UNIVERSITY SENATE

AGENDA | FEBRUARY 5, 2019

3:15PM – 5:00PM | ATRIUM – STAMP STUDENT UNION

1. Call to Order

2. Approval of the December 4, 2018 Senate Minutes (Action)

3. Report of the Chair

4. Review of the Outcomes of the Athletics Reports (Senate Document #18-19-29) (Information)

5. PCC Proposal to Establish a Master of Science in Applied Economics (Senate Document #18-19-25) (Action)

6. PCC Proposal to Establish a Master of Science in Geospatial Information Sciences (Senate Document #18-19-26) (Action)

7. PCC Proposal to Establish a Master of Science in Geospatial Intelligence (Senate Document #18-19-27) (Action)

8. PCC Proposal to Establish a Post-Baccalaureate Certificate in Computation and Mathematics for Biological Networks (COMBINE) (Senate Document #18-19-28) (Action)

9. PCC Proposal to Establish a Post-Baccalaureate Certificate in Innovation and Entrepreneurship (Senate Document #18-19-22) (Action)

10. Revisions to the University of Maryland Libraries (LIBR) Plan of Organization (Senate Document #18-19-08) (Action)

11. Special Order
    Julia Strange
    Assistant Director, Prevention
    Campus Advocates Respond and Educate (CARE) to Stop Violence
    Chair, Sexual Assault Prevention Committee
    Sexual Assault Prevention at the University of Maryland

12. Discussion of the Search for a New President (Information)

13. New Business

14. Adjournment

CALL TO ORDER

Senate Chair Walsh called the meeting to order at 2:48 p.m.

SPECIAL ORDER OF THE DAY: STATE OF THE CAMPUS ADDRESS 2018

Wallace D. Loh, President of the University of Maryland
State of the Campus Address 2018

Chair Walsh welcomed President Loh to provide his State of the Campus Address.

President Loh stated that he would use this opportunity to reflect on his time at the University of Maryland. He noted that his position provides a unique perspective of the community and praised shared governance in American higher education as a unique form of academic democracy.

Undergraduate Enrollment & Programs
President Loh remarked on undergraduate admissions and noted that the total number of undergraduate student applications has increased by over 10,000 since he came to the University. He praised the University as one of the most diverse public research institutions in the country, noting that 42% of the student body is made up of people of color. He mentioned that the University is experiencing a temporary fluctuation in the number of African-American students accepting admission offers but noted that the overall number of applications from students of color is continuing to trend upwards. He stated that the University is hiring additional admissions personnel to ensure that prospective students get the information and support that they need to complete and submit their applications.

President Loh considered the value of an education at the University, emphasizing the role of the General Education Program in producing well rounded students and noting that over 60% of students at the university take optional courses that provide experiences in entrepreneurship and innovation. He highlighted the implementation of the University's Do Good initiative and its goals of empowering students to utilize their education to have a direct impact on society. He expressed his belief that it is the responsibility of the University to prepare students to be responsible citizens and to know how to live rightly in a free society. He stated that to that end, the University will soon be unveiling a campus-wide interdisciplinary initiative that intends to impart the values and skills of democracy and civic engagement to students, including the ability to listen to others, to negotiate and compromise, and to respect academic freedom and the freedom of speech.

President Loh reported that the Honors program at the University is being transformed to include a series of seminars on specific themes in order to provide a more integrated experience, build coherence, and prepare students to move into departmental Honors programs. He also shared that the University plans to construct two new dorm buildings to house students in the Honors College.

Research & Innovation
President Loh emphasized the University's status as not only a research institution, but as a university that also focuses on innovation. He highlighted the University's strategic partnership with

the University of Maryland, Baltimore (UMB), reporting that the partnership has resulted in over 50 joint faculty appointments and research projects that have generated over $80 million in research funding between the two universities. He also mentioned that the strategic partnership has allowed for the development of a research and intervention initiative to fight human trafficking on Interstate-95.

President Loh referenced discussions with local leaders and consultants at the beginning of his tenure and their emphasis on the importance of partnering with the surrounding community. He was challenged to develop relationships with the Prince George's County community to ensure that the University would have a positive impact on the surrounding area. He enumerated several areas of growth and development that support this goal, including the expansion of jurisdiction of the University Police Department's into the City of College Park; the establishment of the College Park Academy charter school; and the establishment of several stops on the Purple Line light rail system through the City of College Park and the campus. He reported that $1.5 billion worth of development had been invested in the University and the surrounding community.

Budget

President Loh addressed rising tuition costs and the financial status of the University. He reported that the State of Maryland provides funding that accounts for 48% of the University's undergraduate education budget; the other 52% comes from tuition revenue. He announced that the University has raised $985 million in its *Fearless Ideas* capital campaign, fulfilling 2/3 of the campaign's $1.5 billion goal, and that the University plans to create a $100 million scholarship fund for need-based financial aid for students. He reviewed the University's differential tuition system and noted that 35% of the funds brought in from differential tuition has also been set aside for need-based financial aid.

Athletics

President Loh reflected on the death of Jordan McNair and the environment that athletics creates at the University, commenting that athletics is the secular religion of the United States. He expressed his appreciation for the speed with which the Walters Inc. consulting firm reported the findings and recommendations from its investigation. He noted that the University began implementing the recommendations as soon as they were reported and stated that over half of them have already been completely implemented. He expressed his belief that it was the right thing to do as the President of the University to accept moral and legal responsibility for the mistakes made by the University's athletic trainers. He stated that he opposed the reinstatement of DJ Durkin as head coach of the football team even after investigations found that there was not a toxic culture in the football program and that he resigned in the face of the Board of Regents' opposition to his stance on the personnel decision. He commented that all personnel decisions on campus are ultimately the responsibility of the President and that the institution must remain autonomous; politically appointed individuals should not have the capability of making such decisions about the University. He noted that the Board of Regents' involvement was a violation of the University's accreditation status with Middle States, and that the Big 10 Conference also expressed concern about the Board's involvement. He stated that he believes that the University can prioritize the health and wellbeing of students while still maintaining a successful athletic program.

Chair Walsh thanked President Loh for his presentation and noted that President Loh had to attend another meeting so he would be unable to answer any questions from Senators.

APPROVAL OF THE NOVEMBER 2, 2018 SENATE MINUTES (ACTION)

Chair Walsh noted that the Senate would have to approve three sets of minutes because of the two additional meetings that had been added to the fall schedule. Walsh asked for additions or corrections to the minutes of the November 2, 2018, meeting; hearing none, he declared the minutes approved as distributed.

APPROVAL OF THE NOVEMBER 7, 2018 SENATE MINUTES (ACTION)

Chair Walsh asked for additions or corrections to the minutes of the November 7, 2018, meeting; hearing none, he declared the minutes approved as distributed.

APPROVAL OF THE NOVEMBER 14, 2018 SENATE MINUTES (ACTION)

Chair Walsh asked for additions or corrections to the minutes of the November 14, 2018, meeting; hearing none, he declared the minutes approved as distributed.

REPORT OF THE CHAIR

Update on Senate Resolutions

Chair Walsh announced that the Chancellor and Chair of the Board of Regents had acknowledged receipt of the Senate's Resolution Condemning the Actions of the Board of Regents. He reported that the Senate also approved a Resolution to Improve the Status of Shared Governance in the University System of Maryland (USM) and charged the Senate Executive Committee (SEC) with compiling a diverse pool of faculty, staff, and student candidates from the campus community for consideration by the Chancellor during the development of the presidential search committee. He stated that the SEC had solicited nominations from Senators that the SEC would review in order to select finalists to present to the Chancellor.

Spring 2019 Senate Meetings

Chair Walsh announced that the first Senate meeting of the spring semester would be on February 5, 2019. He stated that a complete schedule could be found at https://senate.umd.edu/senate-meetings. Walsh noted that the spring semester is expected to be busy due to much of the work that is currently in our various committees coming forward for a vote. He encouraged Senators to be actively engaged in the discussion of these important issues.

Senate Elections

Walsh announced that the Senate Office would begin the candidacy/election process for all staff, student, and single-member constituency Senators for 2019-2020 on January 22, 2019. Walsh asked Senators to encourage their colleagues to run to be Senators or consider running, if eligible. Full details about the timeline and process are available under the "Get Involved" tab on the Senate website.

NOMINATIONS COMMITTEE SLATE 2018-2019 (SENATE DOCUMENT #18-19-18) (ACTION)

Pamela Lanford, Chair of the Committee on Committees, presented the Nominations Committee Slate 2018-2019 (Senate Document #18-19-18) and provided background information on the process for developing the slate.

Chair Walsh opened the floor to discussion of the slate; hearing none, he called for a vote on the slate. The result was 96 in favor, 2 opposed, and 4 abstentions. **The motion to approve the slate passed.**

PCC PROPOSAL TO ESTABLISH A BACHELOR OF SCIENCE IN EMBEDDED SYSTEMS AND THE INTERNET OF THINGS (SENATE DOCUMENT #18-19-19) (ACTION)

Janna Bianchini, Chair of the Programs, Curricula, and Courses (PCC) Committee, presented the PCC Proposal to Establish a Bachelor of Science in Embedded Systems and the Internet of Things (Senate Document #18-19-19) and provided background information on the proposal.

Chair Walsh thanked Bianchini for her presentation and opened the floor to discussion of the proposal; hearing none, he called for a vote on the proposal. The result was 83 in favor, 7 opposed, and 11 abstentions. **The motion to approve the proposal passed.**

PCC PROPOSAL TO ESTABLISH A BACHELOR OF ARTS IN PHILOSOPHY, POLITICS, AND ECONOMICS (SENATE DOCUMENT #18-19-20) (ACTION)

Janna Bianchini, Chair of the Programs, Curricula, and Courses (PCC) Committee, presented the PCC Proposal to Establish a Bachelor of Arts in Philosophy, Politics, and Economics (Senate Document #18-19-20) and provided background information on the proposal.

Chair Walsh opened the floor to discussion of the proposal; hearing none, he called for a vote on the proposal. The result was 90 in favor, 10 opposed, and 5 abstentions. **The motion to approve the proposal passed.**

REVISION OF THE CODE OF ACADEMIC INTEGRITY (SENATE DOCUMENT #17-18-08) (ACTION)

Fuller Ming, Chair of the Student Conduct Committee, presented the Revision of the Code of Academic Integrity (Senate Document #17-18-08) and provided background information on the proposal.

Chair Walsh opened the floor to discussion of the proposal.

Senator Baker, faculty, College of Education, asked about the expanded definition of 'self-plagiarism'. She commented that a requirement that a student seek permission from a previous instructor to reuse a written assignment might be unnecessary.

Ming responded that the expanded definition of 'self-plagiarism' was included because it has always been considered to be a form of academic dishonesty, and the committee included the specific phrasing so that students would be aware of it in the future.

Senator A. Brown, faculty, College of Computer, Mathematical, and Natural Sciences stated that she agreed with Senator Baker and asked how students should proceed if they are unable to communicate with previous instructors.

Ming responded that the committee discussed the potential burden of contacting previous instructors, and that the included language is intended to encourage students to discuss the reuse of assignments with instructors whenever possible. He stated that the committee wishes to retain

the language and noted that extenuating circumstances would be taken into account for any allegations against a student.

Walsh introduced James Bond, Assistant Director of the Office of Student Conduct. Bond stated that the committee thoroughly discussed this aspect of the *Code* and that it would not oppose an amendment to strike the language requiring a student to contact their previous instructor. He noted that if the language is retained and if a student made reasonable efforts to communicate with a previous instructor and was unable to establish contact, the student would not be in automatic violation of the *Code* if they proceeded to reuse an assignment with the current instructor's permission.

Pamela Lanford, Chair-Elect, asked if in the case of a student being required to receive permission from both the previous and the current instructor, if the student were unable to contact the previous instructor, they would be required to produce a unique piece of work for the current course.

Bond responded that the Office of Student Conduct always encourages students to produce unique work for each new course.

Senator Baker stated that as an instructor, she would advise previous students to consult with their current instructor about whether they can reuse work from a previous course. She commented that doctoral students may face difficulty in gaining permission to reuse work or in rewriting their own work repeatedly as they typically work on similar topics from semester to semester. She made a motion to amend the definition of self-plagiarism.

> SELF-PLAGIARISM: the reuse of substantial identical or nearly identical portions of one's own work in multiple courses without prior permission from the **current** instructor~~s of each course~~ **or from each of the instructors if the work is being submitted for multiple courses in the same semester**.

Walsh called for a second. The motion was seconded. Walsh opened the floor to discussion of the amendment.

Daniel Falvey, Past Senate Chair, stated that he appreciated the points that were made and suggested that if the Senate wished to change the definition of 'self-plagiarism', it may be more effective to send the *Code* back to the committee for further revision.

Senator Baker responded that though her amendment would change the content, she does not believe that it would change the actual definition.

Ming stated that the committee acknowledged this concern, so it discussed the language proposed in the amendment and was supportive of it.

Bond stated that the Office of Student Conduct was also supportive of the language proposed in the amendment.

Senator Abana, graduate student, A. James Clark School of Engineering, suggested that the definition include an explanation of how it would be determined whether the student made a legitimate effort to seek permission from both instructors.

Senator Celi, faculty, A. James Clark School of Engineering, stated that requiring students to seek permission from a previous instructor presents an undue burden on students. He expressed his support for the amendment.

John Buchner, member of the Student Conduct Committee stated that the intent of the definition is to encourage academic growth by motivating students to produce original work for each course they take. He noted that there are professional circumstances in which you are not allowed to submit the same work in two different areas even if it is your intellectual property.

Senator Priola, faculty, College of Agriculture and Natural Resources commented that plagiarism is the misrepresentation of someone else's work as your own. He asked if students would be allowed to cite their own work from a previous course in an assignment for a current class and expressed his belief that students should be allowed to use and cite their own material.

Bond responded that students are encouraged to cite their own work if it is referenced in a current assignment but noted that the intent of the definition is motivated by the advancement of knowledge rather than the ownership of intellectual property. He stated that the definition was included so that students would be made aware that self-plagiarism is a form of plagiarism, and to inspire students to have conversations with instructors about the use of past work.

Senator Pound, faculty, College of Computer, Mathematical, and Natural Sciences stated that citing work is not the same thing as directly reusing work. He commented that the reuse of work is not allowed in academic journal publications so it should not be encouraged at the University. He expressed his support for the language proposed in the amendment.

Seeing no further discussion, Walsh called for a vote on the amendment to the proposal. The result was 78 in favor, 8 opposed, and 4 abstentions. **The motion to amend the proposal passed.**

Seeing no further discussion, Walsh called for a vote on the proposal as amended. The result was 87 in favor, 2 opposed, and 2 abstentions. **The motion to approve the proposal as amended passed.**

PROPOSAL TO AMEND THE UMD POLICY AND PROCEDURES ON THE DISCLOSURE OF STUDENT EDUCATION RECORDS (SENATE DOCUMENT #17-18-16) (ACTION)

Jeffrey Henrikson, member of the Educational Affairs Committee, presented the Proposal to Amend the UMD Policy and Procedures on the Disclosure of Student Education Records (Senate Document #17-18-16) and provided background information on the proposal.

Chair Walsh opened the floor to discussion of the proposal.

Senator Ming, exempt staff, asked if items covered by the Family Educational Rights and Privacy Act, including student identification numbers, would need to be modified to comply with the amended policy.

Henrikson responded that those items would not need to be modified.

Seeing no further discussion, Walsh called for a vote on the proposal. The result was 77 in favor, 1 opposed, and 10 abstentions. **The motion to approve the proposal passed.**

NEW BUSINESS

There was no new business.

ADJOURNMENT

The meeting was adjourned at 4:25 p.m.

Review of the Outcomes of the Athletics Reports

Submitted January 28, 2019

BACKGROUND

On September 5, 2018, the University of Maryland (UMD) University Senate voted to charge the Senate Executive Committee (SEC) with examining the findings of two independent reviews initiated following a) the tragic death of football player Jordan McNair, and b) the allegations of a "toxic culture" in UMD football, with the objective of providing feedback and/or recommendations to the administration. This Senate action was taken in recognition of the great loss to the McNair family and to our campus community, as well as of the impact of this tragedy and allegations on the institution as a whole. Our goal was, and will continue to be, to work toward a system that protects the health and welfare of every student athlete and promotes the vision and aims of the University.

The report presented here represents a compilation of recommendations stemming from a review of the nearly 300 pages of findings comprising the Walters Report, the Board of Regents Commission and the Athletics Action Plan, issued by the Athletic Director in fall 2018. It should be noted that, in providing these recommendations, our intent is not to second guess the expertise or knowledge base of Dr. Walters or the members of the Commission. Similarly, we do not necessarily seek to critique what we see as appropriate and we welcome actions taken by the Athletic Director so far. Our emphasis has been to identify instances where we believe additional mechanisms and approaches should be in place that will help ensure the implementation of best practices in staff training and preparedness and foster improved transparency and accountability within the athletics program.

Our recommendations fall into six major categories, as detailed below; however, **we wish to emphasize the instillation of a culture of clarity, transparency, and accountability and the fundamental need to overcome the cloistered nature of our intercollegiate athletics program.** To do this will require the establishment of new mechanisms, oversight bodies, and documentation methods on many fronts, ranging from global oversight to periodic reviews, reporting systems, and documentation methods. As Vince Lombardi has been quoted: "If you're not keeping score, it's just practice." Consequently, we urge the athletics program to adopt the mindset that if it wasn't documented, it didn't happen - at every step. We believe that such an approach is integral to ensuring accountability within the athletics program, the restoration of good faith between athletics and the greater campus community, and most importantly, the safety and wellbeing of our student-athletes.

The Senate Executive Committee wishes to thank President Loh and Athletic Director Damon Evans for their cooperation in this process. We look forward to working with them, the student-athletes, and the greater campus community in moving our institution forward.

SUMMARY OF RECOMMENDATIONS

Based on the findings and proposed actions of the Walters Report, the Board of Regents Commission Report, and the Athletics Action Plan, the Senate Executive Committee makes recommendations to the President and the Athletics Department in six major categories, as summarized below. A detailed description of specific recommendations within each of these six categories follows.

- **Improved Global Oversight** of Athletics through the establishment of an external review panel;
- **Increased Reporting, Transparency, and Accountability** with regard to the implementation of the Athletics Action Plan, mechanisms for anonymous reporting by student-athletes and staff, the establishment of a student-athlete ombudsperson, and the improvement of transparency and relationships between athletics and the campus community.
- **Periodic review of the Emergency Action Plan (EAP)** by an external panel, continuous assessment of the EAP's efficacy, and a commitment to regular staff training exercises of the EAP with staff understanding incorporated into the PRD process;
- **Utilization of the Medical Model** where athletic trainers are contracted by an entity external to Athletics and clarification of the roles and responsibilities of the physician overseeing athletics and associated reporting lines;
- **Improved Supervision of coaching staff** that is clearly defined so that the Head Coach maintains hiring authority over the Strength & Conditioning Coach, responsibility for the tone and overall culture, and performing their performance review with daily oversight, comprehensive review of strength & conditioning practices, and an overall evaluation of performance reviews conducted by an Athletics administrator; and
- **Establishment of Cultural Values & Norms** that align with the University of Maryland's Values Statement and the adoption of a Code of Conduct for Athletics personnel that recognizes the coaching staff's role in the development of the student-athlete as a member of the larger community.

