Major Requirements

84 Credits

A.	<u>Core Courses</u>			<u>50 Credits</u>	
	CSDP	221	Introduction to Computer Programming	4	
	CSDP	222	Advanced Programming (OOP)	4	
	GASE	310	Game Programming I	3	
	GASE	320	Game Programming II	3	
	GASE	335	Game Design	3	
	CSDP	250	Data Structures		3

CSDP	351	Computer Architecture	3	
GASE	370	Game Level Design	3	
GASE	381	Computer Graphics for Game Design	3	
CSDP	401	Operating Systems		3
CSDP	450	Algorithms & Data Structures	3	
GASE	460	3D Modeling & Simulation	3	
GASE	470	Game Development & Production		3
GASE	490	Artificial Intelligence for Game Environment	3	
GASE	498	Senior Project I		3
GASE	499	Senior Project II		3
B. <u>Advanced Courses (choose five courses)</u>			<u>15 Credits</u>	
CSDP	305	Software Engineering	3	
CSDP	390	Social, Ethical & Legal Issues in Computer Science		3
GASE	330	Web Application Development	3	
GASE	340	Mobile Application Development I		3
GASE	365	Interactive Narrative	3	
GASE	377	Information Security I	3	
GASE	380	Innovation & Invention	3	
GASE	440	Mobile Application Development II		3
GASE	450	Interactive Game and Audio	3	
GASE	465	Interaction Design		3
GASE	475	Data Visualization		3
GASE	477	Information Security II	3	
GASE	480	Intro to Cloud Computing		3
GASE	481	3D Graphics & Animation		3
C. <u>Mathematics</u>			<u>9 Credits</u>	
MATH	211	Calculus II		4
MATH	232	Introduction to Linear Algebra	3	
MATH	309	Probability and Statistics		3
D. <u>Supportive Mathematics and Science courses</u>			<u>10 Credits</u>	
MATH	210	Elementary Statistics		3
MATH	323	Introduction to Discrete Structures	3	
CHEM	101	General Chemistry I		3
CHEM	103	General Chemistry Laboratory I	1	
			Total: 124 Credits	

Course Descriptions

Part I Computer Science Courses – Current Classes

CSDP 101 Computer Science Orientation

1 Credit

This course is a survey of Computer Science with special emphasis on topics of importance to computer scientists. It also provides an exploration of the skills required and resources available to students majoring in Computer Science. Topics include the nature of problems, hardware, human factors, security, social, ethical, and legal issues, and familiarization with various aspects of computing and networks. This course must be taken by all Computer Science majors and minor students.

CSDP 221 Introduction to Computer Programming

4 Credit

The course, primarily for departmental majors, is designed to introduce the student to computers and programming in a high-level language. Course topics include but are not limited to computer hardware, software, algorithms, programming methodology, and social and ethical implications of computing. The programming language C++ is used to learn input/output, arithmetic computation, control structures, subroutines and functions, string manipulation, arrays, and pointers. Significant emphasis is placed on coding and debugging of programs in the computer laboratory. Prerequisite(s): MATH 109 or MATH 110.

CSDP 222 Advanced Programming

4 Credit

This course covers advanced programming language features, including structured programming, top-down, and object-oriented techniques. Emphasis is placed on team projects and structured walk-throughs. Much of the work in this course involves the construction and debugging of programs that accomplish realistic applications. Prerequisite(s): CSDP 221.

CSDP 250 Data Structures and Algorithms for Simulation Games I

3 Credit

This course covers the properties, implementation, and analysis of data structures and object-oriented programming styles. Topics covered include linked lists, queues, stacks, binary trees, B-trees, graphs, and heaps. Prerequisite(s): CSDP 222.

CSDP 305 Software Engineering

3 Credits

This course introduces methodologies and tools that are useful in software engineering, including structured programming, software charts, sequence selection, and iteration structure charts. The course covers the ethical and social implications of computing, concepts of software design, software module structures, data flow diagrams, system dynamics, engineering system analysis, real-time data flow, and introduction to object orientation and requires written and oral presentations. Computer-Aided Software Engineering (CASE) will be introduced. Prerequisite(s): CSDP 250.

CSDP 351 Computer Architecture

3 Credits

This course covers how computer hardware works, logical aspects of system implementation as seen by the programmer, and what considerations go into the design of a computer and its components. Topics include processor design, instruction set design and addressing; control structures and

microprogramming; memory management, caches, and memory hierarchies; interrupts and I/O structures; and advanced topics. Prerequisite(s): CSDP 301.

CSDP 390 Social, Ethical and Legal Issues in Computer Science 3 Credit

The growth in computer usage and the number of networks in the information age of the 21st century have placed responsibilities on computer scientists to properly use both computers and networks. Issues such as professional, social, ethical, and legal responsibilities, intellectual property, piracy, hacking, internet crimes, viruses, privacy, crime, and civil liberties are addressed. Prerequisite(s): Students must have junior status and have a basic understanding and awareness of computer programming.

CSDP 401 Operating Systems 3 Credits

This course is an introduction to the fundamentals of operating systems. Topics may include interrupts and recovery, inter-process communication and synchronization, process scheduling, deadlock, memory management, virtual memory file systems, scheduling, and distributed systems. Formal principles are illustrated with examples and case studies of one or more contemporary operating systems. Prerequisite(s): CSDP 250 and CSDP 301

CSDP 450 Data Structures and Algorithms for Simulation Games II 3 Credit

This course will focus on the design and analysis of algorithms. Topics include a review of data structures, analysis of algorithms, brute force algorithms, searching techniques, divide-and-conquer, sorting and selection, dynamic programming, graph algorithms, greedy algorithms, P and NP, and coping with NP-completeness. Prerequisites: CSDP 250 and MATH 323.

Part II Gaming and Software Engineering Courses – New Classes

GASE 310 Game Programming I 3 Credits

This course is an introduction to Java™ programming language, one of the most popular game programming languages. Besides the basic concepts, topics also include the software development technique that imposes a hierarchical structure on the design of the programs, the principles of object-oriented programming (OOP), and the programming technique based on objects. Prerequisite: CSDP 222.

GASE 320 Game Programming II 3 Credits

This course introduces game engine scripting, event-driven and data-driven programming. Topics include game engine data structures, basic game-related graphics, and AI concepts. The course also introduces popular industry-standard programming languages such as C#, JavaScript, and HTML5 to write sample game and simulation applications. Prerequisite: GASE 310.

GASE 323 Introduction to Discrete Structures 3 Credits

Topics covered in this course include group, graph, Boolean, propositional, and other algebraic structures through the detailed study of automata and their relationship to formal languages. This course requires teams to create relatively large application programs. Prerequisite(s): CSDP 222.

GASE 330 Web Application and Implementation 3 Credits

This course allows students to explore the design and development of media-rich web applications that utilize static and procedurally manipulated media such as text, images, and audio. Topics include client and server-side web development and features, framework characteristics, information management, presentation, interactivity, persistence, and data binding. Prerequisite: GASE 310.

GASE 335 Game Design

3 Credits

In this course, students will understand what defines a “game” as well as the mechanics and rules behind different types of games. Topics include gameplay, game mechanics, game interface, the player-centric approach, and the game development process. Students learn to develop games utilizing industry-standard software. Prerequisite: GASE 310.

GASE 340 Mobile Application Development I

3 Credits

This is an introductory course for iOS mobile application development using the Swift language in the Xcode platform. Topics include the basic concepts of designing intuitive and usable interfaces, data types, control structures, functions, arrays, and the mechanics of running, testing, and debugging applications. Prerequisite: CSDP 222.

GASE 365 Interactive Narrative

3 Credits

This course will examine how storytelling acts as a vital mechanism for driving video gameplay forward. Topics include traditional narrative story processes, defining character, setting, and structure to create a compelling game concept. Prerequisites: GASE 335 and ENGL 102.

GASE 370 Game Level Design

3 Credits

This course introduces and teaches multiple levels for a variety of popular game engines. Topics include game architecture, shape composition, prototyping, and play psychology. The course particularly discusses the flow of space, game mechanics, and narrative experience design. Prerequisite: GASE 320 and GASE 335.

GASE 377 Information Security I

3 Credits

This course focuses on information security, integrity, and privacy techniques. Topics include the nature and challenges of computer security, the relationship between policy and security, the role and application of cryptography, the mechanisms used to implement policies, the methodologies and technologies for assurance and vulnerability analysis, and intrusion detection. Prerequisites: None.

GASE 380 Innovation and Invention

3 Credits

This course explores the process and products of innovation and invention. Topics span multidisciplinary arts, natural science, social science, and advanced technology. Readings, presentations, and scholarly papers are provided to explore the experience of interplay for innovation and invention. Presentations, projects, and individually written research papers are required. Prerequisite: This course requires the permission of the Instructor.

GASE 381 Introduction to Computer Graphics

3 Credits

This course introduces the fundamentals of computer graphics. Topics include graphics systems, rasterization, clipping, transformations, modeling, viewing, hidden surface removal, illumination, and shading. Emphasis is on realistic, 3D image synthesis. Prerequisite: GASE 310.

- GASE 440 Mobile Application Development II 3 Credits
This course extends the Mobile Applications Development I course in that students will learn to apply mobile design skills to develop applications using industry-standard game development tools, including the Unity 2020 game engine. Students will design, develop, and test mobile applications. This course covers the major components such as activities, receivers, content providers, permissions, intents, fragments, data storage, and security. Programming projects are required. Prerequisite: GASE 381.
- GASE 450 Interactive Game and Audio 3 Credits
This course introduces the basics of audio theory and game production and practical applications for game development. Topics include music, sound effects, dialogue, soundscape design, digital signal processing, basic audio engine principles, and the aesthetic vs. technical considerations in game audio production. Prerequisite: GASE 370.
- GASE 460 3D Modeling and Simulation 3 Credits
The course will teach advanced algorithms and techniques for 3D geometric modeling, texturing, animation, and physics-based simulation, all fundamental components of content creation software. Topics include digital representations of shapes (polygon meshes, point clouds, NURBS surfaces, and subdivision surfaces), algorithms for surface scanning, reconstruction, registration, differential geometry, re-meshing, smoothing, texturing, parameterization, and geometric deformations. The advanced topics include character rigging and animation, physics-based simulation of rigid bodies, and deformable solids. Prerequisites: Math 232, GASE 381
- GASE 465 Interactive Design 3 Credits
This course discusses the areas of interest through research related to interactive game development, building aesthetics, environments, and game engines with the implementation of process and execution of interactive games in an appropriate platform. Topics include artwork for an interactive game environment, proper game format for the chosen interactive platform, an interactive game concept centered on design principles, user experience, and interface. Prerequisite: GASE 370 and GASE 460.
- GASE 470 Game Development and Production 3 Credits
This course explores the implementation of the game development process. Topics include engaging gameplay, comprehensive game mechanics, game story and character progression, application of skills in storytelling, 3D modeling, animation, advanced game-level design, and prototyping. Prerequisite: GASE 370 and GASE 381.
- GASE 475 Data Visualization 3 Credits
This course discusses how to collect, clean, organize, and filter data sets of their choosing. Topics include visual design, the psychology of perception, user experience design, and ethics. Advanced topics cover static and interactive visualizations with various information structures and how to develop the exploratory experiences that tell the story within the data. Prerequisites: CSDP 450 and GASE 381.
- GASE 477 Information Security II 3 Credits

This course focuses on enterprise information architecture, including enterprise strategy, business, application, information, and infrastructure layers. Topics include enterprise systems and integration, gaining a competitive advantage with Information Systems (IS), business process reengineering and change management and structured approaches to creating IS, mobile computing and the digital economy, front-end web development, etc. Prerequisite: GASE 377.

GASE 480 Introduction to Cloud Computing 3 Credits

This course explores the rise of Cloud Computing, from applications and administration to programming and infrastructure. The topics include cloud systems, parallel processing in the cloud, distributed storage systems, virtualization, security in the cloud, and multicore operating systems. Prerequisites: GASE 320.

GASE 481 Introduction to 3D Graphics and Animation 3 Credits

This course introduces the fundamentals of computer graphics, animation, audio, and video. Topics include lighting, staging, camera, and special effects. Emphasis is on 3D modeling building blocks. The course also focuses on practicing the principles of animation with 3D software and shows weight and emotion through movement. Prerequisite: GASE 381.

GASE 490 Artificial Intelligence for Game Design 3 Credits

This course explores concepts of artificial intelligence (AI), particularly as they relate to gaming and simulations. Topics include AI algorithms, logic, and behavior methodologies. Students will learn how to use powerful Deep Reinforcement Learning and Artificial Intelligence tools with examples of simple AI games. Prerequisite: Senior status.

GASE 498 Senior Project I 3 Credits

First of a two-course sequence to support the Gaming and Software Engineering program, students will analyze, design, and implement a non-trivial software game project. Work products related to projects include code, analysis, and technical writing. Modeling and simulation techniques must be included. Prerequisite: Senior status.

GASE 499 Senior Project II 3 Credits

Second of a two-course sequence to support the Gaming and Software Engineering program, students work in teams to build a significant software application and learn through the experience of building something substantial. Experience opportunities include game design, presenting game products, launching a game application, learning through user observation, benchmarking, brainstorming, and rapid prototyping. All class participants demonstrate their projects to an audience that includes course staff, other students, and faculty from the department. Prerequisite: Senior status.

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

Part I General Education Requirements 40 Credits

A. Curriculum Area I (Art and Humanities)			9 Credits
<i>Course</i>	<i>No</i>	<i>Title</i>	<i>Credits</i>
ARTS	101	Exploration of the Visual Arts	3
MUSI	100	Rudiment of Music	3

Select one course from the following languages.

ENGL	203	Fundamentals of Contemporary Speech	3
FREN	101	Fundamentals of French I	3
SPAN	101	Fundamentals of Spanish I	3
CHIN	101	Fundamentals of Chinese I	3
ARAB	101	Fundamentals of Arabic I	3
JAPN	101	Fundamentals of Japanese I	3

B. Curriculum Area II (Social & Behavioral Science) 6 Credits

Select one course from each of two categories.

Social Sciences:	ECON 201/201H, ECON 202/202H, GEOG 201/202, HIST 101/111H, HIST 102/112H, POLI 200/200H, POLI 342, SOCI 101/111H	3
Behavioral Sciences:	CRJS 101, HUEC 203, HUEDC 220, HUEC 361, PSYC 100, SOCI 201, SOWK 200/200H	3

C. Curriculum Area III (Physical Sciences) 8 Credits

PHYS	121	General College Physics I	3
PHYS	123	General College Physics I Laboratory	1
PHYS	122	General College Physics II	3
PHYS	124	General College Physics II Laboratory	1

D. Curriculum Area IV (Mathematics) 4 Credits

MATH	112	Calculus I	4
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E. Curriculum Area V (English composition) 9 Credits

ENGL	101	Basic Composition I or	3
ENGL	101H	Basic Composition I (Honors)	3
ENGL	102	Basic composition II or	3
ENGL	102	Basic composition II (Honors)	3
ENGL	305/W	Technical Writing or	3
ENGL	310/W	Advanced Composition	3

F. Curriculum Area VI (Emerging Issues) 4 Credits

CSDP	101	Intro to Computer Science	1
EXSC	111	Personalized Health Fitness	3
EDTE	111	Technology and Society	3

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

The Department of Computer Science and Engineering Technology at the University of Maryland Eastern Shore (UMES) proposes to expand its degree offerings in computing by adding a BS in Gaming and Software Engineering. As a lead, the Department of Computer Science and Engineering Technology will cooperate with the Department of Engineering and Aviation Sciences in developing and implementing the degree program.

The proposed Bachelor of Science in Gaming and Software Engineering will be designed to be an ABET accreditable program. ABET's 2023-2024 general criteria for Accrediting Computing programs guidelines state, "For baccalaureate degree programs, ... Graduates of the program will have an ability to 1) Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions; 2) Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline; 3) Communicate effectively in a variety of professional contexts; 4) Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles; 5) Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.

ABET's 2023-2024 program criteria for accrediting Software and similarly named engineering programs state for baccalaureate degree programs, "The curriculum must provide both breadth and depth across the range of engineering and computer science topics implied by the title and objectives of the program. The curriculum must include computing fundamentals, software design and construction, requirements analysis, security, verification, and validation; software engineering processes and tools appropriate for developing complex software systems; and discrete mathematics, probability, and statistics, with applications appropriate to software engineering."

All students in the proposed Bachelor of Science in Gaming and Software Engineering program will be required to take **124** semester credit hours, and students must obtain a minimum grade of C for all courses counted towards graduation. Due to the degree program being designed to meet the professional accreditation requirements of ABET, the program will require a higher number of credit hours or requires course work that can not be completed in 120 credit hours per COMAR 13B.02.02.16(B)(1)(c)(ii).

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

The section is not applicable as the proposed program will not have a contract with another institution or non-collegiate organization.

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.*

As with other academic programs offered by the University of Maryland Eastern Shore, 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.

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.*

As with other academic programs offered by the University of Maryland Eastern Shore, the proposed program will ensure that advertising, recruiting, and admissions materials will clearly and accurately represent the proposed program and the services available. In addition, the program will be advertised alongside other academic graduate programs within the School of Business and Technology at UMES. Proper venues include Public Radio WESM 91.3, and social media such as the UMES Facebook page, the University Key, the UMES alumni association, and other professional societies.

H. Adequacy of Articulation

1. If applicable, discuss how the program supports articulation with programs at partner institutions. Provide all relevant articulation agreements.

The proposed program does have provisionally signed articulation with community college partners. The proposed program will continue to work to establish articulation agreements with other institutions at the associate’s degree level, for example, an A.S./B.S. articulation between the A.S. in Associate of Science in Interactive Design and Game Development at Hagerstown Community College and the proposed bachelor’s program at UMES. UMES aims to work with partner institutions to provide a pathway for students interested in computer science, engineering, or closely related fields to obtain a B.S. in Gaming and Software Engineering. Please see the appendix for all provisionally signed articulation agreements.

I. Adequacy of Faculty Resources

1. Provide a brief narrative demonstrating the quality of the 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.

The following faculty are instructors to support the proposed program at its outset: There are eleven (11) full-time faculty and (6) part-time faculty to teach in the Department of Computer Science and Engineering Technology. Eleven (11) CSET faculty are dedicated to supporting the B.S. in Gaming and Software Engineering program. In addition to the current faculty resources, two (2) new faculty members will be added via the hiring process to support the Gaming and Software Engineering degree over the next five years. Therefore, at the end of the five years, there will be thirteen (13) CSET faculty to support the Bachelor of Science in Gaming and Software Engineering.

The existing faculty in the Department of Computer Science and Engineering Technology are listed below.

Table: Summary of Faculty Status: Full-time, Part-time, Adjunct, and Academic Title/Rank

<u>Faculty Member</u>	<u>Status: Full-time, Part-time, Adjunct</u>	<u>Academic Title/Rank</u>
Mr. Elhibir M. Abusin	Part-time	Adjunct
Dr. Joe Ashby	Part-time	Adjunct
Dr. Asad Azemi	Full-time	Professor
Dr. DeWayne Brown	Part-time	Adjunct
Dr. Celeste Chamberlain	Part-time	Adjunct
Dr. Derrek B. Dunn	Full-time	Professor
Ms. Cui Fang	Full-time	Lecturer
Dr. Kenny Fotouhi	Full-time	Professor
Dr. Wassim Itani	Full-time	Assistant Professor
Dr. Etahe Johnson	Adjunct	Academic Support Associate
Ms. Abuobida Osman	Full-time	Lecturer
Mr. Andrew Wilson Parkinson	Part-time	Adjunct
Mr. Daniel E. Rice	Part-time	Adjunct

Dr. Maha Shamseddine	Full-time	Associate Professor
Dr. Rakesh Sharma	Full-time	Lecturer
Dr. Weiwei Zhu-Stone	Full-time	Associate Professor
Mr. Joel Tomlinson	Full-time	Lecturer
Dr. Jun Zhang	Full-time	Associate Professor

Mr. Elhibir M. Abusin

Dr. Joe Ashby is a part-time faculty member in the Department of Computer Science and Engineering Technology. He received his Ph.D. in Computing Technology in Education from Nova Southeastern, M.S. and B.S. degrees in Electronics & Computer Engineering Technology from Indiana State University. Dr. Ashby has extensive experience in Automation Engineering and Project Management, experience as a department chair, and face-to-face as well as online course development and delivery practice.

Dr. Asad Azemi is a Professor in the Department of Computer Science and Engineering Technology. Before joining UMES, Dr. Asad Azemi was employed at UW-Platteville as the department chair and electrical and computer engineering professor. Before his move to the Midwest, Azemi was an associate professor of engineering at Penn State. His research interests include estimation and signal processing with agriculture and health science applications. Azemi became interested in engineering at a young age. It continued to grow after a family member pursued the degree. "I feel like anyone who is interested in math and physics tends to look into engineering as an option for a major," he said. "My cousin went to school for engineering, and I followed." Azemi earned his bachelor's degree in electrical engineering from UCLA. He continued his education at Loyola Marymount and the University of Arkansas, receiving his master's and doctorate degrees in electrical engineering.

Dr. DeWayne Brown is a part-time faculty member in the Department of Computer Science and Engineering Technology. Dr. Dewayne R. Brown holds the rank of Professor in Electronics Technology. He received his Ph.D. in Electrical Engineering from Virginia Polytechnic Institute and State University (Virginia Tech), and his M.S. in Electrical Engineering from North Carolina Agricultural & Technical State University. He received his B.S. in Electrical Engineering from the University of South Carolina. His experiences include working at the Naval Surface Warfare Center (NSWC), SPAWAR Joint-Base, Charleston, SC, and Penn State Applied Research Laboratory as a summer faculty researcher with a primary research focus in the area of global positioning systems.

Dr. Celeste Chamberlain, CISSP, is a part-time faculty member in the Department of Computer Science and Engineering Technology. She received her D.Sc. in Emergency Management from Jacksonville State University, M.S. in Informatics from Northeastern University, and B.Sc. in Computer Science from Hampton University. Her experiences include working with the U.S. Senate Homeland Security and Governance Affairs Committee

as a cybersecurity legislative advisor, and 20 years creating cybersecurity governance under the Department of Homeland Security.

Dr. Derrek B. Dunn is a tenured Professor in the Department of Computer Science and Engineering Technology. He received his Ph.D. and M.S. in Electrical Engineering from Virginia Polytechnic Institute and State University (Virginia Tech). His experiences include working at Hewlett-Packard Laboratory and Oak Ridge National Laboratory as a summer faculty researcher with a primary research focus in communications and networks. Dr. Dunn teaches and conducts research in the areas of Cybersecurity, Global Positioning Systems, and Wireless Communication Systems.

Ms. Cui Fang is a Lecturer at the Department of Computer Science and Engineering Technology. She has a bachelor's in environmental engineering from China. She joined UMES in 2015 and earned two master's degrees, including Applied Computer Sciences Program. Ms. Cui Fang specializes in C++, blockchain and smart contract technology, and database management. She is currently more focused on teaching undergraduate-level courses.

Dr. Kenny Fotouhi is a Professor of Electrical Engineering Technology in the Department of Computer Science and Engineering Technology. He received his MS in Electrical Engineering from Oklahoma State University in 1979, and his Ph.D. in Electrical Engineering from the University of Missouri-Rolla in 1983. He was an Interim Chair of the Department of Technology from 2018 to 2021. Dr. Fotouhi has been active in area research and published numerous papers in Electrical Engineering and Solid- solid-state physics Fields. He has been involved in joint research in developing new semiconductors and Maryland Off-Shore Wind Energy Research and Smart Agriculture - Smart farming. He received the 1990 University of Maryland Eastern Presidential Distinguished Research Award and is a member of ASEE and IEEE and the Eta Kappa Nu Honor Society.

Dr. Wassim Itani is an Associate Professor of Electrical Engineering Technology in the Department of Computer Science and Engineering Technology. Dr. Wassim Itani's teaching interest is in computing security and privacy. He has over ten years of experience in academic teaching and research and four years of experience in the industry, where he worked in partnership with EMC2 in Dubai, UAE, and Riyadh, KSA. His research interests are in the fields of Data Science and AI in networking and cyber security, cloud computing security and privacy, cloud visualization, energy efficiency, and resource allocation. Dr. Itani earned his Ph.D. in Electrical and Computer Engineering from the American University of Beirut in 2012.

Dr. Etahe Johnson is the Academic Support Associate and Adjunct Faculty. She has an Ed.D. in Organizational Leadership and Innovation from Wilmington University. Dr. Johnson received her master's from Iowa State University in Technology Education and a bachelor's from North Carolina A&T State University. She is the faculty advisor for several student clubs at the university.

Mr. Abuobida Osman is a lecturer in the Department of Computer Science and Engineering Technology. Mr. Osman has been with this department since its establishment in January 2021. Mr. Osman was a lecturer in the Department of Mathematics and Computer Science at UMES' School of Business and Technology from August 2011 until December 2020. Also, Mr. Osman also served as an adjunct lecturer with the Department of Mathematics and Computer Science from January 2001 to May 2011. Mr. Osman has taught numerous mathematics and computer science courses across all skills, from entry-level to higher level. Mr. Osman is also a member of several committees and has furthered his contributions through many seminars, workshops, conferences, and training sessions. For six months, Mr. Osman trained and developed a new course with IBM in Poughkeepsie, NY, in 2010. The course he developed was CSDP 210, Introduction to Enterprise Computing Testing. Mr. Osman studied and attained degrees in Sudan, Pakistan, the UK, and the USA. He has a B.SC in Engineering and M.Sc in Applied Computer Science. He has also worked in various countries throughout Sudan, the Middle East, and the USA, with experience in both academia and engineering roles. He is certified in the Statistical Analysis System (SAS) language.

Mr. Andrew Parkinson is a part-time lecturer in the Department of Computer Science and Engineering Technology. Mr. Parkinson holds a bachelor's in Computer Engineering and a Master's in Computer Science from Capitol Technology University in Laurel, MD. He has worked in various engineering roles supporting ground and flight software development at NASA Wallops Flight Facility for the last 15 years. Mr. Parkinson is the Associate Branch Head for the Wallops Systems Software Engineering Branch.

Mr. Daniel E. Rice is a part-time lecturer in the Department of Computer Science and Engineering Technology. Dan Rice is a Software Engineer working at NASA's Wallops Flight Facility and is an Adjunct Faculty Member for the UMES Computer Science Department. Dan was a Computer Science, Physics, and Mathematics High School Teacher for 12 years, earning Delaware's STEM Teacher of the Year in 2021. Dan has a Masters Of Arts in Teaching and a Bachelor of Science in Mathematics both from Frostburg State University, and is earning a Masters of Science in Applied Computer Science from UMES in 2024. Dan's Thesis is applying custom trained computer-vision neural network to Antarctic Krill enabling 3D stereophotogrammetry as part of an NFS-funded project facilitating USF's Fluid Dynamics Lab study of krill schooling behavior.

Dr. Maha Shamseddine is an Assistant Professor in the Department of Computer Science and Engineering. Dr. Maha Shamseddine holds a Doctorate Degree in Electrical and Computer Engineering and a Master's degree in Computer and Communication Engineering from the American University of Beirut, and a Bachelor's degree in Electrical and Computer Engineering from Beirut Arab University.

Dr. Rakesh Sharma is a Lecturer in the Department of Computer Science and Engineering. He has taught Computer Science and Math classes in the Department of Computer Science and Engineering Technology at the University of Maryland Eastern Shore for over 18 years. Dr. Sharma completed his B.S. in Engineering from the University of North Carolina at Charlotte and MIS Degree from the North Carolina Central University-Durham. He has completed 18 graduate credit hours in Computer Science and 18 credits in Cyber

Security. Rakesh completed his Ph.D. in Computer Science from Gyan Vihar University, Jaipur. Before joining UMES, he worked for EDS (as an IT contractor for the Department of Defense, American Airlines, and US Postal Service), IBM, and Micron Computers. Dr. Sharma has done considerable research in the following areas: machine learning, cybersecurity, decision support systems for critical infrastructure, data analysis, and project and resource management. He has published over fifteen research papers in peer-reviewed journals and has given several conference presentations.

Dr. Weiwei Zhu-Stone is an Associate Professor in the Department of Computer Science and Engineering. With a multi-background in computer science, applied mathematics, and electronic engineering, she has taught over 20 courses in multiple disciplines and advised students' research and graduate projects at both the undergraduate and graduate levels. Her research interests include Blockchain, big data analysis, game-based learning, tsunami prediction, wavelet analysis, and non-uniform B-spline analysis. Dr. Stone has been active in serving in professional areas and the local community. She also directs the graduate program of the department.

Mr. Joel Tomlinson is a Lecturer/Laboratory Technician in the Electrical/Electronics Engineering Technology program in the Department of Computer Science and Engineering Technology. Mr. Tomlinson plays a crucial role in the department by managing assets and equipment used in academic research and instruction. In addition to his asset and equipment role, Mr. Tomlinson teaches engineering technology courses related to circuit analysis, digital electronics, electronics troubleshooting, instrumentation, microcontrollers, and programmable logic controllers (PLCs). Mr. Tomlinson has an extensive background in Computer-Aided Design (CAD) and 3D printing. He is involved in several research projects, grants, and teacher training events related to CAD and 3D printing. Mr. Tomlinson holds a bachelor's in Electrical/Engineering Technology and a Master's in Career and Technology Education from the University of Maryland Eastern Shore. Alongside his education credentials, Mr. Tomlinson was employed as an Industrial Electronic Technician for one of the largest poultry-producing/processing companies in the United States. Before being hired by UMES, he was a manufacturing engineer for a military and commercial wire harness manufacturing company. While performing this role, Mr. Tomlinson managed over \$8 million worth of government and commercial contracts.

Dr. Urban Wiggins is an Assistant Professor in the Department of Computer Science and Engineering Technology. Dr. Urban Wiggins is the Vice Provost for Decision Science and Visualization in the Office of Academic Affairs at the University of Maryland Eastern Shore. In 2020, he was awarded the Innovative New Spaces for Practice and Rehearsal Teacher Education Computer Science–Artificial Intelligence or INSPIRE CS-AI Fellowship from the Massachusetts Institute of Technology and Carnegie Mellon University. He serves as the UMES Extreme Science and Engineering Discovery Environment (XSEDE) campus champion and the advisor for the Association of Computing Machinery (ACM) and Upsilon Pi Epsilon (UPE) student organizations.

Dr. Wiggins has served as the Director of Institutional Research and Data Analytics and Assistant Professor of Computer Information Systems at Jarvis Christian College. He was

associated with the Louisiana Technology Council and EMP Task Force for National and Homeland Security. He previously served as the Director of the Planning, Assessment, and Institutional Research office at Southern University.

Dr. Wiggins' was previously employed at Telcordia Technologies in the Broadband Networking Division as a Lead Consultant, xDSL, and Cable Modem Subject Matter Expert. He has also been a Network, Server, and Customer Integration Engineer at the Intel Corporation.

Dr. Wiggins has been an active member of InfraGard, a public/private partnership with the Federal Bureau of Investigations. In 2014, he was awarded the Louisiana Governor's Technology Award for Outstanding Leadership in Technology for his Cyber Security and Education work.

Dr. Wiggins received his doctoral degree in Computer Science from Louisiana State University and his master's and bachelor's degrees from Southern University in Computer Science and Mathematics, respectively.

Dr. Jun Zhang is a tenured Associate Professor in the Department of Computer Science and Engineering Technology. He is the first Interim Chair of the new Department of Computer Science and Engineering Technology, established in January 2021. He joined UMES as an Assistant Professor in August 2014. At UMES, he has taught over ten undergraduate and graduate classes, including Programming Languages, Algorithms and Data Structures, Operating Systems, Software Engineering, and Computational Science. Dr. Zhang has been actively conducting research; his research interests include algorithms and theory, data and computational science, and computer science education. Dr. Zhang is well-educated in both China and the USA. He has four degrees, including a Ph.D. in Computer Science from the University of Rhode Island. Dr. Zhang has ample work experience in academia and industry, as he previously worked as an advanced software engineer at Siemens and taught in China, Vietnam, and the USA.

Table: Course(s) each Faculty Member will teach in the Proposed Program

<u>Faculty Member</u>	<u>Course Assignments</u>
Mr. Elhibir M. Abusin	CSDP 221, 404, 405
Ms. Cui Fang	CSDP 221, 222
Dr. Wassim Itani	GASE 310, 320, 335, 370, 381, 460
Ms. Abuobida Osman	CSDP 210, 305, 332, 399
Mr. Andrew Wilson Parkinson	CSDP 301, 351
Mr. Daniel E. Rice	CSDP 401
Dr. Maha Shamseddine	GASE 340, 365, 377, 460, 470, 490
Dr. Rakesh Sharma	CSDP 100, 240, 390, 403
Dr. Weiwei Zhu-Stone	CSDP 250, GASE 477, 480, 481, 498, 499
Dr. Urban Wiggins	CSDP 341, 431,
Dr. Jun Zhang	CSDP 450, GASE 380, 440, 450, 465, 475

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

a) Pedagogy that meets the needs of the students

The Center for Teaching Excellence (CTE) provides ongoing pedagogy training for faculty in evidence-based best practices to support high-impact pedagogy practices to meet the needs of UMES students. To accomplish its mission of ensuring expanding and enhancing faculty pedagogy training, CTE has developed three broad program areas to support faculty teaching success, including evaluation of teaching techniques, professional development of faculty as it relates to pedagogy, and recognition of faculty who have demonstrated outstanding pedagogy methodology.

The evaluation of the teaching techniques program includes using student experience of learning surveys, peer observation of teaching, and open classroom week. The professional development of the faculty program provides funding to attend pedagogy conferences, faculty workshops, FACTE working groups, seminar series for new faculty, and innovation in teaching & learning conferences. Lastly, CTE's faculty recognition program includes student choice for teaching excellence e-badge, CTE website – faculty spotlights, and SOTL publication opportunities.

b) The learning management system

The Center for Instructional Technology and Online Learning (CITOL) at UMES supports developing, designing, and delivering online and hybrid programs, classes, and workshops focusing 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.

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 developing, designing, and delivering online and hybrid programs, classes, and workshops focusing 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. Other services offered by the Center for Instructional Technology and Online Learning include: supporting 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 (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.

The Frederick Douglass Library is the only library on the University of Maryland Eastern Shore (UMES) campus. As a member of the University of System of Maryland and Affiliated Institutions (USMAI) consortium, the Frederick Douglass Library is affiliated with 17 public universities and colleges in Maryland. The integrated library system ALEPH makes it possible for patrons to have 24/7 access to USMAI library collections and electronic resources. In-person visits to the library are available 91.5 hours per week, including weekends.

The Frederick Douglass Library has the following resources available and/or the measures to be taken to ensure resources are adequate to support the proposed programs:

Books, periodicals, and other reference materials may be located and obtained for patron usage at any time online via the library catalog, online databases, interlibrary loan, inter-campus loan, or by visiting the library.

ILLIAD (Interlibrary Loan) service allows students, faculty, and staff to take advantage of the millions of items from other universities that are unavailable at the Frederick Douglass Library.

Interlibrary Loan allows the borrower to request items (books and articles from non-university of Maryland System libraries. The average time to receive an article is two weeks. The average time to receive a book is 3 weeks. Rapid Interlibrary Loan (Rapid ILL) is also where most articles may be received within 24 hours.

Borrowers are notified by email from the FDL staff to pick up items from the Interlibrary Loan service desk. Many articles requested will be received electronically and available to be accessed within ILLIAD.

Inter-campus loans may be requested from another University of Maryland System Library and delivered to the FDL for patron pick-up. The average time to receive a book is 3-5 days.

Resources that are available electronically via the Frederick Douglass webpage are databases, e-books, and e-journals. Open Education Resource Textbooks is a search interface that allows faculty to retrieve OER resources to be used as course materials at no cost to students.

There are over 140 databases of research in 17 subject areas.

Databases By Subject

Agriculture	Health & Medicine
Business Management & Accounting	History
Computer Science & Engineering Technology	Hospitality & Tourism Management
Criminal Justice & Government	Human Ecology
Education	Life Sciences
Engineering & Aviation Science & Built Environment	Pharmacy
English & Modern Languages	Physical Sciences
Fine Arts	Physician Assistant
	Social Sciences

Library Holdings as of 2022 for Proposed Degree Programs

New Program(s)	eJournal Titles	eBooks
Applied Computing and Engineering	125	500
Construction Engineering Program	150	750
Biomedical & Bioengineering Program	20	400
Simulation & Game Development Program	40	150
Aviation Science	25	100

Print books and periodicals are located on the three floors of the Frederick Douglass Library. Periodicals are housed on the Lower Level. Reference books are on the first floor. Circulating and Special Collections books are located on the library's second floor.

To ensure that resources are adequate to support the proposed programs, the library director and library liaisons will network and collaborate with program faculty to select resources to be housed in the library. A one-credit Library Information Literacy class is taught each semester in winter and

summer sessions. Individual classroom library sessions are also taught upon request by the instructor. This instruction can range from basic research and knowledge of the library to the highest level of research for those seeking graduate degrees.

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. Although UMES does not have the IEEE Digital Library, IEEE Xplore, the technical papers could be accessed through the Interlibrary Loan (ILL) services.

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.***

Physical Facilities: No additional facilities are required.

The University of Maryland Eastern Shore, School of Business and Technology, Department of Computer Science and Engineering Technology is housed in the Engineering and Aviation Science Complex within a 166,000 square feet facility which was completed in the 2015/2016 academic year.

The Department of Computer Science and Engineering Technology has six dedicated computer laboratories (where students learn programming and coding using C++, COBOL, Assembly, Java, Python, Networking, SAS, etc.) at their disposal, including:

- EASC 2112 - Supercomputer Lab (contains the mainframe)
- EASC 2108 - Graduate Lab (22 computer stations with private desks and overhead storage that graduate students may use for conducting research and completing projects)
- EASC 2122 - CS Computer Lab Computer Programming (classroom/lab with 31 computer stations loaded with software, applications, and programs)
- EASC 2121 - CS Computer Lab Computer Programming (classroom/lab with 35 computer stations loaded with software, applications, and programs)
- EASC 2090 - Software Engineering Lab (classroom/lab with 28 computer stations loaded with a variety of software, applications, and programs)
- EASC 2091 - Database Lab (classroom/lab with 35 computer stations loaded with software, applications, and programs)
- The Department has five dedicated laboratories for engineering technology:
- ATC 1046 – Electronics Lab: The Electronics Lab contains circuit analysis and test equipment utilized by the Electrical/Electronic Engineering Technology program. The equipment includes function generators, oscilloscopes, digital multimeters, a PCB milling machine, high-power generation, a transmission trainer, soldering equipment, and other test equipment. The lab is fitted with 14 computers with double-screen monitors that host several types of software related to electronics.
- ATC 1050 – Communications Lab: The Communications Lab contains specialized equipment for analyzing and testing Radio Frequency (RF) and Microwave communication signals and systems. The equipment includes two network analyzers, two spectrum analyzers, two Lab-Volt analog communications, trainers, two Lab-Volt digital communication trainers, LCR meters, frequency counters, oscilloscopes, and an antenna design and testing trainer.

- ATC 1045 – Global Positioning Systems (GPS) Laboratory: The GPS Lab is a dedicated lab space for developing and testing communication systems related to GPS. This lab includes a grant-funded \$250,000 CAST Navigation system for simulating and modeling advanced navigation technology related to military, federal, and commercial industry sectors.
- EASC 1028 – Communications Laboratory: The Communications Laboratory is a shared laboratory space with the Department of Engineering. This Lab includes 32 computers with various engineering, programming, and simulation software. This computer lab has five wall-mounted LCD screens for multiple viewing angles and small work groups.
- EASC 1028 – Embedded Systems Laboratory: The Embedded Systems Laboratory is a shared laboratory with the Department of Engineering. This laboratory contains equipment for designing, testing, and simulating embedded devices and systems. The equipment in this lab includes benchtop multimeters, oscilloscopes, function generators, 3D printers, Bolt Sphero robots, digital logic analyzers, digital electronics trainers, soldering stations, and 10 computers.

These labs can support the instruction in the new courses and research activities as part of the proposed degree program. A complete list of computer science and engineering technology labs with brief descriptions can be found using the link: <https://wwwcp.umes.edu/cset/cset-laboratories/>

All engineering faculty and staff have individual offices facilitating student advising, office hours, etc. Sufficient classrooms are also available in the same building, which makes it very convenient for students to take classes and conduct laboratory experiments.

Infrastructure Equipment: The program does not need any additional infrastructure equipment.

All faculty and staff in the School of Business and Technology have individual offices facilitating student advising, office hours, etc. Sufficient classrooms are also available in the same building, which makes it very convenient for students to take classes and conduct laboratory experiments.

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

All students who are admitted and enrolled at UMES are assigned a Google Gmail email system and have access to the Google Meets video conferencing systems.

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

The Information Technology Department, Center for Instructional Technology and Online Learning (CITOL), and Academic Computing Unit professionals provide faculty support for development and instructions. The learning management system (LMS) is available for instructional design, software development, educational research, Canvas Learning Management System (LSM), etc. These technologies and opportunities ensure students are enrolled in courses and faculty development for teaching includes adequate access to the learning resources.

In addition, the Center for Instructional Technology and Online Learning (CITOL) at UMES assists faculty and students in all aspects of e-learning, including hosting, training, development, and support

of the Canvas Learning Management System, Google Education Plus, Echo360, and Respondus. UMES' web portal is a single sign-on allowing students, faculty, and staff access to:

- HawkWeb - a system where student enrollments and registrations, class rosters, and administrative functions related to academics are located.
- Canvas - the learning management system where course content can be published as well as where the entire online course experience for students is managed.
- Web Help Desk - the Information Technology Help Desk system where you can create a ticket to request assistance for your computer, networking, and telephone needs.

The UMES campus has wireless networking access points to allow network access from a wireless-enabled device like a laptop, smartphone, or tablet.

L. Adequacy of Financial Resources with Documentation

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: RESOURCES					
Resources Categories	(Year 1)	(Year 2)	(Year 3)	(Year 4)	(Year 5)
1. Reallocated Funds ¹	\$0	\$0	\$0	\$0	\$0
2. Tuition/Fee Revenue ² (c+g below)	\$195,720	\$215,040	\$267,700	\$273,065	\$278,495
a. # FT Students	15	20	25	25	25
b. # Annual Tuition/Fee Rate	\$9,300	\$9,486	\$9,676	\$9,869	\$10,067
c. Annual / Full Time Revenue (a x b)	\$139,500	\$189,720	\$241,900	\$246,725	\$251,675
d. # PT Students	5	5	5	5	5
e. Credit Hour Rate	\$413	\$422	\$430	\$439	\$447
f. Annual Credit Hours	12	12	12	12	12
g. Total Part Time Revenue (d x e x f)	\$24,780	\$25,320	\$25,800	\$26,340	\$26,820
3. Grants, Contracts & Other External Sources ³	\$0	\$0	\$0	\$0	\$0
4. Other Sources	\$0	\$0	\$0	\$0	\$0
TOTAL (Add 1 - 4)	\$195,720	\$215,040	\$267,700	\$273,065	\$278,495

Narrative Rationale for Resources

1. Reallocated Funds

A FTE faculty position will not be reallocated from existing programs.

2. Tuition and Fee Revenue

We assumed that tuition and fees would increase for the next five years (\$9,300, \$9,486, \$9,676, \$9,869, and \$10,067). The in-state part-time tuition rate per credit hour is currently \$413 per credit. This value was used in calculating the revenue assuming 9 credits per semester for full-time students and 12 credits per academic year for part-time students.

3. Grants and Contracts

No additional sources of funding are expected at this time.

4. Other Sources

No additional sources of funding are expected at this time.

Total Year: A 5-year estimate is provided.

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: EXPENDITURES					
Expenditure Categories	(Year 1)	(Year 2)	(Year 3)	(Year 4)	(Year 5)
1. Total Faculty Expenses (b + c below)	\$95,900	\$191,800	\$191,800	\$191,800	\$191,800
a. # FTE	1	2	2	2	2
b. Total Salary	\$70,000	\$140,000	\$140,000	\$140,000	\$140,000
c. Total Benefits (37%)	\$25,900	\$51,800	\$51,800	\$51,800	\$51,800
2. Total Administrative Staff Expenses (b + c) below	0	0	0	0	0
a. # FTE	0	0	0	0	0
b. Total Salary	0	0	0	0	0
c. Total Benefits	0	0	0	0	0
3. Total Support Staff Expenses (b + c) below	0	0	0	0	0
a. # FTE	0	0	0	0	0
b. Total Salary	0	0	0	0	0
c. Total Benefits	0	0	0	0	0
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)	\$95,900	\$191,800	\$191,800	\$191,800	\$191,800

Narrative Rationale for Expenditure

1. Faculty (# FTE, Salary and Benefits)

Each year over the next five years, the proposed program will employ 2 FTE faculty per hired (with backgrounds in the proposed program course) to operate the program. There will be no need for additional administrative staff. The existing departments and school administrative staff will be sufficient to run the program.

2. Support Staff (# FTE, Salary and Benefits)
None
3. Equipment
None.
4. Library
None.
5. New and/or Renovated Space
Not needed
6. Other Expenses
None.

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 Evaluation

The University of Maryland Eastern Shore has a comprehensive course and program evaluation process. Each course syllabus has a set of written student learning outcomes. The course learning outcomes are assessed through embedded questions on tests, assignments, and portfolios that address specific course outcomes. Data is collected to analyze results and improve course curriculum and pedagogy.

Once the program is launched, the courses will enter the course evaluation system. Teaching evaluation asks students to reflect on the course structure, content, and the instructor's performance. Summary data will be reviewed by faculty members, the program chair, and the school administration to determine whether revision or improvement actions are necessary.

Achievement of the program outcomes will be assessed using direct and indirect methods as described in the proposed Assessment Plan developed by the School of Business and Technology faculty at UMES for the proposed Data Science and Analytics Engineering. The assessment procedure is currently being developed to evaluate the proposed program's courses will be designed to be in line with the continuous program improvement as required by other accreditation bodies that review other degree programs in the School of Business and Technology at UMES, including the American Council for Construction Education (ACCE), National Council for Accreditation of Teacher Education (NCATE), now called Council for the Accreditation of Educator Preparation (CAEP), Association to Advance Collegiate Schools of Business (AACSB), Accreditation Commission for Programs in Hospitality Administration (ACPHA), Professional Golfers' Association of America (PGA), and Accreditation Board for Engineering and Technology (ABET).

Faculty Evaluations

Faculty evaluations are conducted with an initial meeting at the start of each academic year, a mid-year meeting typically in January of each academic year, and a final evaluation meeting in April of each academic year. The faculty evaluation process at UMES is as follows:

At the beginning of the academic year, the faculty is required to meet with the department chair to discuss goals and objectives for the academic year. The individual faculty objectives must reflect:

- Departmental, school, and university goals;
- Faculty assignment (defined as % time allocated for each category based on appointment and release time awarded for that year);
 - Note: Faculty who are on 100% teaching lines with no approved release time are expected to have the following % breakdown: 50%, teaching 35 % scholarship, 15% service; and
- Faculty member's professional development.

During the academic year, the department chair would be informed of any major changes made to the objectives. If necessary, the department chair will share information with the faculty member regarding the areas of concern.

In January, the faculty will meet with the chair to review progress toward the objectives.

Each faculty member will submit the evaluation document in April to the department chair. The Department Chair will review the information and discuss his/her evaluation with the faculty member. Students' evaluations of instruction will be utilized in this discussion between the Chair and faculty members. Copies of the summary evaluations should be attached as they become available. Note: Peer review of teaching will be included if done.

Student Learning Outcome Evaluation

Based on established school standards, we will establish an ongoing program evaluation where we,

- Assess samples of student performance on computer-based problems and projects.
- Assess samples of the use of technology in student presentations.
- Assess samples of the group and individual case studies.
- Assess written and oral student presentations, written assignments, and research projects.
- Track analytical performance in courses.
- Evaluate student performance in exams, quizzes, and assignments in elective courses.
- Assess comprehensive final exams in core courses.

Assessment instruments include graded student work, and the evaluation of written project papers, and presentations. The achievement levels are determined using the rubrics developed separately for each outcome.

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.*

Assessment of Student Learning Outcomes:

The School of Business and Technology at the University of Maryland Eastern Shore has several academic programs accredited by national program-level accreditation bodies including the American Council for Construction Education (ACCE), Association to Advance Collegiate Schools of Business (AACSB), Accreditation Commission for Programs in Hospitality Administration (ACPHA), Professional Golfers' Association of America (PGA), and Accreditation Board for Engineering and

Technology (ABET). Due to this, academic programs that have program-level accreditation have undergone rigorous reviews of their processes of assessing student learning outcomes. These processes and standards will be extended to the proposed academic program. The school departments conduct an annual assessment of student learning outcomes and faculty evaluations. The departments have developed and implemented a comprehensive assessment plan that contains all the components required for this intent. All faculty members in the school's departments participate in the student learning outcomes assessment process and the faculty evaluation process.

In addition to previously discussed learning outcomes, the proposed program will have three (3) additional Program-level Learning Outcomes. The Outcomes were reviewed and agreed upon by all faculty. The Program Learning Outcomes are:

1. Students will demonstrate foundation knowledge and skills in their program areas (concentrations).
2. Students will demonstrate problem-solving, critical thinking, oral and written communication, and leadership skills.
3. Students will integrate theory, discovery, and technology into practice.

The School of Business and Technology departments use assessment data to make informed curriculum decisions regarding improving teaching and learning processes. The departments in the school are strongly engaged in the assessment of Student Learning Outcomes. The school faculty has a well-developed assessment plan to ensure we use the data to improve student learning. In addition, academic program assessment takes place on a six-year cycle. Data regarding program enrollment, retention, and graduation rates are collected by the Office of Decision Sciences and Visualization in conjunction with the program faculty. The data are analyzed against program outcomes, and results are used to improve the program.

Student Retention:

The University of Maryland Eastern Shore is committed to student retention. The Center for Access and Academic Success (CAAS) provides dedicated advisors for first-year students and works with the academic programs to ensure adequate academic advising. CAAS also provides support to students at all levels of enrollment. The academic programs in the school have well-established advising processes and have developed an advising handbook for faculty advisors. Another important aspect of student retention is ensuring the high quality of the program. Excellent programs will be attained through hiring highly qualified and experienced faculty members. The curriculum will be regularly updated to ensure relevance to current and future trends. The learning environment will be positive and supportive of students. The academic programs will ensure that all the resources needed are provided promptly. Student engagement activities will be conducted to increase cohesion and pride in belonging to the degree program.

Student and Faculty Satisfaction:

Student satisfaction will be measured using course evaluation and exit interview surveys. Faculty satisfaction will be measured through the annual evaluation process, including a planning and goal-setting session in the fall, a mid-year review in February, and a final evaluation session at the end of the spring semester. An academic climate survey will also assist in assessing faculty satisfaction.

Additionally, informal feedback from faculty will be used to determine faculty and student satisfaction, and adjustments will be made accordingly.

Cost-Effectiveness:

The proposed academic program will build upon existing undergraduate and graduate programs offered by the School of Business and Technology. The foundational resources, faculty and facilities needed to start the program are already in place. The visibility of the new program will attract more students and ensure sustainability and cost-effectiveness. Based on projected program enrollment, the new degree will produce enough revenue to self-sustain.

Faculty Evaluation:

In addition, every faculty is evaluated each year. The evaluation process includes an assessment of faculty teaching, faculty research record and productivity, and school-wide and department service. To receive a high evaluation, a faculty member must demonstrate effective teaching, active scholarly activities, publications, etc. There is also a provision for the administration to set out an improvement plan for faculty members who have not done well in teaching. Tenured faculty will undergo a five-year post-tenure review.

Program assessment takes place in a six-year cycle. Data regarding program enrollment, retention, and graduation rates are collected by the Office of Decision Sciences and Visualization in conjunction with the program coordinator. The data are analyzed against program outcomes and results are used to improve the program.

N. Consistency with the State’s Minority Student Achievement

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

The University of Maryland Eastern Shore mission is compatible with the State of Maryland’s minority achievement goals. The University of Maryland Eastern Shore is an 1890 land grant HBCU. Our programs attract a diverse set of students, with the majority of the student population being African-American, multiethnic, and multicultural. The University actively recruits a minority population for all undergraduate and graduate-level degrees. Special attention is also provided to recruit diverse groups into the STEM and multidisciplinary programs at all degree levels, including undergraduate, master’s, and doctoral. The same attention will be given to the M.S. in Data Science and Analytics Engineering program.

As part of UMES Strategic Plan Subgoal 4.1: Improve structure for attracting, developing, and retaining high-quality and diverse students; UMES takes pride in the diversity of its faculty, staff, and students with representation from 37 states and 47 countries. UMES values people of different ethnicities, orientations, cultures, and perspectives. The University of Maryland Eastern Shore has one of the most racially and ethnically diverse student populations in the University System of Maryland. Based on fall 2017 data, UMES faculty were 56% African American, 27% White, 5% Asian, 1% American Indian, and 5% international. Student race and ethnicity statistics from fall 2017 reflect a student population of 69.7% African American, 12.3% White, 8.8% two or more races, 3.6% Hispanic, 1.2% Asian, and 3.8% international.

UMES offers the most competitive tuition rates in the state of Maryland compared to other institutions in Maryland. This improves minority student access. Our program appeals to minority students, as evidenced by the high proportion of minority student enrollment in UMES degree programs. We

support educationally disadvantaged minority students by offering remediation and mentoring relationships.

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 Bachelor of Science in Gaming and Software Engineering program is unrelated to an identified low-productivity program at UMES.

P. Adequacy of Distance Education Programs

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 distance education program. UMES participates in *The State Authorization Reciprocity Agreement*. Some 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).

The University of Maryland Eastern Shore (UMES) is submitting a proposal for a Master of Science in Data Science and Analytics Engineering. The proposed program will be offered online and in a traditional face-to-face format. The current faculty in the Department of Business, Management and Accounting, Department of Computer Science and Engineering Technology, Department of Engineering and Aviation Sciences, and Department of the Built Environment will serve as the majority of the instructors in the new program. Any new instructors recruited to teach online must meet the same qualifications as the current faculty. All faculty teaching in the online version of the program will be required to complete UMES Online Learning Training, and the School of Business and Technology recommends Quality Matters training, Online Learning Consortium, or other comparable training for its instructors.

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 developing, designing, and delivering online and hybrid programs, classes, and workshops focusing 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. 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 student 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.

References:

- [1] <https://www.globenewswire.com/news-release/2021/09/22/2301712/0/en/Gaming-Market-Worth-545-98-Billion-by-2021-2028-Fortune-Business-Insights.html>
- [2] Ghaffarzadegan, N., & Rahmandad, H. (2020). Simulation-based estimation of the early spread of COVID-19 in Iran: Actual versus confirmed cases. *System Dynamics Review*, 36(1), 101-129. <https://doi.org/10.1002/sdr.1655>
- [3] Giraldo, J. S., Kok, K., & Paterakis, N. G. (2021). Development, application, and evaluation of an online competitive simulation game for teaching electricity markets. *Computer Applications in Engineering Education*, <https://doi.org/10.1002/cae.22485>

Appendix A: Support Letters from Corporations, Government, and Educational Entities



Dr. Derrek B. Dunn, Professor and Dean
School of Business and Technology
30665 Student Services Center
EASC Complex, Suite 3087
Princess Anne MD 21853

Re: Bachelor of Science
Gaming and Software Engineering

July 31, 2023

Dear Dr. Dunn,

Please accept this letter in support of the proposed Bachelor of Science degree in Gaming and Software Engineering at the University of Maryland Eastern Shore (UMES).

The diversity of economic sectors throughout our region adds to the strength and stability of our overall economy. The proposed program complements many of our existing sectors and offers the opportunity to add to the diversity of our economic base so we're even less reliant upon any one industry or economic sector for our viability and prosperity. Creative and critical thinking are outcomes of the proposed program and can be applied locally in existing companies as well as in new, entrepreneurial ventures, especially within the growing gaming and software industry.

Thank you for your leadership and please let me know how I or my office may further assist.

Very Truly Yours,

A handwritten signature in black ink, appearing to read 'DRyan', is written over a horizontal line.

David Ryan
Executive Director

ONE PLAZA EAST, SUITE 501 | P.O. BOX 4700 | SALISBURY, MO 21803
410.749.1251
SWED.ORG | INFO@SWED.ORG

Appendix B: Articulation Agreements with Community Colleges

GAMING AND SOFTWARE ENGINEERING (PROVISIONALLY)

Articulation
Page 1 of 4

(PROVISIONALLY SIGNED)

**ACADEMIC PROGRAM ARTICULATION AGREEMENT BETWEEN
CHESAPEAKE COLLEGE
AND
UNIVERSITY OF MARYLAND EASTERN SHORE
REGARDING TRANSFER FROM
ASSOCIATE OF ARTS IN COMPUTER SCIENCE TECHNOLOGY
TO
BACHELOR OF SCIENCE IN GAMING AND SOFTWARE ENGINEERING**

This Academic Program Articulation Agreement (“Agreement”) is entered into by and between Chesapeake 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 Computer Science Technology, Associate degree, for the completion of Gaming and Software Engineering, Bachelor’s degree:

Institution	HEGIS Program Title	Award Type	Statewide CIP
Chesapeake Community College	510302- Computer Science Technology	Associate Degree	119999
University of Maryland Eastern Shore	079910- Gaming and Software Engineering	Bachelor’s Degree	100304

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 Chesapeake College;
2. Are enrolled at Chesapeake College, in good standing; and maintaining a 2.0 cumulative grade point average to transfer;
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 from Chesapeake College into the University of Maryland Eastern Shore for the completion of the Bachelor of Science in Gaming and Software Engineering
2. Courses that the University of Maryland Eastern Shore will accept credits for towards completion of the Bachelor of Science in Gaming and Software Engineering include:

MHEC Articulation Agreement

Last Updated: March 8, 2023

Doc ID: 372ebe7256cbab4bbb6849c5f5bc016818c05bd8

Chesapeake College			University of Maryland Eastern Shore Comparable Course			
Course Number	Course Name	Credits	Course Number	Course Name	Credits	Applied to*
FSC 101	Freshman Seminar Course	1	CSDP 100	Freshman Year Exp	1	General Education
CST 102	Introduction to Per BI & MYSQL	3	Elective	Elective	3	Program Major / Req.
CST 109	Introduction to Computers	4	CSDP 121	Microcomputer Applications	4	Program Major / Req.
CST 143	Operating Systems	3	CSDP 401	Operating Systems	3	Program Major / Req.
MAT 140	Calculus & Analytical Geometry	4	MATH 112	Calculus I	4	General Education
CST 119	Python I & Problem Solving	4	CSDP 221	Introduction to Computer Programming	4	Program Major / Req.
Program Elective	Program Elective	6-8	Program Elective	Program Elective	6-8	Program Major / Req.
ENG 101	Composition	3	ENGL 101	Basic Composition I	3	General Education
	Social & Behavior Science	3		Social & Behavior Science	3	General Education
CST 250	Computer Networks	3	CSDP 402	Computer Networks	3	Program Major / Req.
CST 208	HTML I & Web Design	4	CSDP 332	Internet Programming	3	Program / Major Req.
MAT 110	Finite Mathematics	3	MATH 232	Introduction to Linear Algebra	3	General Education
	Biology / Natural Science	4		Biology / Natural Science	4	General Education
	Arts / Humanities	3		Arts / Humanities	3	General Education
CST 217	Ethics & IT	3	CSDP 390	Social, Ethical and Legal Issues in Computer Science	3	Program Major / Req.
BUS 101	Introduction to Business	3	BUAD 132	Introduction to Business	3	Program Major / Req.
CST 245	Computer User Support	3	Elective	Program Elective	3	Program / Major Req.
CPL 280	Cooperative Work Experience	3	CSDP 395	Internship	3	Program / Major Req.
Gen. Ed.	General Education Elective	3	Gen. Ed.	General Education Elective	3	General Education

*Receiving Institution must indicate if the 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.

	Chesapeake College	University of Maryland Eastern Shore
Name of staff person responsible for oversight	Marcella Leach	Dr. Willie L. Brown, Jr.
Title of staff person	Executive Director of Eastern Shore Higher Education Center and Director of Continuing Education	Vice Provost for Faculty Affairs
Email address	mleach@chesapeake.edu	wlbrown@umes.edu
Telephone Number	410-822-5761	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	Chesapeake 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. UMES is offering in-state tuition to Chesapeake Community College students regardless of their state of residency.
8. 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. Governing Law

This Agreement shall be governed by, and construed in accordance with, the laws of the State of Maryland.

D. No Third-Party Beneficiaries

There are no third-party beneficiaries to 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 (Provisionally Signed)

By: Reall
Dr. Rondall Allen, Provost and Vice President for Academic Affairs

03 / 13 / 2023
Date

(PROVISIONALLY SIGNED)

**ACADEMIC PROGRAM ARTICULATION AGREEMENT BETWEEN
FREDERICK COMMUNITY COLLEGE
AND
UNIVERSITY OF MARYLAND EASTERN SHORE
REGARDING TRANSFER FROM
ASSOCIATE OF APPLIED SCIENCE IN COMPUTER SCIENCE
TO
BACHELOR OF SCIENCE IN GAMING AND SOFTWARE ENGINEERING**

This Academic Program Articulation Agreement (“Agreement”) is entered into by and between Frederick Community (the “Sending Institution”) and the University of Maryland Eastern Shore (the “Receiving Institution”) (collectively, the “Institutions”) to facilitate the transfer of academic credits from Computer Science, Associate degree, for the completion of Gaming and Software Engineering, Bachelor’s degree:

Institution	HEGIS Program Title	Award Type	Statewide CIP
Frederick Community College	498001- Computer Science	Associate’s Degree	520904
University of Maryland Eastern Shore	079910- Gaming and Software Engineering	Bachelor’s Degree	100304

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 Frederick Community College;
2. Are enrolled at Frederick Community College, in good standing; and maintaining a 2.0 cumulative grade point average in order to transfer;
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 from Frederick Community College into the University of Maryland Eastern Shore for the completion of the Bachelor of Science in Gaming and Software Engineering
2. Courses that the University of Maryland Eastern Shore will accept credits for towards completion of the Bachelor of Science in Gaming and Software Engineering include:

Frederick Community College			University of Maryland Eastern Shore Comparable Course			
Course Number	Course Name	Credits	Course Number	Course Name	Credits	Applied to*
ENGL 101	English Composition I	3	ENGL 101	Basic Composition I	3	General Education
MATH 165	Pre-Calculus	3	MATH 110	Trigonometry / Analytical Geometry	3	General Education
ARTS	Arts Elective	3	ARTS	Arts Elective	3	General Education
	Social / Behavior Sciences	3		Social / Behavior Sciences	3	General Education
CMIS 201	Computer Science I	4	CSDP 221	Introduction to Computer Programming	3	Major / Core Req.
CMIS 222	Computer Organization	3	CSDP 351	Computer Architecture	3	Major / Core Req.
MATH 185	Calculus I	4	MATH 112	Calculus I	4	General Education
PHYS 151	General Physics	4	PHYSICS 121/123	General Physics I w/Lab	4	General Education
CMIS 202	Computer Science II	4	CSDP 222	Advanced Programming	4	Major / Core Req.
MATH 195	Calculus II	4	MATH 211	Calculus II	4	General Education
CMIS 175	Game Theory /Design	s	SIGD 335	Game Design	3	Major / Core Req.
HUMN	Humanities Elective	3	HUMN	Humanities Elective	3	General Education
	Physical Education, Health, or Nutrition	3		Physical Education, Health, or Nutrition	3	General Education
PHYS 252	General Physics II	4	PHYS 112/114	General Physics II w/Lab	4	General Education
CMIS 177	Interactive 3D Technology	3	SIGD 381	Introduction to Computer Graphics	3	Major / Core Req.
CMIS 178	3D Modeling / Animation	3	SIGD 460	3D Modeling / Simulation	3	Major / Core Req.
	Social / Behavior Sciences	3		Social / Behavior Sciences	3	General Education
COMM 102	Interpersonal Communication	3	ENGL 203	Interpersonal Communication	3	General Education

*Receiving Institution must indicate if the 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.

	Frederick Community College	University of Maryland Eastern Shore
Name of staff person responsible for oversight	Dr. Jacob Ashby	Dr. Willie L. Brown, Jr.
Title of staff person	Assistant Dean, Assessment and Articulation	Vice Provost for Faculty Affairs
Email address	jashby@frederick.edu	wlbrown@umes.edu
Telephone Number	(301) 624-2802	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	Frederick Community College	University of Maryland Eastern Shore
Name of person	Jennifer McAninely	Dr. Etahe Johnson
Title of person	Assistant Director, Academic Programs and Transfer Advising	Academic Support Associate
Email address	jmcaninely@frederick.edu	ejohnson2@umes.edu
Telephone Number	(240) 629-7935	(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. UMES is offering in-state tuition to FCC students regardless of their state of residency.
8. 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. Governing Law

This Agreement shall be governed by, and construed in accordance with, the laws of the State of Maryland.

D. No Third-Party Beneficiaries

There are no third-party beneficiaries to 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 (Provisionally Signed)

By: Reall
Dr. Rondall Allen, Provost and Vice President for Academic Affairs

03 / 13 / 2023
Date

(PROVISIONALLY SIGNED)

**ACADEMIC PROGRAM ARTICULATION AGREEMENT BETWEEN
FREDERICK COMMUNITY COLLEGE
AND
UNIVERSITY OF MARYLAND EASTERN SHORE
REGARDING TRANSFER FROM
ASSOCIATE OF APPLIED SCIENCE IN GAMING SIMULATION DEVELOPMENT
TO
BACHELOR OF SCIENCE IN GAMING AND SOFTWARE ENGINEERING**

This Academic Program Articulation Agreement (“Agreement”) is entered into by and between Frederick Community (the “Sending Institution”) and the University of Maryland Eastern Shore (the “Receiving Institution”) (collectively, the “Institutions”) to facilitate the transfer of academic credits from Gaming Simulation Development, Associate degree, for the completion of Gaming and Software Engineering, Bachelor’s degree:

Institution	HEGIS Program Title	Award Type	Statewide CIP
Frederick Community College	510301- Gaming and Simulation Development Science	Associate’s Degree	110201
University of Maryland Eastern Shore	079910- Gaming and Software Engineering	Bachelor’s Degree	100304

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 Frederick Community College;
2. Are enrolled at Frederick Community College, in good standing; and maintaining a 2.0 cumulative grade point average in order to transfer;
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 from Frederick Community College into the University of Maryland Eastern Shore for the completion of the Bachelor of Science in Gaming and Software Engineering
2. Courses that the University of Maryland Eastern Shore will accept credits for towards completion of the Bachelor of Science in Gaming and Software Engineering include:

Frederick Community College			University of Maryland Eastern Shore Comparable Course			
Course Number	Course Name	Credits	Course Number	Course Name	Credits	Applied to*
ENGL 101	English Composition I	3	ENGL 101	Basic Composition I	3	General Education
MATH 185	Calculus I	4	MATH 112	Calculus I	4	General Education
CMIS 175	Game Theory / Design	3	SIGD 335	Game Design	3	Major / Core Req.
CMIS 176	Game Creation	3	SIGD 370	Game Level Design	3	Major / Core Req.
	Arts / Humanities	3	ARTS/HUMN	Arts / Humanities	3	General Education
PHIL 208 <i>OR</i> PHIL 101	Business Ethics <i>OR</i> Introduction to Philosophy	3	BUAD 200 <i>OR</i> PHIL 101	Business Ethics <i>OR</i> Introduction to Philosophy	3	General Education
CMIS 177	Interactive 3D Technology	3	SIGD 381	Introduction to Computer Graphics	3	Program / Major Req.
CMIS 178	3D Modeling / Animation	3	SIGD 460	3D Modeling / Simulation	3	Program / Major Req.
CMIS 226	Game Scripting	3	CSDP Elective	CSDP Elective	3	Program / Major Req.
	Social / Behavior Science	3		Social / Behavior Science	3	General Education
	Health or Nutrition	1	General Ed. Elective	Gen. Ed. Elective	3	General Education
CMIS 227	Game Programming	4	SIGD 310	Game Programming, I w/ 1 credit Elective	4	Program / Major Req.
CMIS 225C	Computer Programming Language: Mobile Applet Programming	3	SIGD 340	Mobile Application Development	3	Program / Major Req.
CMIS 203	System Analysis / Design	3	CSDP 305	Software Engineering	3	Program / Major Req.
	Biological / Physical Science	3		Biological / Physical Science	3	General Education
	General Education Course	3		General Education Course	3	General Education
	Elective	6		Elective		Program / Major Req.
CMIS 228	Simulation and Game Development	4	Elective	Selected Topics	3	Program / Major Req.

*Receiving Institution must indicate if the course is applied to General Education, Program/Major requirements, or General Elective.

- 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.

	Frederick Community College	University of Maryland Eastern Shore
Name of staff person responsible for oversight	Dr. Jacob Ashby	Dr. Willie L. Brown, Jr.
Title of staff person	Assistant Dean, Assessment and Articulation	Vice Provost for Faculty Affairs
Email address	jashby@frederick.edu	wlbrown@umes.edu
Telephone Number	(301) 624-2802	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	Frederick Community College	University of Maryland Eastern Shore
Name of person	Jennifer McAninely	Dr. Etahe Johnson
Title of person	Assistant Director, Academic Programs and Transfer Advising	Academic Support Associate
Email address	jmcaninely@frederick.edu	ejohnson2@umes.edu
Telephone Number	(240) 629-7935	(410) 651-6131

- 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).
- 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. UMES is offering in-state tuition to FCC students regardless of their state of residency.
8. 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. Governing Law

This Agreement shall be governed by, and construed in accordance with, the laws of the State of Maryland.

D. No Third-Party Beneficiaries

There are no third-party beneficiaries to 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 (Provisionally Signed)

By: Reall
Dr. Rondall Allen, Provost and Vice President for Academic Affairs

03 / 13 / 2023
Date

(PROVISIONALLY SIGNED)

**ACADEMIC PROGRAM ARTICULATION AGREEMENT BETWEEN
 WOR-WIC COMMUNITY COLLEGE
 AND
 UNIVERSITY OF MARYLAND EASTERN SHORE
 REGARDING TRANSFER FROM
 ASSOCIATE OF ARTS IN COMPUTER SCIENCE
 TRANSFER – GAME DEVELOPMENT
 TO
 BACHELOR OF SCIENCE IN GAMING AND SOFTWARE ENGINEERING**

This 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 Computer Science Technology, Associate degree, for the completion of Gaming and Software Engineering, Bachelor’s degree:

Institution	HEGIS Program Title	Award Type	Statewide CIP
Wor-Wic Community College	498001- Computer Science Transfer – Game Development	Associate Degree	110101
University of Maryland Eastern Shore	079910- Gaming and Software Engineering	Bachelor’s Degree	100304

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 at Wor-Wic Community College, in good standing; and maintaining a 2.0 cumulative grade point average to transfer;
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 from Wor-Wic Community College into the University of Maryland Eastern Shore for the completion of the Bachelor of Science in Gaming and Software Engineering
2. Courses that the University of Maryland Eastern Shore will accept credits for towards completion of the Bachelor of Science in Gaming and Software Engineering 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 /College Study	1	CSDP 100	Computer Science Orientation	1	General Education
CMP 134	Approaches to Problem Solving	4	CSDP Elective	CSDP Elective	3	Program / Major Req.
CMP 141	Introduction to Game Development	3	CSDP Elective	CSDP Elective	3	Program / Major Req.
ART 101	Introduction to Art History	3	ARTS 101	Art Appreciation	3	General Education
ENG 101	Fundamentals of English I	3	ENGL 101	Basic Composition I	3	General Education
MTH 121	Precalculus	3	MATH 110	Trigonometry / Analytical Geometry	3	General Education
CMP 135	Introduction to Programming	3	MATH 221	Introduction to Computer Programming	3	Program / Major Req.
CMP 142	Game Engines	3	CSDP Elective	CSDP Elective	3	Program / Major Req.
ENG 151	Fundamentals of English II	3	ENGL 102	Basic Composition II	3	General Education
GEN. ED.	Biological / Physical Science	3		Biological / Physical Science	3	General Education
PHY 121	General Physics I	4	PHYS 121	General College Physics I	3	General Education
CMP 211	Computer Science II	4	CSDP221	Advanced Programming	4	Program / Major Req.
GEN. ED.	Social / Behavior Science	3		Social / Behavior Science	3	General Education
GEN. ED.	Elective	3		Elective	3	General Education

*Receiving Institution must indicate if the course is applied to General Education, Program/Major requirements, or General Elective.

- 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	Ms. Angie Hayden	Dr. Willie L. Brown, Jr.
Title of staff person	Director of Records and Admissions	Vice Provost for Faculty Affairs
Email address	ahayden@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	Dr. Patricia L. Riley	Dr. Etahe Johnson
Title of person	Dean, General Education	Academic Support Associate
Email address	priley@worwic.edu	ejohnson2@umes.edu
Telephone Number	(410) 334-2853	(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. UMES is offering in-state tuition to Wor-Wic Community College students regardless of their state of residency.
8. 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. Governing Law

This Agreement shall be governed by, and construed in accordance with, the laws of the State of Maryland.

D. No Third-Party Beneficiaries

There are no third-party beneficiaries to 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 (Provisionally Signed)

By: RE Allen
Dr. Rondall Allen, Provost and Vice President for Academic Affairs

03 / 13 / 2023
Date

University of Maryland Eastern Shore: Doctor of Veterinary Medicine

TOPIC: Academic Program Proposal:
University of Maryland Eastern Shore: Doctor of Veterinary Medicine

COMMITTEE: Education Policy and Student Life

DATE OF COMMITTEE MEETING: Wednesday, November 29, 2023

SUMMARY: The University of Maryland Eastern Shore (UMES) proposes to establish a new Doctor of Veterinary Medicine (DVM) Program. The proposed program is integral to UMES's Land Grant Mission of teaching, research, and extension with a focus on agriculture and the pet industry. The program links directly to health-focused programs at UMES, and the overall national approach to one health especially as the interconnection of people, animals, and the environment becomes more important. As only the second such program at an HBCU, it will be attractive to underrepresented groups and thus meet a critical need to expand and diversify the workforce.