RECOMMENDATIONS

Global Oversight

Given the impact of recent events on the athletes, the athletic program, and the campus as a whole, it is advisable that the campus put in place mechanisms for improved oversight and accountability. One measure that we support is the establishment of an external panel that

- performs in-depth review and evaluation of the athletics program as a whole, including policies, procedures, and operations;
- considers the findings of targeted reviews on specific aspects of athletics operations (e.g. EAP review, Athletics Council reviews);
- meets regularly (at least twice annually) to discuss any issues identified during the intervening cycle;
- makes recommendations for improvement to the President, the Athletic Director, and the Athletic Council; and
- makes a summary of its findings and recommendations available publicly.

Reporting, Transparency, and Accountability

The Athletic Director has begun implementation of a series of actions initiated in response to the circumstances surrounding the death of Jordan McNair as defined in the Athletics Action Plan. This Plan describes a comprehensive set of actions and changes related to equipment and staffing that are aimed at improving the policies and procedures affecting the health and safety of our student-athletes. We commend both the spirit and many of the specifics detailed in the Action Plan, and recommend that

- the ongoing oversight of the overall implementation of the Action Plan incorporate regular reporting to the Athletic Council (e.g., at least twice annually).

The Athletics Action Plan describes the establishment of an online portal called "Terps Feedback" that allows student-athletes to share concerns or report issues securely and in real time. We commend this action but cannot emphasize strongly enough that mechanisms for documentation and review of feedback of *many* types must be put into place such that there is clarity and accountability throughout the Athletics Department. To that end, we recommend that

- comments posted to Terps Feedback be directed not only to leadership within the Athletics Department but also to leadership within a separate UMD division, such as to the Vice President for Student Affairs, to ensure transparency and that effective actions are taken in response.
- the University provide Athletics employees with a mechanism for independent and anonymous reporting of irregular, unethical, or abusive behavior (e.g., USM hotline; "Ethical Systems" reporting system recently purchased by UMD).
- data from the student-athlete survey, including perceptions of care associated with their physical and mental wellbeing, be provided to the faculty on the Athletic Council. Such faculty are well-equipped to provide impartial assessment of the results of the survey, and to recommend actions as appropriate.
- a formal system be established to track and integrate feedback from all sources, both formal (as above) and informal, such that patterns of complaints may be discerned and acted upon. Findings should be reported to both the Athletic Director and to the Athletic Council for evaluation and corrective action. We recognize that such a system may require dedicated staff and/or other resources to implement effectively.
- the role of the Athletic Council in oversight should be expanded and codified in the Athletic Council Charter to involve the Council in a review of the feedback and implementation of any corrective actions, such that the overall transparency and accountability of the athletics program to the broader campus is improved.
- The Athletic Council Charter should establish a subcommittee composed of faculty representatives of the Council, whose responsibility would be to consider input from student-athletes and staff reviews and concerns raised through Terps Feedback.
- a dedicated student-athlete ombuds position be established, such as is in place at Michigan State, that is outside of Athletics and is clearly an independent resource for the resolution of issues specific to the student-athlete experience.

We agree with the findings of the Walters report, that the Athletics program should take steps toward becoming more accessible in their day-to-day functions. Specifically, Athletics should consider

- implementing the Walters report recommendation that video cameras be installed in weight rooms;
- encouraging increased public access to team practices; and

- improving outreach and engagement of, and integration with the greater campus community.

Emergency Action Plan (EAP)

The Athletics Action Plan indicates that, based on the Walters report, UMD will establish an independent review panel that will annually review procedures and protocols associated with student-athlete safety. We support this action, and recommend that

- such a review be performed on a regular basis internally and include a tabletop drill or other exercise to inform any needed updates and/or revision of the Emergency Action Plan (EAP). In addition to internal review, we recommend a periodic review of the EAP by independent external evaluators, occurring on a regular established schedule (e.g., on a bi- or triennial basis).
- the findings of both the internal and external evaluations of the EAP and its implementation should be reviewed by the Athletic Council annually.
- a regular, ongoing schedule of EAP training and renewal trainings be established, with documentation and tracking of such training available for review.
- methods for evaluating the effectiveness of these trainings be established, to ensure trainees are knowledgeable and prepared on an ongoing basis.
- knowledge and implementation of EAP elements be included in annual staff performance reviews.

The Medical Model

The Walters report refers to the structure in which athletic trainers are employed and supervised as a modified version of the “athletic model” where UMD trainers are part of the UMD Athletic Department but medical supervision is provided by physicians elsewhere. We understand the inclination to maintain control over hiring/firing decisions for UMD staff; consequently, we recommend that

- athletic trainers be contracted through an entity outside UMD Athletics (e.g., the “medical model”) to ensure that actions by athletic trainers may be completely independent of any threat to their positions, real or perceived. An “outside entity” may include divisions within the University (such as student affairs) but outside Athletics.
- the roles and responsibilities of the physician overseeing the athletics medical program be clarified, such that a better understanding of how athletic training staff are hired, trained, and supervised may be provided to staff as well as the greater campus community. An organizational chart that incorporates the lines of authority as well as the reporting lines would provide clarity and transparency.

Supervision of Coaching Staff

The Commission report states that ‘Strength and conditioning coaches wield enormous influence over players, so much so that one former coach referred to them as the “head coaches of the off-season.”’ Clearly, it is imperative that the Strength and Conditioning (S&C) coach and the Head Coach be in accord with one another in terms of approach, practices, and objectives. It is also clear from both the Commission and Walters reports that the lines of authority and oversight of the UMD S&C coach were not properly structured, and that, as a result, the process of evaluating the performance of the S&C coach was nonexistent. The lack of clarity regarding reporting lines must be resolved, and a thorough annual review process be established for this and all coaching staff. To that end, we recommend that

- the Head Coach retain authority for hiring of the S&C coach, such that the Head Coach may evaluate the alignment of their approach, practices, and objectives with his overall vision. As the hiring authority, the Head Coach then bears responsibility for setting the overall tone, and by extension the culture, of the program. Practices in the hiring of this and all other assistant coaches should be consistent with those described in the NCAA document, "Managing Your Program: A Guide From One Coach to Another" (see below).
- the Head Coach maintain authority over the HR reporting line of the S&C coach, including performing PRDs, periodic reviews, and other official oversight of the S&C coach. This is recommended so that the responsibility of the Head Coach, regarding the overall tone and culture of the program is clear. At the same time, we believe that a dual oversight mechanism be in place, such that on-the-ground, daily oversight of the S&C coach should be performed by an Athletics administrator such as an associate AD, who reports her/his findings to the AD and Head Coach, and whose evaluation must be incorporated into the periodic review. The associate AD would continue to review PRDs of the S&C coach as part of a comprehensive review of strength & conditioning practices across the Athletics Department.
- formal evaluation of all coaches, including all assistant coaches, the S&C coach, and the Head Coach occur on an annual basis, consistent with University-wide practice, consisting of a comprehensive assessment that includes multiple inputs: evaluation by the student-athletes (to include written comments), relevant staff members, the associate AD, the Head Coach, and the AD.

Cultural Values and Norms

The Commission report emphasizes that the ability to compete in the sport of football at the intercollegiate level requires the S&C coach to be "tough and relentless" and to push the athlete to their limits. However, the report also recognizes that multiple standards set by the NCAA, the Big Ten Conference, the US military, and the Maryland Athletics Policy and Procedures manual require strength and conditioning to be performed in a positive, non-punitive, and professional manner. We agree with this finding and further recommend that

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- all coaching and other athletics staff be expected to behave in a manner consistent with the University of Maryland's Values Statement with particular regard to the components *"Respectful"* and *"Safe and Secure"*.
- all new hires be advised of these values and expectations during the interview process.

Further, we support the findings of the Commission report that recommends that the AD adopt a code of conduct for all Athletics Department staff, and recommend that

- the code includes a statement recognizing that coaching staff responsibilities are not limited to the physical development and performance of each student-athlete, but also include the development of the student-athlete as a member of the larger community, and that that responsibility requires coaching staff to model good moral, ethical, and professional standards.
- the AD, together with the Athletic Council and in consultation with the Student-Athlete Advisory Committee, develop a document describing what student-athletes have a right to expect from the coaching staff, as well as what the coaching staff has a right to expect from the students.
- periodic/annual reviews for all staff emphasize and reinforce the code of conduct and the students' expectations document.

NCAA Managing Your Program: A Guide From One Coach to Another

We recommend review and adherence to this document from the NCAA Division I Men's Basketball Ethics Coalition, as a model for guiding principles in coaching across sports. We particularly wish to emphasize the following sections of the document:

- **Best Practices - Hiring a Staff -** Preferred qualities for an assistant coach
- **Best Practices - Communicating With Your Team -** Establish a culture of honesty and respect
- **Promoting Student-Athlete Wellness -** Mental health; Nutrition, sleep and performance; Sexual violence prevention
- **Commitment to Monitoring -** Establishment of a program of prompt and consistent review of documentation related to monitoring of forms, logs, evaluations and questionnaires within the sport program.

Establish a Master of Science in Applied Economics (PCC 18049)

PRESENTED BY	**Janna Bianchini, Chair, Senate Programs, Curricula, and Courses Committee**
REVIEW DATES	**SEC – January 28, 2019 | SENATE – February 5, 2019**
VOTING METHOD	**In a single vote**
RELEVANT POLICY/DOCUMENT	**N/A**
NECESSARY APPROVALS	**Senate, President, University System of Maryland Board of Regents, and Maryland Higher Education Commission**

ISSUE

The Department of Economics (ECON) within the College of Behavioral and Social Sciences (BSOS) proposes to establish a Master of Science degree program in Applied Economics. This program exists currently as an iteration of the Master of Professional Studies (MPS) program. The 30-credit program has been in operation since the fall of 2012. The Master of Professional Studies program was approved in 2005 by the University System of Maryland Board of Regents and Maryland Higher Education Commission to allow for the expedited approval of curricula that respond to changing market needs of working professionals. Once a new iteration of the MPS is approved through campus PCC review, it only needs approval by the USM Chancellor to become official.

A limitation of offering this program as an MPS iteration is that all Professional Studies programs must use the same generic Federal Classification of Instructional Programs (CIP) code rather than a CIP code that accurately describes the program content. Searches that use CIP codes to find program offerings will not find the discipline-specific iteration, which reduces market visibility. Moreover, some CIP codes are designated as “STEM” eligible by the US Department of Homeland Security, and international students with F1 visas who graduate from STEM designated programs may continue to work in the United States for two years longer than students in non-STEM designated programs. The generic CIP code for Professional Studies programs does not qualify as STEM-designated, even if the academic content of the Professional Studies program is STEM-related.

Consequently, the Economics Department proposes to transition the program from a Master of Professional Studies program to a stand-alone Master of Science program in order to be classified more accurately. No changes are proposed to the program curriculum or administration. In separate proposals, another BSOS department, Geographical Sciences, is also proposing to convert their Professional Studies programs, Geospatial Information Sciences and Geospatial Intelligence, to stand-alone Master of Science programs.

The Applied Economics program provides rigorous training in economic reasoning, formulating and estimating economic models, and utilizing quantitative methods to evaluate policy proposals and

programs. The curriculum consists of five core courses and five field-courses from a list of nine eligible ECON courses. The core courses are as follows:

- ECON641 Microeconomic Analysis (3 Credits)
- ECON642 Topics in Applied Macroeconomics (3 Credits)
- ECON643 Empirical Analysis I (3 Credits)
- ECON644 Empirical Analysis II (3 Credits)
- ECON645 Empirical Analysis III (3 Credits)

The field courses allow students to apply the tools learned in the core courses to specific fields of economics and public policy analysis.

Through the program, students learn to collect, evaluate, understand and analyze economic data. Students understand and interpret statistical results and apply empirical evidence to economic arguments. They articulate and apply macroeconomic and microeconomic theories and models to policy discussions. They also learn to interpret and communicate economic models to a wider audience, and measure and evaluate the effectiveness of policy programs using sound econometric techniques.

The program has been successful since its inception in 2012, with more than 90% of its graduates finding employment in economics-related positions.

This proposal was approved by the Senate Programs, Curricula, and Courses committee on December 7, 2018.

RECOMMENDATION(S)

The Senate Committee on Programs, Curricula, and Courses recommends that the Senate approve this new degree program.

COMMITTEE WORK

The committee considered this proposal at its meeting on December 7, 2018. John Straub, Director of the Master of Professional Studies Program in Applied Economics, presented the proposal. The proposal was approved by the committee.

ALTERNATIVES

The Senate could decline to approve this new degree program.

RISKS

If the Senate declines to approve this degree program, the university will lose an opportunity to take an existing program and make it more attractive to international students by simply classifying the program more accurately.

FINANCIAL IMPLICATIONS

There are no significant financial implications with this proposal as the program already exists as a Master of Professional Studies program.

UNIVERSITY OF MARYLAND PCC PROGRAM/CURRICULUM/UNIT PROPOSAL

PCC LOG NO. 18049

Program: Master of Science in Applied Economics – to replace existing Master of Professional Studies in Applied Economics

Department / Unit: Economics

College/School: BSOS

Proposal Contact Person (with e-mail): John Straub – straub@econ.umd.edu

TYPE OF ACTION: *Italics indicate that the proposal must be presented to the full University Senate for consideration.*

- ☐ Curriculum change (including modifying minors, concentrations/specializations, and creating informal specializations)
  - ☐ Curriculum Change is for an LEP Program
- ☐ *Renoming of program or formal Area of Concentration*
- ☐ *Establish/Discontinue a formal Area of Concentration*
- ☐ *Establish a new academic degree/certificate program*
- ☐ ✓ *Establish a new academic degree/certificate program*
- ☐ Create an online version of an existing program
- ☐ Establish a new minor
- ☐ *Suspend/Discontinue a degree/certificate program*
- ☐ Establish a new Master or Certificate of Professional Studies program
  - ☐ New Professional Studies program will be administered by Office of Extended Studies
- ☐ Other:

APPROVAL SIGNATURES: *Please print name, sign, and date. For proposals requiring multiple unit approvals, please use additional cover sheet(s).*

1. Department Committee Chair: John Straub
2. Department Chair: Maureen L. Cropper
3. College/School PCC Chair: (for Karol Soltan) 11/9/18
4. Dean: Wayne McIntosh 11/9/18
5. Dean of the Graduate School (if required): _____
6. Chair, Senate PCC: Janna Bianchini 12-7-18
7. University Senate Chair (if required): _____
8. Senior Vice President and Provost _____

Instructions: When approved by the dean of the college or school, send the proposal and signed form to the Office of the Associate Provost for Academic Planning and Programs, 1119 Main Administration Building, Campus-5031, and e-mail the proposal document as an MSWord attachment to pcc-submissions@umd.edu.

Summary of Proposed Action (use additional sheet if necessary): See the attached Preface for further context.
This proposal is to convert the MPS in Applied Economics to an MS in Applied Economics, with the CIP designation of 45.0603, "Econometrics and Quantitative Economics". The description of this CIP code is *"A program that focuses on the systematic study of mathematical and statistical analysis of economic phenomena and problems. Includes instruction in economic statistics, optimization theory, cost/benefit analysis, price theory, economic modeling, and economic forecasting and evaluation."*
The actual program curriculum is not changing, since the curriculum is already well-matched to this description. The program will also continue to be administered through the Office of Extended Studies. However, a proposal to MHEC is required in order to create the new standalone degree program.

Unit Code(s) (to be entered by the Office of Academic Planning and Programs):

A new degree program proposal will need to be approved not just by campus but also by the University System of Maryland (USM) Board of Regents and the Maryland Higher Education Commission (MHEC). New certificate programs need to be approved by the USM Chancellor and MHEC. The following prompts are based on academic policies for programs and reflect campus requirements and MHEC requirements. The prompts also include questions frequently asked by review committees. For more information about MHEC requirements, see http://mhec.maryland.gov/institutions_training/Pages/acadaff/AcadProgInstitApprovals/NewAcademicProgramProposals.aspx. Please feel free to add additional information at the end of this document or in a separate appendix.

MISSION AND PURPOSE

1. *Describe the program and explain how it fits the institutional mission statement and planning priorities. The University Mission Statement and Strategic Plan can be found on this site: https://www.umd.edu/history-and-mission.*

The proposed Master of Science program is a continuation of the existing Master of Professional Studies in Applied Economics. This Applied Economics iteration of the MPS was established in 2011 with initial operation in a Middle States approved location Washington, DC. A highly successful curriculum, it expanded in 2014 and now has cohorts in session both in Washington, DC location and on the College Park campus.

The re-christened MS in Applied Economics program will continue the nationally ranked professional master's curriculum (Ranked #3 in the Financial Engineer's ranking of US economics master's degree programs). With the appropriate STEM designation, the MS program's international graduates will have more opportunities to intern in the United States after graduation. Combined with the already high (well over 90%) employment rate for domestic graduates, the program's already strong ties to area employers will become even stronger. With the standalone credential and the STEM designation, we also hope to attract a more diverse population of students.

PROGRAM CHARACTERISTICS

2. *Provide a full catalog description of the proposed program. As part of the description, please indicate any areas of concentration or specializations that will be offered.*

   The Master of Science (MS) in Applied Economics provides rigorous training in economic reasoning, formulating and estimating economic models, and utilizing quantitative methods to evaluate policy proposals and programs.

3. *What are the educational objectives of the program?*

   Focusing on the application of modern economic tools to the analysis of public policy questions, **the Master of Science (MS) in Applied Economics** emphasizes the role of econometric analysis and economic policy analysis with a particular focus on real-world policy-relevant examples. The 10-course, 30-credit degree program emphasizes empirical skills, particularly data analysis and interpretation, with respect to economic and public policy applications. The program provides students with advanced training in economics that prepares them for policy analysis positions in the public and private sectors. The policy-oriented curriculum focuses on all aspects of econometric modeling and incorporates instruction using STATA and similar statistical software.

4. *Describe any selective admissions policy or special criteria for students selecting this field of study.*
   Applicants must meet the following minimum admissions criteria as established by the University's Graduate School:

Applicants must have earned a four-year baccalaureate degree from a regionally accredited U.S. institution, or an equivalent degree from a non-U.S. institution.

Applicants must have earned a 3.0 GPA (on a 4.0 scale) in all prior undergraduate and graduate coursework.

International Applicants must also meet the UMD Graduate School's minimum English Language Proficiency requirements, posted at: https://gradschool.umd.edu/admissions/english-language-proficiency-requirements.

A non-refundable application fee of is required (currently $75).

In addition, there are 3 program-specific requirements:

* Introductory course in microeconomics with a grade of at least B
* Introductory course in macroeconomics with a grade of at least B
* One semester calculus course with a grade of at least B-

5. *Indicate the course requirements with course numbers, titles and credits. If applicable, indicate if any course will also count for a general education requirement. In an appendix, provide the course catalog information (credits, description, prerequisites, etc.) for all of the courses.*

The semester-calendar format for the 30-credit MS in Applied Economics (offered in College Park) may be completed in four semesters. Students must complete five core courses (15 credits) and five field courses (15 credits). Full-time students complete three courses in each of their first three semesters (fall, spring, fall) with the final course taken in the last spring semester.

The term-calendar format for the 30-credit MS in Applied Economics (offered in Washington, DC) may be completed in 15 months. Students must complete five core courses (15 credits) and five field courses (15 credits). Full-time students complete two courses per term for five 12-week terms.

CORE COURSES

ECON641 Microeconomic Analysis. 3 credits.
ECON642 Topics in Applied Macroeconomics. 3 credits.
ECON643 Empirical Analysis I: Foundations of Empirical Research. 3 credits.
ECON644 Empirical Analysis II: Introduction to Economic Models. 3 credits.
ECON645 Empirical Analysis III: Econometric Modeling and Forecasting. 3 credits.