UMES's DVM program has been designed to be innovative and future-focused in a number of ways while satisfying accreditation requirements. It provides a more accelerated program (within the mandatory 9 semesters) with state-of-the-art curriculum, the opportunity for students to gain professional experiences at practices and animal-related institutions (public and private) across the country via distributive clinical rotations, an emphasis on multicultural clinical skills, and technology capabilities to prepare professionals for the future workplace.

The program may be completed in 3 calendar years by those who enter after completing a BS degree – students complete required and elective courses in semesters 1-6, and the clinical rotations are completed in Semesters 7, 8 and 9. UMES will be seeking accreditation for this program from the Council of Education (COE) of the American Veterinary Medical Association.

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 Eastern Shore to offer a Doctor of Veterinary Medicine.

COMMITTEE RECOMMENDATION: DATE: November 29, 2023

BOARD ACTION: DATE:

SUBMITTED BY: Alison M. Wrynn 301-445-1992 awrynn@usmd.edu



UNIVERSITY OF MARYLAND EASTERN SHORE
Office of the President

October 15, 2023

Dr. Jay Perman, Chancellor
University System of Maryland
701 E. Pratt St.
Baltimore, MD 21202

Dear Chancellor Perman,

The University of Maryland Eastern Shore hereby submits a proposal to begin offering a new **Doctor of Veterinary Medicine (DVM)** as part of a comprehensive Veterinary Science Program within a new **School of Veterinary Medicine**.

The proposed DVM Program is integral to UMES' Land Grant Mission of teaching, research and extension with a focus on agriculture and the pet industry. The program will address a significant workforce need area at both the state and national levels. Furthermore, it links directly to various human health-focused programs at UMES, and the overall national approach to one health especially as the interconnection of people, animals, and the environment becomes more important against a background of an expanding human population. It is anticipated that the establishment of a DVM Program at UMES will underpin the subsequent development of several complimentary programs which are also in high demand. Specifically, a B.S. in Veterinary Technology and M.S./Ph.D. in Biomedical Sciences. Consistent with its mission, UMES seeks to expand its capacity to offer unique and/ or critical certificate and degree programs.

The UMES Veterinary Sciences Program will only be the second in the nation at an 1890 land-grant HBCU. The program will serve interested students from a range of majors, including agriculture, animal and poultry sciences, biology etc. The program is expected to attract students from across the state. As only the second such program at an HBCU, it will be particularly attractive to underrepresented groups and thus fill an important niche at a time when there is a critical need to diversify the workforce. The program will seek formal linkages with all University System of Maryland and other institutions in Maryland to ensure there are clear pathways for students from across the state into the program.

The UMES' DVM Program will receive full accreditation by the Council on Education (COE) whose members are appointed by the American Veterinary Medical Association (AVMA) and the American Association of Veterinary Medical Colleges (AAVMC). Traditional veterinary science programs are typically 4-year 9-semester programs with a 3-semester final year in a campus teaching hospital. However, this is no longer required by accreditors

and is very resource intensive and prohibitive for a new program. Furthermore, the new animal healthcare marketplace demands a different veterinarian, resembling the dynamics of human medicine. Therefore, UMES proposes a dynamic curriculum comprising nine (9) semesters which will run over three calendar years. This will allow graduates to enter the workforce one year earlier.

UMES is working closely with key public and private stakeholders who will play a critical role in the program's implementation. This has included engagement with the Secretary, US Department of Agriculture, key private sector veterinary service providers who will be integral partners, the Maryland Department of Agriculture. Additionally, a number of 1890 land-grant universities have expressed strong interest to form articulations to ensure their graduates have a clear pathway into the program.

We acknowledge that this is a bold and ambitious program but we believe its need is supported strongly by the data and the timing is right. We have the conviction that it will make a significant difference in a critical workforce need area and hence the economy of the state and nation.

Thank you for considering this request.

Sincerely,

A handwritten signature in cursive script, appearing to read "Heidi M. Anderson".

Heidi M. Anderson, Ph.D., FAPhA
President

Copy: Dr. Randall Allen, Provost and Vice President for Academic Affairs
Dr. Sandeep Gopalan, Vice Provost

UNIVERSITY SYSTEM OF MARYLAND INSTITUTION PROPOSAL FOR

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

University of Maryland Eastern Shore (UMES)

Institution Submitting Proposal

Doctor of Veterinary Medicine

Title of Proposed Program

Doctor of Veterinary Medicine (DVM)

Award to be Offered

Fall 2026

Projected Implementation Date

800

Proposed HEGIS Code

1.8001

Proposed CIP Code

School of Veterinary Medicine

Department in which program will be located

Dr. Moses Kairo

Department Contact

410-651-6072

Contact Phone Number

mkairo@umes.edu

Contact E-Mail Address



Signature of President or Designee

10/15/2023

Date

Proposal for New Graduate Degree Program Doctor of Veterinary Medicine within a New School of Veterinary Medicine

The University of Maryland Eastern Shore (UMES) proposes to establish a new Doctor of Veterinary Medicine (DVM) Program as part of a comprehensive veterinary sciences program within a new School of Veterinary Medicine. The proposed program is integral to UMES' Land Grant Mission of teaching, research and extension with a focus on agriculture and the pet industry. The program links directly to various human health-focused programs at UMES, and the overall national approach to one health especially as the interconnection of people, animals, and the environment becomes more important against a background of an expanding human population. The program will serve interested students from a range of majors and it is expected to attract students from across the state. As only the second such program at an HBCU, it will be particularly attractive to underrepresented groups and thus fill an important niche at a time when there is a critical need to expand and diversify the workforce.

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 Maryland Eastern Shore (UMES) is proposing to offer a new Doctor of Veterinary Medicine (DVM) degree program. The program is designed based upon the requirements of the accrediting body for the profession - the American Veterinary Medical Association's Council on Education (COE) – and will provide a pool of diverse, highly skilled¹ practitioners to serve the animal healthcare needs of residents in Maryland and beyond. Importantly, UMES' DVM program has been designed to be innovative and future-focused in a number of ways while satisfying COE requirements. It provides a more accelerated program (within the mandatory 9 semesters) with state-of-the-art curriculum, the opportunity for students to gain diverse professional experiences at practices and animal-related institutions (public and private) across the country via distributive clinical rotations, an emphasis on multicultural clinical skills, and technology capabilities to prepare professionals for the future workplace.

The costs for building, launching and operating a veterinary program have been reduced significantly over the past 10-15 years due to efficiencies in key areas such as: virtual didactic course delivery, distributive clinical rotations (made even less expensive due to commitment from the largest national practices to provide rotations for UMES at no cost), use of highly talented adjunct faculty (a growing trend in new and existing programs), and use of the 3 calendar-year (still 9 semesters) model that reduces the on-campus cohort to 2 classes instead

¹ <https://www.marsveterinary.com/tackling-the-veterinary-professional-shortage/>

of 3 (reducing infrastructure needs and size of faculty/staff). The UMES program described in this document incorporates each of these features.

The proposed DVM program addresses important skills gaps in the employment market both in Maryland and nationally. Several studies have reported on the shortage of qualified veterinarians to serve both pet owners and those with large animals in the state and broader region. The ¹[most recent study](#) by former Florida Veterinary School Dean James Lloyd, who is a veterinarian with a PhD in Economics, comprehensively explains the scope and underlying factors for these shortages. These shortages are exacerbated by the growth in pet ownership during the Covid-19 pandemic with a nationwide spike in pet adoptions across the US. Corporate practices now offer large signing bonuses and other perks to attract talent and report having to turn away clients due to staff shortages. One of consequence of the Covid-19 veterinary boom was pressure it applied on scarce talent necessary to serve rural and semi-urban areas of the country. The net result is that there are massive shortages of trained professionals to serve both urban and rural markets with adverse impact on pets, large animals, animal owners, the agriculture sector, and population health more broadly. New veterinary programs are crucial, especially since only one new veterinary school opened in the 30 years between 1985 and 2014 when the US population doubled. Millennial and Generation Z households now own 50% of the companion animals in the United States, and these cohorts want pet healthcare delivered at the same quality, scale and convenience as human healthcare. This has created significantly greater demand for veterinarians to lead such care delivery.

The UMES DVM program will advance diversity across the field of veterinary medicine, which has lagged behind all other professions. This is a high priority for UMES as an 1890 land-grant HBCU. The promotion of diversity and expansion of educational opportunities for African American and other minority students is central to our mission. The veterinary medicine profession has been racially homogenous for a long time – about 90% of practitioners are white. The current representation of Blacks in the profession is less than 3%. This program will be only the second such offering at an HBCU, and the only public HBCU institution.

The UMES DVM program has been designed to address structural barriers to admission and entry into the profession of veterinary medicine faced by minority and socio-economically disadvantaged students. The program may be completed in 3 calendar years by those who enter after completing a BS degree – students complete required and elective courses in semesters 1-6, and the clinical rotations are completed in Semesters 7, 8 and 9.

The proposed program offers an accelerated, affordable program in an area of substantial market demand for Maryland residents and non-resident students, and has the potential to expand educational opportunities, fill equity gaps, promote upward social mobility, and increase diversity in the profession of veterinary medicine.

The program is consistent with UMES' mission and vision. As a land-grant HBCU, the university offers "distinctive learning, discovery and engagement opportunities in the arts and sciences, education, technology, engineering, agriculture, business and health professions."

The UMES mission statement reads:

As a public 1890 land-grant Historically Black University that embraces diversity, UMES is committed to serving first-generation and underserved students and providing educational, research, and community engagement opportunities to transform the lives of its students who will impact the state, region, and the world.

As an HBCU, providing access to historically disadvantaged populations is critical to UMES' mission. Among the major professions, veterinary medicine exhibits a systemic lack of diversity. The American Association of Veterinary Medicine Colleges (AAVCM) conducted a recent study into the racial gaps in the profession and found that, 87 percent of 2018 veterinary school applicants were women and approximately 76 percent were White.² It reported that a mere 5% of applicants were Black.³ The study concluded that there was "a very real need to reexamine admissions processes. Schools and colleges of veterinary medicine should objectively and rigorously review their admissions processes and reevaluate those elements, such as the number of veterinary, animal, or total experience hours, that may be a source of inherent bias against particular groups of applicants." The proposed UMES DVM program answers this call.

The new DVM program links directly to various agriculture and human health-focused programs at UMES and supports the national approach to 'One Health' as the mutual dependency of people, animals, and the environment becomes more important. The establishment of a DVM Program at UMES should accelerate the development of several complementary programs which are also in high demand, specifically, a B.S. in Veterinary Technology and M.S./Ph.D. in Biomedical Sciences. The projected demand for veterinary technicians with a B.S. is expected to grow by 20% at the national level and 8.1% in Maryland.

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

UMES has prioritized programs in the health sciences for several years as evidenced by its accelerated pharmacy program, physical therapy program, and physician assistant programs. The DVM program expands UMES' healthcare focus into another area with workforce needs, diversity/access deficits.

The program also furthers the 2020 UMES Strategic Plan, specifically:

Goal 4: Meet the educational needs of the state of Maryland with high-quality and innovative academic programming.

Goal 6: Achieve and maintain national eminence and global impact.

UMES is currently in the process of adopting its new Strategic Plan 2023 "Soaring to Excellence: From Aspiration to Realization." The plan is organized under five Priority Areas:

² <https://www.insightintodiversity.com/research-sheds-light-on-diversity-and-bias-in-veterinary-school-admissions/>

³ Id.

1. Academic Excellence and Innovation;
2. Access, Affordability, and Achievement;
3. Workforce and Economic Development;
4. Research and Community Engagement; and
5. Diversity, Equity, and Inclusion.

There are two elements under Priority Area 1 which speak directly to the proposed DVM program:

- 1.1. Attract, retain, and graduate more aspiring students who will become leaders in their chosen disciplines at the undergraduate and graduate levels from domestic and international markets;
- 1.2. Pilot innovative pathways for working professionals that respond to workforce demands.

Priority Area 2 contains two elements that are tied to the new DVM program:

- 2.1. Increase enrollment to improve the university's efficiency and scalability;
- 2.2. Improve transfer pathways for students into UMES.

One of the signature features of the new DVM program is the ability of students who have commenced an undergraduate degree program or an associate degree program at another higher education institution to gain entry into the accelerated combined BS/DVM and complete it with 6/7 years. Given that raising 4-year degree attainment is a goal of Maryland, this newly created avenue for students to enter a highly valuable profession while saving time and money should attract transfer students from community colleges and other institutions. These other institutions will include HBCUs with which UMES has a long history of collaborative and positive relationships (see letters expressing interest to collaborate in Appendix 2). UMES will explore the possibility of allocating as much as 50% of each entering DVM class to qualified students from a group of HBCUs (see example letters of support in Appendix II). As such, the new DVM program is a direct implementation of priority 2.2 in the UMES Strategic Plan 2023.

The new DVM program is the signature initiative under Priority 3: Workforce and Economic Development. Specifically, the following elements under Priority Area 3:

- 3.1. Diversify and strengthen Maryland's knowledge workforce by expanding the pipeline of underrepresented minority students entering critical workforce fields (STEM, cyber, healthcare, education, etc.)
- 3.2. Expand the number of graduates in fields critical to Maryland's economy: STEM, cyber, healthcare, etc.
- 3.4. Develop a broad, data-informed academic portfolio reflecting the needs of students and employers.
- 3.5. Deliver graduates with well-rounded backgrounds and the credentials needed to enter the workforce.
- 3.7. Become a leader for partnerships that match state and regional needs.

The proposed DVM program will provide Maryland residents with access to the high-quality credentials and training necessary to enter the profession of veterinary medicine. The accrediting body AVMA COE requires programs to be highly rigorous and geared towards attaining a minimum pass rate of 80% in the professional licensing examination. As UMES graduates successfully pass the North American Veterinary Licensing Examination (NAVLE) and enter the profession, it will enhance the reputation of the university, re-enforcing the vision of UMES to be the “preeminent public Historically Black University that is recognized for leadership in student-centered education, exceptional research, innovation, and inclusiveness.”

The UMES DVM program’s fundamentals represent a combination of strong basic sciences, pre-clinical training in all facets of modern veterinary medicine, hands-on examination, anatomy, communications and surgical training, and intensive immersion in core and elective rotations through the distributive clinical year. Everything is designed to produce a day one practice-ready veterinarian upon graduation, as well as the foundation for graduates seeking employment outside of the practice setting or an academic career through internships and residencies.

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 DVM program will achieve positive net income in first year not including initial startup costs. The third year represents a full cohort of 3 classes of approximately 100 students each. Only 2 of these three cohorts will be on campus and receiving instruction and services. The third year cohort will be in rotations throughout the mid-Atlantic, eastern and southern United States and beyond, requiring only minimal support from the UMES team. UMES will provide funding infrastructure and initial operations for the new program as a strategic priority. The university plans to allocate space adjacent to the new Pharmacy building to enable the shared use of facilities such as labs and classrooms, and to promote inter-professional interactions and collaboration. UMES will allocate resources for the hiring of a dean and new faculty in this discipline.

UMES will receive significant financial support from large organizations in the animal health sector. Based upon work by a UMES consultant, preliminary commitments will be documented and are expected to include direct donations valued at \$6-10 Million, donation of clinical rotations (normally charged with a fee back to the veterinary school) with a value for operating budget in range of \$500,000-\$750,000 annually, plus curriculum delivery donated by international experts with annual operating value in range of \$300,000-\$500,000. UMES has submitted a five year plan for facilities improvement to USDA-NIFA which includes resources to support development of facilities to support the program. The award letter for the first \$898,000 of \$4.5 million has been received.

4. Provide a description of the institution’s a commitment to:

- a) ongoing administrative, financial, and technical support of the proposed program

UMES is fully committed to supporting the DVM program and the discipline of veterinary medicine. The university plans to create a new School of Veterinary Medicine with the DVM as its centerpiece. It will recruit a dean and dedicated faculty and staff who will be located in the new school.

At the initial stage of development, the program will be housed within the existing structure under the Provost's Office with support from the Schools of Agricultural and Natural Sciences, and Pharmacy and Health Professions. This will enable the swift development of policies and procedures and provide a high level of institutional support at the nascent stage of the new school. A multi-disciplinary leadership team will shepherd the initial stages of program development in line with the University's internal rules and processes and the accreditation requirements stipulated by the COE. This leadership team plus consultant will recruit a dean and founding faculty to lead the processes for accreditation, the site visit, and the like. The dean and founding faculty will work in close alignment with the UMES marketing and admissions teams to communicate with potential students and recruit the inaugural class. The dean and faculty will also work with allied units such as Information Technology (IT), the library, student services, facilities, etc., to make adequate provisions for the successful launch of the new program.

In summary, UMES will ensure that adequate ongoing administrative and other support are provided to launch this program in 2026-27.

- b) continuation of the program for a period of time sufficient to allow enrolled students to complete the program.

UMES proposes to add this program as a regular offering in its catalog and will ensure that all students admitted into the program are allowed to complete the program. As noted previously, student success, the preparation of graduates who will serve the workforce needs of the state, and the promotion of diversity and enhanced access to high quality education to underserved populations are integral to UMES' mission. This means that the proposed DVM program is expected to be a signature program in UMES' portfolio of academic degree offerings.

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

Provide evidence that the perceived need is consistent with the [Maryland State Plan for Postsecondary Education](#).

The proposed UMES DVM program will play a critical role in meeting present and future needs for veterinarians in the State. It will provide qualified practitioners to serve clients in underserved areas and address longstanding shortages that are adversely impacting animal and human health.

Meeting demand: There is likely to be substantial demand for the new UMES DVM program based on national trends. According to the AAVMC, there were 10,834 applicants seeking admission into DVM programs in 2022.⁴ This showed an increase of 5.5% compared to the previous year and represents strong and sustained applicant demand for several years in a row. Notably, the acceptance rate into DVM programs nationally is 10-15%, meaning that a very large number of applicants are unable to secure places. In particular, the limited number of places has an adverse impact on Maryland residents because there are no veterinary schools in the state currently aside from the Virginia, Maryland College of Veterinary Medicine (VMCVM) at Virginia Tech, which is expected to serve three states: Virginia, West Virginia, and Maryland residents. Critically, VMCVM is located in Virginia, and has an entering class of 128 students. While the agreement between Virginia Tech and University of Maryland College Park guarantees 30 admission slots, this has not translated to increased opportunities for students coming from other schools. Clearly, Maryland residents are not adequately served by this limited provision.

Advancing diversity: As noted by a recent article in the Baltimore Sun, veterinary medicine is populated “statistics show, ... [is mostly] socioeconomically privileged white women with a love for animals. Countless other individuals, who would provide outstanding care and whose research efforts would benefit all of society, may never consider veterinary medicine.”⁵

This racial and gender mismatch in the veterinary medicine profession is ill-suited to the demographics of Maryland, which is the most diverse state on the East Coast. As seen from the US Census data below (Figure 1), about 31% of the population identifies as Black. The opening of a new DVM program in Maryland is likely to enhance diversity in the veterinary medicine profession.

Figure 1. Excerpt of US Census data for Maryland in 2022

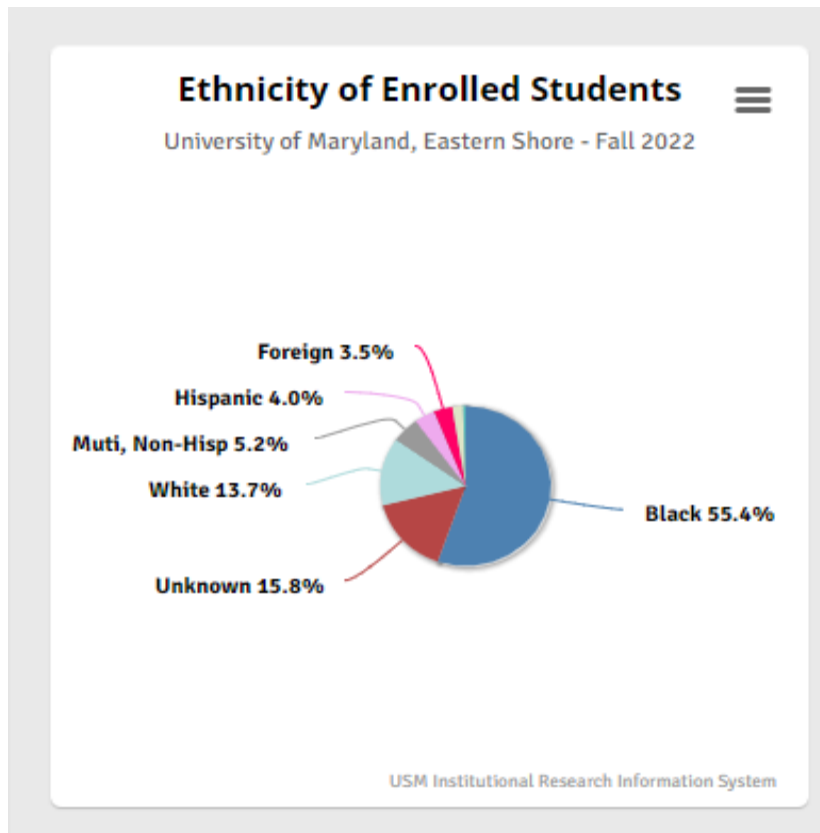
⁴ <https://todaysveterinarybusiness.com/veterinary-school-applications/#:~:text=Today's%20Veterinary%20Business%20Staff&text=Veterinary%20medicine%20remains%20a%20popular,the%2010%2C273%20applicants%20last%20year.>

⁵ Leah Fine, *The veterinarian shortage starts in the pipeline to veterinary school*, The Baltimore Sun, Aug 1, 2022, available at, <https://www.baltimoresun.com/opinion/op-ed/bs-ed-op-0801-veterinarian-shortage-20220801-ey2ejpo7ovaqfpyjq3hznvbioa-story.html>

Population Estimates, July 1 2022, (V2022)	6,164,660
Population Estimates, July 1 2021, (V2021)	6,174,610
Persons under 18 years, percent	22.1%
Persons 65 years and over, percent	16.3%
Female persons, percent	51.3%
Race and Hispanic Origin	
White alone, percent	57.8%
Black or African American alone, percent (a)	31.4%
American Indian and Alaska Native alone, percent (a)	0.7%
Asian alone, percent (a)	6.9%
Native Hawaiian and Other Pacific Islander alone, percent (a)	0.1%
Two or More Races, percent	3.1%
Hispanic or Latino, percent (b)	11.1%
White alone, not Hispanic or Latino, percent	49.0%

Source: US Census 2022.

Figure 2. UMES student distribution by ethnicity (Fall 2022)



As shown, 55% of UMES students identify as Black. The proposed new program is likely to enroll students with a similar racial profile, thereby advancing racial diversity in the profession of veterinary medicine.

The proposed UMES DVM program will expand educational opportunities and choices for African American students in Maryland and nationally. Currently, the only HBCU offering such a program is Tuskegee University. Tuskegee University's tuition for the DVM program is currently listed as \$20,585 for the Fall and Spring

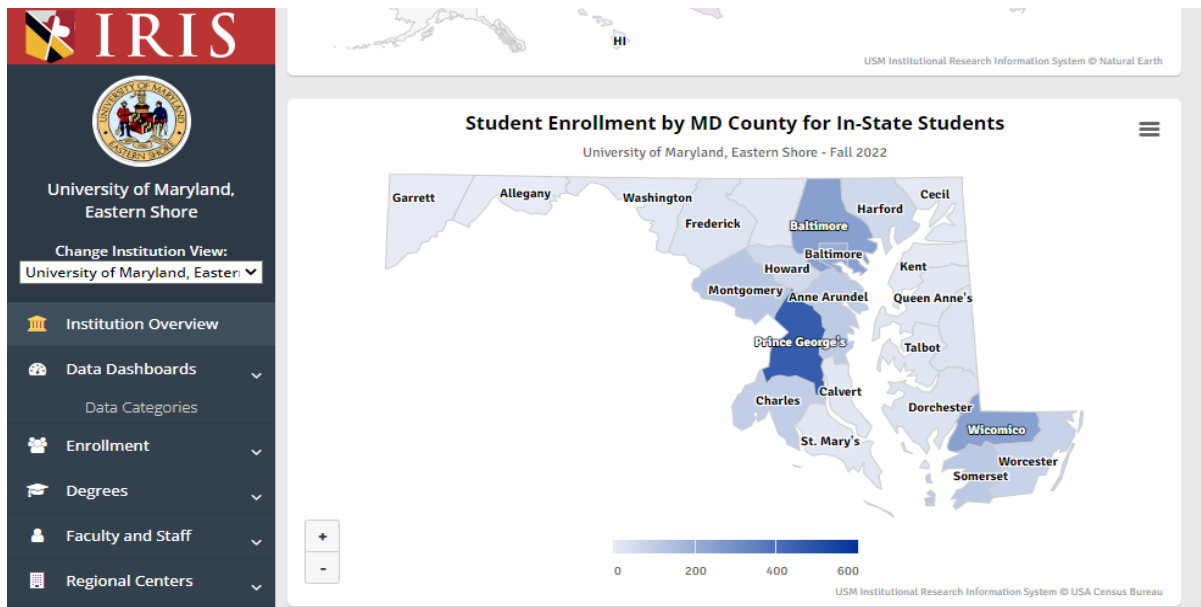
semesters (for a full 4-year program cost of \$187,129 with fees is \$313,053⁶) and UMES proposed tuition and fees rate is \$52,500 per year, for a 3-year total cost of \$157,500. African American and other minority students from Maryland will benefit from having an affordable alternative within the state at an established HBCU.

Aside from racial and gender diversity deficits, the data shows that the majority of entrants into the profession wish to work in urban areas. This leaves significant gaps in the supply of veterinarians in rural areas.

UMES draws its student body primarily from rural or semi-urban counties (Figure 3). It is likely that this will translate into the new DVM program as well. Aside from contributing to the geographic diversity of new entrants into veterinary medicine, the proposed new program is also likely to advance the diversity of outcomes – a higher percentage of UMES graduates are likely to work in rural counties due to their backgrounds. This will address severe shortages of veterinarians in rural areas of Maryland and other states.

⁶ <https://www.aavmc.org/becoming-a-veterinarian/funding-your-degree/cost-comparison-tool/>

Figure 3. Origin of UMES students by county (Fall 2022)



In addition, the proposed new DVM program is consistent with the Maryland State Plan for Postsecondary Education. Specifically, the program advances the two pillars below:

- **Access:** *Ensure equitable access to affordable and high-quality postsecondary education for all Maryland residents.*
- **Innovation:** *Foster innovation in all aspects of Maryland higher education to improve access and student success.*

The new DVM program offers Maryland residents access to an affordable high-quality professional degree in a field that is in high demand regionally and nationally. Given there are currently only 34 institutions offering a Doctor of Veterinary Medicine program nationally, access to these programs is inequitable. Students who experience economic and educational disadvantages have a lower chance of success in gaining admission into this limited pool of places. It has been reported that the requirement for applicants to possess hundreds of hours of work experience acts as an entrenched barrier to those from lower socio-economic strata as they do not have the means to accumulate such experience, which is often either lowly paid or unpaid. Further, the lack of a geographically proximate program acts as a barrier to those with limited economic resources as enrolling in an out-of-state degree program entails higher additional costs. It is likely that applicants from Maryland who are unable to gain admission into VMCVM and do not have the financial wherewithal to pursue studies out of state have to sacrifice their aspirations of becoming veterinarians.

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.

The proposed DVM program will produce graduates who will enter the market as veterinary medical practitioners. Entry into the profession is pursuant to meeting educational requirements specified by the COE and passing the licensing examination, NAVLE. The scale of the shortage of veterinarians is such that students may be expected to have multiple job offers. Distributive clinical rotations programs are noted for the common practice of students receiving job offers from participating practices who observe the students' skills in action.

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

The proposed new program will help attenuate skills gaps in the job market for veterinarians. According to the Bureau of Labor Statistics, at the national level the employment of veterinarians is projected to grow 19 percent from 2021 to 2031, much faster than the average for all occupations, and 13 percent for Maryland from 2020-2030. Not surprisingly, the United States agriculture and pet industry faces a serious challenge due to the current and projected shortage of veterinarians.

Figure 4. Employment projections for veterinarians (Source: U.S. Bureau of Labor Statistics, Employment Projection Program

Occupational Title	SOC Code	Employment 2021	Projected Employment, 2031	Change, 2021-31	
				Percent	Numeric
Veterinarians	29-1131	86,300	103,100	19	16,800

According to the United States Department of Agriculture, 500 counties in 46 states reported a critical shortage of veterinarians in 2022. The demand for veterinarians to serve the pet industry in the highly urbanized metropolitan areas in Maryland and adjacent locales is expected to continue to grow. A similar high demand exists in rural farming communities where there is an acute shortage of large animal veterinarians. The data for Maryland (Figure 5) shows a very robust job market demand:⁷

Figure 5: Demand for veterinarians in Maryland

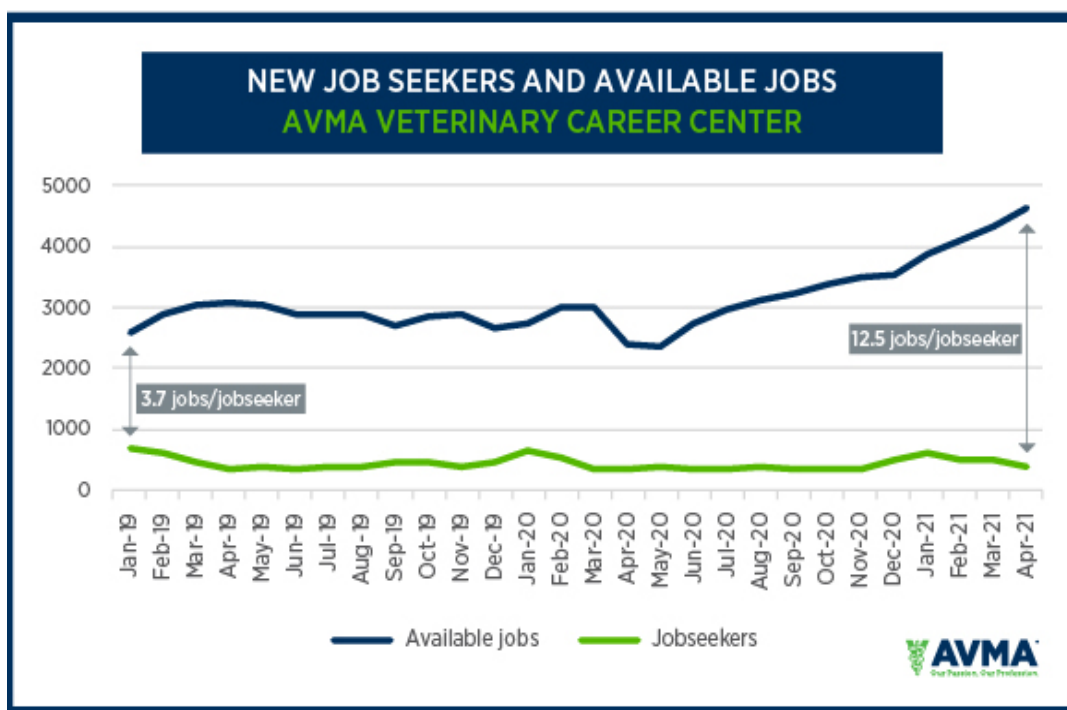
Occupation	2020	2030	Change	Percent Change
Veterinarians	1,959	2,206	247	12.61%

⁷ Maryland Department of Labor projections 2020-30, available at <https://www.dllr.state.md.us/lmi/iandoproj/maryland.shtml>.

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.

The Bureau of Labor Statistics projects about 4,800 openings for veterinarians each year and the employment change for 2012-30 at 16,800. As noted previously, there is a strong demand for veterinarians in the market and the industry projects a need for about 41,000 veterinarians by 2030. The chart below (Figure 7) produced by AVMA conservatively evidences the gap between supply and demand:

Figure 6. National job supply and demand projections veterinary careers (Source: AVMA⁸)



The Atlantic magazine recently published an article about the shortage of veterinarians noting Corporate veterinary practices have recently started offering bonuses as high as \$100,000 to vets who sign three-year contracts. But there is an underlying supply-and-demand problem. More Americans are acquiring pets, while the number of people going into the veterinary profession has not been keeping pace.”⁹ The piece also references the need for 41,000 veterinarians by 2030.

In a recent report, the Farm Foundation Journal bemoans the ‘decline in rural food animal veterinarians’ and says it has ‘now reached such a critically low point that urgent action is required.’ The report notes just ‘3-4% of new veterinary graduates have entered food animal-

⁸ <https://www.avma.org/blog/veterinary-medicine-jobseekers-market>

⁹ Sarah Zhang, The Great Veterinary Shortage, The Atlantic, July 6, 2022, available at <https://www.theatlantic.com/health/archive/2022/07/not-enough-veterinarians-animals/661497/>

related practice over the past 20 years. ... Without enough food animal veterinarians and reliable access to the services they provide, 3.7 million livestock jobs are at stake, as well as overall public health and food safety.’¹⁰ The Farm Foundation calls for ‘supporting schools by enhancing training opportunities and actively recruiting students from rural backgrounds.’

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

As noted previously, there are only 34 veterinary medical programs in the United States currently. According to a recent research report by former Florida DVM Dean James Lloyd for Mars Veterinary Health, the world’s largest provider of veterinary care and employer of veterinarians and a core partner for UMES, there are approximately 2,500-2,600 graduates entering the workforce as veterinarians in the US each year. Mars estimates that over 41,000 veterinarians will be needed over the next decade to meet the projected demand in 2030. Based on current numbers entering the workforce, Mars projects a shortage of 15,000 veterinarians in the US by 2030.¹¹

To conclude, there is not a sufficient supply of qualified veterinarians to fill existing vacancies. Moreover, there is a substantial percentage of the qualified professional group exiting the field either due to retirement or for other reasons. In addition, the pet population in the US is growing with consequential implications for healthcare. The net result is both a current shortage and a projected gap of over 15,000 veterinarians by 2030. The proposed UMES DVM program can play a vital role in addressing this gap, in addition to contributing to important goals such as diversity across racial, rural, gender, and socio-economic dimensions.

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.

The Virginia-Maryland College of Veterinary Medicine (VMCVM) formed in partnership between Virginia Tech and the University of Maryland is the only veterinary program within the broader region. However, it is located at Virginia Tech’s campus in Blacksburg, VA. The program only admits 128 students currently and differs from the UMES program meaningfully in terms of research emphasis and large animal infrastructure/faculty/staff.

As a program to be accredited by the AVMA COE, there is likely to be some overall similarity between the VMCVM program and the new UMES DVM program because of the disciplinary accreditor’s mandates for competencies to be possessed by licensed practitioners. However, there are substantial differences:

- a. The UMES program can be completed in 3 years for entrants with a BS degree;

¹⁰ https://www.farmjournalfoundation.org/_files/ugd/cfcaf3_a4daf753ad254d31a95ce13f47636e5d.pdf

¹¹ <https://www.marsveterinary.com/tackling-the-veterinary-professional-shortage/>

- b. The UMES program allows those without a BS to complete a combined BS-DVM in 6 or 7 years.
- c. The UMES program is likely to attract more diverse students and especially Black students;
- d. The UMES program is likely to attract more non-urban students;
- e. The UMES program is likely to produce more non-urban veterinarians.

2. Provide justification for the proposed program.

There is just one HBCU currently offering a DVM program. Unsurprisingly, the veterinary medicine field is not diverse and about 90% of veterinarians identify as white. The proposed UMES program will help to diversify the profession by providing a pipeline of graduates from minority communities into the profession. In turn, the greater representation of minorities as veterinary practitioners will attract additional learners from these communities into the profession and change the current distortions in demographic representation.

The new UMES DVM will also provide Maryland residents, in particular African Americans and other minorities with additional educational opportunities and choices by creating an affordable pathway into an in-demand profession or further study and research in the veterinary sciences. Notably, UMES programs charge lower tuition fees compared to other programs, meaning that students will be able to graduate with lower debt.

The UMES program also facilitates the achievement of the important goal of socio-economic mobility and expanding economic opportunities for all sections of society. The median earnings of veterinarians in the US is about \$103,000 and growing, and the debt-to-income ratio for veterinarians is low at 1.67:1. This means that enabling students from disadvantaged backgrounds to enter the profession will assist in achieving upward socio-economic mobility and reducing entrenched inequality.

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.**

UMES is an HBCU and this program will have a supportive impact on the maintenance of other programs, especially in agriculture, STEM and the health science fields.

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.**

This has been addressed above in the section on alignment with mission and strategic plan. As an HBCU, the proposed DVM program is a critical part of advancing the identity and impact of UMES.

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 DVM program will be housed in a newly established School of Veterinary Medicine. It was designed by faculty with expertise in the area with assistance from the Provost's Office and a UMES appointed consultant. A new Dean of the School of Veterinary Medicine and disciplinary faculty will oversee the program and its administration.

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

UMES graduates from the DVM program are expected to demonstrate the following:

1. Fundamental knowledge of biological processes, critical thinking, research, and problem-solving skills to recommend effective treatment solutions as veterinarians with due regard for animal welfare, public health, legal, and ethical norms;
2. Ability to safely perform diagnostic, preventative, medical and surgical procedures for the health, welfare, and treatment of animals;
3. Ability to respond to emergencies as applicable to biosecurity and infectious diseases with due regard to the health and welfare of humans, animals, and the environment;
4. Ability to practice evidence-based veterinary medicine and critically analyze scientific literature to advance knowledge;
5. Ethical and professional conduct for veterinary practice within a complex and diverse society;
6. Effective communication skills incorporating a variety of technology tools with an understanding of the needs of diverse audiences.

3. Explain how the institution will:

- a) provide for assessment of student achievement of learning outcomes in the program

Student progress will be measured through both formative and summative assessment and will include:

- Assessing written and oral student presentations, written assignments, and research projects.
- Evaluating student performance in exams, quizzes, and assignments.

- Performance assessments in small groups and individual exercise such as laboratory skills checks.
- During intensives, formative learning will be measured using a formal skills assessment checklist, which will align with the evaluative components of the clinical rotations to monitor summative mastery of critical skills.
- Performance records and evaluations at each 4-week rotation during the distributive third year.

b) document student achievement of learning outcomes in the program

Student achievement will be documented through grades provided to the Registrar by individual faculty overseeing each course. Determination of grades will follow the standards and protocols established by the faculty in the School of Veterinary Medicine which will be based on clear grading criteria including rubrics assessing achievement of learning outcomes and competencies. The grading scale and rubric for each course will be available to students as part of the syllabus.

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

The University of Maryland Eastern Shore is proposing a 3-year program with 9 semesters, including the Fall, Spring, and Summer of each year. Semester 1 will start in the Fall of the first year. Graduation will take place at the end of the Summer of the third year. The first 6 semesters will be comprised of primarily didactic and laboratory courses. Both required and elective courses are offered during these 6 semesters. Semesters 7, 8, and 9 are the clinical rotations of this distributive model program based upon a collaborative partnership between community professionals and the veterinary school. The list of courses has not been finalized by veterinary faculty or Deans and will be reviewed multiple times before the first class of veterinary students arrive in 2026. The list of course offerings by Semester for Semesters 1-9 is given below. Details of the courses are provided in Appendix A.

Year 1 & 2 Summary

SEMESTER 1 (FALL)	
<i>Core (Required) Courses</i>	Credits
Building Adaptability and Academic Resilience	0.5
Veterinary Anatomy I	5.0
Veterinary Physiology	5.0
Veterinary Histology	1.0
Veterinarians & Animals in Society	0.5
Clinical Skills I	1.0
Applied Anatomy & Physiology	1.0
Professional Life Skills/Professional Identity	1.0
Medical Science	1.0
Total Core Credits	16.0

SEMESTER 2 (SPRING)	
<i>Core (Required) Courses</i>	Credits
Veterinary Anatomy II	4.0

Veterinary Parasitology	3.0
Evidence-Based Veterinary Medicine	1.5
Veterinary Immunology	2.5
Veterinary Virology	1.5
Bacteriology & Mycology	2.5
Epidemiology & Biostatistics	1.0
Clinical Skills II	1.0
Professional Life Skills II / Professional Identity	1.0
Basic Pharmacology	1.0
Total Core Credits	19.0

SEMESTER 3 (SUMMER)	
<i>Core (Required) Courses</i>	Credits
Veterinary Pathology	6.0
Clinical Pathology	3.0
Zoonotic & Transboundary Diseases	2.0
Clinical Skills III	1.5
Professional Life Skills III	1.0
Introduction to Diagnostic Imaging	3.0
Integrated Diagnostics	1.0
Total Core Credits	17.5
<i>Elective Courses</i>	
Students select up to 2 available elective courses	0.5-2.0
Total Core + Elective Credits	18.0 - 19.5

SEMESTER 4 (FALL)	
<i>Core (Required) Courses</i>	Credits
Animal Welfare and Behavior	2.0
Toxicology	1.5
Veterinary Nutrition	2.0
Surgery I (Introduction to Surgery)	2.0
Surgery II (Soft Tissue Surgery)	1.5
Surgery III (Orthopedic Surgery)	1.5
Animal, Human, Environmental Health	1.0
Clinical Skills IV	1.5
Anesthesia & Analgesia I (Introduction)	2.0
Veterinary Dentistry	1.5
Professional Life Skills IV	1.5
Total Core Credits	18.0
<i>Elective Courses</i>	
Students select up to 2 available elective courses	0.5-2.0
Total Core + Elective Credits	18.5 - 20.0

SEMESTER 5 (SPRING)	
<i>Core (Required) Courses</i>	Credits
Clinical Pharmacology I	1.5
Small Animal Medicine I	4.0

Theriogenology	2.0
Food Animal Production Medicine and Surgery I	3.0
Equine Medicine & Surgery I	3.0
Clinical Skills V	2.5
Professional Life Skills V	1.0
Radiographic Interpretation	1.0
Clinical Reasoning	1.0
Avian & Exotic Animal Medicine	1.0
Total Core Credits	20.0
Elective Courses	
Students select up to 2 available elective courses	0.5-2.0
Total Core + Elective Credits	20.5 - 22.0

SEMESTER 6 (SUMMER)	
Core (Required) Courses	Credits
Emergency & Critical Care	1.0
Clinical Pharmacology II	1.0
Small Animal Medicine II	4.0
Food Animal Production Medicine and Surgery II	3.0
Equine Medicine & Surgery II	3.0
Clinical Skills VI	3.0
Introduction to Practice Management	1.0
Professional Life Skills VI	1.0
Total Core Credits	17.0
Elective Courses	
Students select up to 2 available elective courses	0.5-2.0
Total Core + Elective Credits	17.5 - 19.0

SEMESTERS 7, 8, 9	
Clinical Schedule Framework for Each of the 3 Clinical Semesters	
Clinical Rotations	Weeks
Block 1 (start May)	4 weeks
Block 2	4 weeks
Block 3	4 weeks
Block 4	4 weeks
Block 5	4 weeks
Block 6	4 weeks
NAVLE Window	3 weeks
Block 7	4 weeks
Block 8	4 weeks
Block 9	4 weeks
Block 10	4 weeks
Block 11	4 weeks
Block 12	4 weeks
Launch Week (e.g., end May)	1 week

Total Weeks	52 weeks
Commencement August	

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

N/A

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

UMES will be seeking accreditation for this program from the Council of Education (COE) of the American Veterinary Medical Association (AVMA).

- UMES requests a Consultative Site Visit (mandatory now for new programs). The COE will send 3-5 site visitors and a staffer for 2–3-day campus visit and discussions. The visit will occur within 4-12 months of the initial request and is preceded by the preparation of a Self-Study covering the 11 Standards for accreditation.
- The COE shares a report with UMES after the Consultative Site Visit.
- UMES requests a Comprehensive Site Visit following the receipt of the Consultative report.
- Comprehensive Site Visit leads to a report approving the program.

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.

During orientation, students will be provided with an informational packet comprising all pertinent information with respect to the curriculum as well as all other support services provided by different offices. The entire curriculum and course specific information of the proposed degree program will be posted on the websites of the new School of Veterinary Medicine. Information about the availability of academic/student support services, financial aid resources, and tuition payment policies can be found on the UMES Office of Graduate Studies website, as well as in the Financial Aid Office of UMES.

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 University's marketing and enrollment offices will be responsible for advertising and recruiting into this program. They will comply with applicable UMES, UMD system, and MHEC guidelines and standards to ensure that all materials accurately represent the proposed program and related services for students.

H. Adequacy of Articulation (as outlined in [COMAR 13B.02.03.19](#))

If applicable, discuss how the program supports articulation with programs at partner institutions. Provide all relevant articulation agreements.

At this stage UMES is preparing for submission of initial self-study documents with the veterinary accreditor COE in Q2 or Q3 of 2024. We have preliminary commitments for program support that will result in Articulation Agreements later this year and Q1 of 2024. Negotiations with partner institutions will commence through legal counsel as soon as the UMES program is approved.

The proposed DVM program does not have articulation partners currently. However, the program will support the establishment articulation agreements with other system institutions to facilitate clear pathways for students into the program. Additionally the program will establish linkages with other out of state institutions several of which have written letters expressing interest in such articulation. at the Bachelor's degree level, for example, a B.S./Ph.D.

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.

UMES currently employs five faculty with expertise relevant to the proposed program (see bios below). However, we anticipate to recruit 10 fulltime faculty during the first year. This number will rise 25 by the end of the first five years. The program anticipates hiring 10-15 adjunct faculty.

Kimberly Braxton (DVM) joined the university in 2018 as campus veterinarian, assistant professor in the Department of Agriculture, Food and Resource Sciences IACUC Attending Veterinarian, and PreVet student advisor. A Maryland native, Dr. Braxton earned her bachelor's degree at UMES and her doctor of veterinary medicine (DVM) degree from Purdue University School of Veterinary Medicine. Braxton completed an externship at the Indianapolis Zoo as well as studied overseas at the Czech Republic Veterinary School and Zoo Brno and Prague Zoo. She practiced small animal medicine for 10 years in Charles County MD and then relocated to the eastern shore to accept her current role as campus

veterinarian and professor. Dr. Braxton currently teaches Animal and Avian Disease, Introduction to Animal science, Introduction to Veterinary Medicine, Veterinary Medical Terminology, and Agriculture and Animal Science Special Topic courses. Dr. Braxton currently serves as a member of the American Veterinary Medical Association (AVMA), American Association for Laboratory Animal Science (AALAC) and American Association of Small Ruminant Practitioners (AASRP). Dr. Braxton also works as a relief clinical veterinarian for local animal clinics and human societies in the area in order to keep her clinical skill sharp but also to help with the shortage of veterinarians in the area. Dr Braxton earned the 2022-2023 Outstanding Student Experience Award from the Department of Agriculture. Dr. Braxton strives to provide excellent service and always goes above and beyond for UMES students, colleagues and constituents.

Janak Dhakal (Ph.D.) is an Assistant Professor of Animal Sciences in the Department of Agriculture, Food, and Resource Sciences at the University of Maryland Eastern Shore. He holds a B.V.Sc. Degree in Veterinary Science and Animal Husbandry, and doctorate in Poultry Science. With over ten years of experience and specialization in controlling and characterizing foodborne bacteria, molds, viruses, and antimicrobial resistance, he is committed to improving animal and human health. Janak also served in the industry for less than a year before joining Kansas State University and the University of Nebraska-Lincoln for his post-doctoral fellowship. He has authored 20 peer-reviewed manuscripts, three research notes, one book chapter, and over three dozen scientific abstracts. Janak also serves as an editor and editorial board member of various international journals, such as *Animals*, *Journal of Food Protection*, *Food Protection*, etc.

Eric B. May (Ph.D.) is a full professor and he received his B.S. in 1971 in Zoology with a Fisheries minor; his M.S. in Biology in 1972 with concentrations in Aquatic Ecology, Parasitology and Cell Biology; and his Ph.D. in 1982 with concentrations in Biochemistry, Pathology and Microbiology. He graduated as a comparative pathologist under the College of Veterinary Medicine at Oregon State University. Since beginning his independent professional career in 1982 Dr. May has served as an assistant professor in the Department of Pathology, University of Maryland School of Medicine during which time he formed and served as coordinator for the Aquatic Toxicology and Pathobiology Laboratory and the first senior pathologist for the National Aquarium in Baltimore. He served as Coordinator and then Chief of the Aquatic Animal Health Program for the Maryland Department of Natural Resources from 1987 to 1997 and as State Assistant Unit Leader (Maryland Department of Natural Resources) for the Maryland Cooperative Fish and Wildlife Research Unit at the University of Maryland Eastern Shore from 1997 to 2000. He is trained in comparative pathology working as resident for the University of Oregon Health Sciences Center in anatomical pathology and surgical pathology; College of Veterinary Medicine Diagnostic Laboratory as diagnostician and Lecturer of Histology and Large Animal Anatomy; University of Maryland at Baltimore School of Medicine as post-doctoral fellow and then Director of the Toxicology and Pathobiology Laboratory and Johns Hopkins Department of Comparative Pathology as visiting resident.

Enrique Nelson Escobar (Ph.D.) is an associate professor and has graduate degrees from the University of Maryland, College Park. He has developed an academic and professional career with small ruminants (sheep and goats) in Texas, Oklahoma and Maryland, and has served multiple times as an instructor and/or consultant in international projects dealing with small

ruminant production. Dr. Escobar has been the recipient of several grants to conduct research and extension activities involving sheep and goats with interest in unwanted vegetation management, forage utilization, and food safety. Presently, Dr. Escobar is an Associate Professor at the University of Maryland Eastern Shore (UMES) and functions as the Small Ruminant Extension Specialist and the UMES Extension Associate Dean. His interests continue to be teaching ruminant nutrition, and research on fescue toxicosis and small ruminant parasites.

Jennifer Timmons, (Ph.D.) is an associate professor who joined the University of Maryland Eastern Shore in 2012 after five years serving as the poultry specialist with the University of Maryland Extension. While working at the University of Maryland Extension she supported the state's poultry industry through research and educational programs to promote sustainable practices that minimize environmental impacts and improve biosecurity awareness and education. Before joining the University of Maryland Extension she worked as a HACCP coordinator and a broiler flock supervisor. Her teaching responsibilities include animal and avian nutrition, and poultry production and management. Her research interests are dietary strategies to address environmental issues, ammonia control/litter management, and energy usage. Dr. Timmons is also a certified PAACO poultry welfare auditor. In addition, Dr. Timmons and her husband Tim own a two house broiler farm in Delaware.

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

UMES offers ongoing professional development and training opportunities for all faculty and staff in the latest pedagogies and learning technologies. These are organized both under individual schools and departments and the Provost's Office. The University operates CITOL and CTE – both of which are responsible for supporting pedagogy and sound evidence-based practices to enhance student outcomes.

a) Pedagogy that meets the needs of the students

The Center for Teaching Excellence (CTE) provides ongoing pedagogy training for faculty in evidence-based best practices to support high-impact practices pedagogy to meet the needs of UMES students. To accomplish its mission of ensuring expanding and enhancing faculty pedagogy training, CTE has developed three broad program areas to support faculty teaching success which includes evaluation of teaching techniques, professional development of faculty as it relates to pedagogy, and recognition of faculty who have demonstrated outstanding pedagogy methodology. The evaluation of teaching techniques program includes the use of student experience of learning surveys, peer observation of teaching, and open classroom week. The professional development of the faculty program includes funding to attend pedagogy conferences, faculty workshops, FACTE working group, seminar series for new faculty, and innovation in teaching & learning conferences. Lastly, CTE's faculty recognition program includes student choice for teaching excellence e-badge, CTE website – faculty spotlights, and SOTL publication opportunities.

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.

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 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 (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.

The Frederick Douglass Library is the only library on the UMES campus. As a member of the University of System of Maryland and Affiliated Institutions (USMAI) consortium, the Frederick Douglass Library is affiliated with 17 public universities and colleges in the state of Maryland. The integrated library system ALEPH makes it possible for patrons to have 24/7 access to USMAI library collections and electronic resources. The UMES library currently possesses some resources that are relevant to this program and will be making additional acquisitions of both print and electronic resources to fully support it.

In-person visits to the library are available 91.5 hours per week including weekends. The Frederick Douglass Library has the following resources available and/or the measures to be taken to ensure resources are adequate to support the proposed programs:

- Books, periodicals, and other reference materials may be located and obtained for patron usage at any time online via the library catalog, online databases, interlibrary loan, inter-campus loan, or by visiting the library.
- ILLIAD (Interlibrary Loan) service allows students, faculty, and staff to take advantage of the millions of items from other universities that are not available at the Frederick Douglass Library. Interlibrary Loan allows the borrower to request items (books, and articles from non-university of Maryland System libraries. The average

time to receive an article is 2 weeks. The average time to receive a book is 3 weeks. There is also Rapid Interlibrary Loan (Rapid ILL) where most articles may be received within 24 hours. Borrowers are notified by email from the FDL staff to pick up items from the Inter-Library Loan service desk. Many articles requested will be received electronically and available to be accessed within ILLIAD. Inter-campus loans may be requested from another University of Maryland System Library and delivered to the FDL for patron pick up. The average time to receive a book is 3-5 days.

- Resources that are available electronically via the Frederick Douglass webpage are databases, ebooks and e-journals. For instance Journal Finder is a quick link on the library homepage that provides alphabetical journal searches for the user. There are 107 journals associated on the subject of Veterinary Science.
- Open Education Resource Textbooks is a search interface that allows faculty to retrieve OER resources to be used as course materials at no cost to students.

There are over 140 databases pertaining to research including the following that have direct relevance to veterinary sciences:

- Academic Search Ultimate – Multi-disciplinary database provides information to most academic disciplines and subjects. Includes full-text for peer-reviewed journals, magazines, newspapers and books.
- AGRICOLA – provides millions of citations relating to the field of agriculture that are comprised of journal articles, book chapters, theses, patents, software, audiovisual materials and technical reports to support agricultural research.
- Animal Welfare Information Center (AWIC) – website provides information for improved animal care and use in research, teaching and testing.
- Ebook Central (ProQuest) – a collection of thousands of full-text online books on a broad range of subjects in the humanities, natural and physical sciences and the social sciences.
- Medline (EBSCO) – provides abstracts and indexing using Medical Subject Headings (MeSH) for about 4,600 biomedical journals published in the U.S. and 70 foreign countries. Coverage includes the fields of medicine, nursing, dentistry, veterinary medicine, psychiatry, pre-clinical sciences, medical education and health care planning and administration of services.
- PubMed – the National Library of Medicine’s Medline database providing abstracts and indexing for biomedical journals published in the U.S. and in foreign countries. It also covers chemistry journals. Topics include medicine, nursing, dentistry, veterinary medicine, psychiatry, pre-clinical sciences, medical education, public health and more.
- Science Direct – Full-text database contains peer-reviewed journal titles and ebooks covering the fields of science, technology and medicine.

κ. 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.**

At the outset, UMES plans to use a mix of appropriated existing and new physical infrastructure to support the program. Indeed, UMES recently made substantial investments in campus infrastructure for the health sciences area. A new School of Pharmacy and Health Professions building has been completed as part of Phase 1 of the project. It is envisaged that Phase 2 will include specific facilities that will support instruction and research for the proposed School of Veterinary Medicine. Instructional space will also be available in the Center for Food Safety, Science and Technology.

Plans have also been made and funding sought to develop additional support facilities including:

A Veterinary Skills Center estimated at about 6,000 sq. ft. will be established. This will contain a large, open space with textured epoxy floors and walls to be used for primarily as an anatomy teaching laboratory. The laboratory is expected to have exam tables, dissection tables, stools, gurneys, large models and the racks for suspending large animal learning models supported by casters which can be wheeled in and out as needed. Eye-wash stations and an emergency shower will be necessary components in the laboratory. Wireless high definition teaching cameras will be used to provide real-time clinical skills demonstrations to strategically positioned large, flat screen monitors. The space will be equipped with appropriate audio/visual equipment. This effort will include the renovation and repurposing of the animal exhibition hall within the Food Science and Technology Building: The animal exhibition hall is a 6,000 sq. ft. space within the Food Science and Technology Center.

Administrative and faculty/staff office spaces will be adjacent to the Veterinary Skills Center with student services and work areas, all totaling 10,000-15,000 sq. ft. The DVM program will access larger teaching, student work and seminar areas within existing UMES facilities, in particular at Phase 1 of the Pharmacy and Health Professions building.

A Bovine Teaching Center comprising a new structure to handle a small herd of about 10 cattle for teaching bovine clinical skills. The facility will contain all relevant supportive structures such as clinical spaces for food animal surgery, restrooms, showers, a teaching laboratory, an office, a garage for animal transport and ambulatory vehicles, including an adjacent restocking area and outdoor pens for livestock.

A small equine stable to handle 4-6 horses including a feed and tack room, a supply room and a restroom will also be constructed including other ancillary facilities such as an equine wash area, a round pen, and an outdoor equine riding arena.

An existing Small Ruminant Facility will be renovated to support the new program.

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 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 with regard to pedagogy and technology. This includes the use of the Canvas Learning Management System, Echo360, Google Workspace, Respondus 4.0, and Respondus LockDown Browser.

L. Adequacy of Financial Resources with Documentation (as 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 (c + g below)	\$5,250,000	\$9,975,000	\$14,463,750	\$14,463,750	\$14,463,750
a. Number of F/T Students	100	190	275.5	275.5	275.5
b. Annual Tuition/Fee Rate	\$52,500	\$52,500	\$52,500	\$52,500	\$52,500
c. Total F/T Revenue (a x b)	\$5,250,000	\$9,975,000	\$14,463,750	\$14,463,750	\$14,463,750
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 (dxexf)	\$0	\$0	\$0	\$0	\$0

3. Grants, Contracts & Other External Sources	\$2,000,000	\$2,000,000	\$2,000,000	\$2,000,000	\$2,000,000
4. Other Sources	\$1,362,600	\$2,588,940	\$3,753,963	\$3,753,963	\$3,753,963
TOTAL (Add 1 – 4)	\$8,612,600	\$14,563,940	\$20,217,713	\$20,217,713	\$20,217,713

Narrative

Tuition: The budget above assumes a cohort of 100 students will be accepted each year with tuition charges for in state students set at \$30,000 and out of state students at \$60,000. Thus an average of \$52,500 is used in the calculation. We also assume that 25% of the students will be in state and 75% out of state. We also assume an attrition rate of 10% and 5% in the second and third year respectively.

Grants Contracts and Other External Sources: It is estimated that donated funds and in kind support by corporate partners will be \$2 million per year.

Other Sources: We assume an increase in the state appropriation on a per student basis calculated at \$13,626.

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)	\$1,620,000	\$3,321,000	\$4,255,031	\$4,361,407	\$4,470,442
a. Number of FTE	10	20	25	25	25
b. Total Salary	\$1,200,000	\$2,460,000	\$3,151,875	\$3,230,672	\$3,311,439
c. Total Benefits	\$420,000	\$861,000	\$1,103,156	\$1,130,735	\$1,159,004
2. Admin. Staff (Dean+Associate Deans) (b + c below)	\$675,000	\$691,875	\$709,172	\$726,901	\$745,074
a. Number of FTE	2	2	2	2	2
b. Total Salary	\$500,000	\$512,500	\$525,313	\$538,445	\$551,906
c. Total Benefits	\$175,000	\$179,375	\$183,859	\$188,456	\$193,167
3. Support Staff (b + c below)	\$1,316,250	\$1,798,875	\$2,028,232	\$2,078,937	\$2,130,911

a. Number of FTE	15	20	22	22	22
b. Total Salary	\$975,000	\$1,332,500	\$1,502,394	\$1,539,954	\$1,578,452
c. Total Benefits	\$341,250	\$466,375	\$525,838	\$538,984	\$552,458
4. Technical Support and Equipment	\$1,000,000	\$1,100,000	\$1,210,000	\$1,331,000	\$1,464,100
5. Library	\$300,000	\$330,000	\$363,000	\$399,300	\$439,230
6. New or Renovated Space					
7. Other Expenses	\$3,575,000	\$6,150,000	\$8,725,000	\$9,225,000	\$9,225,000
TOTAL (Add 1 – 7)	\$8,486,250	\$13,391,750	\$17,290,435	\$18,122,546	\$18,474,757

Narrative

Faculty salaries are set at \$120,000 with an escalation for cost of living allowance set at 2.5% (10 FTE in first year rising to 25 in the fifth year).

Administrative staff (dean and associate dean) salaries set at \$250,000 with a 2.5% cost of living allowance (Total 2 FTE)

Staff salaries are set at \$65,000 with an escalation for cost of living allowance set at 2.5%. (15 FTEs in first year rising to 22 in the fifth year)

Technical support and equipment expenses envisaged at \$1 million in first year and escalated at 10%.

Library support costs set at \$300,000 in first year with a 10% escalation.

Other expenses budgeted include scholarship support set at 30% of tuition and operational expenses (travel, recruitment, supplies etc.) which are budgeted at \$2 million in first year rising to \$4.5 million in fifth year.

Startup Costs. Although not included in the five year expense budget, it is anticipated that for the three years prior to start of classes, \$13,869,500 will be spent including \$11,500,000 to acquire new or renovated space to support the program. Other costs covered during this period will include salaries for two founding faculty, 1 administrators (founding dean) and 2 staff (total cost \$1,849,500). Operational expenses including consultant charges are budgeted at \$520,000.

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.**

UMES has a comprehensive course and program evaluation process. Each course syllabus has a set of written student learning outcomes. The course learning outcomes are assessed through embedded questions on tests and assignments that address specific course outcomes. Data are collected and analyzed and results are used to improve course curriculum and pedagogy.

Once the program is launched all courses will be entered into the course evaluation system. Teaching evaluations ask students to reflect on the course structure, the course content, and the instructor's performance. Summary data will be reviewed by faculty members, the program chair, and the school administration, to determine any necessary revisions or improvements are needed.

Additionally, all faculty are evaluated annually. The evaluation process includes an assessment of faculty teaching, research productivity, and service. To receive a high evaluation, a faculty member must demonstrate effective teaching, active scholarly activities, publication, etc. There is also a provision for the administration to set out an improvement plan for faculty members who have not done well in the area of teaching. Tenured faculty will undergo a five-year post-tenure review.

UMES policy requires all existing academic programs to undergo a periodic review every seven years. The review process is approved by the University System of Maryland (USM) Board of Regents and includes an internal self-study, an external review, and the submission of a periodic program review report to the USM.

- External review of existing academic programs is a standard practice in higher education. The purpose of external review is to garner additional perspectives on program strengths and weaknesses from academics and professionals in the field or a closely related field who are affiliated with other institutions.
- The review of existing academic programs shall include both self-study (internal review) and external review.
- As much as possible, the institution should link its reviews of existing academic programs to specialized accreditation processes and dates. An external review associated with reaffirmation of specialized accreditation or with initial accreditation may, if completed within one year of the review date, satisfy the external review requirement.
- When review of the academic program will not occur as part of the specialized accreditation process, each institution should develop its own process for garnering external reviews. The method for identifying and selecting specific individuals who will serve as external reviewers should be determined.
- External reviews may consist of written responses to the self-study and supporting documents and/or may include on-campus visits during which team members interview students, faculty, and administrators.
- The final product from external reviewers should be a report that explicitly identifies program strengths and suggests improvements.

The below documents provide additional evidence about the process for program reviews at UMES:

Document: [Periodic Program Reviews \(PPR\) Information Session](#) The Templates (June 2022)

Document: [Periodic Program Reviews \(PPR\) Information Session](#) Overview (May 2022)

Form: [PPR 2022 Self-Study Report \(Internal Review\) Template](#)

Form: [USM 2022 Report on the Periodic Review of Academic Programs \(PPR\) Template](#)

For online courses, UMES operates a Course Review process, whereby instructors work with instructional design professionals to review their course in light of the [UMES Quality Online Instruction \(QOI-UMES\) rubric](#). QOI-UMES provides a tool not for assessing courses but for providing feedback to help instructors revise and remodel their courses. Instructors should expect the review process to take up to 4 weeks, depending on instructor and designer availability.

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.

Given that the DVM program will be accredited by AVMA-COE, a key indicator of the proposed program's educational effectiveness is provided by the pass rate of graduates in the North American Veterinary Licensing Examination (NAVLE). The accrediting body requires a minimum pass rate of 80%.

The new School of Veterinary Medicine will implement processes for review of student learning outcome achievement both at the individual course level and at the programmatic level. The dean of the school will, in conjunction with staff review retention and student success data with a view to identifying areas for improvement. The university also regularly implements student evaluations of teaching each semester to collate student feedback and make necessary changes.

UMES operates a system of shared governance with faculty and the dean of the new school will be responsible for assessing faculty satisfaction and taking any necessary steps for improvement. The dean will also be expected to work with the Provost and the CFO in ensuring that the program is cost effective.

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

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

The mission of UMES focuses directly on matters pertaining to minority student access and success. The institution's cultural and diversity goals and framework are structured around four core diversity principles focusing on recruitment, retention, curriculum and training, and culture. These components will be central to all the developments within the new School of Veterinary Sciences. As an 1890 land-grant university, UMES' programs attract a diverse student base with the majority being African-American and those who are multiethnic and multicultural. The new DVM program will establish linkages with minority focused source schools in Maryland, other 1890 schools and minority serving institutions (see sample letters of interest to collaborate, Appendix II).

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.**

N/A

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.**

UMES participates in the State Authorization Reciprocity Agreement (SARA). 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. SARA is a voluntary agreement among its members 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). All faculty in the new School of Veterinary Sciences who involved in any online courses will be required to complete all necessary training and certifications.

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

UMES has a strong commitment to online teaching and this is demonstrated by the resources of its Center for Instructional Technology and Online Learning (CITOL) which was founded in 2006. CITOL provides a faculty computer lab, course development, instructional, and technical support to new and current faculty. CITOL 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. 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 new School of Veterinary Medicine and CITOL will work closely to assure that any courses under the new program adhere to C-RAC Guidelines for the Evaluation of Distance Education.

Appendix I: Doctor of Veterinary Medicine at UMES - Curriculum Overview

The University of Maryland Eastern Shore is proposing a 3-year program with 9 semesters, including the Fall, Spring, and Summer of each year. Semester 1 will start in the Fall of the first year. Graduation will take place at the end of the Summer of the third year. The first 6 semesters will be comprised of primarily didactic and laboratory courses. Both required and elective courses are offered during these 6 semesters. Semesters 7, 8, and 9 are the clinical rotations of this distributive model program based upon a collaborative partnership between community professionals and the veterinary school. This curriculum document has not been finalized by veterinary faculty or Deans and will be reviewed multiple times before the first class of veterinary students arrive in 2026.

In this document are:

- Veterinary Course Listings by Semester for Semesters 1-9
- Required Courses with Course Descriptions by Semester for Semesters 1-6
- Elective Courses with Course Descriptions for Semesters 1-6
- Clinical Year Required Courses for Semesters 7, 8, 9
- Clinical Rotations for Semesters 7, 8, 9 as Foundational, Elective, Required

Year 1 & 2 Summary:

SEMESTER 1 (FALL)	
<i>Core (Required) Courses</i>	Credits
Building Adaptability and Academic Resilience	0.5
Veterinary Anatomy I	5.0
Veterinary Physiology	5.0
Veterinary Histology	1.0
Veterinarians & Animals in Society	0.5
Clinical Skills I	1.0
Applied Anatomy & Physiology	1.0
Professional Life Skills/Professional Identity	1.0
Medical Science	1.0
Total Core Credits	16.0

SEMESTER 2 (SPRING)	
<i>Core (Required) Courses</i>	Credits
Veterinary Anatomy II	4.0
Veterinary Parasitology	3.0
Evidence-Based Veterinary Medicine	1.5
Veterinary Immunology	2.5
Veterinary Virology	1.5
Bacteriology & Mycology	2.5
Epidemiology & Biostatistics	1.0
Clinical Skills II	1.0
Professional Life Skills II / Professional Identity	1.0
Basic Pharmacology	1.0

Total Core Credits	19.0
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SEMESTER 3 (SUMMER)	
<i>Core (Required) Courses</i>	Credits
Veterinary Pathology	6.0
Clinical Pathology	3.0
Zoonotic & Transboundary Diseases	2.0
Clinical Skills III	1.5
Professional Life Skills III	1.0
Introduction to Diagnostic Imaging	3.0
Integrated Diagnostics	1.0
<i>Total Core Credits</i>	17.5
<i>Elective Courses</i>	
Students select up to 2 available elective courses	0.5-2.0
Total Core + Elective Credits	18.0 - 19.5

SEMESTER 4 (FALL)	
<i>Core (Required) Courses</i>	Credits
Animal Welfare and Behavior	2.0
Toxicology	1.5
Veterinary Nutrition	2.0
Surgery I (Introduction to Surgery)	2.0
Surgery II (Soft Tissue Surgery)	1.5
Surgery III (Orthopedic Surgery)	1.5
Animal, Human, Environmental Health	1.0
Clinical Skills IV	1.5
Anesthesia & Analgesia I (Introduction)	2.0
Veterinary Dentistry	1.5
Professional Life Skills IV	1.5
<i>Total Core Credits</i>	18.0
<i>Elective Courses</i>	
Students select up to 2 available elective courses	0.5-2.0
Total Core + Elective Credits	18.5 - 20.0

SEMESTER 5 (SPRING)	
<i>Core (Required) Courses</i>	Credits
Clinical Pharmacology I	1.5
Small Animal Medicine I	4.0
Theriogenology	2.0
Food Animal Production Medicine and Surgery I	3.0
Equine Medicine & Surgery I	3.0
Clinical Skills V	2.5
Professional Life Skills V	1.0
Radiographic Interpretation	1.0
Clinical Reasoning	1.0
Avian & Exotic Animal Medicine	1.0

Total Core Credits	20.0
Elective Courses	
Students select up to 2 available elective courses	0.5-2.0
Total Core + Elective Credits	20.5 - 22.0

SEMESTER 6 (SUMMER)	
Core (Required) Courses	Credits
Emergency & Critical Care	1.0
Clinical Pharmacology II	1.0
Small Animal Medicine II	4.0
Food Animal Production Medicine and Surgery II	3.0
Equine Medicine & Surgery II	3.0
Clinical Skills VI	3.0
Introduction to Practice Management	1.0
Professional Life Skills VI	1.0
Total Core Credits	17.0
Elective Courses	
Students select up to 2 available elective courses	0.5-2.0
Total Core + Elective Credits	17.5 - 19.0

SEMESTERS 7, 8, 9	
Clinical Schedule Framework for Each of the 3 Clinical Semesters	
Clinical Rotations	Weeks
Block 1 (start May)	4 weeks
Block 2	4 weeks
Block 3	4 weeks
Block 4	4 weeks
Block 5	4 weeks
Block 6	4 weeks
NAVLE Window	3 weeks
Block 7	4 weeks
Block 8	4 weeks
Block 9	4 weeks
Block 10	4 weeks
Block 11	4 weeks
Block 12	4 weeks
Launch Week (e.g., end May)	1 week
Total Weeks	52 weeks
Commencement August	

Veterinary Medicine Curriculum

Semester 1 (Year 1) Fall Semester Core Courses

Course Title	Credits Lec hours Lab hours	Mode of Instruction	Course Description
Building Adaptability and Academic Resilience	0.5 Credits Lec: 7 Lab: 0	Lecture, Technologies	This course will facilitate the transition to the first year of the veterinary curriculum and veterinary medical school. Students will apply research from learning science, components of positive psychology, and well-being to their individual contexts to best support academic transitions. They will be introduced to the importance of adaptability for success and concepts of the adaptability quotient. Topics include organizational strategies with cognitive load, facilitating a reasonable study plan that demonstrates forethought, monitoring learning through sustaining practice with different types of knowledge, among other topics.
Veterinary Anatomy I	5 Credits Lec: 39 Lab: 68	Lecture, Lab, Technologies	This course provides a systemic and topographic study of macroscopic body structure through both didactic lectures and laboratory experiences. Students will gain insights into the normal structure, function, and relationships of clinically important structures using the dog and the cat as primary models for the study of general mammalian form. A team approach is used for laboratory work using models and prepared specimens for demonstration, dissection, and state-of-the-art immersive technologies, like virtual reality. Function will be correlated with clinically relevant malfunction of anatomical structures, as clinical applications are incorporated throughout the course in alignment towards the ultimate goal of contributing to the education of a veterinary practitioner.