FIELD COURSES

ECON670 Financial Economics. 3 credits.
ECON671 Economics of Health Care. 3 credits.
ECON672 Program Analysis and Evaluation. 3 credits.
ECON673 Information, Game Theory and Market Design. 3 credits.
ECON674 Economic Analysis of Law. 3 credits.
ECON675 Environmental Economics. 3 credits.
ECON676 Economic Development. 3 credits.
ECON683 International Macroeconomics and Finance. 3 credits.
ECON684 Applied Time Series Analysis and Forecasting. 3 credits.

Course Catalog Information: See Appendix A.

6. *Summarize the factors that were considered in developing the proposed curriculum (such as recommendations of advisory or other groups, articulated workforce needs, standards set by disciplinary associations or specialized-accrediting groups, etc.).*

The existing **Master of Professional Studies in Applied Economics** program was originally approved in 2011 (PCC Log No. 11008) and has been operating successfully in Washington, DC since the fall of 2012 (MPEC). A parallel version of the program for the main campus in College Park was approved in 2014 (PCC Log No. 14015) and has been operating successfully since the fall of 2016 (MPEM). Four additional elective field courses were also added to the curriculum in both locations when the College Park version of the program was added in 2014.

The economics faculty in College Park were primarily responsible for developing the program's curriculum initially. Based mostly on their world-class academic research, our economics department is consistently ranked among the top 20-30 departments in the US. Many of our faculty also have strong ties to applied work being done in many policy-relevant areas. For example: Our department chair, Maureen Cropper, is a Senior Fellow at Resources for the Future and has served as chair of the EPA Science Advisory Board's Environmental Economics Advisory Committee, and as a Lead Economist at the World Bank. Lawrence Ausubel, Peter Cramton, and Daniel Vincent have been involved in high profile auctions of natural resources, including the radio spectrum. Sebastain Galiani is currently on leave, serving as the Secretary of Economic Policy in Argentina's Treasury Ministry. Professional activities like these make our faculty well positioned to develop the curriculum for a professional program in applied economics, with courses in Environmental Economics, Game Theory and Market Design, Development Economics, and many other important fields.

Over the last 7 years, we have staffed the program's courses with members of our department's teaching faculty, and with PhD economists working at the DC area's many private, governmental, and non-governmental organizations. These highly qualified practitioners have developed specific course syllabi that provide exactly the kind of training that students need to be successful analysts in the same kinds of organizations where many of our instructors work.

We also maintain open lines of communication with the many area employers who hire our students and graduates. In conjunction with our department's undergraduate program and the UMD Career Center, we organize 2 applied economics placement/recruiting events every year – one in October and another in February. Dozens of area employers participate in these events, with many employers returning twice a year. The employment rates for our graduates have been close to 100%, with 26 of the 27 graduates employed in 2016, and 44 of the 45 graduates employed in 2017. For the May 2018 graduates, 26 of the 28 domestic graduates are already working in the field. The high employment rates for our program's graduates speak well to the value that employers place on the training that the curriculum in our professional program provides.

7. *Sample plan. Provide a term-by-term sample plan that shows how a hypothetical student would progress through the program to completion. It should be clear the length of time it will take for a typical student to graduate.*

Course	Course	Term-Calendar	Semester-Calendar
Core Courses			
ECON 641	Microeconomic Analysis	I	Year 1 Fall

ECON 643	Empirical Analysis I: Foundations of Empirical Research	I	Year 1 Fall
ECON 642	Topics in Applied Macroeconomics	II	Year 1 Fall
ECON 644	Empirical Analysis II: Introduction to Economic Models	II	Year 1 Spring
ECON 645	Empirical Analysis III: Econometric Modeling and Forecasting	III	Year 2 Fall
Field Courses			
ECON 670	Financial Economics	III, IV or V	Year 1 or 2 Spring
ECON 671	Economics of Health Care	III, IV or V	Year 2 Fall
ECON 672	Program Analysis and Evaluation	III, IV or V	Year 2 Spring
ECON 673	Information, Game Theory and Market Design	III, IV or V	Year 1 or 2 Spring
ECON 674	Economic Analysis of Law	III, IV or V	Year 1 or 2 Spring
ECON 675	Environmental Economics	III, IV or V	Year 2 Fall
ECON 676	Economic Development	III, IV or V	Year 2 Fall
ECON 683	International Macroeconomics and Finance	III, IV or V	Year 2 Fall
ECON 684	Time Series Analysis and Advanced Forecasting	III, IV or V	Year 2 Spring

8. *Indicate whether the program will be offered in a non-standard delivery format, such as online delivery, off-campus, or through a semester-based, term-based, or non-standard terms calendar. Please note that MHEC requires a separate proposal for off-campus delivery. If the program will be offered in a term-based or non-standard terms calendar, describe the term structure and whether the Office of the Registrar and the Office of International Scholar and Student Services have been notified and support the proposal. If the program will be offered exclusively online or will have both a face-to-face and online version of the program, complete this additional form and add as an appendix:*
https://docs.google.com/document/d/1ojpUBt4mAWlNPCiQNzZ48UH68zGPYj31TPgEOfW3q1E/

The Master of Science (MS) in Applied Economics uses face-to-face, seminar-style classroom delivery. The program is offered through a semester-based (fall/spring) calendar in College Park AND a term-based (12-week) calendar in Washington, DC to more effectively serve student needs. Both the Office of the Registrar and the Office of International Scholar and Student Services have been notified and are in support of the proposal.

9. *For Master's degree programs, describe the thesis requirement and/or the non-thesis requirement.*

The program does not have a thesis requirement. Students must complete the 5 core courses and 5 of the field courses. All courses are 600-level 3-credit courses.

10. *List the intended student learning outcomes. In an appendix, provide the plan for assessing these outcomes.*

Student Learning Outcomes

1. To collect, evaluate, understand and analyze economic data.
2. To understand and interpret statistical results and apply empirical evidence to economic arguments.

3. To articulate and apply standard macroeconomic theories and models to policy discussions.
4. To articulate and apply standard microeconomic theories and models to policy discussions.
5. To interpret and communicate economic models to a wider audience.
6. To measure and evaluate the effectiveness of policy programs using sound econometric techniques.

Assessment of Learning Outcomes: See Appendix B.

11. *Identify specific actions and strategies that will be utilized to recruit and retain a diverse student body.*

The Master of Science (MS) in Applied Economics will use the model established by the University of Maryland's commitment to diversity by marketing and recruiting applicants from various professional organizations with demonstrated respect for individuals regardless of differences in age, race, ethnicity, sex, religion, disability, sexual orientation, class, political affiliation, and national origin. Course content will also demonstrate opportunities for instruction on tolerance and inclusion.

A total of 63 newly admitted students enrolled in the program in 2016/17. Only 23 (36.5%) of these 63 students were female. A very similar proportion of the complete applicant pool was female (105/171 = 38.6%). A slightly higher proportion of our May 2018 graduates were female: 15/36 = 41.7%.

Of the 63 newly admitted students enrolled in 2016/17, 10 were international students on F1 or J1 visas. Five of these were Chinese citizens. The other 5 were from Bulgaria, Kosovo, Peru, Taiwan, and Turkey. Nine of these 10 students graduated from the program in May of 2018. The student from Taiwan interrupted his studies after the first year for military service. He is returning this year and expects to graduate in May of 2019. If this proposal is adopted, and the new MS program has the appropriate STEM designation, the program should be able to attract even more international students. Of the 53 domestic students enrolled 2016/17, five (9.4%) reported themselves to be Black or African-American, and 34 (61.8%) reported themselves to be white.

Teaching assistants are available to all students, and we encourage students with the most need to avail themselves of the assistance. We strive to foster an inclusive and supportive environment for all.

RELATIONSHIP TO OTHER UNITS OR INSTITUTIONS

12. *If a required or recommended course is offered by another department, discuss how the additional students will not unduly burden that department's faculty and resources. Discuss any other potential impacts on another department, such as academic content that may significantly overlap with existing programs. Use space below for any comments, otherwise add supporting correspondence as an appendix.*
    Not applicable.

13. *Accreditation and Licensure. Will program need to be accredited? If so, indicate the accrediting agency. Also, indicate if students will expect to be licensed or certified in order to engage in or be successful in the program's target occupation.*
    Not applicable.

14. *Describe any cooperative arrangements with other institutions or organizations that will be important for the success of this program.*

Not applicable.

FACULTY AND ORGANIZATION

15. *Faculty and organization. Who will provide academic direction and oversight for the program? As an appendix, please indicate the faculty involved in the program. Include their titles, credentials, and courses they may teach for the program.*

A. Academic Direction and Program Oversight

Graduate School
Dean of the Graduate School: Steve Fetter

Program Director
John Straub, Department of Economics

Office of Extended Studies Administrative Support and Oversight
Terrie Hruzd, Director of Programs

B. Faculty

Program Faculty, see Appendix C.

RESOURCE NEEDS AND SOURCES

16. *Each new program is required to have a library assessment in order to determine any new library resources that may be required. Please contact your departmental/programmatic library liaison or Daniel Mack at dmack@umd.edu, Associate Dean of Collections, to request a library assessment that will be added as an appendix.*

Library Assessment, see Appendix D.

17. *Discuss the adequacy of physical facilities, infrastructure, and instructional equipment.*

For the term-based program in Washington, DC, we rent a suite at 1400 16th Street, NW with two classrooms, two small offices, a reception area, a small kitchen, and a lounge/group study area. The building in DC also has a large conference space that tenants can rent for well below the going rate for conference space in the DuPont Circle neighborhood. Our department uses the conference space for Information Sessions, Recruiting/Placement Events, and academic seminars. The space has worked well for our program and is a Middle States approved additional location. The current lease runs through March of 2020.

In College Park, all of our classes meet in the evening (6:30-9:15) when classroom space on campus is plentiful. The economics department has also allocated Morrill 1102 for office space related to the master's program. The space includes offices for the program director, College Park program coordinator, an office for program

instructors to use before class, and an office for the ECON PhD students who serve as TAs and graders in the master's program. There is also a lounge/group study area for students in the master's program.

The space on campus and off campus has been adequate for the program's purposes.

18. *Discuss the instructional resources (faculty, staff, and teaching assistants) that will be needed to cover new courses or needed additional sections of existing courses to be taught. Indicate the source of resources for covering these costs.*

    This proposal does not call for any additional courses, relative to what is already being offered in the already existing program. If enrollments increase, we may need additional faculty, staff and teaching assistants. But if enrollments increase, the additional tuition revenue will be more than sufficient to cover the cost of additional faculty, staff and teaching assistants.

    Source of Resources: Tuition revenue will be used to cover all program expenses (salaries, benefits, program materials, and physical resources). All students will pay all associated mandatory fees and the graduate application fee. This self-support program will have no impact on the unit's traditional programs.

19. *Discuss the administrative and advising resources that will be needed for the program. Indicate the source of resources for covering these costs.*

    As above, no changes to program administration or advising is expected if this proposal is adopted. The following administrative and advising regime will continue:

    The program director serves as the academic adviser to all students in the program. The program director reports to the chair of the department of economics, and to the director of graduate studies in the department of economics. The program director is currently supported by 2 part-time program coordinators – one for the semester-based version of the program on the main campus in College Park, and one for the term-based program in Washington, DC.

    Tuition revenue covers all program expenses (salaries, benefits, program materials, and physical resources). All students will pay all associated mandatory fees and the graduate application fee. This self-support program will have no impact on the unit's traditional programs.

20. *Use the Maryland Higher Education Commission (MHEC) commission financial tables to describe the program's financial plan for the next five years: https://docs.google.com/spreadsheets/d/1V6iSZG05edMitWP6CAOXjCoGO58Gf6VXxPaacKfrhZ4/edit#gid=0. Add these tables as attachments. Use the space below for any additional comments on program funding.*

    Program Financial Five-Year Plan: see Appendix E.

IMPLICATIONS FOR THE STATE (ADDITIONAL INFORMATION REQUIRED BY MHEC AND THE BOARD OF REGENTS)

21. *Explain how there is a compelling regional or statewide need for the program. Argument for need may be based on the need for the advancement of knowledge and/or societal needs, including the need for*

"expanding educational opportunities and choices for minority and educationally disadvantaged students at institutions of higher education." Also, explain how need is consistent with the Maryland State Plan for Postsecondary Education. http://mhec.maryland.gov/institutions_training/Documents/acadaff/acadproginstitapprovals/MHECStatePlan_2014.pdf

Since the proposed program will continue a program that already exists, the logic of our response here begins with the fact that the existing program has already been successfully serving students since 2012. The fact that well over 90% of the program's domestic graduates find employment in the field strongly suggests that the program is serving exactly the function that one would hope from a professional master's degree program.

The Washington, DC location targets working professionals with day jobs downtown. Approximately half of the students in each of the first 2 College Park cohorts have been international students on F-1 visas, sponsored by the University of Maryland. The other students in College Park have been domestic students who simply prefer the College Park location, often because of proximity to where they live.

The impetus for the current proposal is to permit the program to have an appropriate CIP code, which would carry a STEM designation. While this would be of specific benefit to the international graduates of the program, it also brings benefits to the area organizations in which the graduates intern, as well as to the domestic students in the program by increasing the diversity of the student body enrolled in the program.

22. *Present data and analysis projecting market demand and the availability of openings in a job market to be served by the new program. Possible sources of information include industry or disciplinary studies on job market, the USBLS Occupational Outlook Handbook https://www.bls.gov/ooh/ , or Maryland state Occupational and Industry Projections http://www.dllr.state.md.us/lmi/iandoproj/ over the next five years. Also, provide information on the existing supply of graduates in similar programs in the state (use MHEC's Office of Research and Policy Analysis webpage http://mhec.maryland.gov/publications/Pages/research/index.aspx for Annual Reports on Enrollment by Program) and discuss how future demand for graduates will exceed the existing supply. As part of this analysis, indicate the anticipated number of students your program will graduate per year at steady state.*

OES has researched the existing supply of graduates in similar programs & using the #'s provided in the budget, have anticipated number of students in proposed program who will graduate.

Domestic students have been graduating from the Washington, DC location of this program since December of 2013. In May of 2018, we also had the first cohort of graduates from the College Park version of the program, which included 8 international students.

Below is the complete list of employers for the 26 employed domestic graduates from the May 2018 graduating class:

Capital One, Financial Industry Regulatory Authority, Gartner, Inc., ISS Governance, Mathematica Policy Research, Northern Virginia Regional Intelligence Center, Office of US Senator Joe Donnelly (D-IN), Regional Economic Studies Institute at Towson University, Resources for the Future, Results for Development, Roosevelt Institute, Service Employees International Union (SEIU), Share Our Strength, US Army, US Bureau of Labor Statistics, US Bureau of the Census (2), US Coast Guard, US Congress, US Department of Agriculture, US Department of Homeland Security, Viget, Wells Fargo, Westat, and Western Union Business Solutions.

23. *Identify similar programs in the state. Discuss any differences between the proposed program and existing programs. Explain how your program will not result in an unreasonable duplication of an existing program (you can base this argument on program differences or market demand for graduates). The MHEC website can be used to find academic programs operating in the state: http://mhec.maryland.gov/institutions_training/pages/HEPrograms.aspx.*

Johns Hopkins University offers a Master of Science in Applied Economics. Our current MPS program in Applied Economics has co-existed with Johns Hopkins' MS in Applied Economics program since the fall of 2012. The demand for this curriculum, along with the complementary geographical reach of the two programs, argues against any unreasonable duplication.

24. *Discuss the possible impact on Historically Black Institutions (HBIs) in the state. Will the program affect any existing programs at Maryland HBIs? Will the program impact the uniqueness or identity of a Maryland HBI?*

    Morgan State University offers a Master of Arts in Economics through its College of Liberal Arts. As with the MS in Applied Economics at Johns Hopkins, the market demand and complementary geographical reach suggest that our curriculum is not in competition with Morgan State's program. The only effect that we anticipate from converting this curriculum from a Master of Professional Studies iteration to a standalone MS degree program would be to enhance the internship opportunities available to international students and graduates of our program.

25. *For new Post-Baccalaureate Certificates derived from existing master's programs only, include the complete curriculum of the existing master's program.*

    Not applicable.

APPENDIX A: COURSE CATALOG INFORMATION

ECON641 Microeconomic Analysis. 3 credits. Prerequisite: Admission to the Master of Science in Applied Economics. This course covers microeconomic analysis applied to public policy problems with an emphasis on practical examples and how they illustrate microeconomic theories. Policy issues such as pollution, welfare and income distribution, market design, industry regulation, price controls, tax policy, and health insurance are used to illustrate the abstract principles of microeconomics.

ECON642 Topics in Applied Macroeconomics. 3 credits. Prerequisite: Admission to the Master of Science in Applied Economics. In this course, focus is on applied macroeconomic models used by federal agencies to explain and predict economic behavior. Course emphasizes macroeconomic data: NIPA accounts, GDP, construction and application of CPI, labor force data, and economic indicators. Students will also study a selected set of current macroeconomic topics including models of economic growth, economic fluctuations, monetary policy, the Great Recession, inflation, and financial markets.

ECON643 Empirical Analysis I: Foundations of Empirical Research. 3 credits. Prerequisite: Admission to the Master of Science in Applied Economics. Fundamental aspects of data management and interpretation emphasizing sampling, descriptive statistics, index numbers and construction of aggregated variables. Students will learn basic probability theory and statistics. The course will include an introduction to simple regression analysis using STATA statistical software.

ECON644 Empirical Analysis II: Introduction to Economic Models. 3 credits. Prerequisite: ECON 643. An introduction to econometric methods with applications to public policy analysis. Primary focus on application and interpretation of multiple regression analysis.

ECON645 Empirical Analysis III: Econometric Modeling and Forecasting. 3 credits. Prerequisite: ECON 644. Refinements and generalizations of multiple regression analysis. Topics can include: panel data methods, instrumental variables, quasi-experimental methods, time series analysis, limited dependent variables, and sample selection corrections.

ECON670 Financial Economics. 3 credits. Prerequisite: ECON 641 and ECON 644 (can be taken concurrently with ECON 644). This course applies microeconomic theory and applied econometric techniques to the study of financial institutions and markets for financial assets. Students will learn how economists model and estimate the value of financial assets. The economic and empirical models are of interest to public policy makers and private wealth managers. Specific topics can include financial intermediation, the regulation of financial institutions, risk management, portfolio theory, the capital asset pricing model and the efficient markets hypothesis.

ECON671 Economics of Health Care. 3 credits. Prerequisite: ECON 641 and ECON 645 (can be taken concurrently with ECON 645). This course is an examination of the structure, conduct, and performance of the health care market including physician services, the pharmaceutical industry, the hospital market, and health insurance using quantitative and analytic economic tools. Special emphasis is on regulatory response to market imperfections.

ECON672 Program Analysis and Evaluation. 3 credits. Prerequisite: ECON 641 and ECON 645. This course examines various methods of program evaluation including randomized and nonrandomized (retrospective)

evaluations. The focus is on evaluation design and implementation including needs assessment, process evaluation, and cost benefit analysis.

ECON673 Information, Game Theory and Market Design. 3 credits. Prerequisite: ECON 641 and ECON 644 (can be taken concurrently with ECON 644). This course focuses on strategic decision-making and the theory and practice of market design. Topics include experimental economics, spectrum auctions, labor markets, electricity markets, and environmental auctions.

ECON674 Economic Analysis of Law. 3 credits. Prerequisite: ECON 641 and ECON 644 (can be taken concurrently with ECON 644). This course applies microeconomic theory to the analysis of legal rules and institutions. Topics include property rights, externalities, contract theory, bargain theory, remedies, industrial organization, patents, damages, and antitrust.