Veterinary Physiology	5 credits Lec: 83 Lab: 0	Lecture, Lab, Technologies	The course offers comprehensive understanding of normal mammalian physiologic function with emphasis on clinical application. Through clinical case examples and using digital learning and immersive technologies, the connection between physiologic knowledge and the practice of veterinary medicine is illustrated and basic mathematical and client education skills are practiced. Course content includes basic cell and cell membrane function, body fluid compartments, water and the major electrolytes, transport processes. excitable tissues, temperature regulation, as well as physiology of the important body systems: (1) neuromuscular; (2) cardiovascular; (3) respiratory; (4) endocrine; (5) nervous system; and (6) integumentary
Veterinary Histology	1 Credit Lec: 0 Lab: 30	Lab, Technologies	This course is a series of laboratories designed to develop the necessary skills to identify and describe the microscopic anatomy of basic cell types, tissues, organs, and organ systems. Course content correlates gross anatomy, microscopic anatomy, and the physiological state of common domestic species. Principles learned in this course will be applied in simultaneous and subsequent courses in the LCSVM curriculum, including courses involving case management.
Veterinarians And Animals In Society	0.5 Credits Lec: 8 Lab: 0	Lecture	This course include the history of veterinary medicine as an introduction to their professional cultural inheritance, human animal bond, animal welfare, the role of animals in human psychosocial health, professional ethics and jurisprudence. It also includes a focus on work life balance, professional organizations, and future opportunities for veterinarians.
Clinical Skills I	1 Credit Lec: 0 Lab: 30	Lab, Technologies	Students will gain experience with safe animal handling and restraint techniques and will be introduced to the general physical examination of various domestic animal species, including small animals (dogs & cats), horses, and production animals (cattle and small ruminants). Students will also be introduced to psychomotor skills needed for surgery and other clinical procedures.
Applied Anatomy And Physiology	1 Credit	Lecture, Technologies	This course is designed to help students develop their skills in critical thinking, communication, resource identification and evaluation, and clinical decision-making

	Lec: 14 Lab: 0	s	through small group management of hypothetical veterinary cases. Through case-based learning, students will revisit and apply knowledge from previous course work as well as preview the application and interpretation of content from upcoming semesters. Students will maintain all appropriate medical records during the management of the mock cases, as they would for real cases.		
Professional Life Skills/ Professional Identity	1 Credit Lec: 11 Lab: 4	Lecture, Lab	This course will facilitate the holistic approach and evolution of student professional identity within the veterinary medical profession. Students will apply research from veterinary medical practice, theory of identity development, components of positive psychology, and well-being to their individual contexts to best support professional identity growth and development. Topics include individual and professional mindsets, the role of values and beliefs in facilitating professional identity development, and challenges veterinary students and professionals experience with professional identity development, among other topics. The course requires reflection that demonstrates forethought and critical analysis through sustaining practice with different types of knowledge and discussion.		
Medical Science	1 Credit Lec: 15 Lab: 0	Lecture	This course will provide a review of foundational and general medical knowledge required of a veterinarian. Subjects include medical terminology, medical chemistry, medical math, and medical physics.		
ELECTIVES	0		Students will not be taking electives in Semester 1.		
SEMESTER 1 TOTAL		Credits: 16	Total Hours: 309	Lecture Hours: 177	Lab Hours: 132
Semester 2 (Year 1) Spring Semester Core Courses					

Course Title	Credits Lec hours Lab hours	Mode of Instruction	Course Description
Veterinary Anatomy II	4 Credits Lec: 49 Lab: 32	Lecture, Lab, Technologies	The course will be divided among large animal and exotic animal species. The horse will serve as the primary model for studying large animal anatomy and for comparing equine anatomy with that of other species, including other large domestic animals and species previously covered in small animal anatomy. Emphasis will be on the anatomy of large animals (horse, large ruminants, small ruminants, porcine), which is vital to preparing LCSVM students to practice veterinary medicine and enter the veterinary medical profession. Topographical, regional, systemic, and functional anatomy will be integrated. Dissection, prosections, models, imaging, digital and immersive technologies, and clinical approaches with clinical cases will be emphasized throughout the study of anatomical structures towards ability to integrate gross anatomy with basic clinical anatomy. Function will be correlated with clinically relevant malfunction of anatomical structures, as clinical applications are incorporated throughout the course in alignment with the ultimate goal of contributing to the education of a veterinary practitioner.
Veterinary Parasitology	3 Credits Lec: 42 Lab: 6	Lecture, Lab	This course teaches principles of parasitology, including etiology, pathogenesis, diagnosis, treatment, and control of selected, clinically relevant parasitic diseases in animals. Students will gain knowledge of life cycle biology, transmission strategies, and natural hosts of major parasites of animals as they relate to the practice of veterinary medicine. Any zoonotic potential of parasites will also be presented.
Evidence-Based Veterinary Medicine	1.5 Credits Lec: 22 Lab: 0	Lecture, Lab, Technologies	This course discusses applying evidence-based veterinary medicine in understanding clinical research in infectious disease management. The course will further the student's comprehension of the application of evidence-based veterinary medicine, as it is used throughout the working life of veterinarians in contemporary veterinary practices. Basic training in research methodology will be covered to learn both clinical study processes and basic research processes, including how new scientific evidence is discovered,

			assessed, shared, and applied. These skills will be utilized to investigate an infectious disease spread within and between populations using mock case studies, in which students will appraise scientific evidence about the etiology, diagnosis, treatment, and prognosis of viral, bacterial, fungal, and parasitic diseases.
Veterinary Immunology	2.5 Credits Lec: 37 Lab: 0	Lecture	This course presents current concepts in basic and clinical immunology with special emphasis on protective immunity against infectious diseases and the role of aberrant immune responses in disease. The principles of immune-based laboratory diagnostic techniques and their interpretation will be discussed, as well as the application of immunologic principles to disease prevention, biosecurity, and therapeutic intervention. Students are expected to gain knowledge, skills, values, attitudes, aptitudes, and behaviors necessary to responsibly address the health and well-being of animals in the context of ever-changing societal expectations.
Veterinary Virology	1.5 Credits Lec: 22 Lab: 0	Lecture	This course introduces fundamental principles of virology as applied to important viral diseases of animals. Students will use this fundamental knowledge to develop a conceptual framework of best practices that can be adapted to incorporate novel approaches to the control of viral diseases encountered during their veterinary medical careers.
Bacteriology And Mycology	2.5 Credits Lec: 38 Lab: 0	Lecture	This course will introduce the principles of bacteriology and mycology as applied to important bacterial and fungal diseases of animals. Students will use this fundamental knowledge to develop a conceptual framework that can be adapted to incorporate novel approaches to the control of bacterial and fungal diseases that they will encounter during their veterinary careers.
Epidemiology And Biostatistics	1 Credit Lec: 15 Lab: 0	Lecture	This course introduces the basic concepts of epidemiology and biostatistics with emphasis placed on the principles and methods of epidemiologic investigation, epidemiologic definitions, appropriate summaries and displays of data, and the use of classical statistical approaches to describe the health of populations. Topics include the dynamic behavior of disease, usage of rates, ratios, and proportions, odds ratios, and other statistical tools. Various epidemiologic study designs for investigating associations

			between risk factors and disease outcomes are also introduced, culminating with criteria for causal inferences. The application of these disciplines in the areas of health services, screening, and environment policy are presented. The influence of epidemiology and biostatistics on legal and ethical issues are also discussed. Critical review of scientific literature will be examined.
Clinical Skills II	1 Credit Lec: 0 Lab: 30	Lab, Technology	Students will be taught and will physically practice basic ligatures and suturing techniques, phlebotomy, intramuscular injection, and subcutaneous injection techniques using both models and live animals. Students will perform physical examinations of canine, equine, bovine, and equine species and be introduced to the Subjective and Objective (SOAP) format used for medical record keeping.
Professional Life Skills II / Professional Identity	1 Credit Lec: 15 Lab: 0	Lecture	This course is the second tier within the Professional Identity Development pathway that continues to facilitate the holistic approach and evolution of student professional identity within the veterinary medical profession. Students will continue to apply research from veterinary medical practice, theory of identity development, components of positive psychology, and well-being to their individual contexts to support professional identity growth and development. Topics include multi-dimensional approach to role of values and beliefs in facilitating professional identity development, self-regulatory practices, conflict management and emotions, inclusive identity practices, and professional identity within the greater culture of challenges veterinary students and professionals experience, among other topics. The course requires reflection that demonstrates forethought and critical analysis through sustaining practice with different types of knowledge and discussion.
Basic Pharmacology	1 Credit Lec: 15 Lab: 0	Lecture	This course will provide the basic information about how drugs/medications work, how they generally affect different body organs and systems, and how the body responds.
ELECTIVES	0		Students will not be taking electives in Semester 2.

SEMESTER 2 TOTAL		Credits: 19	Total Hours: 323	Lecture Hours: 255	Lab Hours: 255
Semester 3 (Year 1) Summer Semester Core Courses					
Course Title	Credits Lec hours Lab hours	Mode of Instruction	Course Description		
Veterinary Pathology	6 Credits Lec: 90 Lab: 0	Lecture, Technology	The first part of this course introduces the student to general pathology of all organ systems. The second part of this course covers systemic pathology of domestic animals. Students will apply knowledge from previous courses (anatomy, histology, physiology, parasitology, immunology, and infectious disease) with the new knowledge of general pathology to describe the pathogenesis and diagnosis of diseases. The pathophysiology of diseases will be covered for body systems of domestic animals: hepatic, pancreatic, urinary cardiovascular, endocrine, musculoskeletal, respiratory, CNS, special senses, reproductive, gastrointestinal, integumentary, and ophthalmic systems.		
Clinical Pathology	3 Credits Lec: 45 Lab: 0	Lecture, Technology	This course explains pathophysiologic mechanisms responsible for abnormal findings in hematologic, biochemical, cytologic tests, and urinalysis in health and disease of animals. Students will learn a selection of appropriate diagnostic tests for various diseases and how to interpret the results of these tests. They will additionally learn basic principles of laboratory medicine, including quality control, reference intervals, specificity, sensitivity, and positive and negative predictive values.		
Zoonotic and Transboundary Diseases	2 Credits Lec: 30 Lab: 0	Lecture, Technology	The course will examine aspects of diseases and the interrelatedness between individual and population human health, animal health, and the environment. The concepts of distribution, diagnosis, treatment, and control of zoonotic diseases and transboundary diseases will be explored. Students will draw from knowledge gained in other courses regarding infectious agents, the immune system, pathophysiology, clinical pathology, and parasitology and apply that knowledge to zoonotic and transboundary		

			diseases. Included will be student team literature search, critical literature analysis, and student presentations. During this course, students will complete phase one of The United States Department of Agriculture (USDA) Initial Accreditation Training.
Clinical Skills III	1.5 Credits Lec: 0 Lab: 45	Lab, Technology	Students will continue development of expertise in handling and interpretation of general physical examination findings in large animals (horses, cattle, small ruminants) and small animals. They will safely handle large animals and small animals as needed for physical examination. They will progress towards mastery of psychomotor skills for surgery, such as catheter placement, closure of abdominal incisions, gloving techniques, and clamping/ligating. Students will be introduced to basic diagnostic techniques.
Professional Life Skills III	1 Credit Lec: 2 Lab: 26	Lecture, Lab	Students will be introduced to professional communication skills and their importance in veterinary medicine. The Professional Life Skills III course will focus on aspects of: Building Professional Identity, Communications, Leadership, Wellbeing, & Financial Literacy.
Introduction To Diagnostic Imaging	3 Credits Lec: 45 Lab: 0	Lecture, Technology	This introductory diagnostic imaging course covers methods of imaging, radiation safety measures, and principles of image interpretation. Radiography and ultrasonography are emphasized. Also included are computed tomography, magnetic resonance imaging, and nuclear scintigraphy. Lectures on basic image interpretation include normal findings and classical signs of common conditions as visualized through imaging methodologies. Advantages and disadvantages of artificial intelligence in diagnostic imaging will be discussed.
Integrated Diagnostics	1 Credit Lec: 0 Lab/Case Study: 20	Lab, Technology	The emphasis of this course is directed toward the integration of basic science with clinical skills, especially the use of diagnostic imaging and clinical pathology when working through a clinical case. Students will develop their skills in critical thinking, communication, resource identification, evaluation, and clinical decision-making through small group management of hypothetical veterinary cases. Through case-based learning, students will revisit and apply knowledge from previous courses as well as preview the application and interpretation of content from upcoming semesters.

ELECTIVES	0.5 - 2.0		A 2 nd elective can be taken by students in high standing, but requires approval by faculty instructor and Associate Dean for Professional Programs		
SEMESTER 3 TOTAL		Credits: 18-19.5	Total Core Hours: 303	Lecture Hours: 212	Lab Hours: 91
Semester 4 (Year 2) Fall Semester Core Courses					
Course Title	Credits Lec hours Lab hours	Mode of Instruction	Course Description		
Animal Welfare And Behavior	2 Credits Lec: 30 Lab: 0	Lecture, Technology	This course is an introduction to animal welfare, behavior, and related husbandry practices in major species. This course will reveal normal animal behavior and social organization from a biological perspective and also identify abnormal behavior. The course allows students to describe normal husbandry of multiple species. This course will prepare students to assess animal welfare, behavior, and husbandry and craft and communicate recommendations with animal owners, as required in the practice of veterinary medicine.		
Toxicology	1.5 Credits Lec: 22 Lab: 0	Lecture	This course is an introduction to principles of toxicology in domestic animals. The student will learn basic principles of veterinary toxicology and learn how to locate toxicological information. The course will present some common toxicants from chemicals and plants, focusing on those found in North America, that affect domestic animals. Students will learn basic approaches for the treatment of poisoned animals.		
Veterinary Nutrition	2 Credits Lec: 28 Lab: 4	Lecture, Lab	This course is an overview of domestic animal nutrition, including digestion and metabolism of nutrients, feedstuffs and feeding, ration formulation, and the interaction of nutrition and disease for small animals, horses, and food animals. Clinical implications will be emphasized.		

Surgery I - Introduction To Surgery	2 Credits Lec: 30 Lab: 0	Lecture, Technology	This course covers principles of surgery, including aseptic technique, perioperative patient care, and basic principles of surgical procedures and techniques, including fundamentals of anesthesia. Application of anatomic knowledge to surgical approaches will be included.
Surgery II - Soft Tissue Surgery	1.5 Credits Lec: 24 Lab: 0	Lecture, Technology	This course will cover clinical conditions seen in small animals with an emphasis on surgical treatment and prognosis. It will integrate and build upon the principles of surgery and surgical diseases, and anatomical knowledge acquired. It will go beyond the genetic and developmental aspects of small animal conditions to address surgical interventions to consider when conservative and medical therapies alone are not appropriate or are not producing satisfactory results. Case-based examples and exercises will be utilized throughout the course to improve students' ability to apply the information to practical clinical situations. Immersive technologies will be incorporated.
Surgery III – Orthopedic Surgery	1.5 Credits Lec: 22 Lab: 0	Lecture, Technology	This course will cover orthopedic and other clinical conditions seen in small animals with an emphasis on surgical treatment and prognosis and the basics of fracture healing. It will go beyond the genetic and developmental aspects of small animal orthopedic and other clinical conditions to address surgical interventions to consider when conservative and medical therapies alone are not appropriate or not producing satisfactory results. Case-based learning and immersive technologies will be utilized throughout the course to improve students' ability to apply the information to real-world practical clinical situations.
Animal, Human, Environmental Health	1 Credit Lec: 15 Lab: 0	Lecture, Technology	This course includes a broad analysis of environmental impacts of livestock production, climate change, food safety and security, and emerging and transboundary diseases. These will be examined across a broad spectrum of ecosystems, including air, land, fresh water, and oceans. The inextricable links between animal, human, and environmental health will be highlighted. During this course, students will complete the USDA Transboundary and Exotic Diseases of Animals for Initial Accreditation Training.

Clinical Skills IV	1.5 Credits Lec: 0 Lab: 45	Lab, Technology	Students will continue to develop expertise in safe animal handling and restraint methods and the interpretation of general physical examination findings in large animals (equine, bovine, small ruminants). Students will progress towards mastery of psychomotor skills for surgery, such as aseptic technique, and anesthetic monitoring, also incorporating immersive technologies and surgical models.		
Anesthesia And Analgesia I – Introduction	2 Credits Lec: 30 Lab: 0	Lecture, Technology	This course serves as an introduction to veterinary anesthesia, analgesia, and peri-operative case management. It will lay the foundation for the basic principles of anesthesia and analgesia, relying on the student to review and become familiar with basic pharmacology and physiology presented in previous semesters. This course is also a prerequisite for the anesthesia lectures within the Small Animal Internal Medicine course of the curriculum, in which students will apply the knowledge learned in the introductory course to formulate specific anesthetic plans for various species and cases with pre-existing conditions or comorbidities. Digital learning and immersive technologies will be a fundamental component of instruction.		
Veterinary Dentistry	1.5 Credits Lec: 22 Lab: 0	Lecture, Technology	This course covers the diagnosis, treatment, prognosis, and prevention of dental diseases of various species. The importance of dental health to overall health will be included. Cases will be presented as examples to emphasize clinical application in practice.		
Professional Life Skills IV	1.5 Credits Lec: 2 Lab: 26	Lecture, Lab	Students will continue their immersion into professional communication skills and their importance in veterinary medicine. The Professional Life Skills IV course will continue its focus on aspects of: Building Professional Identity, Communications, Leadership, Wellbeing, & Financial Literacy.		
ELECTIVES	0.5 - 2.0		A 2 nd elective can be taken by students in high standing, but requires approval by faculty instructor and Associate Dean for Professional Programs		
SEMESTER 4 TOTAL		Credits: 18.5-20	Total Core Hours: 300	Lecture Hours: 225	Lab Hours: 75

Semester 5 (Year 2)
Spring Semester Core Courses

Course Title	Credits Lec hours Lab hours	Mode of Instruction	Course Description
Clinical Pharmacology I	1.5 Credits Lec: 22 Lab: 0	Lecture, Technology	The course covers drug disposition, pharmacodynamics, drug regulations, and critical appraisal of evidence about use of drugs. Drugs will be explored that affect various body systems, including respiratory, reproductive, gastrointestinal, endocrine, immune, urinary, integumentary, cardiovascular, musculoskeletal, and nervous systems. Drugs used for pain, inflammation, infections (e.g., antibiotics and other anti-infectives) and cancer (e.g., antineoplastics) in animals will also be studied. The course will provide drug information for accurate diagnosis and treatment utilizing Plumb's™ point of care resources.
Small Animal Medicine I	4 Credits Lec: 60 Lab: 0	Lecture	This course covers diagnosis, treatment, prognosis, and prevention of non-surgical diseases of the dog and cat. Students will experience a series of interactive anesthesia lectures over the course of the academic year that will integrate knowledge gained from the small animal medicine block with that of the introductory anesthesia and analgesia courses.
Theriogenology	2 Credits Lec: 30 Lab: 0	Lecture	This course integrates reproductive physiology, endocrinology, pathology, and pharmacology in the diagnosis, treatment, and prevention of reproductive disorders of domestic animals. Normal estrous cycles, breeding management, pregnancy, dystocia management, and parturition in domestic animal species will be covered. Breeding soundness in male and female animals, normal pregnancy, and production principles are included.
Food Animal Production,	3 Credits Lec: 45	Lecture, Technology	This course is designed to educate the veterinary student on the diagnosis, treatment, prognosis, and prevention of non-surgical and surgical diseases of food and fiber

Medicine, & Surgery I	Lab: 0		animals (bovine, ovine, caprine, porcine, camelid) and includes production animal medicine, emerging diseases, and common husbandry practices.
Equine Medicine And Surgery I	3 Credits Lec: 45 Lab: 0	Lecture, Technology	This course provides to students knowledge of equine clinical conditions, both medical and surgical, with emphasis on clinical signs, diagnosis, medical and surgical treatment, and prognosis.
Clinical Skills V	2.5 Credits Lec: 0 Lab: 75	Lab, Technology	Students will continue development of expertise in safe animal handling and restraint and interpretation of physical examination findings in small animals (dog and cat) and large animals (horses, cattle, small ruminants). Training in anesthesia and surgical skills will continue with introduction of anesthesia and surgery in the live animal (canine or feline).
Professional Life Skills V	1 Credit Lec: 3 Lab: 24	Lecture, Lab	Students will continue to explore professional communication skills and their importance in veterinary medicine. The Professional Life Skills V course will continue a focus on aspects of: Building Professional Identity, Communications, Leadership, Wellbeing, & Financial Literacy.
Radiographic Interpretation	1 Credit Lec: 15 Lab: 0	Lecture, Technology	This course covers principles and applications of radiographic image interpretation using the foundation of Roentgen signs. Each case presented will give students the opportunity to practice the skills of basic image interpretation, including identifying normal findings as well as classical imaging findings associated with commonly encountered radiographic diagnoses, and application of AI diagnosis. A working knowledge of veterinary anatomy and physiology is a prerequisite for this course.
Clinical Reasoning	1 Credit Lec: 8 Lab: 15	Lecture, Lab	Clinical Reasoning will introduce students to the critical review of the literature and application of clinical reasoning and critical thinking in case examples. It will also serve as preparation for the North American Veterinary Licensing Examination (NAVLE).
Avian & Exotic Animal Medicine	1 Credits Lec: 15	Lecture	The purpose of this course is to build confidence, competence, and understanding in the approach to the species of small, exotic, mammalian, avian, and reptilian species that are most commonly presented to clinicians in North American practices. The

	Lab: 0		representative species discussed will enable the veterinary student to gain a basic understanding of the unique challenges and requirements of these animals. The veterinary student will be expected to be able to apply their skill sets and knowledge base to the unique characteristics of these species.		
ELECTIVES	0.5 - 2.0		A 2 nd elective can be taken by students in high standing, but requires approval by faculty instructor and Associate Dean for Professional Programs		
SEMESTER 5 TOTAL		Credits: 20.5-22	Total Core Hours: 357	Lecture Hours: 243	Lab Hours: 114
Semester 6 (Year 2) Summer Semester Core Courses					
Course Title	Credits Lec hours Lab hours	Mode of Instruction	Course Description		
Emergency & Critical Care	1 Credit Lec: 0 Lab: 30	Lab, Case- Based	This course introduces critical care topics and techniques. Students will apply this information during case-based exercises and discussions. Students will prepare in advance for case-based activities by reading assigned material and/or watching pre-recorded presentations. Students will also complete group-based activities and individual assessments. Digital and immersive technologies will be utilized.		
Clinical Pharmacology II	1 Credit Lec: 15 Lab: 0	Lecture, Technology	This course will build upon content of Clinical Pharmacology I. It will also include peculiarities among different animal species and their responses will be highlighted with relevant clinical applications. The course is designed to complement and expand on the treatment options that students learn as part of their small animal medicine, equine medicine and surgery, and food animal medicine and surgery courses. The basic principles of pharmacokinetics (absorption, distribution, metabolism, and excretion) and pharmacodynamics (biochemical and physiological drug effect, mechanism of action) will be reviewed as they relate to the practice of veterinary medicine.		

			Therapeutic uses, contraindications, monitoring, and adverse effects of drugs will be discussed. The Plumb'sTM resources will be applied.
Small Animal Medicine II	4 Credits Lec: 60 Lab: 0	Lecture	This course continues the diagnosis, treatment, prognosis, and prevention of non-surgical diseases of the dog and cat with emphasis on diagnosis and treatment.
Food Animal Production, Medicine, & Surgery II	3 Credits Lec: 45 Lab: 0	Lecture	This course builds on Food Animal Production, Medicine, & Surgery I. It is designed to educate the student on the diagnosis, treatment, prognosis, and prevention of non-surgical and surgical diseases of food and fiber animals (bovine, ovine, caprine, porcine, camelid) and includes production animal medicine, emerging diseases, and common husbandry practices.
Equine Medicine And Surgery II	3 Credits Lec: 45 Lab: 0	Lecture	This course continues exploration of clinical conditions, both medical and surgical, seen in the horse, with emphasis on clinical signs, diagnosis, medical, and surgical treatment, and prognosis.
Clinical Skills VI	3 Credits Lec: 0 Lab: 90	Lab, Technology	Students will be introduced to more advanced diagnostic and therapeutic procedures for small animals and large animals, including ophthalmology procedures, ultrasonography, radiography, bandaging, semen evaluation, and epidurals. A combination of live animals, models, and immersive technologies will be used. Students will demonstrate continued practice with completing medical records, including SOAPs, case presentations, and discharge instructions.
Introduction To Practice Management	1 Credit Lec: 15 Lab: 0	Lecture	This course exposes students to key concepts in veterinary practice management and ownership. Students will gain insights into the operational workings in a variety of clinical settings, including business operations, team management, and client acquisition and retention.
Professional Life Skills VI	1 Credit	Lecture, Lab	Students will continue to explore professional communication skills and their importance in veterinary medicine. The Professional Life Skills V course will continue to

<i>Include In Facilities – Multipurpose – DO & Dvm)</i>	Lec: 12 Lab: 5		focus on aspects of: Building Professional Identity, Communications, Leadership, Wellbeing, & Financial Literacy.		
ELECTIVES	0.5 - 2.0		A 2 nd elective can be taken by students in high standing, but requires approval by faculty instructor and Associate Dean for Professional Programs		
SEMESTER 5 TOTAL		Credits: 17.5-19	Total Core Hours: 317	Lecture Hours: 192	Lab Hours: 125
Semesters 3-6 Elective Courses					
<ul style="list-style-type: none"> • Variable Contact Hours • Students may take one elective per semester • Students in high academic standing can take two electives per semester with approval by instructor and Associate Dean of Professional Programs 					
Course Title	Credits Lec hours Lab hours	Mode of Instruction	Course Description		
Veterinary Oncology Elective	1 Credit Lec: 15 Lab: 0	Lecture, Lab	This course teaches principles and practice of veterinary oncology. Students will gain knowledge of the most common malignancies seen in both small and large animals, including diagnosis and appropriate treatment options with associated prognoses. Information will be presented in both didactic and case-based format.		
Wildlife & Zoological Medicine Elective	1 Credit Lec: 15 Lab: 0	Lecture	The purpose of this course is to introduce and expose veterinary students to the diversity of this discipline of veterinary medicine. The representative species discussed and studied in this course will enable the veterinary student to gain a basic understanding of the unique challenges and requirements of medicine and surgery involving diverse species in ex situ locations within zoological parks and in situ within natural habitats or other environments. Likewise, the veterinary student will broaden		

			<p>one's knowledge and skill base, but also see the potential and benefits of providing professional veterinary care for these species.</p> <p>This course will build upon the knowledge & skills the sixth semester veterinary student has developed over the previous five semesters. This course will require a sound knowledge of parasitology, anatomy, physiology, general pathology, immunology, infectious diseases, and other disciplines of medicine and surgery. The veterinary student will be expected to adapt and modify their skill sets and knowledge base to apply them to the unique characteristics of these species of other taxa of the vertebrate phylum.</p>
Nutritional Management Of Small Animal Diseases Elective	<p>1 Credit</p> <p>Lec: 15</p> <p>Lab: 0</p>	Lecture	<p>This course is an introduction to clinical nutrition that will cover recognition and management of common diseases of dogs and cats in which proper diet and nutrition play important roles.</p>
Advanced Equine Diagnostic Procedures Elective	<p>1 Credit</p> <p>Lec: 0</p> <p>Lab: 30</p>	Lab	<p>This course expands on principles introduced in Equine Medicine and Surgery, Clinical Skills, and other courses taught in the LCSVM curriculum that are applicable to equine practice. Students will learn to use advanced diagnostic procedures and techniques commonly applied in equine medicine, surgery, and theriogenology. This course is particularly recommended for equine-oriented students before the beginning of their clinical year rotation. The course is designed to allow students to become competent and confident using basic diagnostic procedures and techniques encountered in equine practice. The individual student will be required to prepare in advance for the laboratories by reading assigned material and completing laboratory assignments.</p>
Advanced Equine Lameness Elective	<p>1 Credit</p> <p>Lec: 12</p> <p>Case: 5</p>	Lecture, Lab, Technology	<p>This elective course can be taken after completion of the first two semesters by veterinary students that have an interest in doing equine sports medicine practice after graduation. The course will cover topics about the pathophysiology of joint disease, advanced performance evaluation, treatment options in athletic horses, abnormalities of the axial skeleton, imaging of the equine athlete, regenerative therapies, and rules</p>

			and regulations for equine competitions, like showing and racing, including those pertaining to medications.
Large Animal Ambulatory Elective	0.5 Credits Lec: 0 Lab: 15	Lab	Students will accompany a clinician on farm calls and participate in all aspects of large animal ambulatory medicine. This course is open to 2nd and 3rd year LCSVM students interested in pursuing large animal medicine. Food animal species will be the focus of the course, but some cases may include other large animals.
Mixed Animal Practice Elective	1 Credits Lec: 15 Lab: 0		This course is primarily directed toward students that wish to focus on rural practice or want to gain broader skills across species. The course is designed to increase expertise in basic skills and techniques across species and offers opportunities to increase problem solving and critical thinking skills. Small animal, equine, dairy, beef, and small ruminant topics will be conducted.
Food Animal Elective	1 Credit Lec: 0 Lab: 30	Lab	This course is designed to increase expertise in food animal skills and techniques and increase their food animal problem solving and critical thinking skills. This course is primarily directed toward students that intend to concentrate and/or specialize in food animal practice. Dairy, beef, and small ruminant topics and exercises will be conducted. At least one outbreak investigation will be included.
Herd And Population Medicine Elective	1 Credits Lec: 15 Lab: 0	Lecture	This course targets students interested in careers in production animal medicine/management. It provides a deeper dive into the concepts of herd and population management. Applied principles of herd health will be examined in the context of major production systems (e.g., dairy, beef, pork, poultry), as well as other domestic species (e.g., horses, small animals), and non-traditional species (e.g., reindeer). Building upon content exposure from the core curriculum, the principles of population medicine, particularly as they relate to livestock production systems in North America, will be the focus of this elective course. This course provides students additional opportunities to understand the diversity of careers and the skills and knowledge required for jobs related to population management, herd health, and animal welfare within production systems.

Poultry Elective	1 Credit Lec: 15 Lab: 0	Lecture	This course teaches principles of Poultry Health. Students will gain knowledge of avian (poultry) clinical anatomy and physiology, nutrition, basic management, clinical signs of common diseases / disorders, generation of differential diagnoses lists, development of diagnostic plans, treatment, control, and prevention strategies. The course stresses critical thinking and problem solving.
Animals In Society Elective	1 Credit Lec: 15 Lab: 0	Lecture	This elective course takes a deeper dive into the role animals play in society. It covers topics like the human-animal bond, benefits to people of animal ownership, various roles animals play (companion, recreation, sport, work, therapy, food, etc.), trends in animal ownership, economics, and policy. The responsibilities and obligations of veterinarians, as major providers of healthcare, will be included.
Introduction To Veterinary Emergency & Disaster Management Elective	1 Credit Lec: 10 Lab: 8	Lecture, Lab	This course introduces the concepts and issues involved in veterinary emergency and disaster medicine at the local, national, and international level. Lectures, case studies, table-top exercises, hands-on laboratories, and simulations will be used to train basic response processes and techniques. Online Federal Emergency Management Agency (FEMA) courses will be used to build background training. Deployment to actual disasters and emergencies may be possible depending upon circumstances.
Veterinary Innovation And Entrepreneurship Elective	1 Credit Lec: 15 Lab: 0	Lecture, Technology	This elective course provides a look into the future of veterinary healthcare, including evolving trends (e.g., technologies, digital health, telehealth, artificial intelligence, AI, GPT, robotics, 3D printing and care that is personalized, integrated, continuous). Insights into development and adoption of innovations will be explored. Students interested in entrepreneurship will be exposed to basic elements of healthcare ventures.
Veterinary Legislative Advocacy Elective	1 Credit Lec: 15 Lab: 0	Lecture	This elective course reveals how the legislative process works and how legislation affects the profession of veterinary medicine and the animals it serves, including companion animals, farm animals, and wildlife species. Current relevant legislation will be explored.

Public Service For Veterinarians Elective	1 Credit Lec: 15 Lab: 0	Lecture	This course is presented with the Clinton School of Public Service and provides an introduction to the foundations of public service and leadership tools needed to impact communities and enact change.
Veterinary Industry Pharmaceuticals, Biologicals, & Diagnostics Elective	1 Credit Lec: 15 Lab: 0	Lecture	This elective course involves exposure to major pharmaceutical company and covers topics such as: value of industry to the veterinary profession, benefits of practitioner partnerships with industry, overview of FDA vs compounded products, path for taking a product to market, career opportunities for veterinarians. It is especially pertinent to students with interest in a career in veterinary pharmaceutical industry.

Required Clinical Year Courses Semesters 7, 8, 9

Rotation Title	# Weeks # Credits	Rotation Description
Small Animal General Practice Clinical Rotation	4 weeks 4 credits	The course consists of supervised clinical instruction in a selected, pre-approved, high quality, small animal general practice (canine, feline, pocket pets). Students see a wide variety of medical and surgical cases and are active participants in their diagnostic and therapeutic management, to include documentation of findings and care in problem-oriented medical records and performance of clinical procedures.
Specialty Practice Clinical Rotation	4 weeks 4 credits	The course consists of supervised clinical instruction in a selected, high quality, specialty practice focusing on small animal species, primarily canine and feline. Instruction will take place in practices with board certified internists, radiologists, surgeons, anesthesiologists, or other specialists, and/or access to those specialists. Students are active participants in diagnostic and therapeutic management of a wide variety of cases with instructive pathophysiological learning issues requiring appropriate medical and/or surgical management in veterinary advanced care, emergency, and critical care situations.
Or:		
Specialty Practice Clinical Rotation "Selective"	4 weeks 4 credits	The course consists of supervised clinical instruction in a selected, high quality, specialty practice. Species of focus or interest can include canine, feline, lab animal, exotic, zoological, equine, and/or food animal depending on the interest and career goals of the student. Instruction will take place in practices with board certified internists, radiologists, surgeons, anesthesiologists, or other specialists, and/or access to those specialists. Students are active participants in diagnostic and therapeutic management of a wide variety of cases with instructive pathophysiological learning issues requiring appropriate medical and/or surgical management in veterinary advanced care, emergency, and critical care situations.

Small Animal Primary Care - Shelter Medicine	4 weeks 4 credits	The course consists of supervised clinical instruction in the medical and surgical areas of a busy community shelter practice. Students will receive an introduction to all aspects of shelter operations and gain a better understanding of the challenges that animal shelters encounter. Students will learn why and how animals are admitted to shelters, behavior and enrichment strategies used in this environment, and how community engagement leads to successful adoptions.
Small Animal Primary Care – Shelter Medicine (Virtual)	4 weeks 4 credits	The course consists of supervised instruction in the medical and surgical areas of a busy community shelter practice. Students will receive an introduction to all aspects of shelter operations and gain a better understanding of the challenges that animal shelters encounter. Students will learn why and how animals are admitted to shelters, behavior and enrichment strategies used in this environment, and how community engagement leads to successful adoptions. Veterinarians and other subject matter experts participating in the course will discuss preventive, medical, and surgical care options for shelter animals with the students, including the review of physical examinations, develop problem lists and determine differential diagnoses on shelter animals. After discussing their findings with a veterinarian, students will then formulate diagnostic and treatment plans for their patients. Students will develop surgical skills through learning about various techniques utilized in spay/neuter procedures. Students will gather patient history and perform animal examinations on client owned animals through simulated activities. Students may also have the opportunity to participate in discussions regarding dentistry procedures and attend presentations by human officers. Communication practice revolving around the care received at preventative health clinics will also be offered. Students may be required to make formal case presentations to others during the course. The virtual course is composed of discussions regarding the medical and surgical care of animals, presentations, self-study, case write ups, and working with members of various shelter departments.
Diagnostic Veterinary Medicine	2 weeks 2 credits	The course is a 2-week rotation during which the students will receive senior level training in diagnostic pathology and 10 ancillary diagnostic services, including bacteriology, virology, molecular biology, serology, toxicology, clinical receiving, histology, parasitology, clinical pathology, and epidemiology. The course is composed of lecture/cooperative/active /group and self-learning sessions. The students will also perform postmortem at a state or university

		veterinary diagnostic laboratory necropsy floor or will work on diagnostic case studies and allied diagnostic services assignments. The students will also give diagnostic pathology case presentations on real case submissions to the diagnostic laboratory and will receive clinical pathology assignments. The clinical pathology assignments are composed of cytology slides collected from case submissions and the students are asked to read the slides using microscopes and submit their diagnostic reports.
Diagnostic Veterinary Medicine - Virtual	2 weeks 2 credits	The course is a 2-week rotation during which the students will receive senior level training in diagnostic pathology and ancillary diagnostic services, including bacteriology, virology, molecular biology, serology, toxicology, clinical receiving, histology, parasitology, clinical pathology, and epidemiology. The course is composed of lecture/cooperative/active/group and self-learning sessions. The students will spend sessions remotely observing postmortem examinations performed on the necropsy floor of a state or university veterinary diagnostic laboratory (with two-way audio/video for Q&A) or will work on diagnostic case studies and allied diagnostic services assignments. The students will deliver diagnostic pathology case presentations on case submissions and will receive clinical pathology assignments. The students will read the slides that are shared virtually and will write and submit their diagnostic reports.
Large Animal Rotation	4 weeks 4 credits	Students will be introduced to diagnostic and therapeutic procedures for large animals including internal medicine cases, bovine lameness, herd and flock health consultation and routine procedures, ophthalmology procedures, diagnostic imaging, equine lameness examination, reproductive technology, bandaging and wound care, dental procedures, anesthesia, and general surgical procedures using a combination of live animals, models, technologies, and cadavers. Students will demonstrate continued communications skills development including communication with owners through written discharge instructions and communication with colleagues via referral letters.
Or:		
Equine (Large Animal Alternate) Rotation	4 weeks 4 credits	Students with a high interest in equine practice, who have demonstrated basic skills in the handling of this species, will be approved by members of the faculty to complete their large animal rotation

		at high quality clinical affiliate sites, in lieu of completing their large animal rotation. These locations will introduce and/or reinforce diagnostic and therapeutic procedures for horses, including internal medicine, surgery, lameness evaluation, sports medicine, herd health and wellness, routine procedures, diagnostic imaging, reproductive management, bandaging and wound care, dental procedures, and anesthesia. Students will continue to develop their communication skills. If this course is being completed at a mixed animal practice, the student needs to construct the activities such that a minimum of 90% of their cases are equine focused.
Large Animal Rotation - Virtual	4 weeks 4 credits	Students will be introduced to diagnostic and therapeutic procedures for large animals in a virtual environment and will include internal medicine cases, bovine lameness, herd and flock health consultation and routine procedures, ophthalmology procedures, diagnostic imaging, equine lameness examination, reproductive technology, bandaging and wound care, dental procedures, anesthesia, and general surgical procedures using a combination of live animals, models, technologies, and cadavers. Students will demonstrate continued communications skills development including communication with faculty through exercises demonstrating written discharge instructions and communication with colleagues via referral letters.
North American Veterinary Leadership Examination (NAVLE) Administration	3 weeks 3 credits	This is a Required Course offered in fall semester. Students will prepare and sit for the North American Veterinary Licensing Exam (NAVLE®). Students will conduct independent studies and review in preparation for the NAVLE®. Students are not required to pass the NAVLE® to pass the course.
Clinical Year Assessment	1 week 1 credit	This required course is offered to students at the conclusion of the clinical year rotation blocks to assist in their transition from veterinary student to DVM. Course design involves a multifaceted approach to content delivery through exit surveys, financial literacy education, veterinary imaging monitoring verification, and interactive professional communication. This course includes four internal CVM programmatic surveys: (1) CVM Graduating Senior Survey; (2) AVMA Graduating Senior Survey; (3) Doctors Without Quarters (DWQ) education seminar; (4) submission of dosimeter badge and various communication activities. Students will have access to online education materials and learning tools provided by the CVM, AVMA, etc. Instructors will track individual student progress in each respective learning unit by tracking performance metrics

		provided by the CVM Outcomes Assessment program. The course assignments and self-directed completion of units will span approximately 2-4 weeks.
Clinical Diagnostic Imaging	2 weeks 2 credits	This course will provide a structured means for students in the clinical year of the DVM program to apply and synthesize the knowledge gained in the pre-clinical training into the clinical setting. Students will use the knowledge and skills gained in a Radiology Short Course to perform radiographic interpretation during their clinical placements.
Advanced Clinical Pathology Rotation	2 weeks 2 credits	This course will build on the core concepts of clinical pathology presented earlier in the curriculum, while fostering higher-level interpretation of laboratory data. Clinical biochemistry, hematology, urinalysis, cytology, and molecular diagnostics will be reviewed in this course, which can be asynchronous and virtual course.
Clinical Rotation	2 weeks 2 credits	This course consists of supervised clinical instruction in high quality learning experiences available at institutions and practices in North America and around the world, to include specialty practices (such as medicine, surgery, cardiology, dermatology, neurology, oncology, ophthalmology), species-specific practices, other accredited Colleges of Veterinary Medicine, zoos, and other LCSVM approved public and private biomedical institutions. Students are active participants in their elective rotations, participating in a wide variety of cases with instructive learning issues and situations to which they will be exposed. Elective clinical rotations either can be selected from a preapproved list or can be requested by submitting a proposal and receiving approval through the LCSVM Clinical Programs and Outreach Office.
Elective Clinical Year Courses Semesters 7, 8, 9		
Rotation Title	Number of weeks/credits	Rotation Description
Externship Clinical Rotation Elective	2 weeks 2 credits	This course consists of supervised clinical instruction in high quality learning experiences available at institutions and practices in North America and around the world, to include specialty practices

		(such as medicine, surgery, cardiology, dermatology, neurology, oncology, ophthalmology), species-specific practices, other accredited Colleges of Veterinary Medicine, zoos, and other LCSVM approved public and private biomedical institutions. Students are active participants in their rotations, participating in a wide variety of cases with instructive learning issues and situations to which they will be exposed upon graduation. Elective externship clinical rotations are submitted and approved through the LCSVM Clinical Programs and Outreach Office.
Advanced Dentistry Small Animal Clinical Rotation Elective	2 weeks 2 credits	This elective course is a continuation of small animal dentistry and is focused on the diagnosis, treatment, and prevention of common dental conditions of canine and feline patients which are typically seen in small animal general practice.
Poultry Medicine Industry Elective	4 weeks 4 credits	This course exposures students to the role poultry veterinarians play in providing healthcare in commercial poultry operations. They will learn examination, flock behavior, vaccinations, inspections, sample collection and analysis, nutritional assessment, and flock health management procedures. They will gain appreciation for the poultry industry in Arkansas that represents its largest agricultural product and accounts for 1 in 4 of its agricultural jobs, the Poultry Federation that serves it, and its major poultry companies.
Veterinary Medical Scientist Research Training Elective	4 weeks 4 credits	This research-intensive experience will provide a concentrated 4-week research training program during Semester 6. Students will be immersed in a mentored research activity with LCSVM faculty oversight. It is possible for students to participate in the National Veterinary Scholars Symposium in August of this semester. To accomplish an 8-week experience two of these elective rotations could be scheduled sequentially.
Veterinary Virtual Care, Telehealth, Telemedicine Elective	2 weeks 2 credits	This elective course provides the student with first-hand experience with virtual care/ telemedicine and telehealth. The clinical focus can be small animals, horses, food animals, or combination. The experience can be a blend of on-site and virtual participation with cases managed virtually by a practicing veterinarian. Telemedicine platforms will be explored.
North American Veterinary Licensing	2 weeks 2 credits	This course is offered to students in the fourth year of the curriculum as an elective to assist in preparation for the North American Veterinary Licensing Examination. Course design involves a

Examination (NAVLE) Prep Rotation		multifaceted approach to content delivery through review sessions, case-based problem solving, online educational resources/testing modules, and structured self-directed study.
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CLINICAL ROTATIONS SEMESTERS 7, 8, 9

Required Courses - Provide all students basic, broad clinical experiences to prepare students for additional clinical experiences			
Foundation Courses	Small Animal General Practice Foundations	4 weeks	20 weeks
	Small Animal Specialty Practice Foundations	4 weeks	
	Diagnostic Medicine/Pathology Foundations	2 weeks	
	Large Animal Diagnostics Foundations	2 weeks	
	Diagnostic Medicine/Radiology Foundations (virtual)	2 weeks	
	Diagnostic Medicine/Clinical Pathology Foundations (virtual)	2 weeks	
	NAVLE Preparation Block – Mandatory Block SIX	4 weeks	
Elective Courses - Include small animal, large animal, and mixed animal practices that may be general, specialty, exotic, zoo, and poultry practices. Also included are research rotations. Students are allowed to make their own proposals for 2 of the 4-week rotations.			
Elective Courses	Elective Clinical Rotation	12 weeks	28 weeks
	Elective General Practice Rotation	4 weeks	
	Elective Specialty Practice Rotation	4 weeks	
	Student Proposed Elective Clinical Rotation	4 weeks	
	Student Proposed Elective Clinical Rotation	4 weeks	
Required Experiences These required experiences are twofold: (1) help students take the NAVLE examination; and (2) provide a series of experiences designed to help launch students into successful careers. The final week of clinical rotations is the clinical launch week.			
Required Experiences	NAVLE Test Window (no credit)	3 weeks	4 weeks
	Clinical Launch	1 week	
			52 weeks

Appendix II Letters of Support



August 14, 2023

Moses T. Kairo Ph.D.
Professor and Dean
School of Agricultural and natural Sciences
University of Maryland Eastern Shore
Princess Anne, MD 21853

Dear Dr. Kairo,

Re: Establishment of a Veterinary Medicine Program at UMES

I am delighted to learn that the University of Maryland Eastern Shore is proceeding with plans to establish a new Veterinary Medicine Program. This will be the second such program at an HBCU and I have no doubt that it would provide more opportunities for diverse students to pursue Careers in Veterinary Medicine. The program would also come at a time when there is a critical national need for veterinarians.

Such a program would also be timely given the increased interest in the veterinary sciences by students. As you know, our Animal Science Major is one of the largest at an 1890 Land Grant University. Increased opportunities for our students is therefore of great interest to me. Henc, as the dean of the College of Agriculture and Environmental Sciences, I would like to express my strong support for the proposed program. With this said, please know we stand ready to develop appropriate articulation agreements with this program to ensure that our students will have a clear and seamless pathway should they wish to join your new program.

I request that you reach out to me at the appropriate time, so that we can formalize such an agreement. In the meantime, keep us posted about the developments with the program and do not hesitate to reach out should you need additional information or if we can be of any assistance. I wish you success is this timely and needed initiative.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Mohamed Ahmedna'.

Mohamed Ahmedna, Ph.D.
Professor and Dean



Florida Agricultural and Mechanical University

TALLAHASSEE, FLORIDA 32307-3100

COLLEGE OF AGRICULTURE AND FOOD SCIENCES (CAFS)
OFFICE OF THE DEAN
217 PERRY-PAIGE BUILDING SOUTH

TELEPHONE: (850) 561-2644
FAX: (850) 561-2794

August 31, 2023

Moses T. Kairo, Ph.D.
Professor and Dean
School of Agricultural and Natural Sciences
University of Maryland Eastern Shore
Princess Anne, MD 21853

Dear Dr. Kairo:

Re: Establishment of a Veterinary Medicine Program at UMES

I am pleased to learn that the University of Maryland Eastern Shore is developing a new Veterinary Medicine Program. Once established, such a program will provide greater access for our students at a time when there is much interest. I am cognizant that there are only 34 veterinary science programs across the nation. Competition for entry into the existing programs is usually quite intense. Thus, a new program at an 1890 land-grant university would provide more opportunities for students.

As you may know, our Animal Science program attracts many students who have interests in careers in the veterinary sciences. Therefore, increased opportunities for our students to pursue relevant careers is of great interest to us. Therefore, as the Interim Dean of the College of Agriculture and Food Sciences, I would like to indicate my support for the proposed program. We will therefore be ready to develop the appropriate articulation agreements that will ensure a clear pathway for our students into the new program.

Please let us know when it will be appropriate to concretize the necessary articulation agreements. I look forward to news of the formal establishment of the new program.

With very best wishes,

G. Dale Wesson

G. Dale Wesson, Ph.D., PE
Interim Dean, Land-Grant Director,
and Associate VP for Research

FAMU IS AN EQUAL OPPORTUNITY/EQUAL ACCESS UNIVERSITY



Office of the Dean

August 31, 2023

Dr. Moses T. Kairo Ph.D.
Professor and Dean
School of Agricultural and natural Sciences
University of Maryland Eastern Shore
Princess Anne, MD 21853

Re: Establishment of a Veterinary Medicine Program at UMES

Dear Dr. Kairo:

We have learned that you are progressing with establishing a new Doctor of Veterinary Medicine Program at the University of Maryland Eastern Shore. Given our proximity, this is something of great interest to our students. We have seen increased interest in animal sciences and progression to professional programs in the veterinary sciences. While there is a Veterinary College within our state, many Virginia State University students would be interested in a Veterinary Program at a sister 1890 Land Grant University.

Against this background, we highly support your efforts to establish a new DVM Program, and we would be very interested in working with you to develop a pathway for our students to join the program. Therefore, as the Dean of the College of Agriculture, I express our strong support for the proposed program, and at the appropriate time, we look forward to developing an articulation agreement with your program.

With very best wishes as you develop this new program.

Sincerely,

Robert N. Corley, III, Ph.D.
Dean and 1890 Administrator

1 Hayden Drive | P.O. Box 9081 | Virginia State University, VA 23806 |
(804) 524-5961 | www.agriculture.vsu.edu



Founded in 1882, Virginia State University is one of Virginia's two land-grant institutions and is located 20 minutes south of Richmond in the village of Ettrick. VSU's College of Agriculture consists of three academic departments: Agriculture, Hospitality Management, and Family and Consumer Sciences. Integrated within the College are an Agricultural Research Station; Randolph Farm, a 417-acre research and educational facility; and Virginia Cooperative Extension.



Maryland Department of Agriculture

Office of the Secretary

Wes Moore, Governor
Aruna Miller, Lt. Governor
Kevin Atticks, Secretary
Steven A. Connelly, Deputy Secretary

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mda.maryland.gov

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410.841.5846 Fax

April 17, 2023

Heidi M. Anderson, Ph.D., President
University of Maryland Eastern Shore
J.T. Williams Hall, Suite 2107
11868 Academic Oval
Princess Anne, MD 21853-1299

Dear President Anderson:

Letter of Support for the Establishment of a Veterinary Medicine Program at UMES

It was a pleasure to meet with you to discuss various agriculture related initiatives that the University of Maryland Eastern Shore (UMES) is undertaking. I wanted to follow up on one, in particular, the establishment of a Veterinary Medicine Program. First, let me reiterate my appreciation that UMES has prioritized the establishment of a Veterinary Medicine Program. Maryland faces a serious shortage of qualified veterinarians and technologists. As you are aware, this acute shortage is replicated across the nation and affects both the pet care industry as well as rural farming communities where large animal veterinarians are in great need.

Your proposed three-year program is innovative and promises to deliver highly qualified professionals faster. I note that you have already implemented three-year health professions programs with great success and therefore have full confidence that you will be successful with the proposed new program. Furthermore, your proposed distributed model of providing education not only has the potential to reduce operational costs for the program, but linkage with industry has the potential to produce experienced workforce-ready graduates. A new Veterinary Medicine program in Maryland will be the first of its kind in the Maryland/Washington DC/Delaware area. There will be great demand for such a program and the timing could not be more opportune. I am amazed that there is only one veterinary school at an 1890 land grant school. Therefore, the promise of greater access to a diverse student body is very compelling. I, therefore, see the proposed program also addressing the need to diversify the veterinary science profession.

In conclusion, let me thank you again for spearheading this bold new initiative. I am very excited about this proposal and would like to affirm the strong commitment of the Maryland Department of Agriculture to support UMES as you move this initiative forward. Please let us know how we can support you to ensure the successful implementation of this new program. Please feel free to share this letter with other stakeholders, as appropriate.

Sincerely,

Kevin Atticks
Secretary, Maryland Department of Agriculture



DELAWARE STATE UNIVERSITY
COLLEGE OF AGRICULTURE, SCIENCE & TECHNOLOGY

October 10, 2023

Dear Dr. Kairo:

Re: Establishment of a Veterinary Medicine Program at UMES

I write to applaud the University of Maryland Eastern Shore for the new initiative focused on establishing a new Veterinary Medicine Program. As you know, the state of Delaware does not have such a program. I am also aware that only one 1890 Land-Grant University has such a program. I am convinced that the establishment of a Veterinary Medicine program on the Delmarva Peninsula would provide a great opportunity for our students to pursue careers in this field.

There is considerable interest by our students to pursue careers in the veterinary sciences. Therefore, I have no doubt that a Veterinary Medicine program at UMES would be very attractive to them. As the dean of the College of Agriculture, Science and Technology, I would like to affirm our strong support for the proposed program. Once the program is established, it will be important for us to develop an articulation agreement which will facilitate the matriculation of our students into the program. At your earliest convenience do let me know when would be appropriate for us to develop such an agreement. In the meantime, please know that you have our full support, and we hope that the program will come into fruition soon.

Again, very best wishes and keep us posted of the developments.

Sincerely,

Cherese Winstead

Cherese Winstead Ph.D.
Dean, 1890 Administrator and Research Director

Update: Kirwan Center for Academic Innovation

TOPIC: Update: Kirwan Center for Academic Innovation

COMMITTEE: Education Policy and Student Life

DATE OF COMMITTEE MEETING: Wednesday, November 29, 2023

SUMMARY: Dr. Nancy O'Neill, Acting Director of the USM William E. Kirwan Center for Academic Innovation, will provide an overview of the Kirwan Center – its history, mission, and vision – and highlight a selection of the Center's current projects and initiatives.

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: November 29, 2023

BOARD ACTION:

DATE:

SUBMITTED BY: Alison Wrynn 301-445-1992

awrynn@usmd.edu



UNIVERSITY SYSTEM *of* MARYLAND
**KIRWAN CENTER FOR
ACADEMIC INNOVATION**

Kirwan Center Overview and Initiative Highlights

Dr. Nancy O'Neill, Acting Director, Kirwan Center for Academic Innovation

November 29, 2023



UNIVERSITY SYSTEM *of* MARYLAND
**KIRWAN CENTER FOR
ACADEMIC INNOVATION**

Center for Innovation
and Excellence in
Learning and Teaching
(CIELT)

2013

Center for Academic
Innovation (CAI)

2014

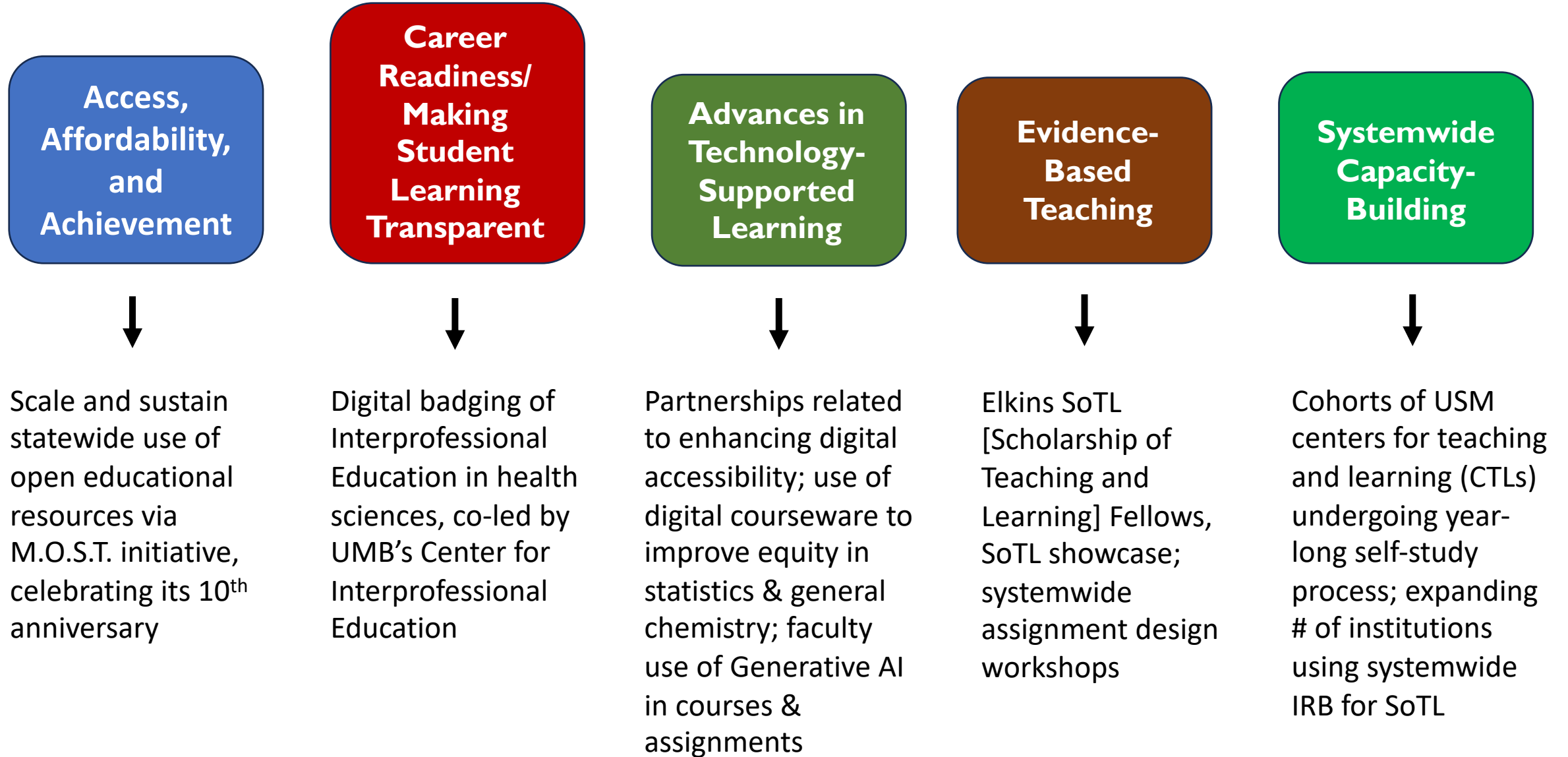
William E. Kirwan
Center for Academic
Innovation (KCAI)

2015 -

“...to leverage the power of multi-institutional collaboration to increase access, affordability, and achievement of high-quality credentials for Maryland students.”

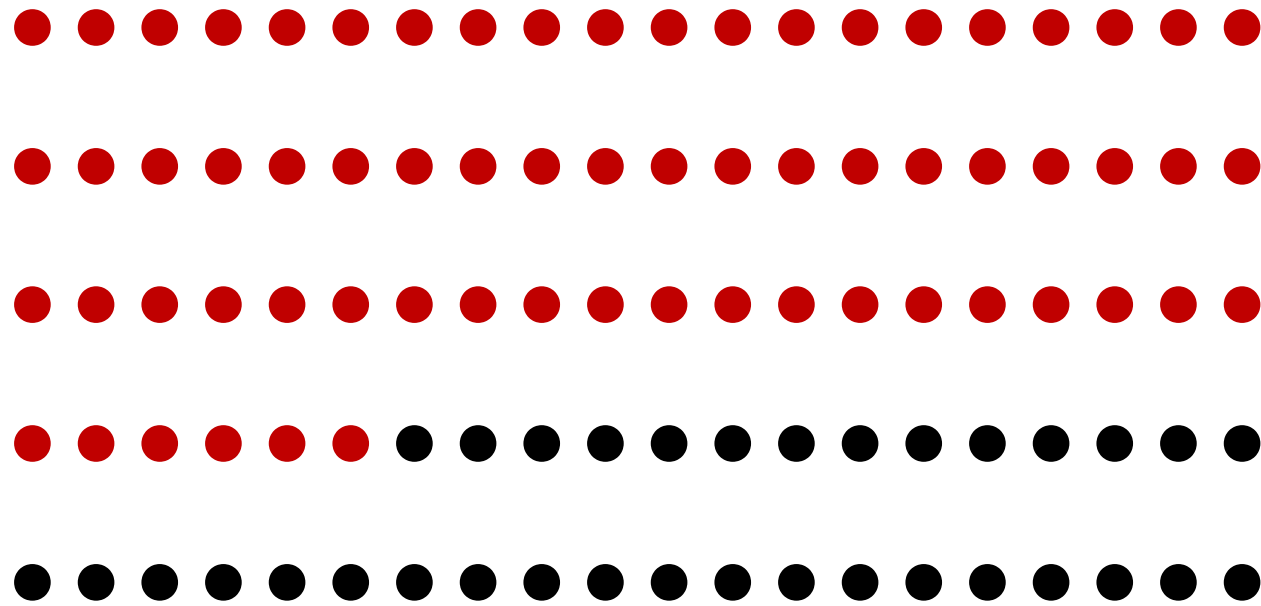
“to foster a collaborative culture of academic innovation that catalyzes new ways of thinking about student success, translates ideas into action, and scales and sustains promising practices.”

We facilitate and support...





MARYLAND OPEN SOURCE TEXTBOOK *Initiative*



66% of
students in
the U.S.

...reported skipping buying assigned course material - a textbook, and access code, or both - during their time at school because of its cost.



Source:
Giulia
Forsythe, n.d.



United Nations Sustainable Development Goals Open Pedagogy Fellowship

Dr. Glenda Hernandez Baca, School of Education
Dr. Maria-Elvira Luna Escudero-Alie, Spanish Department

Project: Education Equity Comparative Analysis

Focus UN SDG Goal- Goal 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

Openwriting.org

open source college composition

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Home

Overview 01: Welcome to Openwriting

Published: Tuesday, 16 July 2019 18:07 | Written by Matthew Hill | Hits: 3964

Openwriting Chapters

- + [Overview 01: Welcome to Openwriting](#)
- + [Overview 02: MLA Manuscript Format](#)

Cases and Theories

Antoinette Martsoukos





MARYLAND OPEN SOURCE TEXTBOOK *Initiative*

**Grants and
Support to
Adopt OER**

**Statewide
Summits**

Webinars

**Grants and
Support to
Create OER**

**Grants for
Campus-
wide OER
Efforts**

**Research
on the Use
of OER**

2023 Maryland OER Summit: Cultivating Agency through Open Educational Practices

Friday, December 1, 2023 | Salisbury University

This one-day summit will bring together faculty, students, librarians, instructional designers, and administrators from across all of Maryland's postsecondary institutions to explore the contours of open pedagogy, from philosophical questions it raises about power in the classroom to practical questions about how to jump into the practice. At the heart of the conference is the question: what happens when students and their collaborators—peers, faculty, community members, librarians, and more—drive knowledge creation?

Impact

210 courses converted across 29 institutions

→ \$22.9 million in cumulative cost savings,

→ an average savings of ~ \$137 per student per course,

→ a reach of ~160,000 students

2016-2023

Impact

Across survey years 2016-2022, 57% of students said they typically spend more than \$200 each semester on materials.

- ✓ In contrast, 68% did not spend any money for resources for their M.O.S.T. course.

In that same period, 52% of students reported using traditional textbooks 2-3 times per month or less.

- ✓ In contrast, 64% students reported using the materials in their M.O.S.T. course 2-3 times per week or more.

2016-2022

Digital Badging of Interprofessional Education

A joint project of the Kirwan Center and the UMB Center for Interprofessional Education



UNIVERSITY SYSTEM *of* MARYLAND
**KIRWAN CENTER FOR
ACADEMIC INNOVATION**



UNIVERSITY *of* MARYLAND
BALTIMORE

IPE is defined as “occasions when two or more professions learn from, with, and about each other to improve collaboration and the quality of care.”

Student participation in IPE activities for health professions disciplines is paramount to preparing them for team-based care.

Why IPE?



“Interprofessional approaches increase the skills, attitudes and knowledge of healthcare professionals and students and enable them to adopt a better...approach to diabetes care.”



“People with diabetes who receive care and education from interprofessional care teams improve their commitment, knowledge and ability to perform diabetes self-management, which also improves outcomes.”



“Measurable effects on patient outcomes, including better HbA1c and glucose levels, have been recorded when IPE is taught and IPC is implemented.”

Nationally...

“More IPE programs in the U.S. are becoming organized and operationalized than were reported previously in the literature.”¹

“Overall, there is little consistency between institutions’ IPE programs [and] a marked heterogeneity and variability among universities in...the presence and implementation of IPE curricula.”¹

Need to “identify best practices and improve quality over time and monitor learner progression...”²

Who participates?

While many institutions in Maryland offer an array of IPE experiences for their students, these experiences are often elective and can be sporadic.

How often and well?

Relatively few health professions students will participate in IPE activities with the duration and intensity necessary to build competency.

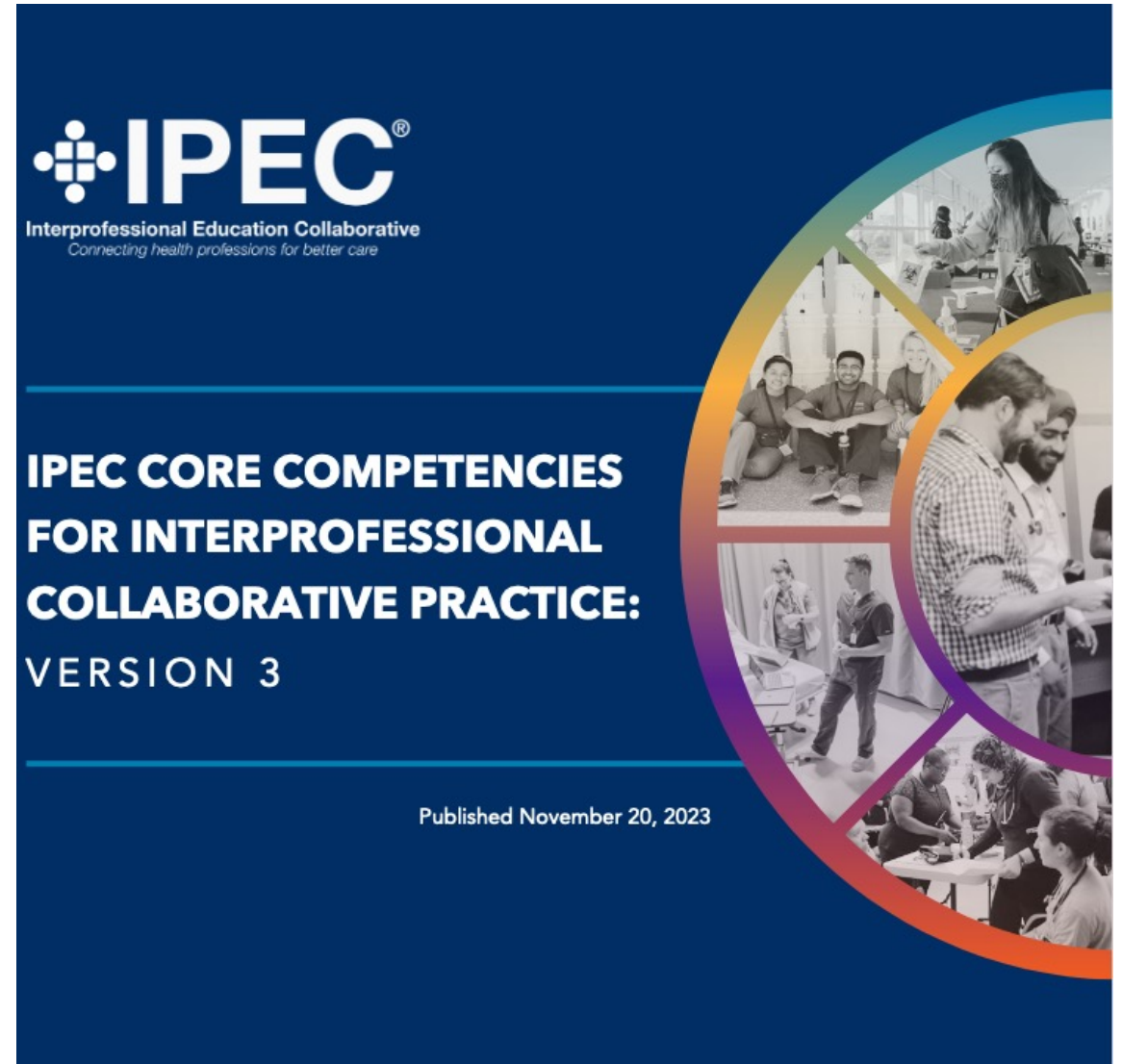
How do we know?

Even with robust IPE, there is a need to help make students' competency development more visible, to themselves, to educators, and to prospective employers.

A new national report calls for “high-quality, programmatic IPE”

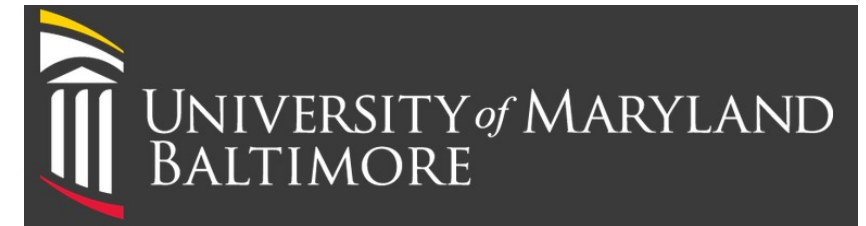
“IPE that is integrated into curricula and spans its entire length, from early didactic IPE experiences to advanced clinical IPE experiences, which collectively result in meaningful outcomes.”

Source: IPEC 2023



MD IPE DIGITAL BADGING PROJECT

“The project provides a means by which faculty and staff can align IPE activities with nationally recognized IPE competencies, ensure there are sustained opportunities for students to practice and improve, and provide the means by which students can more clearly communicate their achievement of IPE competencies to employers.”



Welcome to the IPE Registry

The Interprofessional Education (IPE) Digital Badging Project brings together teams of leaders from Maryland 2-year and 4-year colleges and universities to increase the availability, quality, and visibility of IPE through digital badging. The Project provides a means by which faculty and staff can align IPE activities with nationally recognized IPE competencies, ensure there are sustained opportunities for students to practice and improve, and provide the means by which students can more clearly communicate their achievement of IPE competencies to employers. Key to this effort is for participating institutions to have up-to-date catalogs of their existing IPE activities, which is made possible through the IPE Registry.

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Participating Institutions in the IPE Digital Badging Project

2023-2024 participating institutions are Coppin State University; Salisbury University; Towson University; University of Maryland Eastern Shore; and University of Maryland, Baltimore.



Contact us

The IPE Digital Badging Project is being led by the University of Maryland Center for Interprofessional Education and the USM Kirwan Center for Academic Innovation.

✉ ipe@usmd.edu



Add an IPE Activity

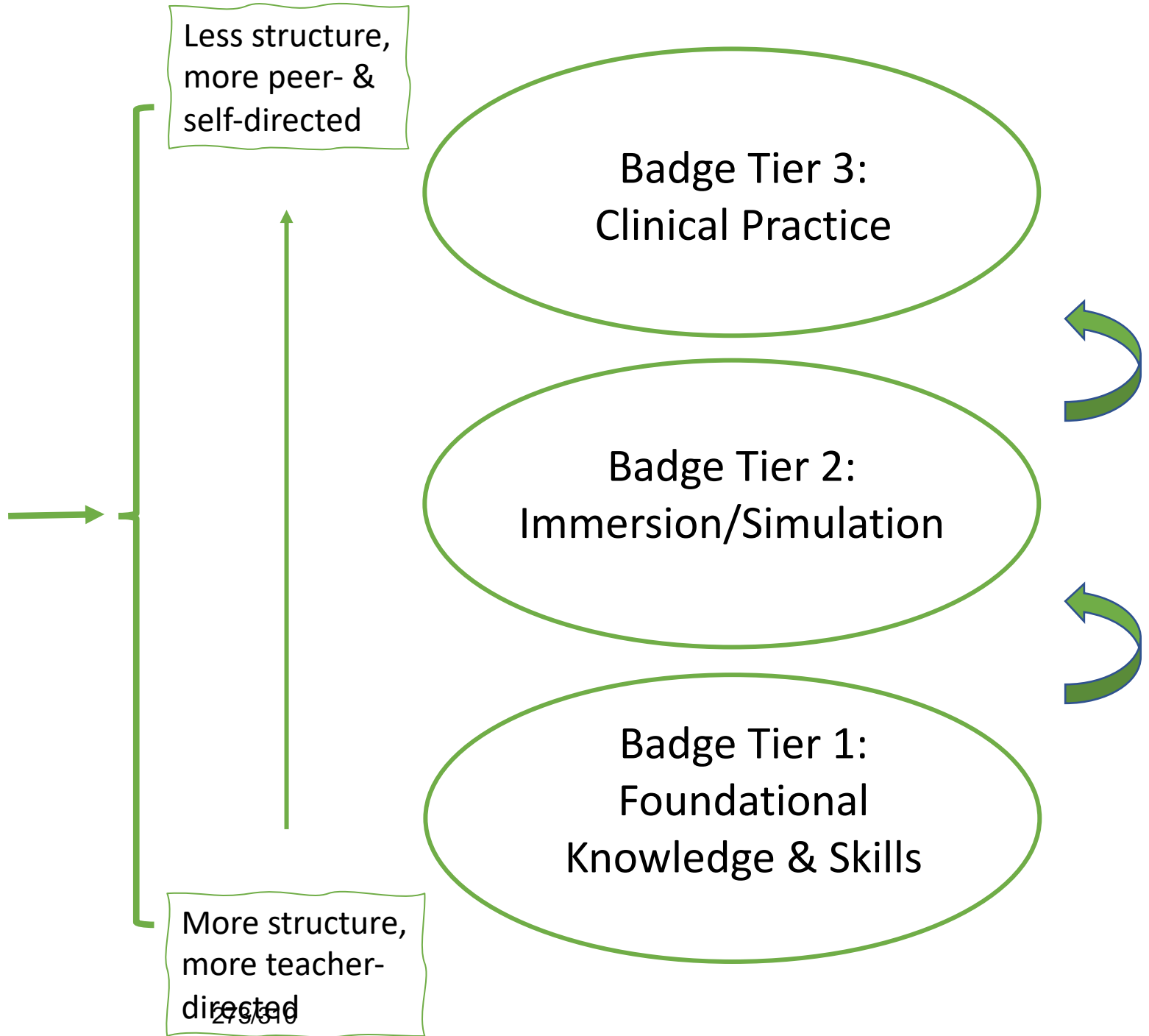
Faculty and Staff: Add or renew an IPE activity on your institution's IPE Registry.



Find an IPE Activity

Students: Find an IPE activity offered by your institution.

<i>National IPE Competency Domains</i>
Values & Ethics for Interprofessional Practice
Roles & Responsibilities in Interprofessional Practice
Teams & Teamwork for Interprofessional Practice
Communication in Interprofessional Practice



Commonalities across our Work

- ✓ Collaboration and community
- ✓ Expanded vision of what's possible
- ✓ Safe space to experiment
- ✓ Mutual problem-solving and support
- ✓ Showcase accomplishments and successes



For more information, visit
www.usmd.edu/cai or
contact Nancy O'Neill at
noneill@usmd.edu





Projects, Initiatives, and Ongoing Work – Summer 2023

*This document summarizes projects and initiatives led by the Kirwan Center. *Indicates projects that include community college partners. See Appendix for a summary of participating institutions.*

ALTERNATIVE CREDENTIALS | Alternative credentials offer institutions a way to validate a range of knowledge, skills, and abilities students have developed, deepening the level of information otherwise provided through student transcripts or resumes |

Interprofessional Education (IPE) Digital Badging Project

Summary: Interprofessional Education (IPE) describes when students from two or more professions in health and social care learn together during all or part of their professional training, with the aim of cultivating collaborative practice. Since 2018, faculty leaders in Interprofessional Education (IPE) have been exploring how to scale learning opportunities associated with IPE across the System, and that year, the Kirwan Center began early discussions about a project to give students the opportunity to earn badges to reflect their achievement of IPE skills. Both strands of activity came together in spring 2020, and between 2020 and 2022 (with some slowdown due to the pandemic), the Kirwan Center has convened a working group focused on building an IPE badge earning framework based on existing IPE competencies that articulates what early, middle, and advanced proficiency would look like. Since 2022, the Kirwan Center has worked with five institutions on the Interprofessional Education (IPE) Digital Badging Project in collaboration with the UMB Center for Interprofessional Education. The institutions have begun cataloguing their IPE activities at their institutions as a first step toward creating coherent pathways for students to earn IPE badges. The activities are being catalogued in the [Maryland IPE registry](#) in partnership with Texas Tech University Health Sciences Center, the creators of the registry tool.