ECON675 Environmental Economics. 3 credits. Prerequisite: ECON 641 and ECON 645 (can be taken concurrently with ECON 645). This course develops a framework for an economic assessment of environmental problems and policy design with respect to market failures and the valuation of environmental resources. Focus is on policy issues, economic incentives, and instruments and valuation of nonmarket goods.

ECON676 Economic Development. 3 credits. Prerequisite: ECON 641, ECON642 and ECON 644 (can be taken concurrently with ECON 644). The course will focus on the consequences of poverty and poor institutions for the behavior and welfare of individuals, households, firms and the aggregate economy in developing countries. Theoretical models and empirical evidence will be used to understand the intended and unintended consequences of policies designed to enhance economic development.

ECON683 International Macroeconomics and Finance. 3 credits. Prerequisite: ECON 642 and ECON 644 (can be taken concurrently with ECON 644). Economic analysis of international macroeconomic issues and policy. Topics can include the study of exchange rates, balance of payments, international financial markets, international business cycles, contagion, and the roles played by international economic institutions.

ECON684 Applied Time Series Analysis and Forecasting. 3 credits. Prerequisite: ECON 642 and ECON 645. Students will learn the theory of stationary processes and how it applied to econometric techniques for estimation and forecasting based on time series data. The techniques will be applied in macroeconomic, financial and business applications.

APPENDIX B: ASSESSMENT OF LEARNING OUTCOMES

When the current MPS program was proposed and approved in 2011, the following items were proposed and approved as Learning Outcomes Assessments:

Assessment Measures

1. Survey of Graduates

Graduates of the program will be asked to complete a survey to address the relevance of the program's course material to their current professional activities. Respondents will be asked to describe the value of the course material in providing quantitative tools for policy analysis. Surveys will be distributed at the time of graduation and one year after graduation to assess program relevance to current and potential employment opportunities.

2. Exit Interview

Graduates will be asked to participate in an exit interview designed to assess the value of the program, the relevance of the course material, and the effectiveness of instructors.

3. Advisory Group

An advisory group has been established to review the results of the assessment methods and, based on examination results and graduate responses, offer changes to continually refine and improve the degree program. The advisory group includes the Department of Economics Chair, Director of Graduate Studies, and Director of the Master's Program.

Since 2011, our Learning Outcomes Assessment practice requires instructors to assess students during their final term in the program. The assessments were along dimensions that match our program's six Learning Outcomes. We have also converted the Exit Interview into a non-anonymous Exit Survey, administered via email, so that we may better track the employment opportunities of our graduates.

The College of Behavioral and Social Sciences is currently working on comprehensive updates of the Learning Outcomes Assessment Plans for all of the college's professional master's degree programs.

The new Learning Outcomes Assessment plan for our program relies partly on performance on an independent 3rd party exam. The 3rd party is the National Association of Business Economics (NABE). The NABE is a professional organization for people who apply economics in business settings. The NABE offers a Certified Business Economist (CBE) credential for professional economists. Economists can take CBE prep courses from the NABE to prepare for the CBE exam, but the NABE also partners with academic programs that offer relevant curricula. We have recently entered a partnership with the NABE, whereby students who have completed certain courses in our program would be able to take the NABE's CBE exam without taking NABE's own courses, and with a discounted exam fee. Students who take the CBE exam may also share their exam score results with our program, so that we may use the exam score data for Learning Outcome Assessment purposes. Data on our students' performance on the NABE's CBE exam will provide a good basis for assessing learning outcomes 1-4.

To assess outcomes 5 and 6, we ask instructors in two of our courses to provide assessments based on student presentations. One of the courses (ECON 643) is taken in students' first term. The other (ECON 672) is taken in students' final term. Data from faculty assessments in these two courses provides a good basis for assessing students' abilities to interpret and communicate economic models to a wider audience, and to measure and evaluate the effectiveness of policy programs using sound econometric techniques.

APPENDIX C: PROGRAM FACULTY

UMD MASTER'S IN APPLIED ECONOMICS – INSTRUCTORS BY COURSE

CORE COURSES – ALL STUDENTS TAKE ECON 641-ECON 645

ECON641 Microeconomic Analysis

Aaron Finkle
Full-time Lecturer, UMCP
Ph.D., Economics, University of Washington–Seattle, 2004
To teach ECON 641 on an overload in CP every fall and in DC every spring.
Terms taught previously in our program:
Fall 2016, 2017, 2018 (College Park), Spring 2018 (DC)

Richard Stahnke
Full-time Lecturer, UMCP
Ph.D., Economics, Columbia, 1999
To teach 2nd section of ECON 641 in College Park as necessary in the fall.
Also teaches ECON 670 in College Park in the spring.
Terms taught previously in our program:
Spring 2018 (ECON 670 in College Park)
Fall 2018 (ECON 641 in College Park)

Maksim Belenkiy
International Economist, US Department of Commerce, International Trade Administration
Adjunct lecturer, UMCP
Ph.D., Economics, University of California, Santa Cruz, 2010
To teach ECON 641 in DC every fall.
Also teaches ECON 644 every summer.
Can also teach ECON 677 (proposed) in future spring terms.
Terms taught previously in our program:
Every summer since 2013 (ECON 644 in DC)
Fall of 2018 (ECON 641 in DC)

ECON642 Topics in Applied Macroeconomics

Mike Barry
Associate Professor of Economics and Law, Mount St. Mary's University
Adjunct Lecturer, UMCP
Ph.D., Economics, University of Wisconsin-Milwaukee, 1998
To teach ECON 642 in CP every fall.
Also to teach ECON 674 in CP every spring.
Terms taught previously in our program:
Fall 2016, 2017, 2018 (ECON 642 in College Park)
Spring 2017, 2018 (ECON 674 in College Park)
Also ECON 684 in the Spring of 2018 in College Park

Aditya Aladangady
Economist, Federal Reserve Board of Governors
Adjunct Lecturer, UMCP
Ph.D., Economics, University of Michigan, 2014
To teach ECON 642 every winter in DC.
Terms taught previously in our program:
Summer 2017, Winter 2017/18

Cynthia Doniger
Economist, Federal Reserve Board of Governors
Adjunct Lecturer, UMCP
Ph.D., Economics, University of Michigan, 2014
To teach ECON 642 every summer in DC.
Terms taught previously in our program:
Summer 2018

ECON643 Empirical Analysis I: Foundations of Empirical Research

John Straub
Full-time Lecturer, UMCP
Executive Director, Master's Degree Program in Applied Economics, UMCP
Ph.D., Economics, University of Wisconsin-Madison, 2001
To teach ECON 643 in CP every fall, and in DC every spring.
Terms taught previously in our program:
Fall 2014, Spring 2015, Fall 2015, Spring 2016 (ECON 641 in DC)
Fall 2016, 2017, 2018 (ECON 643 in College Park)
Spring 2017, 2018 (ECON 643 in DC)

Marina Miller
Principal Analyst, Congressional Budget Office
Adjunct Lecturer, UMCP
Ph.D., Economics, University of California–San Diego, 2015
To teach ECON 643 every fall in DC.
Terms taught previously in our program:
Fall 2018

ECON644 Empirical Analysis II: Introduction to Economic Models

Hossein Abassi
Full-time Lecturer, UMCP
University of Illinois at Urbana-Champaign, 2009
To teach ECON 644 every spring in CP.
Terms taught previously in our program:
Spring 2018

Maksim Belenkiy
International Economist, US Department of Commerce, International Trade Administration
Adjunct lecturer, UMCP
Ph.D., Economics, University of California, Santa Cruz, 2010
To teach ECON 644 in DC every summer.
Also to teach ECON 641 in DC every fall.
Can also teach ECON 677 (proposed) in future spring terms.
Terms taught previously in our program:
Every summer since 2013 (ECON 644 in DC)
Fall of 2018 (ECON 641 in DC)

Razvan Vlaicu
Senior Research Economist, Inter-American Development Bank
Adjunct lecturer, UMCP
Ph.D., Economics, Northwestern University, 2006
To teach ECON 644 in DC every winter.
Terms taught previously in our program:
Every winter since 2015/16 (ECON 644 in DC)
(Was an assistant professor in UMCP Department of Economics from Aug 2006 – June 2014.)

ECON645 Empirical Analysis III: Econometric Modeling and Forecasting

Marquise McGraw
Economist, US Consumer Financial Protection Bureau
Adjunct Lecturer, UMCP
Ph.D., Economics, University of California–Berkeley, 2015
To teach ECON 645 every spring in College Park.
Terms taught previously in our program:
Spring 2018

Cristina Tello-Trillo
Economist, US Bureau of the Census
Adjunct Lecturer, UMCP
Ph.D., Economics, Yale, 2015
To teach ECON 645 every fall and spring in DC
Can also teach ECON 677 (proposed) in the fall and/or spring
Terms taught previously in our program:
Every fall and spring since the spring of 2016.

Shanthi Ramnath
Financial Economist, US Department of the Treasury
Adjunct Lecturer, UMCP
Ph.D., Economics, University of Michigan-Ann Arbor, 2010
Teaching ECON 645 in the fall of 2018 (maternity leave for Cristina Tello Trillo)
Also qualified to teach ECON 672 and/or ECON 643 in the future as needed.
Terms taught previously in our program:
Fall 2018

FIELD COURSES – STUDENTS CHOSE 5 FROM THE FOLLOWING (670-684):

ECON670 Financial Economics

Richard Stahnke
Full-time Lecturer, UMCP
Ph.D., Economics, Columbia, 1999
To teach ECON 670 in College Park every spring.
Also teaches 2nd section of ECON 641 in College Park as necessary in the fall.
Terms taught previously in our program:
Spring 2018 (ECON 670 in College Park)
Fall 2018 (ECON 641 in College Park)

Lubomir Petrasek
Principal Economist, Federal Reserve Board of Governors
Adjunct lecturer, UMCP
Ph.D., Finance, Penn State University, 2011
To teach ECON 670 in DC in the fall and/or spring.
Terms taught previously in our program:
Fall 2017, Spring 2018, Fall 2018

ECON671 Economics of Health Care

Nathan Petek
Economist, Federal Trade Commission
Adjunct Lecturer, UMCP
Ph.D., Business, University of Chicago, Booth School of Business, 2016
To teach ECON 671 in the fall in College Park and/or in the summer in DC.
Terms taught previously in our program:
Fall 2018 in College Park

Patrick Richard
Assistant Professor of Health Economics
Uniformed Services University of the Health Sciences
Adjunct Lecturer, UMCP
Ph.D., Health Economics, Johns Hopkins University, 2007
To teach ECON 671 in the summer in DC.
Terms taught previously in our program:
Spring of 2014 and 2015
Every summer since 2016, and the winter of 2016/17

ECON672 Program Analysis and Evaluation

Misty Heggeness
Chief, Longitudinal Research, Evaluation, and Outreach Branch, U.S. Census Bureau
Adjunct Lecturer, UMCP

Ph.D. Applied Economics, University of Minnesota, 2010
To teach ECON 672 every spring in College Park
Terms taught previously in our program:
Spring 2018 in College Park

Joanne Hsu
Senior Economist, Board of Governors of the Federal Reserve
Adjunct Lecturer, UMCP
Ph.D., Economics, University of Michigan-Ann Arbor, 2011
To teach ECON 672 every summer in DC
Terms taught previously in our program:
Summer 2017, Winter 2017/18

Ryan Nunn
Fellow, Economic Studies Program, Brookings Institution
Adjunct Lecturer, UMCP
Ph.D., Economics, University of Michigan-Ann Arbor, 2012
To teach ECON 672 every winter in DC
Terms taught previously in our program:
Winter of 2015/16, Summer of 2016, Summer of 2018

ECON673 Information, Game Theory and Market Design

David Ovadia
Economist, Federal Trade Commission
Adjunct Lecturer, UMPC
Ph.D., Economics, Northwestern University, 2015
To teach ECON 673 every spring in College Park, and every fall in DC.
Terms taught previously in our program:
Fall 2017 (DC), Spring 2018 (CP), Fall 2018 (DC)

ECON674 Economic Analysis of Law

Mike Barry
Associate Professor of Economics and Law, Mount St. Mary's University
Adjunct Lecturer, UMCP
Ph.D., Economics, University of Wisconsin-Milwaukee, 1998
To teach ECON 674 in CP every spring.
Also to teach ECON 642 in CP every fall.
Terms taught previously in our program:
Fall 2016, 2017, 2018 (ECON 642 in College Park)
Spring 2017, 2018 (ECON 674 in College Park)
Also ECON 684 in the Spring of 2018 in College Park

David Burk
Economist, Congressional Budget Office

Adjunct Lecturer, UMCP
Ph.D., Economics, University of Chicago, 2014
To teach ECON 674 in DC every fall.
Also to teach ECON 684 every spring in College Park and some summers in DC.
Terms taught previously in our program:
ECON 674: Fall 2016, Spring 2018 (DC)
ECON 684: Winter 2016/17, Winter 2017/18 (DC)

ECON675 Environmental Economics

Hong Kim
Labor Economist, US Department of Labor
Adjunct Lecturer, UMCP
Ph.D., Applied and Resource Economics, University of California-Davis, 1994
To teach ECON 675 every fall in College Park
Terms taught previously in our program:
Fall 2017, Fall 2018

Charles Griffiths
Research Economists at the US Environmental Protection Agency
Adjunct Lecturer, UMCP
Ph.D., Economics, UMCP, 1997
To teach ECON 675 every winter in DC (co-instructor with Chris Dockins)
Terms taught previously in our program:
Fall 2013, Fall 2014, Spring 2015, every Winter since 2016/17

Chris Dockins
Senior Economists at the US Environmental Protection Agency
Adjunct Lecturer, UMCP
Ph.D., Economics, Duke, 1996
To teach ECON 675 every winter in DC (co-instructor with Charles Griffiths)
Terms taught previously in our program:
Fall 2013, Fall 2014, Spring 2015, every Winter since 2016/17

ECON676 Economic Development

Oscar Mitnik
Principal Economist, Inter-American Development Bank
Adjunct Lecturer, UMPC
Ph.D., Economics, University of California–Los Angeles, 2004
To teach ECON 676 every fall in DC (co-instructor with Jonathan Rose)
Terms previously taught in our program:
Fall 2018

Jonathan Rose
Lead Economics Specialist, Inter-American Development Bank

Adjunct Lecturer, UMPC
Ph.D., Economics, University of Iowa, 2001
To teach ECON 676 every fall in DC (co-instructor with Oscar Mitnik)
Terms previously taught in our program:
Fall 2018

Currently interviewing candidates to teach ECON 676 in College Park

ECON677 International Trade (Proposed)

Cristina Tello-Trillo
Economist, US Bureau of the Census
Adjunct Lecturer, UMCP
Ph.D., Economics, Yale, 2015
To teach ECON 645 every fall and spring in DC
Can also teach ECON 677 (proposed) in the fall and/or spring
Terms taught previously in our program:
Every fall and spring since the spring of 2016.

Maksim Belenkiy
International Economist, US Department of Commerce, International Trade Administration
Adjunct lecturer, UMCP
Ph.D., Economics, University of California, Santa Cruz, 2010
To teach ECON 644 in DC every summer.
Also to teach ECON 641 in DC every fall.
Can also teach ECON 677 (proposed) in future spring terms.
Terms taught previously in our program:
Every summer since 2013 (ECON 644 in DC)
Fall of 2018 (ECON 641 in DC)

ECON 677 instructor in College Park to be determined.

ECON683 International Macroeconomics and Finance

Mahsa Gholizadeh
Economist, US Bureau of Economic Analysis
Adjunct Lecturer, UMCP
Ph.D., Economics, American University, 2015
To teach ECON 683 every fall in College Park and every spring in DC.
Terms taught previously in our program:
Fall 2017 and 2018 in College Park
Spring 2018 in DC

ECON684 Applied Time Series Analysis and Forecasting

David Burk
Economist, Congressional Budget Office
Adjunct Lecturer, UMCP
Ph.D., Economics, University of Chicago, 2014
To teach ECON 684 every spring in College Park and some summers in DC.
Also to teach ECON 674 in DC every fall.
Terms taught previously in our program:
ECON 674: Fall 2016, Spring 2018 (DC)
ECON 684: Winter 2016/17, Winter 2017/18 (DC)

Thiago Ferreira
Economist, Board of Governors of the Federal Reserve
Adjunct Lecturer, UMCP
Ph.D., Economics, Northwestern University, 2014
To teach ECON 684 in the summer and/or winter in DC.
Terms taught previously in our program:
Summers of 2017 and 2018

Library Assessment
DATE: February 11, 2011
TO: Stephanie C. McKissic, Program Manager Office of Extended Studies
FROM: Zaida Díaz and Lily Griner Business, Economics and Agricultural Economics Librarians; Geraldine Foudy, Manager of Collections and Scholarly Communication; Dr. Desider Vikor, Director for Collection Management and Special Collections
RE: Library Collection Assessment

We are providing this assessment in response to the Master of Professional Studies in Applied Economics degree proposal by the Office of Extended Studies, working with the Department of Economics. This library assessment has been requested to evaluate the ability of the UM Libraries to support this new Master program. The University of Maryland Library already has an established background in providing bibliographic support for researchers and professionals in the related academic disciplines, i.e., Business, Economics as well as Agricultural & Resource Economics. We feel that the University of Maryland Libraries' collections provide a strong base and continued growth to support adequately the curricular and research needs of this newly-proposed Master program.

The Collection: Books
Relevant books in the Libraries' collections appear to be substantial in number, as reflected in the catalog search title results below:
Economic models – 1218; Economic theory – 918; Economic statistics – 1616; Econometrics – 543; Economic data – 116; Economics-decision making – 122; Economics- statistical methods – 92; Economics policy – 1743; Economic forecasting – 1196

The Collection: Serials
A search was performed in *Journal Citations Reports* 2009, a database that uses citation data to rank and determine the impact factor of journals in an academic field. To support the proposed degree access is available at the present time to the following ranked journals:

- Quarterly Journal of Economics Journal of Economic Literature
- Journal of Economic Perspectives.
- Econometrica Journal of
- Economic Growth Journal of Financial Economics
- Applied Economics Applied Economics
- Letters Economic Policy
- Economic Modeling International Journal of Forecasting

The Collection: Electronic Resources
The UM Libraries subscribe and/or have access to the following significant databases that will support the master's program:
Article Databases: AgEcon Search, Berkeley Electronic Press, Business Source Complete, EconLit, Economist Historical Archive (1843-2006), Factiva, JSTOR, NBER Working Papers Online, RePEc/EconPaper, ScienceDirect, Wall Street Journal Historical (1889-1992).

Reference, eBooks and Others: Conference Board, EIU Viewswire, EIU Country Commerce, EIU Country Finance, Digital Dissertations, Encyclopedia of Business and Finance, Gale Encyclopedia of U.S. Economic History, Goldsmiths-Kress Library of Economic Literature Handbooks in Economics, New Palgrave Dictionary of Economics, OECDiLibrary, Oxford Encyclopedia of Economic History, Sage Reference Collection, SourceOECD, Springer eBooks, Worldmark encyclopedia of national economies

Data Sources: Balance of Payment Statistics, Bloomberg, CRSP, Country at a Glance Tables (World Bank), Country Data (PRS Group), Datastream, EIU Viewswire, FRED: Federal Reserve Economic Data, DataInsight Web, Gartner Group, Global Development Finance (World Bank), Global Economic Monitor (World Bank), Historical Statistics of the United States, International Comparison Program, International Financial Statistics (IMF), IHS/Global Insight, Joint External Debt Hub (Joint BIS-IMF-OECD-WB Statistics), Lexis/Nexis Datasets, Reuters 3000 Xtra, Social Science Research Network, Wharton Data Research Services (WRDS), World Economic Outlook, World Development Indicators Online.

Interlibrary Loan

When resources are not part of our holdings within the sixteen University System of Maryland and Affiliated Institutions (USMAI) libraries, the Interlibrary Loan Office can obtain monographs, journal articles, dissertations, government documents and technical reports at no charge to the student or faculty.

Conclusion

Our assessment is, therefore, that the University of Maryland Libraries are able to support the courses that constitute the proposed Master of Professional Studies in Applied Economics degree.

APPENDIX E: FIVE-YEAR BUDGET

Budget: MS in Applied Economics					
Estimated Program Revenue & Support	Year 1	Year 2	Year 3	Year 4	Year 5
I. Total Tuition Revenue	**$1,040,000**	**$1,615,640**	**$1,820,874**	**$2,039,941**	**$2,273,620**
A. Semester-Based Revenue (by year)	**$390,000**	**$716,560**	**$815,526**	**$921,264**	**$1,034,155**
Subtotal: Semester-based, Students	20	42	46	50	54
1a. Semester-based: Student Enrollment, 1st Year	20	22	24	26	28
1b. Semester-based: Student Enrollment, 2nd Year		20	22	24	26
Subtotal: Semester-based, Courses	6	10	10	10	10
1a. Semester-based: Courses, 1st Year	6	6	6	6	6
1b. Semester-based: Courses, 2nd Year		4	4	4	4
B. Term-Based Revenue (by year)	**$650,000**	**$899,080**	**$1,005,347**	**$1,118,677**	**$1,239,465**
Subtotal: Term-based, Students	25	52	56	60	64
2a. Term-based: Student Enrollment 1st Year	25	27	29	31	33
2b. Term-based: Student Enrollment 2nd Year		25	27	29	31
Subtotal: Term-based, Courses	8	10	10	10	10
2a. Term-based: Courses, 1st Year	8	8	8	8	8
2b. Term-based: Courses, 2nd Year		2	2	2	2
C. Tuition Per Course Rate; Assumes 4% increase	**$3,250**	**$3,380**	**$3,515**	**$3,656**	**$3,802**
II. Other Support	$0	$0	$0	$0	$0
A. Dean Support					
B. Department Support					
C. Other program support (grant/vendor)					
Total Estimated Program Revenue & Support	**$1,040,000**	**$1,615,640**	**$1,820,874**	**$2,039,941**	**$2,273,620**
Estimated Program Expenses	Year 1	Year 2	Year 3	Year 4	Year 5
I. Total Instructional & Academic Administration	**$407,015**	**$438,299**	**$451,448**	**$464,991**	**$478,941**
A. Instructional Totals	**$111,106**	**$133,512**	**$137,518**	**$141,643**	**$145,893**
1. Instructor salary (assumes a 3% annual increase)	8,573	8,830	9,095	9,368	9,649
2. Total instructors per year	12	14	14	14	14
Subtotal: Semester-based, Instructors	5	9	9	9	9
1a. Semester-based: Instructors, 1st Year	5	5	5	5	5
1b. Semester-based: Instructors, 2nd Year		4	4	4	4
Subtotal: Term-based, Instructors	7	9	9	9	9
2a. Term-based: Instructors, 1st Year	7	7	7	7	7
2b. Term-based: Instructors, 2nd Year		2	2	2	2
3. Instructional Benefits: Total FICA (8%)	8,230	9,890	10,187	10,492	10,807

B. Academic Administration Totals	**$295,909**	**$304,786**	**$313,930**	**$323,348**	**$333,048**
1. Administrative Salaries (assumes 3% increase): Totals	223,007	229,697	236,588	243,686	250,996
a. Academic Director (responsible for teaching 2 courses)	129,007	132,877	136,864	140,969	145,199
b1.Semester-based: Academic Coordinator	26,000	26,780	27,583	28,411	29,263
b2.Semester-based: Graduate Assistant	21,000	21,630	22,279	22,947	23,636
c1.Term-based: Academic Coordinator	26,000	26,780	27,583	28,411	29,263
c2.Term-based: Graduate Assistant	21,000	21,630	22,279	22,947	23,636
2. Administrative Benefits (30%): Totals	66,902	68,909	70,976	73,106	75,299
3. Other Labor: Totals	6,000	6,180	6,365	6,556	6,753
a. Semester-based: Graders	3,000	3,090	3,183	3,278	3,377
b. Term-based: Graders	3,000	3,090	3,183	3,278	3,377
II. Materials & Supplies	**$9,000**	**$18,800**	**$20,400**	**$22,000**	**$23,600**
A. Cost per course (estimated)	$10	$10	$10	$10	$10
B. Total number of courses (semester- & term-based)	20	20	20	20	20
C. Total number of students (semester- & term-based)	45	94	102	110	118
III. Marketing	**$15,000**	**$15,000**	**$15,000**	**$15,000**	**$15,000**
A. Marketing ($15,000 per year minimum)	15,000	15,000	15,000	15,000	15,000
IV. Equipment	**$2,800**	**$2,800**	**$2,800**	**$2,800**	**$2,800**
A. Computer-related (laptops, tablets)	2,000	2,000	2,000	2,000	2,000
B. Other Devices (printer, scanner, projectors, etc.)	800	800	800	800	800
V. Space Rental	**$138,960**	**$143,129**	**$147,423**	**$151,845**	**$156,401**
A. 1400 16th Street, NW, WDC (per year for term-based)	138,960	143,129	147,423	151,845	156,401
VI. Other Operational Expenses (2% annual increase)	**$6,450**	**$153**	**$156**	**$159**	**$162**
A. Travel (for recruitment)	150	153	156	159	162
B. Business Meals	1,800	1,836	1,873	1,910	1,948
C. Phone & Internet	3,500	3,570	3,641	3,714	3,789
D. Other	1,000	1,020	1,040	1,061	1,082
Total Estimated Program Expenses	**$579,225**	**$618,181**	**$637,227**	**$656,796**	**$676,904**
Total Estimated Program Revenue & Support	**$1,040,000**	**$1,615,640**	**$1,820,874**	**$2,039,941**	**$2,273,620**
Total Estimated Program Expenses	**$579,225**	**$618,181**	**$637,227**	**$656,796**	**$676,904**
Net Revenue	**$460,775**	**$997,459**	**$1,183,647**	**$1,383,145**	**$1,596,716**

PREFACE: Conversion of the MPS iteration to a Standalone Degree Program

The Master of Professional Studies (MPS) program was approved in 2005 by the University System of Maryland (USM) Board of Regents (BOR) and Maryland Higher Education Commission (MHEC) to allow for the expedited approval of curricula that respond to changing market needs of working professionals. New iterations within the MPS only need approval by the USM Chancellor after they have been approved through campus review. Technically, students receive their master's degree (or graduate certificate) in Professional Studies. The actual program focus (for example, Applied Economics) also appears on the transcript and diploma, but as a concentration rather than the actual degree program. Because of this structure, though, all Master of Professional Studies iterations carry the same Department of Education's Classification of Instructional Program (CIP) taxonomy code of 30.9999, "Multi-/Interdisciplinary Studies, Other". The CIP code is linked to the top-level credential.

While tracks within the MPS have the benefit of an expedited approval process, the common CIP code presents some disadvantages. Searches that use CIP code to find program offerings will not find the discipline-specific iteration, which reduces market visibility. Moreover, some CIP codes are designated as "STEM" eligible by the Department of Homeland Security, and international students with F1 visas who graduate from STEM designated programs may continue to work in the United States for two years longer than students in non-STEM designated programs. The generic CIP code for Professional Studies programs does not qualify as STEM-designated, even if the academic content of the Professional Studies program would qualify.

For MPS iterations that have demonstrated stable market interest and that have appropriate "STEM"-identified content, it is of interest to pull them out from underneath the MPS umbrella and create a standalone version. Creation of a standalone degree program requires approval by the USM Board of Regents and by MHEC.

Establish a Master of Science in Geospatial Information Sciences (PCC 18050)

PRESENTED BY	Janna Bianchini, Chair, Senate Programs, Curricula, and Courses Committee
REVIEW DATES	SEC – January 28, 2019 | SENATE – February 5, 2019
VOTING METHOD	In a single vote
RELEVANT POLICY/DOCUMENT	N/A
NECESSARY APPROVALS	Senate, President, University System of Maryland Board of Regents, and Maryland Higher Education Commission

ISSUE

The Department of Geographical Sciences within the College of Behavioral and Social Sciences (BSOS) proposes to establish a Master of Science degree program in Geospatial Information Sciences. This program exists currently as an iteration of the Master of Professional Studies (MPS) program. The 31-credit program has been in operation since 2007. The Master of Professional Studies program was approved in 2005 by the University System of Maryland Board of Regents and Maryland Higher Education Commission to allow for the expedited approval of curricula that respond to changing market needs of working professionals. Once a new iteration of the MPS is approved through campus PCC review, it only needs approval by the USM Chancellor to become official.

A limitation of offering the program as an MPS iteration is that all Professional Studies programs must use the same generic Federal Classification of Instructional Programs (CIP) code rather than a CIP code that accurately describes the program content. Searches that use CIP codes to find program offerings will not find the discipline-specific iteration, which reduces market visibility. Moreover, some CIP codes are designated as "STEM" eligible by the Department of Homeland Security, and international students with F1 visas who graduate from STEM designated programs may continue to work in the United States for two years longer than students in non-STEM designated programs. The generic CIP code for Professional Studies programs does not qualify as STEM-designated, even if the academic content of the Professional Studies program is STEM-related.

Consequently, the Geographical Sciences Department proposes to transition the program from a Master of Professional Studies program to a stand-alone Master of Science program in order to be classified more accurately. No changes are proposed to the program curriculum or administration. In a separate proposal, Geographical Sciences is proposing to convert its Professional Studies program in Geospatial Intelligence to a stand-alone program. The Economics Department is also proposing to convert its Master of Professional Studies program in Applied Economics to a stand-alone program in a separate proposal.

The Geospatial Information Sciences program provides advanced education in geospatial technology, theory and applications. The courses cover spatial analysis, spatial statistics, remote

sensing, computer programming, spatial databases, geographic information systems (GIS) modeling, Web GIS, mobile GIS, big data analytics, and open source GIS.

The curriculum consists of 22 credits of core courses and 9 credits from a list of eligible GEOG courses. The core courses are as follows:

- GEOG651 Spatial Statistics (3 credits)
- GEOG652 Digital Image Processing and Analysis (3 credits)
- GEOG653 Spatial Analysis (3 credits)
- GEOG655 Spatial Database System (3 credits)
- GEOG656 Programming and Scripting for GIS (3 credits)
- GEOG657 Web Programming (3 credits)
- GEOG795 Professional Practices Seminar (1 credit)
- GEOG797 Professional Project (3 credits)

The elective course list is as follows:

- GEOG650 Mobile GIS (3 credits)
- GEOG654 GIS and Spatial Modeling (3 credits)
- GEOG660 Advanced Remote Sensing using Lidar (3 credits)
- GEOG661 Fundamentals of Geospatial Intelligence (3 credits)
- GEOG663 Big Data Analytics (3 credits)
- GEOG670 Open Source GIS (3 credits)
- GEOG677 Internet GIS (3 credits)
- GEOG796 GIS Project Management (3 credits)

Through the program, students develop a proficiency in the collection, processing, analysis, modeling and visualization of spatial data. Students develop spatial databases, process digital images, design web and mobile applications, and use high performance computing for analysis of large sets of spatial data.

The program has been successful since its inception in 2008. Graduates have been able to find job placements in a variety of institutions including federal government agencies, local government, non-profit organizations, and private sectors.

This proposal was approved by the Senate Programs, Curricula, and Courses committee on December 7, 2018.

RECOMMENDATION(S)

The Senate Committee on Programs, Curricula, and Courses recommends that the Senate approve this new degree program.

COMMITTEE WORK

The committee considered this proposal at its meeting on December 7, 2018. Jack Ma, Director of the Master of Professional Studies Program in Geospatial Information Sciences, presented the proposal. The proposal was approved by the committee.

ALTERNATIVES

The Senate could decline to approve this new degree program.

RISKS

If the Senate declines to approve this degree program, the university will lose an opportunity to take an existing program and make it more attractive to international students by simply classifying the program more accurately.

FINANCIAL IMPLICATIONS

There are no significant financial implications with this proposal as the program already exists as a Master of Professional Studies program.

University of Maryland PCC
Program/Curriculum/Unit Proposal

PCC Log No: 18050

Program: Master of Science in Geospatial Information Sciences

Department/Unit: Geographical Sciences

College/School: BSOS

Proposal Contact Person (with email): Jianguo Ma, jma3@umd.edu

Type of Action (check one):

- ☐ Curriculum change (includes modifying minors, concentrations/specializations and creating informal specializations)
  - ☐ Curriculum change is for an LEP Program
- ☐ *Rename a program or formal Area of Concentration*
- ☐ *Establish/Discontinue a formal Area of Concentration*
- ☐ Other:
- ☒ *Establish a new academic degree/certificate program*
- ☐ Create an online version of an existing program
- ☐ Establish a new minor
- ☐ *Suspend/Discontinue a degree/certificate program*
- ☐ Establish a new Master or Certificate of Professional Studies program
  - ☐ New Professional Studies program will be administered by Office of Extended Studies

Italics indicate that the proposal must be presented to the full University Senate for consideration.

Approval Signatures - *Please print name, sign, and date. For proposals requiring multiple unit approvals, please use additional cover sheet(s).*

1. Department Committee Chair JULIE SHEVA 10/10/18
2. Department Chair Chris Justice 10/11/18
3. College/School PCC Chair for Karol Salton 11/9/18
4. Dean Wayne Mackay 11/9/18
5. Dean of the Graduate School (if required)
6. Chair, Senate PCC Janna Bianchini 12-7-18
7. University Senate Chair (if required)
8. Senior Vice President and Provost

Instructions:
When approved by the dean of the college or school, please send the proposal and signed form to the Office of the Associate Provost for Academic Planning and Programs, 1119 Main Administration Building, Campus-5031, **and** email the proposal document as an MSWord attachment to pcc-submissions@umd.edu.

Summary of Proposed Action (use additional sheet if necessary):
The proposed Master of Science in Geospatial Information Sciences (MSGIS) will replace the current Master of Professional Studies in Geospatial Information Sciences (MPSGIS) program, and continue to provide advanced education in the field of geospatial information sciences. This new MSGIS will have an appropriate STEM designation which will help attract more highly skilled domestic and international students. For domestic students, the STEM designation will enhance their application for scholarships and career improvement. For international students, the extra optional practical training (OPT) term will benefit their job search. The success of these students will in turn strengthen the academic reputation of the MSGIS program and the University.

Unit Code(s) (to be entered by the Office of Academic Planning and Programs):

Program: Master of Science in Geospatial Information Sciences

Date of Proposal: September 21, 2018

Start Term for New Program: Fall, 2019

A new degree program proposal will need to be approved not just by campus but also by the University System of Maryland (USM) Board of Regents and the Maryland Higher Education Commission (MHEC). New certificate programs need to be approved by the USM Chancellor and MHEC. The following prompts are based on academic policies for programs and reflect campus requirements and MHEC requirements. The prompts also include questions frequently asked by review committees. See http://mhec.maryland.gov/institutions_training/Pages/acadaff/AcadProgInstitApprovals/NewAcademicProgramProposals.aspx for more information about MHEC requirements. Please feel free to add additional information at the end of this document or in a separate appendix.

Mission and Purpose

1. Describe the program and explain how it fits the institutional mission statement and planning priorities. The University Mission Statement and Strategic Plan can be found on this site: https://www.umd.edu/history-and-mission.

The University of Maryland is committed to providing educational programs that meet the needs of a variety of audiences. The Department of Geographical Sciences proposes to establish a **Master of Science in Geospatial Information Sciences (MS GIS)** to provide advanced education and training in geospatial technology, theory and applications. The program aims to help students from nationwide learn the most up-to-date knowledge and skills of geographical information systems, remote sensing, and computing in general. A **Master of Professional Studies in Geospatial Information Sciences (MPS GIS)** program was established in 2007 to fulfill this very responsibility. In past 10 years, it has grown into one of the largest and also the best GIS programs in the US. This program is recognized as one of the Esri Development Centers (http://www.esri.com).

The proposed **MS GIS** program will replace the current **MPS GIS** program, and continue to provide advanced education in the field of geospatial information sciences. This new MS GIS will have an appropriate STEM designation which will help attract more highly skilled domestic and international students. For domestic students, the STEM designation will enhance their application for scholarships and career improvement. For international students, the extra optional practical training (OPT) term will benefit their job search. The success of these students will in turn strengthen the academic reputation of the program and the University.

GIS is a software application system that has a wide range of application areas such as transportation logistics, network analysis, emergency management, urban planning, environmental research, etc. Demand for well-trained GIS professionals is growing much faster than supply. Trained individuals are needed at multiple levels – from certified entry-level technicians to Ph.D. research scientists. In the Washington DC metropolitan area, there is a high concentration of government agencies and various organizations which have high demand for skilled GIS professionals. Because of its unique location, the University of Maryland has the responsibility of playing an important role and providing quality education and training to such work force in Maryland and the greater Washington D.C. metropolitan area.

Program Characteristics

2. Provide the catalog description of the proposed program. As part of the description, please indicate any areas of concentration or specializations that will be offered.

The **MS GIS** program is designed to provide advanced education and training of the most up-to-date knowledge and skills of geospatial technology including GIS, remote sensing, and computing. The concentration of the program is on GIS application development and integration of GIS and remote sensing. This is very different from traditional GIS which is focused on desktop software application and typically does not require computer programming and development.

3. What are the educational objectives of the program?

The goal is to help students become GIS developers, instead of GIS users. Therefore, the MS GIS curriculum is beyond GIS and includes remote sensing, statistics, and computing as well. The topics cover spatial analysis, spatial statistics, programming and scripting, spatial databases, GIS modeling, remote sensing, Internet GIS, Mobile GIS, Big Data, and Open Source GIS.

Specifically the education objectives of the MS GIS program include but are not limited to:

1. Comprehend and apply concepts and practices of geographic information systems (GIS)
2. Comprehend and apply concepts and practices of remote sensing
3. Comprehend and apply concepts and issues related to modeling and simulation in the GIS context
4. Comprehend and apply concepts and practices of GIS application development on Web and mobile platforms
5. Comprehend and apply scripting and object-oriented programming with Python

4. Describe any selective admissions policy or special criteria for students interested in this program.

The **MS GIS** program admission policies are based on that of the Graduate School of the University of Maryland. In addition, the Program has a set of specific admission criteria.

The admission criteria of the Graduate School include:

- The applicants should have earned a four-year baccalaureate degree or equivalent from an accredited institution.
- The applicants should have a minimum cumulative 3.0 GPA (on a 4.0 scale). Official transcripts of a post-secondary degree and a résumé are required along with the application.
- International applications must meet all requirements for international admissions, which have specific standards for academic credentials, language proficiency, financial support, visa requirements, etc. Refer to http://www.gradschool.umd.edu/admissions/international-admissions for process and requirements for international applications.

In addition to the admission criteria from the Graduate School, the MS GIS program also requires that applicants will have completed prerequisite courses in Geographic Information Systems and Remote Sensing

before their official enrollment. Students without this academic background may substitute with relevant professional experience in GIS field.

As required by the Graduate School, all application materials are to be submitted electronically:

- Graduate Application
- College or University Transcripts
- Statement of Purpose
- Letters of Recommendation
- Program/Department Supporting Documents
- Non-refundable application fee ($75) for each program to which an applicant applies

Completed applications are reviewed by an admissions committee in each graduate degree program. The recommendations of the committees are submitted to the Dean of the Graduate School, who will make the final admission decision. Students seeking to complete graduate work at the University of Maryland for degree purposes must be formally admitted to the Graduate School by the Dean. To ensure the integrity of the application process, the University of Maryland authenticates submitted materials through **iThenticate for Admissions**.