Update: Recently, the Kirwan Center received one-time funding for this project aimed at significantly accelerating the teams' progress in three areas: cataloguing their existing IPE activities and conducting a gap analysis; developing new courses, co-curricular experiences, and clinical experiences to address identified gaps; and building capacity to carry out effective assessment of student learning of IPE competencies at scale, including making student learning of IPE competencies more explicit and visible via digital badging. This funding will be disbursed over two years and include structured support to help ensure the institutional teams make progress on their goals related to these three areas.

Participating Institutions: For 2023-2024, the project includes Coppin State University; Salisbury University; Towson University; University of Maryland, Baltimore; and University of Maryland Eastern Shore.

For more information: <https://www.usmd.edu/cai/interprofessional-education-ipe-digital-badging-project>

ONLINE LEARNING | Online learning comprises any learning environment that makes substantive use of a web-based component that enables collaboration and access to content beyond the classroom |

Digital Accessibility*

Summary: To help ensure that teaching and learning activities are accessible to all learners, the Kirwan Center launched the Maryland Higher Education Professionals Digital Accessibility Community in 2021. This community of practice is open to faculty, staff, and administrators from any Maryland postsecondary institution and will comprise individuals responsible for ensuring digital accessibility across at least four areas of practice: instruction, student support, technology, and procurement. While the purpose and goals of the group will likely evolve to address the members' needs, the initial purpose of this community is to share best practices in digital accessibility, including web accessibility, accessible course materials, online courses, and information resources, as well as how to procure and support optimally accessible technologies. The hope is to respond more quickly and robustly to issues that arise, avoid duplication and "reinventing the wheel," and generate new ideas for additional collaboration.

Update: The Kirwan Center will be looking at ways to revitalize the Maryland DA Community, which has gone quiet due to staffing turnover in the Center. In the meantime, the Center collaborated with the National Federation of the Blind on a [USM digital accessibility convening in Fall 2022](#) and is planning a follow-on workshop in the Fall 2023 for teams of faculty leaders to learn more about digital accessibility and the types of technology supports available for blind and low vision learners. In addition, the Kirwan Center has convened a small working group to lay out a strategic plan for the Center's leadership and support around digital accessibility, as well as to explore a partnership with the [Maryland Initiative for Digital Accessibility](#) (MIDA) at UMCP. This engagement could also dovetail with revitalizing the statewide DA Community.

Participating institutions: This community is open to individuals from all higher education institutions in Maryland. The NFB partner convenings have been for USM institutions.

OPEN EDUCATION | Open education entails supporting faculty and institutions in scaling robust use of openly licensed, fully accessible instructional resources. Open educational resources (OER) reduce costs for students and can empower faculty to continuously improve their teaching |

Maryland Open Source Textbook (M.O.S.T.) Initiative*

Summary: With support from the Hewlett Foundation, the Maryland Open Source Textbook (M.O.S.T.) Initiative began in 2013 to provide a statewide opportunity for faculty and institutions to explore the promise of open educational resources (OERs) to reduce students' cost of attendance while maintaining, or perhaps even improving, learning outcomes. OERs consist of any openly licensed instructional materials that are also available at little or no cost and can include textbooks, course readings, and other learning content; simulations, games, and other learning applications; syllabi, quizzes, and assessment tools; and virtually any other material that can be used for instructional purposes. In 2017, M.O.S.T. launched the High-impact OER Mini-Grant Program to enhance the Kirwan Center's OER efforts by targeting high-enrollment courses with existing quality OERs at two- and four-year Maryland public higher education institutions.

Update: In Spring 2023, the M.O.S.T. OER Grant Program awarded OER grants to faculty selected from 7 Maryland postsecondary institutions, with a potential impact for just over 1,000 students in AY 2023-2024, with a potential cost savings of over \$70,000. M.O.S.T. also awarded Institutional OER Institutional Grants to Stevenson University and Towson University to support strategic institutional efforts to increase access, affordability, and achievement for students through more systemic incorporation of open educational resources (OER) into teaching practice. These grants will

collectively support significant advances in OER adoption, scaling, and sustainability in support of student success institution wide.

This spring, the Kirwan Center, in partnership with the University System of Maryland and Affiliated Institutions (USMAI) Library Consortium, advanced to the full proposal stage with a proposal to the Institute of Museum and Library Services (www.ims.gov) for a planning grant that would clarify and frame the role of academic libraries and consortia in supporting OER localization (defined as the practices and partnerships necessary to increase the relevance of open educational resources to local student populations, student learning needs, and institutional and community contexts). We should hear from the funder this month (July 2023).

Finally, the Kirwan Center secured one-time funding from USM to support the engagement of 4-5 institutions with a national OER improvement tool, the [Equity through OER rubric](#). This project is based on [a successful national pilot project](#) and will span two years, starting in Fall 2023 with recruitment of institutions. The one-time funding will support 4 USM institutions, and the Kirwan Center staff are looking at whether the Center can support at least one Maryland community college, as well.

Participating Institutions: Allegany College of Maryland, Anne Arundel Community College, Baltimore City Community College, Bowie State University, Carroll Community College, Chesapeake College, Community College of Baltimore County; Cecil College, Coppin State University; Frederick Community College; Frostburg State University; Garrett College; Hagerstown Community College; Harford Community College; Howard Community College; Montgomery College; Morgan State University; Prince George's Community College, Salisbury University; St. Mary's College of Maryland; Stevenson University, Towson University; University of Baltimore; University of Maryland, Baltimore, University of Maryland, Baltimore County; University of Maryland, College Park; University of Maryland Eastern Shore; and Wor-Wic Community College.

For more information: <http://www.oer-maryland.org/>

Driving OER Sustainability for Student Success (DOERS³) Collaborative*

Summary: The Driving OER Sustainability for Student Success (DOERS³) Collaborative was conceived by the University System of Maryland (USM) in partnership with the City University of New York (CUNY) system, and State University of New York (SUNY) system. Launching in Fall 2018, DOERS³ is open to higher education organizations that are supporting large-scale, statewide/provincewide Open Educational Resources (OER) initiatives and are committed to advancing innovation in OER. Leveraging the collective strength of the Collaborative, DOERS³ members build capacity to take established OER initiatives to scale and shape national and state innovation in the areas of OER research, policy, accessibility, and quality. DOERS³ members currently represent 35 participating systems and statewide/provincewide initiatives, serving over 7.5 million students at 814 colleges and universities in the US and Canada.

Update: Nancy O'Neill is currently serving as the Working Group Co-Lead for the Research Working Group of DOERS³, which is exploring creating a standardized data collection mechanism and glossary for statewide systems and initiatives, as well as exploring the types of data collected on faculty use of OER.

Participating Systems: Affordable Learning Georgia, Alabama Commission on Higher Education, BCCampus, California State University Affordable Learning Solutions, Colorado Community College System, Colorado Department of Higher Education, Community College System of New Hampshire, Connecticut State Colleges and Universities System, City University of New York System, DigiTex,

eCampusOntario, Kansas Board of Regents, Idaho State Board of Education, Indiana University , Massachusetts Department of Higher Education, Minnesota State Colleges and Universities, OhioLINK, Oklahoma State Regents for Higher Education, OERizona, Open Oregon Educational Resources, State University of New York System, Tennessee Higher Education Commission, Texas A&M University System, Texas Higher Education Coordinating Board, University of Colorado System, University of Connecticut, University of North Carolina System, University of Texas System, University of Wisconsin System, University System of Maryland, University System of New Hampshire, Utah Academic Library Consortium, Washington State Board for Community and Technical Colleges, West Virginia Council for Community and Technical College Education, West Virginia Higher Education Policy Commission, AAC&U, CCCOER, Hewlett Foundation, National Consortium for OER, OpenSTAX, Rebus Foundation, Regional Leaders for Open Education (RLOE), and SPARC

For more information: <https://www.doers3.org/>

CAPACITY-BUILDING FOR ACADEMIC TRANSFORMATION | Capacity-building includes supporting leaders from across the system, the state, and nationally in collaboration, sharing of ideas and best practices, and change management oriented toward student success |

Supporting Evidence-Based Teaching through the Scholarship of Teaching and Learning (SoTL)

Summary: This project has been renamed to signal its expansion from an earlier focus on creating a systemwide IRB for the scholarship of teaching and learning (SoTL). In Fall 2021, the Kirwan Center proposed developing a systemwide IRB protocol for USM faculty who wish to engage in common types of Scholarship of Teaching and Learning (SoTL) research projects that pose minimal risk to participants.¹ Working collaboratively with the UMCP Human Research Protection Program staff, the Kirwan Center submitted a standing SoTL IRB protocol that has been approved by UMCP's IRB. With the protocol and appropriate institutional agreements in place, USM faculty can propose specific SoTL projects using a streamlined amendment form that would go to the UMCP IRB for expedited review. The process will allow faculty to complete a simple form and receive a timely turnaround on project proposals while freeing up precious time for local IRBs across the System. The process will also potentially streamline multi-site research projects across the System. The principal IRB protocol is housed at UMCP and will be renewed as needed. The Kirwan Center is also developing a process by which points of contact at institutions serving as study sites would be notified about any USM SoTL IRB-approved studies being carried out. In spring 2023, the Kirwan Center staff engaged a faculty member from Towson University to serve as a senior fellow focused on SoTL (the first time a senior fellow came into the Kirwan Center). In addition, the Kirwan Center created the Elkins SoTL Fellowship Program to support and elevate faculty research on teaching practice.

Update: To date, UMBC and UBalt have signed reliance agreements to take advantage of the streamlined IRB process. More institutions will be recruited this coming year. In addition, the Kirwan Center Senior Fellow for SoTL will be consulting with the System teaching and learning centers about additional supports that would be useful to help faculty develop and carry out high-quality SoTL studies. Additionally, she will be mentoring the inaugural cohort of eight Elkins SoTL Fellows. The Elkins SoTL Fellows hail from five USM institutions (SU, TU, UBalt, UMB, and UMES) and their

¹ SoTL focuses on systematic investigation of student learning, instruction, and/or teaching innovations and the dissemination of findings so as to contribute to a broader knowledge community. SoTL projects at their essence aim to improve student success by providing an evidence base to help inform course design and instructional decisions undertaken by faculty and programs.

research projects span areas such as faculty engagement with artificial intelligence, community-building in online courses, perceptions of belonging and other factors contributing to student retention, and more.

New! Equity in Assignment Design

Summary: This initiative will launch in late summer 2023 and aims to support systemwide leadership development around transparent and equitable assignment design. This initiative draws on the work of the [Transparency in Learning and Teaching \(TILT\) project](#) and will be modeled after the [highly successful statewide program](#) led by SCHEV in Virginia.

Update: A planning committee is being finalized and will include colleagues from among USM teaching and learning centers and from SCHEV.

New! Supporting USM Teaching and Learning Centers through Cohorted Self Study

Summary: The Kirwan Center is launching a two-year effort to engage with all USM institutions to investigate their capacity to take faculty professional development to scale while building a culture of teaching excellence. USM Teaching and Learning Centers* will be invited to join one of two cohorts (one in AY23-24 and one in AY24-25) that will use the [POD Teaching and Learning Center matrix](#) to undergo a comprehensive self-study. They will meet virtually as a cohort in the fall and in person in the spring to share results and insights across the cohort and in doing so, help the Kirwan Center identify shared challenges and areas of mutual interest. These findings in turn will help inform the Kirwan Center's future directions.

Update: An invitation to the Teaching and Learning Center points of contact is planned to go out in July. *One institution, Coppin State University, is planning to start a teaching and learning center, and this tool can be used to support a planning process as well as a review process.

Inclusive Pedagogy

Summary: With funding from the Bill & Melinda Gates Foundation, Lumen Learning partnered with the Kirwan Center to build principles associated with diversity, equity and inclusion (DEI) into Lumen Circles online professional development programs for faculty. In spring 2021, DEI subject matter experts from across USM engaged in the expansion of Lumen Circles' evidence-based teaching framework to include practices associated with belonging & inclusive teaching and vetted a new curriculum for a 9-week virtual community of practice focused on Belonging & Inclusive Teaching using the Lumen Circles model and online platform. The Kirwan Center then reached out to USM teaching and learning center directors to help recruit faculty into pilot circles in summer and fall 2021 to test run the newly developed curriculum and provide feedback as part of its ongoing development.

Based on popularity and positive feedback from faculty, the Kirwan Center extended the pilot phase through Spring 2022, opening up unlimited seats in the Belonging Circles. In total, 91 faculty participated in the full nine-week Belonging Circles experience between Fall 2021 and Spring 2022. An additional 93 faculty and staff participated in the pilot of the shorter, self-paced Introduction to Belonging series of modules offered by Lumen in Spring 2022. The Kirwan Center covered the cost of these seats for the pilot period as an incentive for institutions and individual faculty to become involved. The Kirwan Center staff will begin to explore cost-sharing with interested institutions this year. As a follow up to the Spring 2022 System convening on Health Equity, in Fall 2022, the Center

covered the cost of a smaller number of seats reserved for Health Sciences faculty, with additional emphasis in the Circles on addressing health equity through teaching.

Update: While the Center will no longer be supporting Circles seats, we are in conversation with Lumen Learning about creating a bulk purchase price on behalf of USM institutions and a universal “order form” to help streamline institutions’ purchasing of Circles seats.

Participating Institutions: The Lumen Circles focused on Belonging and Inclusive Pedagogy have been open to all USM institutions, with emphasis on Health Sciences programs in Fall 2022.

+++++

ARCHIVED PROJECTS | Past projects that serve as a foundation of current work and an illustration of the kinds of academic innovation work undertaken by the Kirwan Center |

Academic Integrity (2018-2022)

Summary: The Kirwan Center has been partnering with the Council for University System Faculty (CUSF) to on reframing the topic of academic integrity and creating a shared institutional approach to academic integrity. In March 2019, USM hosted a convening with teams of faculty and staff from all of the USM institutions to begin the conversation on academic integrity systemwide and to start identifying the people who can make real cultural change on campus, as well as to identify ways that the Kirwan Center can help faculty create learning experiences which will engage and encourage academic integrity. In that academic year, the System is partnering with International Center for Academic Integrity (ICAI) to further this work through professional development and online resources.

Update: A revised Academic Integrity policy will be coming from USM in Fall 2022. The USM Office of Academic and Student Affairs will maintain outreach to Academic Integrity leads across the System as the Kirwan Center transitions away from direct involvement in this work.

Participating Institutions: All USM Institutions.

Badging Essential Skills for Transitions (B.E.S.T.)* (2015-2021)

Summary: The B.E.S.T. initiative was designed to more clearly communicate graduates’ career-ready skills to employers through digital badging. B.E.S.T. focuses on eight essential career-ready skills— Collaboration, Communication, Critical Thinking, Globalism, Interculturalism, Leadership, Problem Solving, and Professionalism—and is a system-wide, scalable approach to career preparation that maximizes the value of curricular and co-curricular opportunities already available to students. Awarded by institutions or organizations, digital badges signify accomplishments such as proficiency in a skill and “make visible and validate learning in both formal and informal settings” (MacArthur Foundation, n.d.). Because they are digital, badges include access to viewable artifacts that provide evidence of learning to employers and other key audiences. Being digital and openly accessible means these badges can be shared through electronic portfolios, social and professional networks such as Facebook and LinkedIn, or other online venues.

Nine institutions explored badge earning pathways for students, with several institutions expanding their scope from the original college and career ready badges to include badges related to the Greater Washington Partnership (see below) and institutional initiatives.

Participating Institutions: Bowie State University; Community College of Baltimore County; Frostburg State University; Montgomery College; Towson University; University of Baltimore; University of Maryland, Baltimore; University of Maryland, College Park; University of Maryland, Baltimore County; and University of Maryland Global Campus.

Comprehensive Learner Record (2019-2021)

The University System of Maryland (USM) was invited to partner with the American Association of Collegiate Registrars and Admissions Officers (AACRAO) and NASPA (Student Affairs Administrators in Higher Education) to participate in their Lumina-funded national project to develop pilots for the Comprehensive Learner Record (CLR). The goal of the Comprehensive Learner Record is to capture a student’s complete picture of learning, from the earliest stages of planning to their achievements and competencies. The Comprehensive Learner Record standard (formerly called Extended

Transcript) is a new generation of secure, verifiable digital records for learners that contain all nature of learning experiences and achievements including courses, competencies, skills, co-curricular achievements, prior learning, internships, and experiential learning.

Three USM institutions worked on building CLR to test out with their students: Towson University, University of Maryland, Baltimore County, and University of Maryland Global Campus.

Participating Institutions: Towson University; University of Maryland, Baltimore County; and University of Maryland Global Campus.

Greater Washington Partnership Capital CoLAB (2019-2022)

Summary: In collaboration with the Greater Washington Partnership (GWP), the Kirwan Center is leading a group of USM institutions in a systemwide project aimed at addressing the region's digital technology workforce needs. The GWP seeks to increase access to well-paying technology-related jobs and elevate the region as an innovation hub. The GWP's Capital CoLAB initiative is working with university partners between Richmond, VA and Baltimore, MD to create robust opportunities for individuals to acquire in-demand digital skills credentials, diversify the digital workforce through intentional talent identification and development of students from both STEM and non-STEM programs, and scale educational opportunities to meet the region's significant need for technology workers. As the only system-level partner in the Capital CoLAB initiative, USM is working through the Kirwan Center to leverage the System's collective expertise and share best practices related to organizing, aligning, and assessing existing curricular and cocurricular opportunities in relation to knowledge, skills, and abilities (KSAs) comprising digital generalist and digital specialist badges.

As of 2022, Digital Generalist and Digital Specialist credentials are now being offered across the seven USM institutions and development work continues in this area, managed directly by the institutions.

Participating Institutions: Bowie State University; Frostburg State University; Towson University; University of Maryland, Baltimore County; University of Maryland, College Park; University of Maryland Eastern Shore; and University of Maryland Global Campus.

USMx: Online Learning Initiative

Summary: In 2016, the Kirwan Center launched USMx to organize online course and program development undertaken through USM's system-level membership in edX. Founded by Harvard University and Massachusetts Institute of Technology (MIT), edX has focused on transforming online and classroom learning through groundbreaking methodologies, game-like educational experiences and cutting-edge research on an open-source platform.

The USMx mission has been to provide both access to innovative e-learning technologies as well as the resources, support, and planning necessary for strategic implementation of online learning. In five years, USMx grew to 1,131,000 course enrollments across 295 instances of approximately 90 courses. USMx generated more than \$3.6 million in revenue for participating institutions and the Kirwan Center. These courses have included MicroMasters and Professional Certificate programs offered by UMGC, UMCP, and UMCES, and multiple MOOC and private courses developed by other USM institutions.

Update: In Fall of 2021, edX was acquired by 2U, and subsequently system-level staffing for USMx was discontinued. Since that time, the Kirwan Center has connected USM institutions with edX/2U to work together directly.

Participating Institutions: Nearly every USM Institution has had involvement in USMx.

USM OnTrack: Supporting Remote Teaching in Response to COVID-19

Summary: In June 2020, as a response to the COVID-19 move to remote and de-densified teaching, the Kirwan Center and University of Maryland Global Campus formed a \$2.6 million partnership, called USM *OnTrack*, to support and assess expansion of high-quality online learning across the system. Working with provosts, teaching and learning center directors, instructional designers, technology professionals, and others, Kirwan Center staff and UMGC are helping institutions to adapt both their instructional technology use and their teaching methods to produce an optimally effective online learning environment, with improved student participation, engagement, and faculty effectiveness. In the short term, this has included access to virtual simulations for use in laboratory-based courses; centralized instructional design consulting and support; and professional development workshops focused on online course redesign.

In Fall 2021, the Kirwan Center organized a faculty showcase entitled *Silver Linings: Lessons Learned from Teaching During the Pandemic*, which engaged more than 90 presenters, largely faculty, who shared novel instructional approaches, active learning pedagogies, experiential learning opportunities, student engagement practices, assessment techniques, communication strategies, and faculty-staff and faculty-student partnerships. In total, 325 people registered to attend 27 sessions held over two days. A proceedings from the showcase was published in October 2022 and is available [here](#).

Participating Institutions: All USM Institutions plus Morgan State University.

APPENDIX: Listing of institutions involved in active Kirwan Center initiatives.

PROJECT	BSU	CSU	FSU	SU	TU	UBalt	UMB	UMBC	UMCP	UMCES	UMES	UMGC	USG	USM-H	USMSM	MSU	SMCM	ACM	AACC	BCCC	CCC	CeC	ChC	CSM	CCBC	FCC	GC	HagCC	HafCC	HoCC	MC	PGCC	W-WCC	
ALTERNATIVE CREDENTIALS																																		
Interprofessional Education Digital Badging Project		X		X	X		X				X															X								
ONLINE EDUCATION																																		
Digital Accessibility*	X	X	X	X	X	X	X	X	X		X	X																						
OPEN EDUCATION^																																		
Maryland Open Source Textbook initiative (M.O.S.T.)*	X	X	X	X	X	X	X	X	X		X	X	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CAPACITY-BUILDING FOR ACADEMIC TRANSFORMATION																																		
Supporting Evidence-Based Teaching through the Scholarship of Teaching and Learning (SoTL)				X	X	X	X	X	X		X																							
Equity in Assignment Design**																																		
Supporting USM Teaching and Learning Centers through Cohorted Self Study**																																		
Inclusive Pedagogy***	X	X	X	X	X	X	X	X	X		X	X																						
*Individual as well as institutional participants. ^As a collaborative of statewide initiatives, DOERS ³ is not included here. **Launching in late summer 2023. ***Individual participants.																																		

Update: Maryland Center for Computing Education

TOPIC: Update: Maryland Center for Computing Education

COMMITTEE: Education Policy and Student Life

DATE OF COMMITTEE MEETING: Wednesday, November 29, 2023

SUMMARY: USM's Maryland Center for Computing Education (MCCE) was established in statute and funded through Maryland's *Securing the Future: Computer Science Education for All Act* on July 1, 2018. (Maryland Code, § 12-118). MCCE received an initial five million dollars in FY2019 and an additional one million dollars each year since. MCCE's primary purpose is to expand access to high-quality PreK-12 computer science (CS) education by strengthening the educators' skills and increasing the number of CS certified teachers in Maryland's public schools. For the second year in a row, Maryland was recognized as number 1 in the nation for high schools offering CS education giving every student the opportunity to access CS. [\(Maryland #1 in CS Education\)](#) [\(CS in Maryland\)](#)

Topics Covered in the Report:

- Support for Maryland's PreK-12 Public Schools
- MCCE Pre-Service Computer Science and Computational Thinking
- MCCE MLDS Data Dashboards
- Challenging Issues Facing the CS Education Field
- Next Steps for MCCE

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: November 29, 2023

BOARD ACTION:

DATE:

SUBMITTED BY: Alison Wrynn 301-445-1992

awrynn@usmd.edu

MCCE MAJOR AREAS OF IMPACT

SUPPORT FOR MARYLAND'S P-12 SCHOOLS ([MCCE Newsletter](#))

MCCE provides hands-on experiences for teachers that translate directly into Maryland public PreK-12 classrooms. The MCCE team supports PreK-12 teachers, counselors, and administrators by providing high-quality CS professional development (PD) opportunities. MCCE regularly partners with state and local educational organizations to encourage teachers to continue to increase their knowledge and skills in this rapidly changing field. Through MCCE's collaborative workshops and summer institutes, Maryland educators continue to learn new teaching methods, applications, and integration of computing concepts. (www.cs4md.com)

MCCE PRE-SERVICE COMPUTER SCIENCE & COMPUTATIONAL THINKING

(MCCE Pre-Service Support) USM's MCCE works with Maryland colleges and universities to redesign the undergraduate preservice educator preparation program. MCCE collaborates with higher education institutions (public & private; 2-year & 4-year) to: (1) expand access to high-quality CS education, (2) strengthen the computing knowledge and skills of future educators, and (3) increase the number of CS teachers.

MCCE MLDS DATA DASHBOARDS ([MCCE Dashboards](#))

Using data that is available in the Maryland Longitudinal Data System (MLDS), MCCE created the *Dashboards: Participation in Maryland High Quality Computing Courses and Post-graduation Outcomes* (Garvin & Koerner, 2021). The online interactive MCCE dashboards are a model for other content-specific dashboards and provide stakeholders with important CS teaching and learning data at the state, local school system, and high school levels and follow Maryland public high school graduates into college and workforce pathways.

CHALLENGING ISSUES FACING THE CS EDUCATION FIELD

- TEACHER TURNOVER AND RETENTION ISSUES:
 - Teachers who rapidly increase their computing knowledge and skills have additional opportunities to pursue outside of the classroom. Retention concerns can be addressed through innovative programs, such as dual instructors with colleges, mentoring colleagues, or summer externships.
 - Novice CS teachers need to be onboarded and mentored by current CS teachers.
- THE NEED TO DEEPEN TEACHER CS KNOWLEDGE
 - The state needs to create non-traditional credentials for CS teachers to continue to deepen their knowledge and skills on emerging computing technologies beyond the initial PD provided by MCCE is the next step.
 - The field of CS is constantly changing, and teachers need on-going PD support for on-going emerging technologies (i.e., cyber and AI).

WHAT'S NEXT

1. Address the key issues of teacher retention by continuing to provide PD services to current and new teachers.

2. Partner with IHEs to create more non-degree credentials and pathways for current teachers to deepen their knowledge and industry professionals to serve in the schools.
3. Explore opportunities to expand equitable access for all students and broaden participation in computing.

*Expanding access to high-quality
PreK-12 computing education*



Since 2018



Overview

- **July 2018:** established in statute and funded with the *Securing the Future: Computer Science Education for All*
- **Purpose:** "expand access to high-quality computer science education in grades PK-12 by strengthening the skills of educators and increasing the number of computer science teachers in elementary and secondary education (Maryland Code, § 12-118)"
- **Vision** - The Center is a collaborative hub for strong public-private partnerships across USM campuses, school systems, nonprofits, government agencies, and industry partners
 - Requires ALL public high schools to offer CS by 2021-2022
 - Make efforts to:
 - incorporate CS instruction in MS/ES
 - Increase URM students including females, students with disabilities.
 - Establishes the MCCE to develop and administer:
 - PD
 - Grants to IHE for Preservice and LEAs

USM's Most Popular Major is CS



UNIVERSITY SYSTEM
of MARYLAND

University System of Maryland Degrees Awarded by Program Area and Degree Type FY 2022

Institution	Program Area	Bachelor's	Master's	Doctoral (Research and Scholarship)
USM Totals	Agric. & Nat. Resources	312	224	20
	Arch. & Envtl. Design	145	45	3
	Area Studies	97	14	4
	Biological Sciences	1,714	268	122
	Business & Management	4,575	3,500	9
	Communications	1,564	48	13
	Computer & Info. Sci.	5,668	1,704	76
	Education	1,651	999	99

PD Offerings and Events



Annual Summer PD

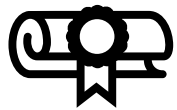
Annual CS Summit at Common Ground



Virtual Webinars, Workshops, and Meet-ups



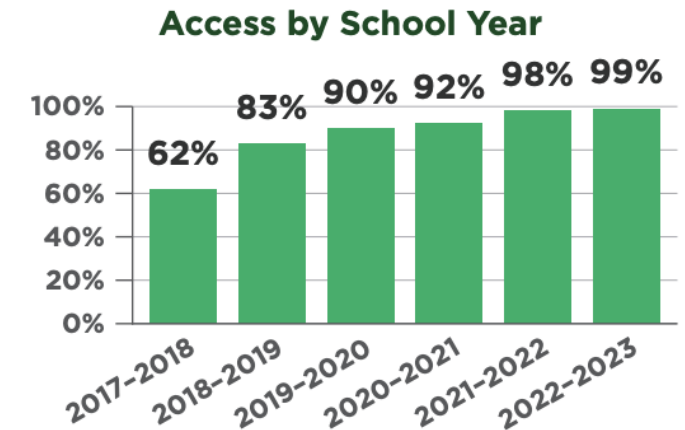
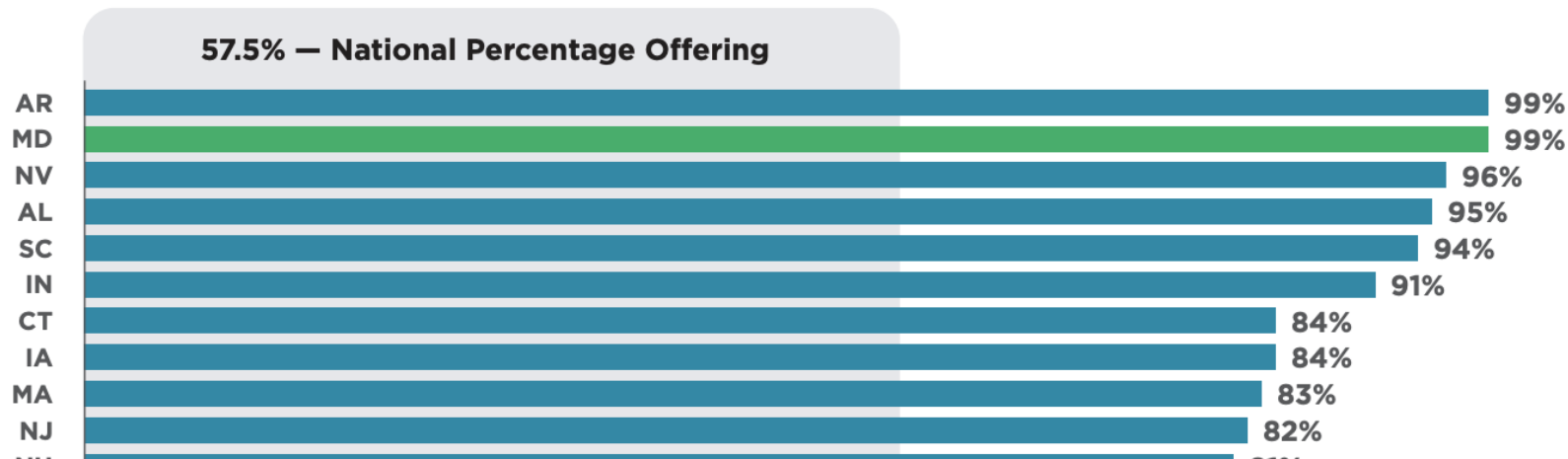
Stipends and Travel Costs through Grants



CPD Credits for Teachers

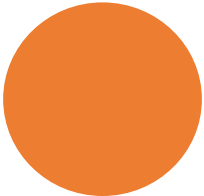
CS in Public High Schools: Where does MD rank across the US?

Percentage of Public High Schools Offering Foundational Computer Science Nationally

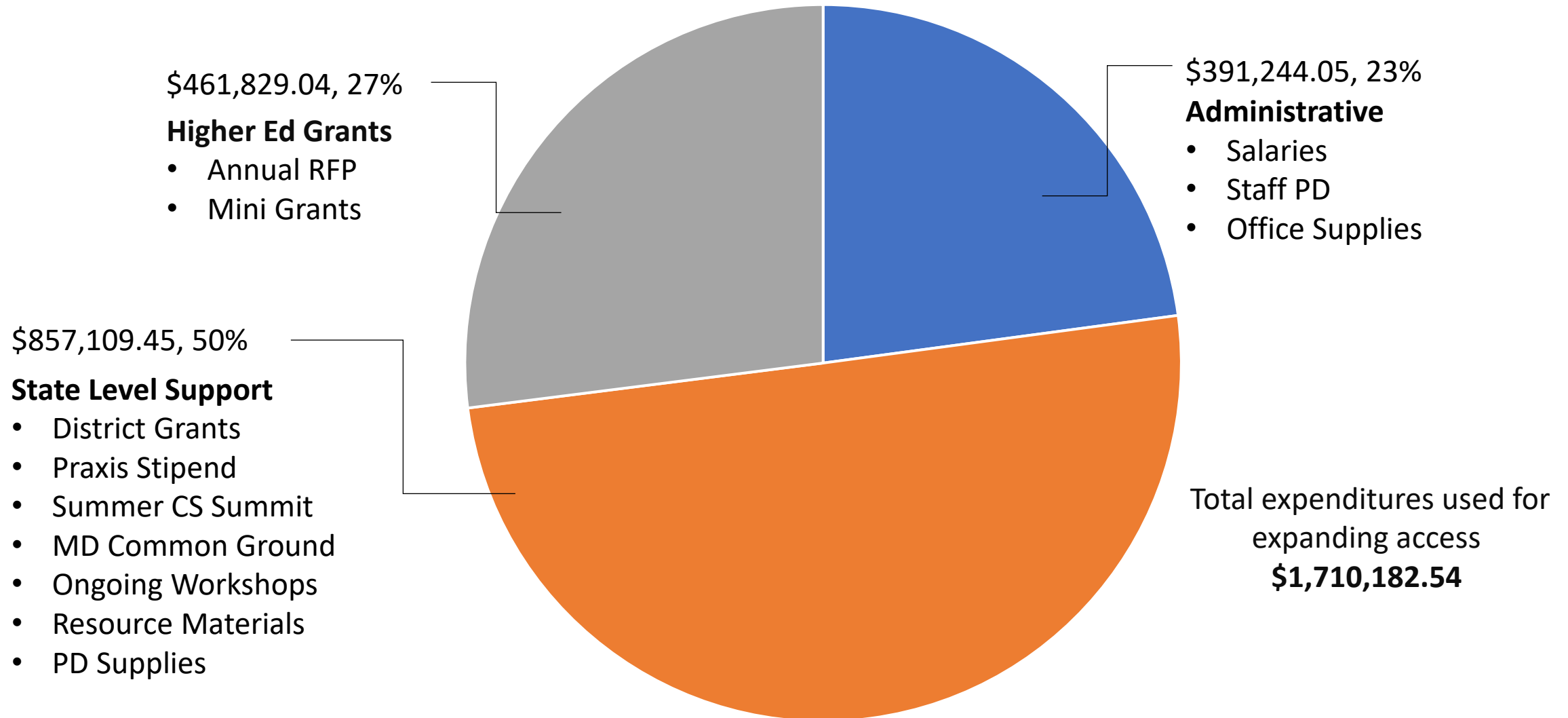


[2023 State of CS Report](#)

MCCE Impact



Spending Categories – FY 23



\$461,829.04, 27%

Higher Ed Grants

- Annual RFP
- Mini Grants

\$391,244.05, 23%

Administrative

- Salaries
- Staff PD
- Office Supplies

\$857,109.45, 50%

State Level Support

- District Grants
- Praxis Stipend
- Summer CS Summit
- MD Common Ground
- Ongoing Workshops
- Resource Materials
- PD Supplies