5. Indicate the course requirements with course numbers, titles and credits. If applicable, indicate if any course will also count for a general education requirement. In an appendix, provide the course catalog information (credits, description, prerequisites, etc.) for all of the courses. Note that suffixed "selected" or "special" topics courses should be avoided. If suffixed-selected or special topics courses are offered regularly in the new program, you should make the courses permanent. Also, please review the basic requirements of degree programs or certificate programs to ensure that they meet the minimum policy requirements.

Please note: new courses or modifications to courses need to be submitted through the Testudo Curriculum Management system and will need to follow the normal VPAC course proposal review process. You may submit individual course changes to VPAC concurrently with the PCC proposal; however, the course changes may be held depending on the outcome of the PCC proposal.

The proposed MS GIS program requires 31 credits to complete and offers **eight core courses** and **eight elective courses**.

Course Type	Course #	Course Title	Credit
Core	GEOG651	Spatial Statistics	3
	GEOG652	Digital Image Processing and Analysis	3
	GEOG653	Spatial Analysis	3
	GEOG655	Spatial Database System	3
	GEOG656	Programming and Scripting for GIS	3
	GEOG657	Web Programming	3
	GEOG795	Professional Practice Seminars	1
	GEOG797	Capstone Project	3
Electiv e	GEOG650	Mobile GIS	3
	GEOG654	GIS and Spatial Modeling	3
	GEOG660	Advanced Remote Sensing using Lidar	3

	GEOG661	Fundamentals of Geospatial Intelligence	3
	GEOG663	Big Data Analytics	3
	GEOG670	Open Source GIS	3
	GEOG677	Internet GIS	3
	GEOG796	GIS Project Management	3

Course Catalog Information is provided in Appendix A.

6. Summarize the factors that were considered in developing the proposed curriculum (such as recommendations of advisory or other groups, articulated workforce needs, standards set by disciplinary associations or specialized-accrediting groups, etc.).

The existing MPS GIS program has been operating successfully since 2008. We are proposing this MS GIS curriculum to continue the previous one based on:

- Geospatial technology trends
- Demand for GIS professionals
- Growth of teaching and research in the Department of Geographical Sciences
- Success of our current MPS GIS program

According to the U.S. Department of Labor, the geospatial technology industry can be defined as an information technology field of practice that acquires, manages, interprets, integrates, displays, analyzes, or otherwise uses data focusing on geographic, temporal, or spatial contexts. It incorporates tools such as aerial and satellite remote sensing imagery, global positioning systems (GPS), and computerized geographic information systems (GIS). The growth of Geospatial Information Sciences has underpinned the rejuvenation of the geography discipline, in the U.S. and internationally, over the last three decades.

The department of Geographical Sciences at the University of Maryland has a research program that is recognized nationally and internationally for its leadership in land remote sensing and allied GIS applications. The department's undergraduate program has more than doubled in size since the introduction of our Geographic Information Systems and Automated Cartography focus in the early 1990's. The department of Geographical Sciences uses its accumulated experience to provide a cutting-edge master's degree for professionals; exploiting its unique academic profile within the Washington, D.C. region.

This new **MS GIS** program will replace the current MPS GIS program, with the same curriculum. The curriculum focuses on advanced geospatial information sciences and their related technologies such as remote sensing and computing.

The success of our current **MPS GIS** program has demonstrated that the demand for GIS professionals is indeed robust. The graduates from this program have been able to find job placements in a variety of institutions including federal government agencies, local government, non-profit organizations, and private sectors. Our program has been recognized as one of 33 Esri Development Centers worldwide.

7. Sample plan. Provide a term by term sample plan that shows how a hypothetical student would progress through the program to completion. It should be clear the length of time it will take for a typical student to graduate. For undergraduate programs, this should be the *four-year plan*.

The **MS GIS** will be offered according to the newly established official 12-week calendar system. This allows working professionals or part-time students to concentrate on one or two courses at a time, which contributes to a better learning outcome. Students have the options to study full-time or part-time. A full-time student will mostly take two courses per term, while part-time students take one course per term.

The tables below provide different sample study plans.

Master Degree Track (Fall Enrollment, Full Time)

Year	Fall	Winter	Spring	Summer
1	GEOG652 (Digital Image Processing and Analysis) GEOG653 (Spatial Analysis)	GEOG656 (Programming and Scripting for GIS) GEOG651 (Spatial Statistics)	GEOG657 (Web Programming) GEOG655 (Spatial Database Systems)	GEOG795 (Professional Practice Seminars) **Select one from the following:** GEOG796 (GIS Project Management) GEOG670 (Open Source GIS) GEOG663 (Big Data Analytics)
2	**Select one from the following:** GEOG654 (GIS and Spatial Modeling) GEOG650 (Mobile GIS) GEOG661 (Fundamentals of Geospatial Intelligence)	**Select one from the following:** GEOG677 (Internet GIS) GEOG660 (Advanced Remote Sensing)	GEOG797 (Capstone Project)	

Master Degree Track (Fall Enrollment, Part Time)

Year	Fall	Winter	Spring	Summer
1	GEOG653 (Spatial Analysis)	GEOG656 (Programming and Scripting for GIS	GEOG657 (Web Programming)	**Select one from the following:** GEOG796 (GIS Project Management) GEOG670 (Open Source GIS) GEOG663 (Big Data Analytics)
2	GEOG652 (Digital Image Processing and Analysis)	GEOG651 (Spatial Statistics)	GEOG655 (Spatial Database Systems)	GEOG795 (Professional Practice Seminars)

3	**Select one from the following:** GEOG654 (GIS and Spatial Modeling) GEOG650 (Mobile GIS) GEOG661 (Fundamentals of Geospatial Intelligence)	**Select one from the following:** GEOG677 (Internet GIS) GEOG660 (Advanced Remote Sensing)	GEOG797 (Capstone Project)	

Graduate Certificate Track (Fall Enrollment)

Year	Fall	Winter	Spring	Summer
1	GEOG653 (Spatial Analysis)	GEOG656 (Programming and Scripting for GIS)	**Select one from the following:** GEOG657 (Web Programming) GEOG655 (Spatial Database Systems) GEOG661 (Fundamentals of Geospatial Intelligence)	GEOG651 (Spatial Statistics)

8. Indicate whether the program will be offered either online or off-campus. Please note that MHEC requires a separate proposal for off-campus delivery. If the program will be offered exclusively online or will have both a face-to-face and online version of the program, please complete this additional form and add as an appendix:
https://docs.google.com/document/d/1ojpUBt4mAWlNPCiQNzZ48UH68zGPYj31TPgEOfW3q1E/

While the **MS GIS** program is a face-to-face offering, provisions will be available for students to participate remotely due to their location or work schedule. All class material is presented in classrooms and then broadcast through streaming video using WebEx. Similarly, laboratory sessions may be attended physically, or students may access instruction remotely using video conferencing and virtual machine access to our software and data at UMD. Courses are scheduled in evenings (e.g. 5:30 pm - 8 pm) to accommodate working professionals. International students are required to attend physically in classrooms on the College Park campus. This is based on the F-1 student visa regulations by the United States Citizenship and Immigration Services (USCIS).

9. If the program will be offered in a non-semester format, identify the term structure that will be used for the program:

- **Approved Campus 12-Week Term (see Academic Calendars)**
- ***Non-Standard Term**

***If you are using a non-standard term structure, indicate whether relevant offices, such as the Registrar's Office and International Scholar & Student Services, have been notified and support the program. Non-standard terms need to fit within the university's scheduling system calendar, and non-standard terms need to work with international student visa requirements.**

Term structure:

The proposed **MS GIS** will be based on the approved campus 12-week term calendar. An academic year is composed of four terms (fall, winter, spring, and summer).

The following schedule outlines the 12-week terms for the academic year 2018-2019:

- fall term 8/26/2019 - 11/15/2019
- winter term 11/25/2019 - 2/19/2020
- spring term 2/27/2020 - 5/20/2020
- summer term 6/1/2020 - 8/21/2020

The detailed academic calendar is available at https://www.provost.umd.edu/calendar/index.html#.

10. For Master's degree programs, describe the thesis requirement and/or the non-thesis requirement.

The proposed **MS GIS** program requires the students complete a capstone project. Before taking the capstone project class, students must have completed all other 10 classes including core courses and electives. Students are required to apply the knowledge and skills they have learned in other classes to their capstone projects, which are comprehensive and in-depth research on the selected topics. The capstone project, a faculty-advised independent research project, is the culmination of the students' entire body of work, and is essential to determining whether the student has met a sufficient number of the required competencies. In addition to demonstrating problem-solving and critical thinking in one or more of the technical areas within the GIS domain, students must also take the initiative in planning and organizing this project and demonstrate that they can communicate effectively in writing and through the capstone project presentation.

11. List the intended student learning outcomes. In an appendix, provide the plan for assessing these outcomes.

The learning outcomes of students graduated from the **MS GIS** program include:

1. Understand the big picture of geospatial technology as a disciplinary field, with a good understanding of its history, current state, and future development trend.
2. Grasp of the comections between different geospatial technology components such as GIS, remote sensing, computing, and emerging software aud hardware options, e.g. drones and artificial intelligence.
3. Develop a good understanding of how geospatial technology is applied to real-world problems.

4. Develop proficiency in the following specific knowledge and skills:
    a. Collection, processing, analysis, modeling and visualization of spatial data
    b. Interpretation, analysis, design and implementation of spatial databases
    c. Processing and analysis of digital images
    d. Development of mobile GIS and native apps across mobile platforms (Android, iOS, etc.)
    e. Interpretation and design of clearly structured programs using Python
    f. Development of client-side and server-side Web applications for non-GIS applications
    g. Creation, analysis, and dissemination of GIS data and services via the Web using [various technologies]
    h. Spatial analysis, including enterprise GIS, spatial SQL, parallel processing, and display of GIS results on Internet, through open use of open-source software
    i. Development of applications of experimental semivariograms, semivariogram models, kriging, cross validation, spatial sampling, and spatiotemporal pattern analysis
    j. Analysis of big data with high performance computing, especially spatial data in large volume and high velocity
5. Develop analytic thinking and real-world problem solving for future success in the workforce. Skills include but are not limited to interpersonal communications and teamwork, creative and critical thinking, occupational planning and organizing, problem-solving and decision making.
6. Design and develop a comprehensive and in-depth GIS project.
7. Comprehend and apply ethical issues in geospatial practice and research, including ethical standards to protect data privacy, security, and copyright, among others

The plan for assessing these outcomes is provided in Appendix C.

12. Identify specific actions and strategies that will be utilized to recruit and retain a diverse student body.

Our current **MPS GIS** program has been very successful in recruiting and retaining a diverse student body since 2008. This new **MS GIS** program will draw on the previous experiences and with continued exploration of new opportunities for further improvement.

Specifically, we use a variety of ways to recruit and retain students:

- Attend conferences that are related to geospatial technology. We have an exhibitor booth or present in the following conferences:
    - Esri Federal User Conference (It is annually held in Washington DC. Considering that a large portion of our students come from federal government agencies, this conference is particularly important and effective for us to recruit students.)
    - Esri International User Conference (It is annually held in San Diego, California. It is the largest and also most influential GIS conference in the world.)
    - Towson University GIS Conference (It is annually held at Towson University. We are able to reach out to the local GIS professionals in this conference.)
    - American Association of Geographers (AAG) Annual Meeting. (It is the largest conference in the

field of Geography.)

- The **MS GIS** program director or other faculty members give presentations to graduating seniors in the department of Geographical Sciences and other departments. This way, we are able to reach out those students who are facing the decision whether they want to continue their education in graduate school.
- We actively advertise our program through Google to increase the profile on the Internet.
- We advertise our program on the UMD university shuttles.
- Another effective way of reaching out to prospective students is through our increasing number of alumni. We regular feature some MPS GIS alumni and their testimony of the program quality through our web site. The success of our graduates have definitely played a more and more important role in helping recruit students.

In terms of retaining students, we have been implementing a variety of ways:

- We actively update and upgrade the curriculum. Geospatial technology is a field which changes rapidly. Students expect to learn the most up-to-date knowledge and skills. Therefore, it is important to offer a curriculum that can reflect the technology trends and offer some of the latest technical practices. We have been trying to offer a new course every two years, along with continual revision of the content of existing courses.
- Some students are interested in participating real-world research or internships while they are studying in the program. We have tried to make connections between our students and the faculty in the department of Geographical Sciences as well as other academic units on campus. Some faculty need students' assistance in their research while students look for research opportunities to enhance their educational experiences. This has worked out well.
- We also have tried to make connections between our students with some government agencies as well as private companies. For example, internships have been designed to help students gain real-world problem solving experiences.

Relationship to Other Units or Institutions

13. If a required or recommended course is offered by another department, discuss how the additional students will not unduly burden that department's faculty and resources. Discuss any other potential impacts on another department, such as academic content that may significantly overlap with existing programs. Use space below for any comments. Otherwise, add supporting correspondence as an appendix.

Not applicable.

14. Accreditation and Licensure. Will the program need to be accredited? If so, indicate the accrediting agency. Also, indicate if students will expect to be licensed or certified in order to engage in or be successful in the program's target occupation.

While the program is not subject to specialized accreditation or licensure, UMD is a founding member of University Consortium of Geographic Information Science (UCGIS) - https://www.ucgis.org/ .
The current **MPS GIS** program is recognized as an Esri Development Centers (EDCs) since 2008.

15. Describe any cooperative arrangements with other institutions or organizations that will be important for the success of this program.

Not applicable.

Faculty and Organization

16. Faculty and organization. Who will provide academic direction and oversight for the program? As an appendix, please indicate the faculty involved in the program. Include their titles, credentials, and courses they may teach for the program.

The MS GIS will be housed in the Department of Geographical Sciences. Continuing academic and program direction will be provided by the Program Oversight Committee. Members of the Program Oversight Committee include:

- Graduate School Representative
  - Steve Fetter, Dean, Graduate School, University of Maryland
- Graduate Director
  - Laixiang Sun, Professor, department of Geographical Sciences, College of Behavioral and Social Sciences, University of Maryland
- CGIS Director
  - Kathleen Stewart, Professor, department of Geographical Sciences, College of Behavioral and Social Sciences, University of Maryland

The program will be administrated and managed by the University of Maryland Center for Geospatial Information Science (CGIS). The program will also form an "MS GIS Advisory Committee". The role of the Advisory Committee will be to provide term-to-term guidance on the running of the program, as well as strategic advice regarding future opportunities for the program.

The administrative and teaching team will be led by:

- Jianguo (Jack) Ma — Director, department of Geographical Sciences, College of Behavioral and Social Sciences, University of Maryland

The complete faculty list is provided in Appendix D.

Resource Needs and Sources

17. Each new program is required to have a library assessment prepared by the University Libraries in order to determine any new library resources that may be required. Please contact your departmental/programmatic library liaison or Daniel Mack at dmack@umd.edu, Associate Dean of Collections, to request a library assessment that will be added as an appendix.

A library assessment report is provided in Appendix E.

18. Discuss the adequacy of physical facilities, infrastructure and instructional equipment.

The **MS GIS** Program will have access to a variety of physical facilities, hardware and software resources:

- GIS Labs
    - The MS GIS students have access to two 25-seat GIS labs equipped with dual-monitor high-end workstations and connected to remote storage facilities. The labs run a wide variety of commercial and open source software for GIS, remote sensing, statistical analysis, data access, image processing, mathematical analyses, graphics and 3D modeling, and software development. Students can study in these labs anytime as long as there are no classes in session.
- High-Performance Computing
    - The CGIS has two high-performance Hadoop-based computing clusters that have been purchased for research and student teaching. These clusters are networked to other HPC resources in the Geographical Sciences department (the Department maintains a Linux-based HPC cluster). The CGIS and department of Geographical Sciences also link to high-performance computing in the College of Behavioral and Social Sciences (the "BSWIFT" cluster), as well as to the University of Maryland Institute for Advanced Computer Studies (UMIACS), which operates several clusters. In partnership with the Mid-Atlantic Crossroads (MAX), we also have high-performance networking access to other high-performance computing sites around the country, as well as nimble access to commercial computing resources (Amazon AWS).
- GIS/Web/Data Servers
    - Two servers have been purchased specifically use in instruction. Students will have access to these servers when they take classes such as Web Programming, Spatial Database, Internet GIS, etc.
- VMWare Servers
    - VMWare servers provide a virtual environment so that students can access to the software installed on the server anywhere anytime as long as they have an Internet connection. It is essentially a cloud-based service that gives students free access to software needed for teaching and learning.
- ELMS
    - The University of Maryland maintains an Enterprise Learning Management System (ELMS) for coursework. ELMS is a Web-based platform for sharing course content, tracking assignments and grades, and enabling virtual collaboration and interaction. The MS GIS program will use ELMS to organize all of its teaching.
- WebEx
    - The University of Maryland provides the faculty with access to a Cisco WebEx Online course delivery platform. WebEx is used to create virtual classrooms to broadcast all lectures in real time so that some students (domestic only) can have the option to attend online while the others attend physically in real classrooms.
- ArcGIS Software Suite
    - The existing MPS GIS program is one of the Esri Development Centers (EDCs). Based on the agreement, the students in our program have free license to most ArcGIS software products including desktop ArcGIS, ArcGIS Server, ArcGIS Pro, and ArcGIS Online. They can install the software on their own computer as long as they are enrolled in the program. Our students will also have free technical support from Esri.

19. Discuss the instructional resources (faculty, staff, and teaching assistants) that will be needed to cover new courses or needed additional sections of existing courses to be taught. Indicate the source of resources for covering these costs.

The current MPS GIS program has three full-time lecturers who are dedicated to teaching most of the classes offered in the curriculum. Part-time lecturers are used for some classes, especially during summer and winter terms. The proposed **MS GIS** program will continue to have these teaching resources. In addition, the **MS GIS** program will have four Teaching Assistants (TA). They are instrumental to improve students' learning experiences and outcomes. Tuition revenue is sufficient to cover all instructional needs.

20. Discuss the administrative and advising resources that will be needed for the program. Indicate the source of resources for covering these costs.

The MS GIS Program Director and a Senior Faculty Specialist will play the major management roles for the program. The director and lecturers in the program will serve as academic advisors for students. Tuition revenue will cover the cost of these resources.

21. Use the Maryland Higher Education Commission (MHEC) commission financial tables to describe the program's financial plan for the next five years: https://docs.google.com/spreadsheets/d/1V6iSZG05edMitWP6CAOXjCoGO58Gf6VXxPaacKfrhZ4/edit#gid=0. Add these tables as attachments. Use the space below for any additional comments on program funding.

The program's five-year financial plan is provided in Appendix F.

Implications for the State (Additional Information Required by MHEC and the Board of Regents)
If the proposed program is for a Post-Baccalaureate Certificate that is derived entirely from existing courses within an existing Master's degree program, then you **only** need to respond to prompts 22 (on market demand) and 25 (curriculum of current master's degree program).

22. Explain how there is a compelling regional or statewide need for the program. Argument for need may be based on the need for the advancement of knowledge and/or societal needs, including the need for "expanding educational opportunities and choices for minority and educationally disadvantaged students at institutions of higher education." Also, explain how need is consistent with the Maryland State Plan for Postsecondary Education.

The U.S. Department of Labor has identified geospatial technologies as one of the three most important emerging and evolving fields, along with nanotechnology and biotechnology. Introduction of a Master of Science in Geospatial Information Sciences (MS GIS) is part of a larger trend nationally and internationally.

A market research firm, Adeo Strategy Partners, conducted a market analysis for the Office of Extended Studies at the University of Maryland about a potential Master's level degree and/or graduate certificate program in the field of Geospatial Information Sciences prior to establishment of the existing MPS GIS program. Adeo's

research concluded that Geospatial Information Sciences is a field that is experiencing rapid growth. It is used heavily in the federal government, and is growing quickly in state, county, and local government. More importantly, the success of the existing MPS GIS program has demonstrated market demand. Since 2008, the MPS GIS program has grown from 10 students a year into a current enrollment of about 40-50 students a year.

The University of Maryland is an equal opportunity institution with respect to both education and employment. The University does not discriminate on the basis of race, color, national origin, sex, age, or handicap in admission or access to, or treatment or employment in, its programs and activities as required by federal (Title VI, Title IX, Section 504) and state laws and regulations.

The students enrolled in the MPS GIS Program have diverse social-economic background. About 50% of students are female and more than 25% are minorities.

23. Present data and analysis projecting market demand and the availability of openings in a job market to be served by the new program. Possible sources of information include industry or disciplinary studies on job market, the USBLS Occupational Outlook Handbook, or Maryland state Occupational and Industry Projections over the next five years. Also, provide information on the existing supply of graduates in similar programs in the state (use MHEC's Office of Research and Policy Analysis webpage for Annual Reports on Enrollment by Program) and discuss how future demand for graduates will exceed the existing supply. As part of this analysis, indicate the anticipated number of students your program will graduate per year at steady state.

GIS is essentially an information technology and thus, often classified as a computer related subject.

According to Maryland State Occupational and Industry Projections, the projections for general Computer Occupations are 117,471 in 2016 and 125,310 in 2026 with an increase rate of 6.67%.

Based on USBLS Occupational Outlook Handbook, it is estimated that the number of jobs for database administrators and computer programmers were 119,500 and 294,900 respectively in 2016. These two positions are the closest job categories that the MS GIS program graduates would possibly fill. It is projected that there will be an 11% increase from 2016 to 2026 for database administrators.

The existing **MPS GIS** program can provide much more accurate and specific insight about the demand and supply for GIS graduates. The current enrollment size has been stable since 2013, which indicates that it might have reached a balance of demand and supply.

Based on our existing **MPS GIS** program, we have high confidence to estimate the enrollment of the proposed **MS GIS** program to be about 40-50 students per year. It is also possible that we can grow slightly by reaching out more to international students. However, we do not plan to grow the program much beyond current enrollments (>60 students per year), in order to maintain a high quality experience for matriculated students.

24. Identify similar programs in the state. Discuss any differences between the proposed program and existing programs. Explain how your program will not result in an unreasonable duplication of an existing program (you can base this argument on program differences or market demand for graduates). The MHEC website can be used to find academic programs operating in the state: http://mhec.maryland.gov/institutions_training/pages/HEPrograms.aspx.

Currently there are two universities have similar programs in the State of Maryland.

- Master of Science in Geographic Information Systems at Johns Hopkins University, Baltimore, Maryland - http://advanced.jhu.edu/academics/graduate-degree-programs/geographic-information-systems/
- Master of Professional Studies in GIS and a Post-Baccalaureate Certificate in GIS at UMBC-Shady Grove, Rockville, Maryland - http://shadygrove.umbc.edu/gis/

Both of these programs are relatively small with no more than 30 students per year. Our MPS in GIS was established prior to these two programs.

Our MS GIS program will not result in an unreasonable duplication of these two programs based on the following factors:

- Our curriculum is focused on Enterprise GIS which is different from traditional GIS. The topics covered include GIS, remote sensing, computing, and statistics, a broader range than a traditional program.
- The goal of our program is to help students become GIS developers rather than GIS users. Therefore, computer programing and development is greatly emphasized. Many of our classes involve computer programming.
- Johns Hopkins University's MS GIS program is a fully online program. On the other hand, the GIS program at UMBC is on-site at the Universities at Shady Grove. Our teaching format offers both on-site teaching and remote participation and thus will allow us to attract both in-state and out-of-state students.

25. Discuss the possible impact on Historically Black Institutions (HBIs) in the state. Will the program affect any existing programs at Maryland HBIs? Will the program impact the uniqueness or identity of a Maryland HBI?

Not applicable. None of the Maryland HBIs currently offer a GIS program.

26. For new Post-Baccalaureate Certificates derived from existing master's programs only, include the complete curriculum of the existing master's program.

Not applicable.

Appendix A: Course Catalog

GEOG650: Mobile GIS
The emergence of highly-capable mobile devices and applications has opened a new opportunity for location-based services. Mobile apps enable us to collect, view, and analyze location-based data wherever and whenever we are. Mobile apps are generally classified into web apps, hybrid apps, and native apps. Nowadays, hybrid mobile app development makes developers easier to develop mobile apps running on different mobile platforms such as Android, iOS, Windows Phone, etc. as they write once and build mobile apps with no extra effort. Hybrid mobile apps are like native apps and run on the mobile device. However, hybrid apps are written with web standards and wrap into native apps using PhoneGap, Cordova, or other hybrid app development frameworks. Also, the application running on Android and iOS can be reused for progressive web applications and even desktop applications. In this course, advanced HTMP5, JavaScript, TypeScript and AngularJS web programming are covered, which can be used to develop both web applications and hybrid mobile applications. In addition, this course teaches how to develop, test, and publish mobile applications using PhoneGap/Cordova and Ionic frameworks. The capabilities of mobile devices such as Camera, Geolocation, Notification, etc. are added to the apps through Apache Cordova and Ionic APIs and map functionality is added to the mobile apps using Google Maps.
(3 credits; Prerequisite: GEOG657)

GEOG651: Spatial Statistics
This course is about quantitative analysis of spatial data. It is intended to provide a broad survey of various spatial statistic methods. The course is geared towards helping students: (1) develop an understanding of the important theoretical concepts in spatial data analysis; and (2) gain practical experience in application of spatial statistics to a variety of social and environmental problems using advanced statistical software. This course covers five broad topical areas: (1) point pattern analysis; (2) area data analysis; (3) continuous data analysis; (4) spatial sampling; and (5) multivariate spatial and temporal analysis.
(3 credits; Prerequisite: none)

GEOG652: Digital Image Processing and Analysis
Digital image processing and analysis applied to satellite and aircraft land remote sensing data. Consideration is given to preprocessing steps including calibration and georegistration. Analysis methods include digital image exploration, feature extraction thematic classification, change detection, and biophysical characterization. Example applications will be reviewed.
(3 credits; Prerequisite: Introduction to Remote Sensing)

GEOG653: Spatial Analysis
This course is designed to help students develop a comprehensive and systematic understanding of spatial analysis methods and learn practical skills in using GIS and spatial analysis to discover features of spatial distribution. The class covers the methods of spatial analysis including measuring aspects of geometric features and identifying spatial patterns of geospatial objects that are represented as point, line, network, areal data, and 3-D surfaces. Spatial statistics, geospatial processing, and modeling will be used for analyzing the data. In terms of the software used in this class, besides the ArcGIS Desktop suite, we will be migrating to ArcGIS Pro, which is a new platform that represents the current trend in GIS field.
(3 credits; Prerequisite: Introduction to GIS)

GEOG654: GIS and Spatial Modeling
This course introduces advanced techniques in GIS data manipulation, geostatistics, and geospatial modeling. The fundamental theories behind analytical and modeling techniques are covered in detail, including model design, construction, evaluation, and application. The theoretical knowledge will be enforced by a series of intensive computer exercises using real data sets. The course covers descriptive and predictive GIS modeling

techniques, including regression modeling, suitability modeling, hydrological modeling, and agent-based modeling.
(3 credits; Prerequisite: GEOG653)

GEOG655: Spatial Database System
This course is designed to help students understand, analyze, design, and implement spatial databases. Topics covered include: spatial data models, spatial query languages, database architecture, data storage and indexing, SQL, data mining, etc. Oracle and ArcSDE are used to design database in GIS context.
(3 credits; Prerequisite: none)

GEOG656: Programming and Scripting for GIS
This course teaches programming and scripting for GIS users. The concepts of scripting and object-oriented programming using the Python programming language are reviewed. This course teaches students to design clearly structured programs and introduces ArcPy, a library providing access to ArcGIS geoprocessing tools. ArcPy includes a series of modules such as data access, mapping, spatial analysis, and network analysis. Students will develop geoprocessing programs to edit, query, manipulate, and analyze spatial data (both vector and raster data) with Python, ArcPy, and other modules like NumPy.
(3 credits; Prerequisite: none)

GEOG657: Web Programming
Component-based web server design and efficient session and secure access management have become challenges to provide fast, robust, and flexible GIS services on the Internet. This course is designed to teach fundamental techniques required in developing both client-side and server-side web application for not only GIS but also non-GIS applications. This course covers web design and static web generation using HTML5 and CSS, client-side programming with JavaScript, and dynamic web development using PHP and MySQL. Basic web design using HTML, XHTML, CSS, etc. is helpful, but not required.
(3 credits; Prerequisite: GEOG656)

GEOG660: Advanced Remote Sensing using Lidar
This course will expand on remote sensing concepts with a focus on light detection and ranging (lidar) technology. Lidar, also known as laser scanning, is an active remote sensing tool that can produce high resolution point clouds. This course will cover the fundamentals of lidar, explore current developments in lidar technology, and discuss different applications where it is being used. Students will get hands-on learning about lidar data management, processing, and analysis. It is recommended that students have a some background in spatial modeling and computer programming.
(3 credits; Prerequisite: GEOG652)

GEOG670: Open Source GIS
Students will learn to use Free and Open Source Software for GIS (FOSS4g) to conduct GIS analysis and articulate the strengths and weaknesses of FOSS4g compared to commercial offerings. Students will be introduced to advanced concepts and techniques including enterprise GIS, spatial SQL, parallel processing, and displaying the results of GIS analysis over the Internet - something very few professional know how to do. Students will learn how to use the FOSS4g products QGIS, PostGRES/PostGIS, and Geoserver into their technology stack and will become familiar with using spatial SQL for solving GIS and database related tasks.
(3 credits; Prerequisite: none)

GEOG677: Internet GIS
This course is designed to: (1) introduce the concepts and theories that are related to an increasingly important technology – Internet/Web GIS; (2) introduce various technologies or techniques for creating, analyzing, and disseminating GIS data and services via the Internet. The topics covered include the hardware/software structure of the Internet (e.g. server-client model, TCP/IP protocol), the evolution of Web GIS, and most

importantly, different technology options. Students will be required to practice almost all of the Web GIS tools including Google Map API, ArcGIS Server, JavaScript API, GeoJSON, Mapbox, and Leaflet. Students will also be exposed to the experience of working with the cloud environment such as AWS EC2 and ArcGIS Online
(3 credits; Prerequisite: GEOG653)

GEOG795: Professional Practices Seminars
This course will provide a preparation for students who are embarking upon professional careers with government agencies, companies, and other institutions who utilize geographic information science and technologies. The topics covered in this class include but not limited to: expectations and requirements of GIS professionals in government agencies from a manager perspective, understanding about Enterprise GIS, GIS data and services in DC, Maryland and Virginia, how to develop Resume and portfolio as a GIS professional, review of latest developments in the GIS field, research seminars in GIS and remote sensing, etc. Alumni from the MPSGIS program are also invited to talk about their GIS career in real world. The content of the class may vary in different years.
(1 credits; Prerequisite: none)

GEOG796: GIS Project Management
This course covers project management methodology emphasizing implementing geographic information systems and integrating geospatial information sciences into broader projects. Topics include project initiation, planning, scope, scheduling, budgeting and risk management.
(3 credits; Prerequisite: none)

GEOG797: Capstone - Professional Project
Each student must undertake a project as a demonstration of his/her competence in geospatial science and technologies. The data and materials for this project can originate from an internship, or from relevant work experience at the student's current employer. The Department of Geographical Sciences will work with each student individually to determine the best mechanism for obtaining the necessary data and experience. Under the direction of a faculty advisor, the student will prepare a project report which shall contain an explanation of the requirements for the work, a technical account of the activities undertaken, including a literature review, a description of the methods and approaches taken, a critical discussion of the results obtained, along with conclusions and recommendations developed from the project. The final project will consist of a full-fledged GIS application that is up and running and can be tested. This will enable the student to present potential employers with a portfolio containing an example of their ability to manage and develop a GIS application project and will show that they understand how to apply the technology to real world situations.
(3 credits; Prerequisite: GEOG653, 651, 652, 655, 656)

GEOG 661: Fundamentals of Geospatial Intelligence
This course introduces the fundamental knowledge required to become a successful GIS practitioner, including the history of the GIS discipline, the intelligence applications of remote sensing and Geographic Information Systems (GIS) technologies, and how GIS products are used to support national security and humanitarian missions. Upon completion of this course you will understand the roles that technology, policy, doctrine, government, and industry play in shaping the Geospatial Intelligence discipline, and develop the technical knowledge and domain expertise to create basic GIS products that provide context for decision makers.
(3 credits; Prerequisite: none)

GEOG 663: Big Data Analytics
This course is designed to introduce statistical analysis over big data sets (and tackling big data problems), primarily in geography and spatial sciences, but with broader appeal throughout the socio-behavioral sciences. Students will be introduced to a range of methods that can be applied to the exploration, modeling, and visualization of big quantitative data. This course explores data fusion, statistical analysis, and data-mining for

geospatial and non-geospatial data in structured and unstructured form, with an emphasis on large silos of data across diverse sources and assumptions.
(3 credits; Prerequisite: GEOG653)

Appendix B: Online Program Offering Supplemental Information

According to the Maryland Higher Education Commission, a new offering of "more than 50 percent" of an existing program in an online format requires MHEC approval. The following prompts are based on academic policies for online programs as well as questions frequently asked by review committees.

Discuss the role of faculty in the development, oversight, and teaching of this online program. Note that MHEC 13B.02.03.11(F) requires that "at least 50 percent of the total semester credit hours within the proposed program shall be taught by full-time faculty." Indicate any other unit or vendor that will be used to administer or deliver the program.

The MS GIS will be housed in the Department of Geographical Sciences. The "Program Oversight Committee" is responsible for directing the program, while the program will be administrated and managed by the University of Maryland Center for Geospatial Information Science (CGIS). The program will also form an "MS GIS Advisory Committee".

Members of the Program Oversight Committee include:

- CGIS Director— Kathleen Stewart, Professor, Department of Geographical Science, College of Behavioral and Social Sciences, University of Maryland
- Graduate Director— Laixiang Sun, Professor, Department of Geographical Sciences, College of Behavioral and Social Sciences, University of Maryland
- Graduate School Representative— Steve Fetter, Dean, Graduate School, University of Maryland

The "MS GIS Advisory Committee" will be formed internally from faculty in the MS GIS program, with two elected student representatives. The role of the Advisory Committee will be to provide term-to-term guidance on the running of the program, as well as strategic advice regarding future opportunities for the program.

Totally there are sixteen courses (core and elective) offered in the MS GIS Program. Thirteen (81%) of these classes are taught by full-time faculty in the Department of Geographical Sciences, while the other three classes are taught by GIS experts from industry. Thus, it is ensured that at least 50% of our classes are taught by full-time faculty.

Discuss the resources available for training and supporting faculty in regard to course development and instructional technology.

GIScience is a field that changes very fast due to software and hardware advancements. Therefore, it is critical for the faculty to receive continuous training. The faculty are encouraged to attend academic conferences and also conduct research to update their knowledge and skills so that they can develop new courses or upgrade existing courses.

In addition, use of instructional technology is important to help improve teaching efficiency and learning effectiveness. The Teaching and Learning Transformation Center (TLTC) at the University of Maryland inspires and supports effective, engaging, efficient, and equitable teaching innovations among the University's instructors and assistants. This team provides faculty with training, resources, professional development activities, and individualized consultation to transform their classrooms and careers. TLTC Teaching

consultants work one-on-one with teachers based on their own goals. The requesting teacher determines the issues to be explored, and the consultant provides an outside perspective, peer support for a plan of action, and suggestions for additional resources.

Discuss how courses will be taught using online technologies. Will courses be synchronous, asynchronous, or a combination of both? What technologies will be used to present material and evaluate the quality and authenticity of student work? How will these technologies be assessed?

For all classes in the MS GIS program, instructors present lectures and lead discussions in physical classrooms and at the same time, the lectures are broadcast online through streaming videos. Students have the options to choose whether they want to attend in person or online. In either case, students can see the slides, see and hear instructors speaking, and also ask questions. Therefore, in both scenarios, lectures are presented in real time dynamically and interactively. All courses will be delivered synchronously.

In addition, all the lectures and lab sessions are video archived. Students can review them anytime. It is also make it easy for some students to catch up on the course materials if they have to miss lectures because of medical issues or business travel.

International students are required to attend the lectures in person, due to visa requirements.

The University of Maryland maintains an Enterprise Learning Management System (ELMS) for coursework. ELMS is a Web-based platform for sharing course content, tracking assignments and grades, and enabling virtual collaboration and interaction. The MS GIS program will use ELMS for all its courses.

The Department of Geographical Sciences also maintains a Cisco WebEx Online course delivery platform, by which lectures and discussions can be streamed virtually. WebEx is a Web conferencing application that can be used to host classes, office hours, and other meetings, in an online environment. Faculty, staff, and students can communicate in real-time using chat, voice (microphone and speakers), and video (webcam) with WebEx. WebEx allows for the ability to display presentations, annotate overtop slides, perform live editing of documents and even conduct a poll within the software. These interactions can also allow the instructors to identify and authenticate the students and their involvement in the teaching and learning processes.

The existing MPS GIS Program has been using the same or similar technologies and strategies since 2009. They have proved to be effective in teaching and learning as well as evaluating students.

Discuss how the online program will be comparable to the existing program in terms of academic rigor. What are the learning outcomes for the online offering? Do they differ from the existing on-site program? How will the program be evaluated?

Since all courses are delivered synchronously, the learning outcomes, assessments, and expected student participation are the same whether students are participating remotely or are physically present in the classroom. The existing MPS GIS Program has been using ELMS and video conferencing technologies to provide dynamic and interactive online teaching component since 2009. Program evaluation is the same for distance delivery and face-to-face delivery.

Describe the admissions criteria and procedures for the online program.

The admission criteria are the same for all MS GIS applicants regardless of whether they will attend classes in person or at a distance. The admission criteria and procedures are listed in section 4 of this proposal.

Discuss how students will have reasonable and adequate access to the range of student support services (library materials, teacher interaction, advising, counseling, accessibility, disability support, and financial aid) needed to support their learning activities.

All students in the MS GIS program will have equal access to resources on-campus just other regular graduate students. These resources are listed on our program website (https://geog.umd.edu/graduate/mps-student-resources).

Discuss how the program will provide students with clear, complete, and timely information on the curriculum, technological competence and equipment needed for the program, admissions criteria, financial aid resources, complaint procedures, and cost and payment policies.

The MS GIS program's website - http://mpsgis.umd.edu serves as the portal to provide clear, complete, and updated information on curriculum, requirement, course plan, admission procedure, financial aid information, resources, etc.

The MS GIS Program Coordinator is dedicated to providing information service and help to students on questions regarding to application, admission, registration, curriculum, course schedule, tuition and fees, complaint procedures, etc.

New student orientation sessions are held before every spring and fall term starts and when there is a new cohort of students. At the orientation sessions, students are introduced to the faculty and also provided with all the information needed to succeed in the program. Particularly, exemplar projects completed by MS GIS graduates in the past will be demonstrated to the new students so that they will have an understanding of program goals and the curriculum.