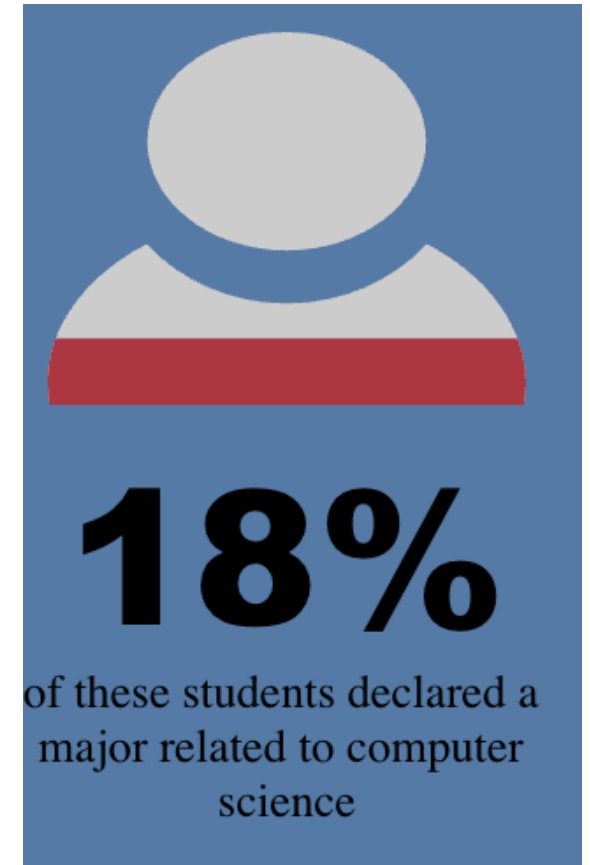
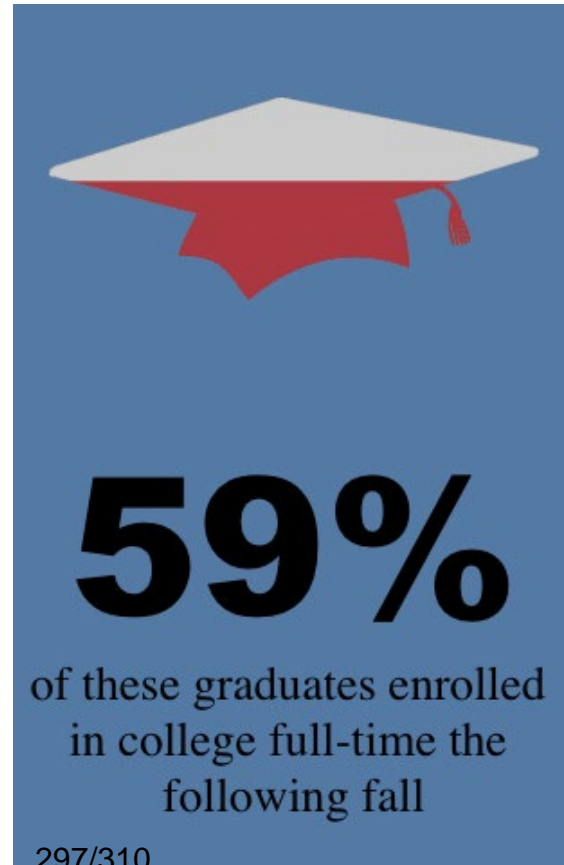
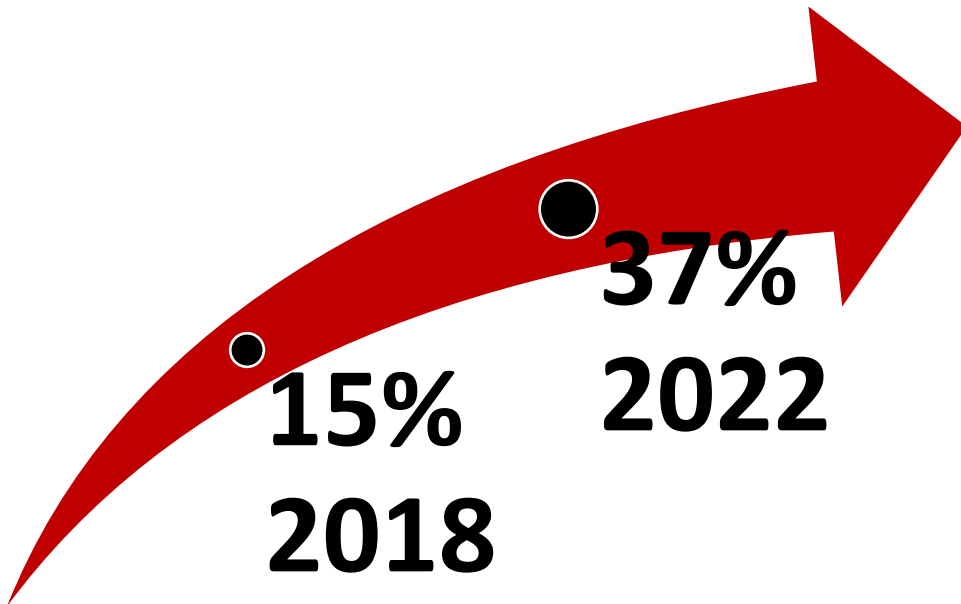
Total expenditures used for expanding access

\$1,710,182.54

MCCE through June 30, 2023

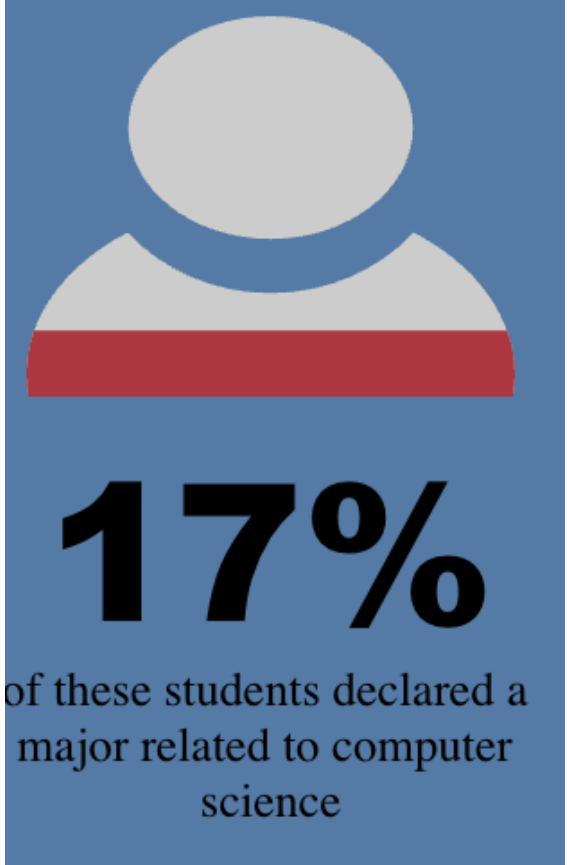
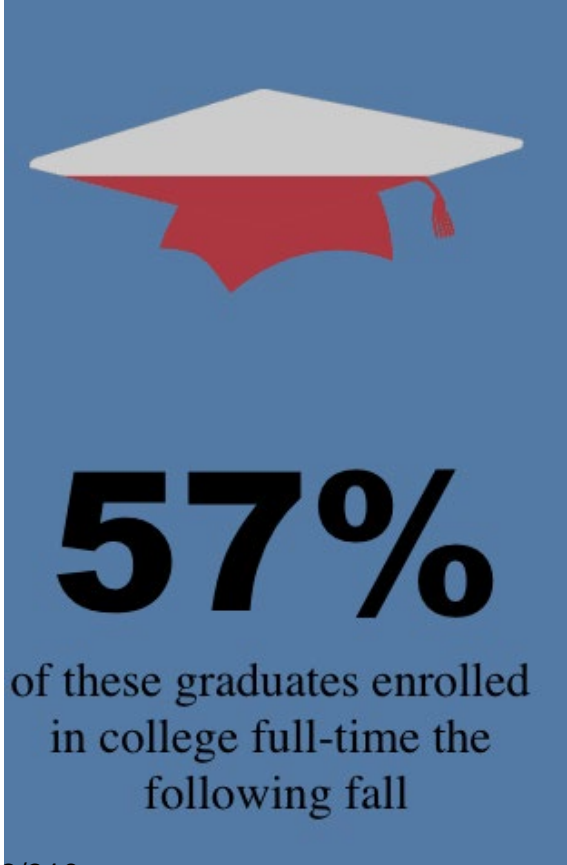
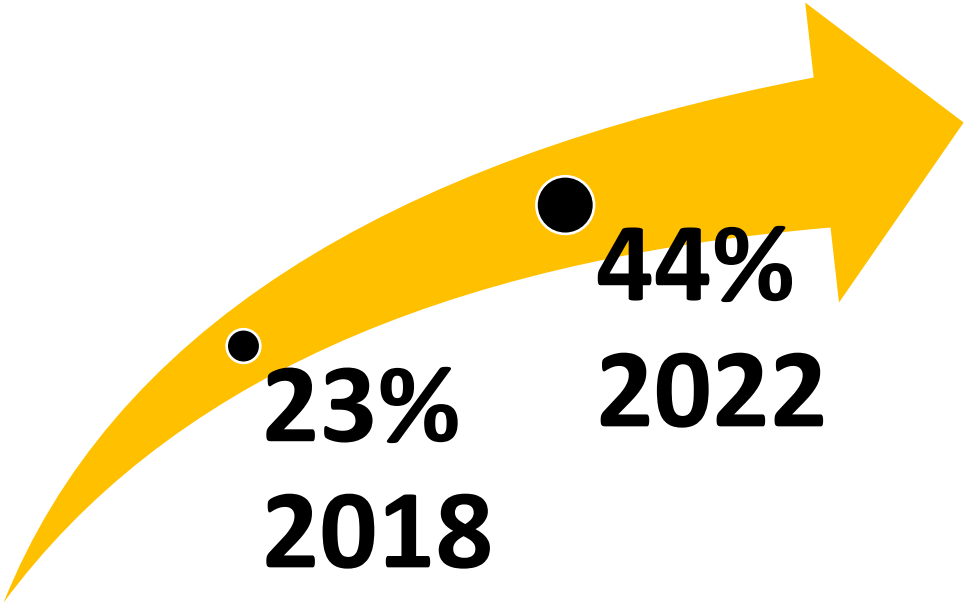
Spent \$7,154,608.15 since 2018.

MD Public High School Graduates who
took at **Least One High-quality CS Course**



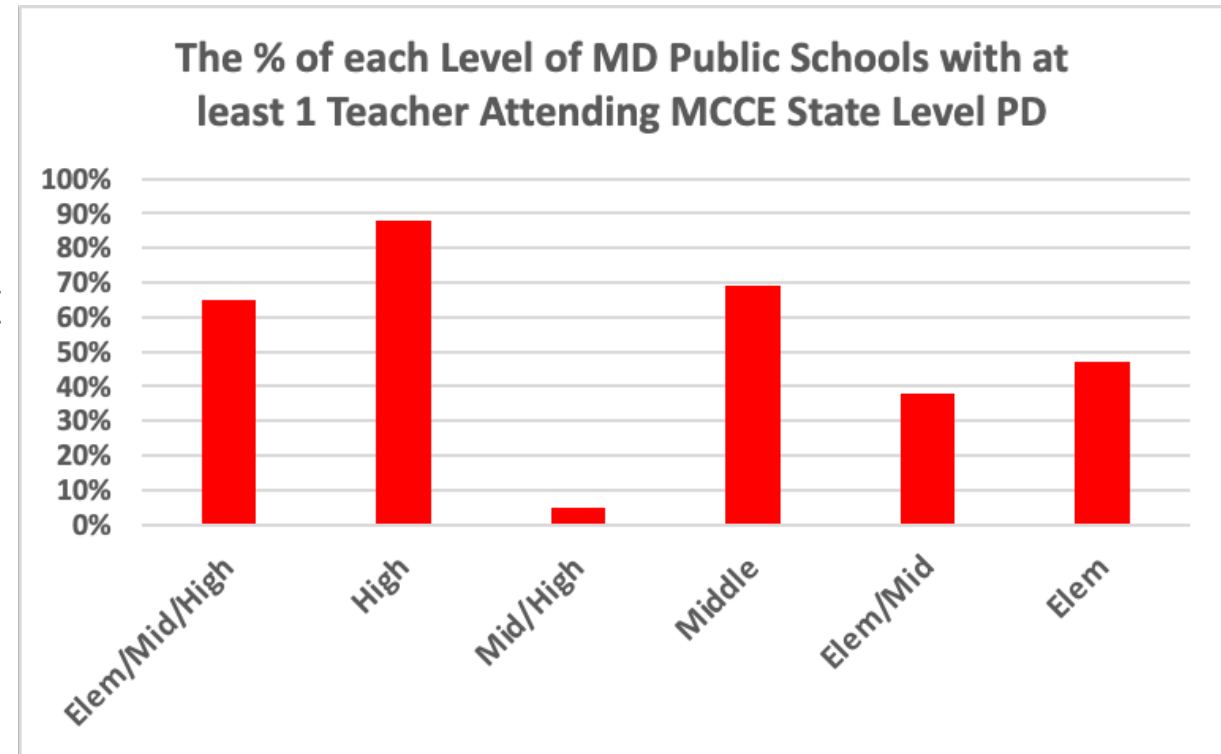
MCCE through June 30, 2023

MD Public High School Graduates who took **Any Computing Course**



MCCE through June 30, 2023

- By the 2021-2022 school year, 18 of the LEAs and **95%** of the public diploma-granting high schools had enrollment and completion of at least one high quality CS course.
- **56%** of all MD public schools had at least 1 teacher attend MCCE State Level PD.



Examples of Grants to IHEs

- Washington College: CS Teacher Secondary degree
- Towson: Math/CS Dual Certification degree
- UMD: iSchool/Education Dual Degree
- UMBC: Masters in CS Education
- Integration of CS into preservice programs:
 - General Education
 - Special Education
 - Early Childhood
 - Computational Thinking
 - Methods Classes
 - Tech Classes
 - English Language Learners
 - Frostburg Accelerator Program

MCCE Expanding Access to CS Ed

- Praxis Study
- Mentor Program
- Just-in-time PD
- AI and Agriculture
- Early Childhood
- Elementary Ambassadors
- Middle School Ambassadors
- Lending Library
- Lesson Repository
- Recommended Resources
- Counselors Training
- SCRIPT Planning
- PD on Demand
- Newsletter, Website, Faces of CS
- CS Supervisor Meetings (MD and National)
- Accessibility (MLLs; School for the Blind and Deaf)

Questions?

Contact Information:

- **Dewayne Morgan, JD**, University System of Maryland, Senior Director for Education, Outreach & Pipeline Development, dmorgan@usmd.edu.

November 2023 Newsletter

Featured in this Issue:

- [Baltimore Chosen as Federal Tech Hub](#)
- [Growth of HS CS in MD](#)
- [Interviews: Kathy Benson, Stephen Sell](#)
- [CS Ed Week Opportunities](#)
- [Compensated Counselor Workshop 11/11](#)
- [CSTA 12/7: CS Holidays, Celebrations](#)
- [Cyber MD Competition](#)
- [Game Jam 10.0](#)



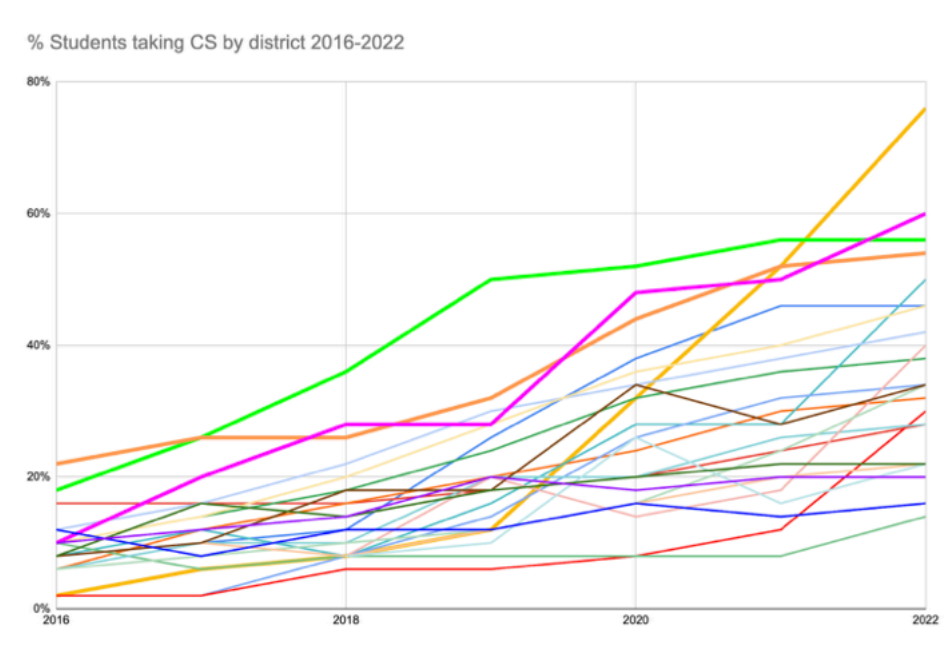
This Month Across the State

Baltimore Area Chosen as Federal Tech Hub

Last month, President Joe Biden and Secretary of Commerce Gina Raimondo announced Baltimore's selection as one of 31 nationwide tech hubs chosen as part of the bipartisan CHIPS and Science Act, an initiative aimed at advancing America's tech industry through competitive grants. Baltimore's focus will be on "predictive healthcare"- applying a combination of artificial intelligence and biotechnology to health data, clinical decision-making, and the development of new therapies and drugs. Baltimore is eligible for nearly \$500 million in federal funds, and the initiative is estimated to generate \$3.2 billion and 52,000 jobs by 2030. [Read the full article here.](#)

Growth of high school students taking CS in Maryland

Why do you think computational literacy is important?
[Check which school system is yours here!](#)



Interviews From Across the State:

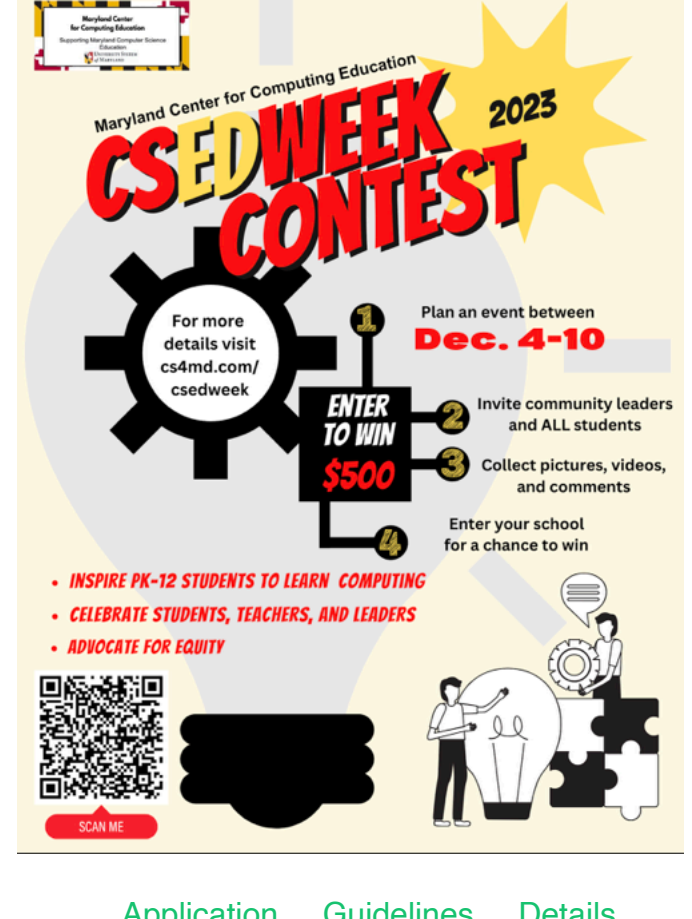


[Kathy Benson](#); Executive Director, Immersive STEAM; Facilitator, MCCE.
[Stephen Sell](#); HS CS Teacher, MCPSS.

Events & Resources for Educators

CS Ed Week Opportunities

From MCCE:



[Application](#) [Guidelines](#) [Details](#)

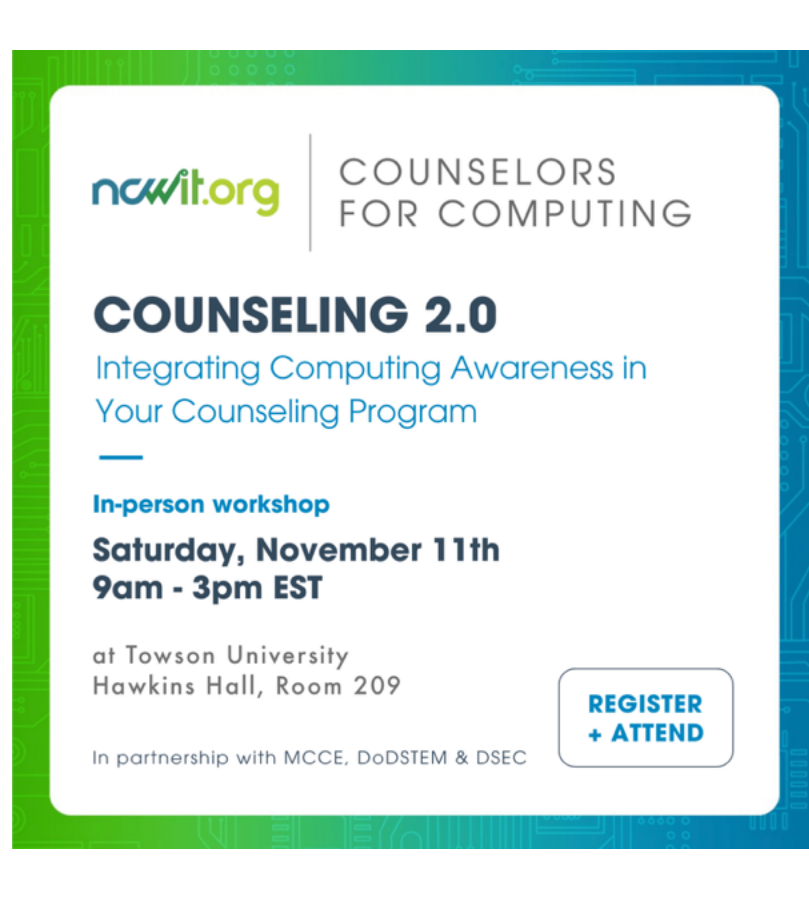
From Google:

This [Computer Science Education Week](#) (starting 12/4) Google's Education for Social Impact team is partnering with interested educators and schools of students grades 3-12. Fill out [this request form](#) to apply to be matched with a Google volunteer, who will facilitate a grade appropriate ~one hour lesson in partnership with you, covering future opportunities in computer science and answering your students' questions.

About NCWIT C4C

We equip counselors with tools and knowledge for a computing future, ensuring all students have access to transformative computing careers.

Register Now:
https://bit.ly/C4C_MDNov2023



Save the dates for summer PD!

- **June 24th-28th:** Hood College in-person PD
- **July 1st-5th:** Holiday week
- **July 15th-19th:** CSTA in Las Vegas
- **July 22nd-26th:** Virtual PD



Next meeting 12/7, 4pm. Topic: CS Holidays, Celebrations. [Join at csteachers.org!](#)

Events & Resources for Students

Cyber Maryland Competition

Free in-person event at UMGC for MD highschoolers; teams of 4. Wednesday December 6th, 9:30am-12:30pm.
[Learn more and sign up here](#)



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Report on Extramural Funding – FY 2023

TOPIC: Report on Extramural Funding – FY 2023

COMMITTEE: Education Policy and Student Life

DATE OF COMMITTEE MEETING: Wednesday, November 29, 2023

SUMMARY: This report provides information on extramural awards received by USM institutions in support of specific initiatives in research, education, or service for FY 2023. In addition to detailed information by institution and funding source for FY 2022 and FY 2023, the report also provides five years of summary data by institution for comparison purposes. It is important to note that while the report on extramural awards is consistent within the USM, it is not directly comparable with NSF accounting-based reports nor with expenditure data in System budget documents.

In FY 2023, when accounting for funding received by USM institutions from sources other than another USM institution, the System received a total of \$1,778,693,873.71 in extramural funding, a 13.9% increase from the FY 2022 total of \$1,573,438,515.81. UMB and UMCP garnered the largest extramural funding totals among System institutions. BSU, FSU, SU, UBalt, UMB, UMBC, UMCP, and UMES obtained higher levels of extramural funding than in FY 2022.

ALTERNATIVE(S): This is an information item.

FISCAL IMPACT: This is an information item.

CHANCELLOR'S RECOMMENDATION: This is an information item.

COMMITTEE ACTION: Information Only

DATE: November 29, 2023

BOARD ACTION:

DATE:

SUBMITTED BY: Alison Wrynn 301-445-1992

awrynn@usmd.edu



USM Report on Extramural Funding FY 2023

Major sources of support for activities at the USM institutions come from extramural sources, including grants and contracts. The faculty and staff of USM institutions obtain funding for research, education, and public service activities from many sources. This report shows how many proposals were generated, how many awards were received, and the total amount of funding received from external sources for each institution and the USM overall.

In FY 2023, when accounting for funding received by USM institutions from sources other than another USM institution, the System received a total of \$1,778,693,873.71 in extramural funding, a 13.9% increase from the FY 2022 total of \$1,573,438,515.81. UMB and UMCP garnered the largest extramural funding totals among System institutions. BSU, FSU, SU, UBalt, UMB, UMBC, UMCP, and UMES obtained higher levels of extramural funding than in FY 2022.

Table I shows how much income each institution generated in the past two years from grants and contracts from the federal government, Maryland state agencies, non-profit foundations, corporations, and other sources, such as non-governmental organizations. Table I also shows the number of proposals submitted to each type of funding source and the number of grants awarded. Awards are counted in the year they are received. It should also be noted that in this report, the number of awards represents not only new awards but also amendments to existing awards that provide additional funding not previously accounted for. Institutions that receive a high percentage of awards funded in increments will have a higher number of awards than proposals, since one initial proposal could result in multiple funding actions. It should also be noted that some awards received in FY 2023 were the result of proposals submitted in a prior fiscal year and that notification regarding the funding of some proposals was still pending when the fiscal year closed.

The degree to which institutions secured funding from the various sources differs by institution. However, the federal government continues to be the largest funding source for the System as a whole (approximately 60% of the USM total – similar to previous years) and the majority of our institutions (ten of twelve). However, the state government, corporations and foundations, and other sources also provide critical support for USM institutions. System-wide, the number of awards and proposals has increased.

Table 2 shows how the overall external funding to the USM and funding to the USM institutions have progressed since FY 2019. The FY22 to FY23 increase of 13.9% is the largest increase the USM has seen in many years. Although three institutions are down in funding from last year, all others have realized increases, and four institutions (Salisbury, UMBC, UMCP, and UMES) posted increases of 23% to 110%. The large increases for those institutions make up the vast majority of the additional \$200,000,000 in funding from FY22 to FY23.

Table 1
Extramural Funding for the USM – Fiscal Years 2022 and 2023

FY 2022

Source	Award Amount	Awards	Proposals
Federal	\$982,150,520.42	2,771	3,015
State	\$216,597,040.69	1,285	838
Corporate	\$111,764,284.52	1,457	1,029
Foundations	\$65,623,111.14	907	667
Other	\$251,694,152.30	3,807	2,395
TOTAL	\$1,627,829,109.07	10,227	7,944
Total Less Other USM	\$1,573,438,515.81		

BSU

Source	Award Amount	Awards	Proposals
Federal	\$25,402,538.42	50	31
State	\$514,093.00	10	10
Corporate	\$111,052.00	4	0
Foundations	\$18,000.00	1	2
Other	\$0.00	0	1
TOTAL	\$26,045,683.42	65	44
Total Less Other USM	\$26,044,683.42		

CSU

Source	Award Amount	Awards	Proposals
Federal	\$17,358,807.00	10	35
State	\$859,834.44	17	25
Corporate	\$725,575.00	12	18
Foundations	\$936,250.35	14	28
Other	\$143,331.94	1	8
TOTAL	\$20,023,798.73	54	114
Total Less Other USM	\$19,046,559.90		

FSU

Source	Award Amount	Awards	Proposals
Federal	\$4,834,634.01	12	19
State	\$2,911,359.23	22	19
Corporate	\$55,000.00	2	3
Foundations	\$28,600.00	5	8
Other	\$255,642.12	15	20
TOTAL	\$8,085,235.36	56	69
Total Less Other USM	\$7,960,944.36		

SU

Source	Award Amount	Awards	Proposals
Federal	\$3,801,382.00	11	18
State	\$4,719,265.00	44	46
Corporate	\$25,000.00	1	2
Foundations	\$120,392.00	13	17
Other	\$661,090.00	36	62
TOTAL	\$9,327,129.00	105	145
Total Less Other USM	\$8,307,089.00		

FY 2023

USM

Source	Award Amount	Awards	Proposals
Federal	\$1,126,159,630.92	3,409	3,285
State	\$221,724,236.64	1,077	777
Corporate	\$112,880,836.39	1,500	1,204
Foundations	\$123,113,536.03	806	574
Other	\$269,510,577.93	4,047	2,785
TOTAL	\$1,853,388,817.91	10,839	8,625
Total Less Other USM	\$1,778,693,873.71		

BSU

Source	Award Amount	Awards	Proposals
Federal	\$26,223,877.01	51	46
State	\$2,348,818.73	11	9
Corporate	\$95,000.00	2	1
Foundations	\$43,000.00	2	1
Other	\$77,517.00	2	6
TOTAL	\$28,788,212.74	68	63
Total Less Other USM	\$28,041,123.74		

CSU

Source	Award Amount	Awards	Proposals
Federal	\$14,032,036.00	15	28
State	\$1,885,374.00	15	20
Corporate	\$974,665.00	8	22
Foundations	\$1,035,610.00	15	32
Other	\$162,975.40	1	5
TOTAL	\$18,090,660.40	54	107
Total Less Other USM	\$17,927,685.00		

FSU

Source	Award Amount	Awards	Proposals
Federal	\$4,989,882.00	16	20
State	\$2,995,546.00	24	19
Corporate	\$7,500.00	1	5
Foundations	\$122,750.00	8	6
Other	\$229,198.00	13	24
TOTAL	\$8,344,876.00	62	74
Total Less Other USM	\$7,608,851.00		

SU

Source	Award Amount	Awards	Proposals
Federal	\$2,555,832.00	5	15
State	\$8,971,582.00	33	38
Corporate	\$0.00	0	2
Foundations	\$0.00	0	4
Other	\$681,052.00	36	36
TOTAL	\$12,208,466.00	74	95
Total Less Other USM	\$10,712,553.00		

FY 2022

TU

Source	Award Amount	Awards	Proposals
Federal	\$8,072,387.00	26	41
State	\$4,115,455.00	39	35
Corporate	\$813,627.00	14	9
Foundations	\$315,316.00	11	23
Other	\$2,143,495.00	31	59
TOTAL	\$15,460,280.00	121	167
Total Less Other USM	\$15,385,281.00		

UBalt

Source	Award Amount	Awards	Proposals
Federal	\$10,240,360.00	7	6
State	\$6,576,578.48	32	27
Corporate	\$14,096.00	2	4
Foundations	\$455,082.00	14	27
Other	\$2,361,867.00	20	17
TOTAL	\$19,647,983.48	75	81
Total Less Other USM	\$19,361,183.48		

UMB

Source	Award Amount	Awards	Proposals
Federal	\$324,855,489.00	756	952
State	\$109,812,653.00	385	278
Corporate	\$63,646,080.00	578	388
Foundations	\$24,315,597.00	198	293
Other	\$113,544,152.00	557	949
TOTAL	\$636,173,971.00	2,474	2,860
Total Less Other USM	\$604,358,538.00		

UMBC

Source	Award Amount	Awards	Proposals
Federal	\$62,660,443.36	296	267
State	\$15,762,929.76	47	65
Corporate	\$4,355,166.52	72	72
Foundations	\$7,112,044.79	77	96
Other	\$24,423,579.24	145	182
TOTAL	\$114,314,163.67	637	682
Total Less Other USM	\$99,405,901.02		

UMCES

Source	Award Amount	Awards	Proposals
Federal	\$12,363,940.00	128	181
State	\$4,139,923.00	54	44
Corporate	\$11,254,909.00	13	13
Foundations	\$1,751,780.00	31	27
Other	\$1,812,160.00	37	32
TOTAL	\$31,322,712.00	263	297
Total Less Other USM	\$30,770,444.00		

FY 2023

TU

Source	Award Amount	Awards	Proposals
Federal	\$4,967,941.00	20	50
State	\$3,787,601.00	66	61
Corporate	\$558,205.00	15	22
Foundations	\$58,872.00	3	19
Other	\$1,222,098.00	32	50
TOTAL	\$10,594,717.00	136	202
Total Less Other USM	\$10,507,943.00		

UBalt

Source	Award Amount	Awards	Proposals
Federal	\$8,580,113.00	6	9
State	\$8,806,009.00	38	22
Corporate	\$33,361.00	3	6
Foundations	\$1,388,867.00	23	18
Other	\$1,466,623.00	11	10
TOTAL	\$20,274,973.00	81	65
Total Less Other USM	\$19,826,520.00		

UMB

Source	Award Amount	Awards	Proposals
Federal	\$337,183,852.00	783	992
State	\$102,364,711.00	223	178
Corporate	\$72,961,200.00	562	378
Foundations	\$68,516,215.00	152	224
Other	\$82,049,908.00	711	1,222
TOTAL	\$663,075,886.00	2,431	2,994
Total Less Other USM	\$659,051,274.00		

UMBC

Source	Award Amount	Awards	Proposals
Federal	\$76,162,516.85	301	285
State	\$21,296,357.91	57	57
Corporate	\$6,538,249.39	81	79
Foundations	\$4,991,672.03	812	68
Other	\$29,999,854.53	181	163
TOTAL	\$138,988,650.71	702	652
Total Less Other USM	\$120,358,024.97		

UMCES

Source	Award Amount	Awards	Proposals
Federal	\$15,736,323.00	57	92
State	\$5,023,291.00	35	51
Corporate	\$702,847.00	6	14
Foundations	\$2,158,775.00	25	25
Other	\$1,462,603.00	24	53
TOTAL	\$25,083,839.00	147	235
Total Less Other USM	\$24,194,282.00		

FY 2022

UMCP

Source	Award Amount	Awards	Proposals
Federal	\$446,399,505.00	1,434	1,401
State	\$65,516,133.00	604	266
Corporate	\$30,163,249.00	749	512
Foundations	\$30,477,549.00	536	138
Other	\$104,729,336.00	2,939	1,039
TOTAL	\$677,285,772.00	6,262	3,356
Total Less Other USM	\$673,615,145.00		

UMES

Source	Award Amount	Awards	Proposals
Federal	\$16,588,755.63	36	59
State	\$953,133.78	26	18
Corporate	\$235,155.00	2	1
Foundations	\$18,500.00	1	4
Other	\$1,563,249.00	26	25
TOTAL	\$19,358,793.41	91	107
Total Less Other USM	\$18,399,159.63		

UMGC

Source	Award Amount	Awards	Proposals
Federal	\$49,572,279.00	5	5
State	\$715,683.00	5	5
Corporate	\$365,375.00	8	7
Foundations	\$74,000.00	6	4
Other	\$56,250.00	0	1
TOTAL	\$50,783,587.00	24	22
Total Less Other USM	\$50,783,587.00		

FY 2023

UMCP

Source	Award Amount	Awards	Proposals
Federal	\$548,719,747.00	2,101	1,658
State	\$61,226,753.00	539	282
Corporate	\$30,748,236.00	821	672
Foundations	\$44,018,596.00	487	171
Other	\$149,126,849.00	3,019	1,186
TOTAL	\$833,840,181.00	6,967	3,969
Total Less Other USM	\$826,764,476.00		

UMES

Source	Award Amount	Awards	Proposals
Federal	\$35,295,506.06	49	86
State	\$2,437,625.00	28	36
Corporate	\$0.00	0	0
Foundations	\$137,179.00	4	0
Other	\$2,955,791.00	15	30
TOTAL	\$40,826,101.06	96	152
Total Less Other USM	\$428,886.00		

UMGC

Source	Award Amount	Awards	Proposals
Federal	\$51,712,005.00	5	4
State	\$580,568.00	8	4
Corporate	\$261,573.00	1	3
Foundations	\$642,000.00	5	6
Other	\$76,109.00	2	0
TOTAL	\$53,272,255.00	21	17
Total Less Other USM	\$53,272,255.00		

**Table 2
Extramural Funding Summary
Fiscal Years 2019-2023**

Institution	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	% Change FY22 - FY23
BSU	\$9,877,588.50	\$12,195,822.12	\$16,788,732.20	\$26,045,683.42	\$28,788,212.74	+10.5%
CSU	\$8,455,960.85	\$9,701,729.56	\$9,943,794.48	\$20,023,798.73	\$18,090,660.40	-9.6%
FSU	\$3,950,208.00	\$3,619,088.00	\$3,829,442.00	\$8,085,235.36	\$8,344,876.00	+3.2%
SU	\$8,705,449.00	\$6,695,773.00	\$6,936,943.00	\$9,327,129.00	\$12,208,466.00	+30.8%
TU	\$12,069,844.00	\$6,727,767.00	\$14,739,482.00	\$15,460,280.00	\$10,594,717.00	-31.4%
UBalt	\$15,026,162.00	\$17,311,342.00	\$16,449,473.08	\$19,647,983.48	\$20,274,973.00	+3.2%
UMB	\$664,650,088.00	\$686,875,487.21	\$692,211,125.00	\$636,173,971.00	\$663,075,886.00	+4.2%
UMBC	\$90,474,514.00	\$81,005,288.00	\$83,873,963.00	\$114,314,163.67	\$138,988,650.71	+21.6%
UMCES	\$21,741,883.36	\$24,095,256.03	\$23,923,181.00	\$31,322,712.00	\$25,083,839.00	-19.9%
UMCP	\$569,462,970.00	\$619,908,919.00	\$668,526,872.00	\$677,285,772.00	\$833,840,181.00	+23.1%
UMES	\$17,194,525.54	\$18,890,552.00	\$27,329,848.00	\$19,358,793.41	\$40,826,101.06	+110.9%
UMGC	\$57,041,537.00	\$75,575,017.00	\$56,772,279.00	\$50,783,587.00	\$53,272,255.00	0%
Institutional Total	\$1,478,650,730.25	\$1,562,602,040.92	\$1,621,325,134.76	\$1,627,829,109.07	\$1,853,388,817.91	13.9%
USM Total (LESS OTHER USM)	\$1,460,932,947.34	\$1,542,951,565.87	\$1,598,843,604.81	\$1,573,438,515.81	\$1,778,693,873.71	13%