Intellectual Property Policy. Units developing online programs should be familiar with the university's intellectual property policy. See https://www.president.umd.edu/iv-320a. Please indicate that the unit will comply with the university's intellectual property policy.

The department will comply with the university's intellectual property policy to deliver the proposed MS GIS program.

Discuss the instructional and administrative resources (faculty, staff, and teaching assistants) that will be needed to cover the cost of the program. Indicate the source of resources for covering these costs. These formatted tables can be used to indicate the resources and expenditures for the program: https://docs.google.com/spreadsheets/d/1V6iSZG05edMitWP6CAOXjCoGO58Gf6VXxPaacKfrhZ4/edit#gid=0.

Program resources are the same for face-to-face and for distance delivery.

Describe the market demand for the program. Evidence may be research from industry or the discipline, and should also consider state and federal employment projections. Indicate the job opportunities available to those who would graduate from this program.

Both market research and the success of our existing MPS GIS program since 2008 have both indicated there is a strong demand for GIS professionals.

A market research firm - Adeo Strategy Partners once conducted a market analysis for the Office of Professional Studies at the University of Maryland about a potential Master's level degree and/or graduate certificate program in the field of Geospatial Information Sciences. Adeo's research concluded that Geospatial Information Sciences is a field that is experiencing rapid growth. GIS is used heavily in the federal government, and is growing quickly in state, county, and local government.

The U.S. Department of Labor has also identified geospatial technologies as one of the three most important emerging and evolving fields, along with nanotechnology and biotechnology. Introduction of a Master of Professional Studies in Geospatial Information Sciences is part of a larger trend nationally and internationally.

More importantly, the success of our existing MPS GIS program has provided perfect research as well. Since 2008, the MPS GIS program has grown from only 10 students a year into a program with about 40-50 students a year. This enrollment size increase is an evidence that the GIS job market is promising and growing. Since 2008, the graduates from the MPS GIS program have secured a wide range of career opportunities including:

- Federal governmental agencies such as NASA, NOAA, FEMA, Census Bureau, EPA, NGA, DOT, USGS, Veteran's Affairs, National Park Service, etc.
- State and local governmental GIS Offices
- Private companies that are specialized or involved geospatial technology, for example Esri, MDA, Dewberry, etc.
- Non-profit organizations such as the World Bank, WWF, etc.

It is also worth to mention that there have been about 15 MPS GIS graduates who have continued to pursue PhD programs at the University of Maryland and also some other institutions.

Appendix C: Plan for Assessment of Learning Outcomes

The learning outcomes of students graduated from the **MS GIS** program include:

1. Can see the big picture of geospatial technology as a discipline field with a good understanding of its history, current state, and future development trend.
2. Grasp of the connections among different geospatial technology components such as GIS, remote sensing, computing, and emerging software and hardware options, e.g. drones and artificial intelligence.
3. A good understanding of how geospatial technology is applied in solving real-world problems.
4. Proficient in the following specific knowledge and skills:
    a. Collect, process, analyze, model and visualize spatial data
    b. Interpret, analyze, design and implement spatial databases
    c. Process and analyze digital images
    d. Develop mobile GIS and native apps across mobile platforms (Android, iOS, etc.)
    e. Interpret and design clearly structured programs using Python
    f. Develop client-side and server-side Web applications for non-GIS applications
    g. Create, analyze, and disseminate GIS data and services via the Web using [various technologies]
    h. Conduct spatial analysis, including enterprise GIS, spatial SQL, parallel processing, and display of GIS results on Internet, through open use of open-source software
    i. Develop applications of experimental semivariograms, semivariogram models, kriging, cross validation, spatial sampling, and spatiotemporal pattern analysis
    j. Analyze big data with high performance computing, especially spatial data in big volume and velocity
5. Training of analytic thinking and real-world problem solving for future success in the workforce. Skills include but are not limited to interpersonal communications and teamwork, creative and critical thinking, occupational planning and organizing, problem-solving and decision making.
6. Design and develop a comprehensive and in-depth GIS project.
7. Comprehend and apply ethical issues in geospatial practice and research, including ethical standards to protect data privacy, security, and copyright, among others

To help students achieve these outcomes, the **MS GIS** program will make great efforts in the following three areas:

1. Curriculum
    a. The curriculum must be cutting-edge and provide the most updated information to the students. The MS GIS course materials will be frequently upgraded to keep up with the advancement of geospatial technology in terms of both software and hardware.
    b. The curriculum must be more than just GIS and should be broad enough to encompass topics such as remote sensing, and increasingly computing. We will try to add new topics such as data science and drones.
    c. More elective courses will be developed and offered in the MS GIS Program. This will help meet specific interest or needs of students, which in turn will improve learning satisfaction.
2. Teaching format

a. We will provide teaching in both on-site and online format. This will ensure the students to attend the real lectures in real time no matter which option they will choose. This dynamic and interactive teaching environment will definitely improve their learning experiences and effectiveness.

b. All the lectures and lab session are video archived. This will allow students to review these materials repeatedly when needed until they fully understand the course materials. These video archives can also be saved for later reference. Therefore, this teaching technology can help improve students' learning and also retain the knowledge.

3. Resources for teaching and learning

   a. We will help students improve their learning experiences by providing a variety of resources. Besides, instructors, Teaching Assistants are available to help students in each class.

   b. Instructors are encouraged to attend academic conferences and also conduct research. This will help instructors to gain the updated knowledge and skills in the field, which in turn will benefit the students during the teaching process.

   c. Beyond the MS GIS Program, students will have access to all the teaching and research resources in the Department of Geographical Sciences. We encourage MS GIS students to participate in faculty's research projects whenever possible.

To assess the learning outcomes, we will evaluate students in a variety of ways:

1. Capstone project

   - The capstone project is one of the main culminating course experiences for the MS GIS program. Each capstone project will be evaluated in a dedicated review session and evidence of learning outcomes as they present in the projects will be assessed.

2. Exit interview

   - An exit interview will be conducted annually with a random sample of graduates (80%) to assess their overall satisfaction with the Program. Some of the interview questions can be designed specifically to help evaluate students' learning effectiveness and outcomes.

3. In-class observation

   - This assessment will be conducted through informal observations by instructors in the MS GIS program, as well as by faculty in the Department of Geographical Sciences. Unstructured (quick chats and check-ins) and structured (survey questions) data will be collected to support these observations.

4. Course Evaluation

   - The course evaluation report for each MS GIS class will be carefully analyzed to identify issues and also evaluate students' satisfaction to teaching and learning. Very often in their comments, students will describe their learning outcomes.

Appendix D: Program Faculty

Dr. Kathleen Stewart

Kathleen Stewart is Director of the Center for Geospatial Information Science and works in the area of geographic information science with a particular focus on geospatial dynamics. This includes topics such as moving objects research (e.g., space-time trajectories, space-time scheduling) and event modeling for dynamic GIS. She is interested in mobility, spatial accessibility, big geospatial data, and currently investigates movement and mobility for a number of different application domains, for example, health and transportation. She is also interested in modeling geospatial semantics including geospatial ontologies and their role for geographic information system design, and spatiotemporal information retrieval. At the University of Maryland, Dr. Stewart is a member of the Program in Oncology at the University of Maryland Marlene and Stewart Greenebaum Comprehensive Cancer Center and also collaborates with researchers at the Institute for Global Health, the Center for Substance Abuse Research, the National Transportation Center, the School of Public Health, and among others. Her research is currently supported in part by grants from the National Institutes of Health, NASA, and the Federal Highway Administration, among other organizations, and she has also received support from IARPA, NGA and NSA. Dr. Stewart serves as a member of the Mapping Science Committee of the National Academies of Sciences, Engineering and Medicine and the Board of Directors for the University Consortium of Geographic Information Science. She is a member of the steering committee for the Maryland Transportation Institute. She also serves as a member of the editorial boards for The International Journal of Geographical Information Science (IJGIS), Computers, Environment, and Urban Systems, Transactions in GIS, Geographical Analysis, and the open-access Journal of Spatial Information Science (JOSIS).

Dr. Jianguo Ma

Dr. Ma is the Director and a Lecturer in the Department of Geographical Sciences at the University of Maryland, College Park. His teaching and research interest are focused on the application of Spatial Analysis, GIS modeling and Web GIS in the field of renewable energy and sustainable development as well as marketing analysis. His educational background includes PhD in Biological and Environmental Engineering from Cornell University (2005) and MS (2003) from Cornell University, MA from Peking University, BS in Geological Engineering from Beijing University of Science and Technology.

The courses that Dr. Ma teaches in the MS GIS program:

GEOG653 (Spatial Analysis), GEOG654 (GIS and Spatial Modeling), GEOG677 (Internet GIS), GEOG795 (GIS Professional Seminars), GEOG797 (Capstone Project)

Dr. Jonathan Resop

Dr. Resop is a Senior Lecturer in the Department of Geographical Sciences at the University of Maryland. Jonathan earned his Ph.D. at Virginia Tech in Biological Systems Engineering. During his time at Virginia Tech, he worked on multiple projects related to spatial modeling and remote sensing, in particular problems that involve agricultural and environmental systems. His dissertation involved applying ground-based lidar to various ecological applications. After completing his Ph.D. he worked as a post-doc for the USDA-ARS in Beltsville in the Crop Systems and Global Change Lab, doing research related to simulating the potential production capacity of crops within regional food systems using a geospatial crop model. Jonathan received his undergraduate degrees at the University of Maryland, College Park in Biological Resources Engineering and Computer Science.

The courses that Dr. Resop teaches in the MS GIS program:

GEOG654 (GIS and Spatial Modeling), GEOG656 (Programming and Scripting for GIS), GEOG660 (Advanced Remote Sensing with Lidar), GEOG797 (Capstone Project)

Dr. Eunjung Lim

Dr. Lim earned a Ph.D degree in Geography (GIS specialty) from the State University of New York at Buffalo. Her specialty is geographic information sciences. In the realm of GIS, she has developed special interest and knowledge in GIS modeling, programming, network analysis, and spatial statistics. She has about 12 years of experience developing software using Java, C, C++, Visual Basic and relational databases.

The courses that Dr. Lim teaches in the MS GIS program:

GEOG650 (Mobile GIS), GEOG651 (Spatial Statistics), GEOG656 (Programming and Scripting for GIS), GEOG657 (Web Programming), GEOG797 (Capstone Project)

Dr. Naijun Zhou

Dr. Zhou is a Senior Lecturer in the Department of Geographical Sciences at the University of Maryland. His teaching and research are focused on Web GIS, Databases, Geospatial semantics and ontology. His educational background includes BS in Photogrammetry and Remote Sensing, MS in GIS, Remote Sensing & Cartography, MS in Computer Science, and PhD in GIScience from the University of Wisconsin.

The courses that Dr. Zhou teaches in the MS GIS program:

GEOG652 (Digital Image Processing and Analysis), GEOG655 (Spatial Databases)

DATE: September 18, 2018

TO: Dr. Kathleen Stewart
Director of the Center for Geospatial Information Sciences
Department of Geographical Sciences

Dr. Jianguo Ma
MPS Program Director, Center for Geospatial Information Sciences
Department of Geographical Sciences

CC: Daniel Mack, Associate Dean of Collections, UMD Libraries
Maggie Saponaro, Head, Collection Development, UMD Libraries

FROM: Kelley O'Neal, GIS and Spatial Data Librarian, UMD Libraries

RE: Library Resources to Support New Program – a Master of Science in Geospatial Intelligence (MS GEOINT)

We are providing this assessment in response to a proposal by the Department of Geographical Sciences in the college of Behavioral and Social Sciences to create a Master of Science in Geospatial Information Sciences (MS GIS). The MS GIS program requested a collections resources assessment from the University of Maryland Libraries to determine how well the Libraries support the curriculum of this proposed program.

Serial Publications

The University of Maryland Libraries subscribe to a large number of scholarly journals, almost all in online format, focusing on Geospatial Information Science and related topics including:

Remote Sensing and Image Processing

Remote Sensing of Environment
ISPRS Journal of Photogrammetry and Remote Sensing
IEEE Transactions on Geoscience and Remote Sensing
International Journal of Applied Earth Observation and Geoinformation
IEEE Applied Earth Observations and Remote Sensing
IEEE Geoscience and Remote Sensing Letters
International Journal of Remote Sensing

Geographic Information Science (GISc)

International Journal of Geographical Information Science
Journal of Geographical Sciences
Transactions in GIS

Social Explorer - Social Explorer is a cloud-based GIS and geospatial data tool that provides access to demographic information about the United States from 1790 to present. Available data includes Census, Public Use Microdata Sample (PUMS), and American Community Survey (ACS). The database includes basic GIS tools to create reports, maps, and slide shows.

SimplyAnalytics – SimplyAnalytics is a cloud-based GIS and geospatial data tool that contains extensive data including demographic, historic census, business, health, real estate, housing, employment, consumer spending, and marketing (over 70,000 variables total). Users can create customized maps and reports. Data is available at the State, County, City, ZIP Code, Census Tract, and Block Group levels for custom trade areas and the entire United States.

LandScan Global Population Dataset - LandScan is a global population database that shows geographical distribution of population at one-kilometer resolution over an average 24 hour period. LandScan datasets are compiled annually using different information sources and analytical techniques and should ideally not be compared across years.

IEEE Xplore - Provides full-text access to IEEE transactions, journals, magazines and conference proceedings published since 1988 and all current IEEE Standards. Includes access to Bell Labs Technical journal Archive (BLTJA) 1922-2015.

Encyclopedia of Statistical Sciences (Wiley) - Covers topics in statistics, biostatistics, quality control, economics, sociology, engineering, probability theory, computer science, biomedicine, psychology, survey methodology, and many other areas. Includes the full text of the first and second print editions, plus the supplemental volumes. The entries are self-contained and easily understood by readers with a limited statistical background.

Also four multi-disciplinary databases, *Academic Search Ultimate, Nexis Uni, ScienceDirect,* and *Web of Science,* are good sources of articles relevant to this topic.

In most cases, these indexes offer full text copies of the relevant journal articles. In those instances in which the journal articles are available only in print format, the Libraries can make copies available to graduate students through either the Libraries' Scan & Deliver Program or via Interlibrary Loan.

Monographs

The Libraries acquire scholarly monographs regularly in geographical sciences and geospatial science and technology along with allied subject disciplines. Monographs not already part of the collection can usually be added upon request.

Even though most library research for this course/program likely will rely upon online journal articles, students may wish to supplement this research with monographs. Fortunately, more and

Digital image processing (print) 2018
Automatic Target Recognition (e-book) 2018
Digital Image Processing and Analysis with MATLAB and CVIPtools, Third Edition (e-book) 2017
Multisensor Image Fusion and Data Mining for Environmental Remote Sensing (e-book) 2017

Spatial Statistics = 112

Spatial Analytics with ArcGIS (e-book) 2017
Spatial econometrics (e-book) 2017
Computational and statistical methods for analysing big data with applications (e-book) 2016
Stochastic geometry, spatial statistics and random fields: models and algorithms (print) 2015

Network Analysis = 1,113

Environment, Politics and Society (e-book) 2018
Networks of international trade and investment: understanding globalization through the lens of network analysis (print) 2018
GIS and the social sciences: theory and applications (e-book) 2018
Sociometrics and human relationships: analyzing social networks to manage brands, predict trends, and improve organizational performance (e-book) 2017

Big Data Analytics = 121

Practical big data analytics: hands-on techniques to implement enterprise analytics and machine learning using Hadoop, Spark, NoSQL and R (e-book) 2018
Big data analytics: tools and technology for effective planning (print) 2018
Earth observation open science and innovation (e-book) 2018
Big Data Analytics with Hadoop 3 Build highly effective analytics solutions to gain valuable insight into your big data (e-book) 2018

Python = 812

Beginning Data Analysis with Python And Jupyter Use powerful industry-standard tools to unlock new, actionable insight from your existing data (e-book) 2018
Hands-On Data Analysis with NumPy and Pandas Implement Python Packages from Data Manipulation to Processing (e-book) 2018
Hands-On Automated Machine Learning A beginner's guide to building automated machine learning systems using AutoML and Python (e-book) 2018

A special amenity for graduate students and faculty, the Scan & Deliver service scans and delivers journal articles and book chapters within three business days of the request--provided that the items are available in print on the UM Libraries' shelves or in microform. In the event that the requested article or chapter is not available on campus, Scan & Deliver will automatically refer the request to Interlibrary Loan (ILL). Interlibrary Loan is a service that enables borrowers to obtain online articles and book chapters from materials not held in the University System of Maryland.

Please note that one limitation of these services that might create some challenges for the online student is that the Libraries are not allowed to make online copies of entire books. The only way that a student can get access to a print copy of an entire book is to physically come to the Libraries and check out that book.

Additional Materials and Resources

In addition to serials, monographs and databases available through the University Libraries, students in the Master of Science in Geospatial Information Sciences will have access to a wide range of media, datasets, software, and technology. Library Media Services (http://www.lib.umd.edu/lms) houses media in a variety of formats that can be utilized both on-site and via ELMS course media. GIS datasets are available through the GIS and Spatial Data Center website (http://www.lib.umd.edu/gis) which includes the BTAA Geoportal (https://geo.btaa.org/). Statistical consulting and additional research support is available through the Research Commons (http://www.lib.umd.edu/rc) while technology support and services are available through the Terrapin Learning Commons (http://www.lib.umd.edu/tlc).

The subject specialist librarian for geographic information systems (GIS) and spatial data, Dr. Kelley O'Neal (kelleyo@umd.edu), also serves as an important resource to Geographical Sciences and the upcoming Master of Science in Geospatial Information Sciences program.

Other Research Collections

Because of the University's unique physical location near Washington D.C., Baltimore and Annapolis, University of Maryland students and faculty have access to some of the finest libraries, archives and research centers in the country vitally important for researchers in geospatial intelligence. These include the Library of Congress, the National Archives, National Agricultural Library, and the Smithsonian, to name just few.

Conclusion

With our substantial journals holdings and index databases, as well as additional support services and resources, the University of Maryland Libraries have resources to support teaching and learning in Geospatial Information Sciences. These materials are supplemented by a strong

Budget Analysis: Master of Science in Geospatial Information Sciences

Program Revenue	AY 2019/20	AY 2020/21	AY 2021/22	AY 2022/23	AY 2023/24
I. Total Tuition Revenue	**$1,015,560**	**$1,035,871**	**$1,173,987**	**$1,197,467**	**$1,221,416**
A. Total Professional Students (annually)	45	45	50	50	50
1. Fall Cohort Enrollment 1st Year of matriculation	30	30	35	35	35
2.Spring Cohort Enrollment 2nd Year of matriculation	15	15	15	15	15
B. Total Credits (annually)	31.0	31.0	31.0	31.0	31.0
1. Cohort Courses 1st Year of matriculation	15.5	15.5	15.5	15.5	15.5
2. Cohort Courses 2nd Year of matriculation	15.5	15.5	15.5	15.5	15.5
C. Per course rate; Assumes 2% increase	$728	$743	$757	$773	$788
Estimated Expenses	AY 2019/20	AY 2020/21	AY 2021/22	AY 2022/23	AY 2023/24
I. Total Instructional and Administration	**$729,600**	**$751,488**	**$774,033**	**$797,254**	**$821,171**
A. Instructional Totals	**$331,500**	**$341,445**	**$351,688**	**$362,239**	**$373,106**
1.Total Faculty Salaries [a x b]	**$255,000**	**$262,650**	**$270,530**	**$278,645**	**$287,005**
a. Total paid instructors per year	3	3	3	3	3
b. Instructor salary; assumes a 3% annual increase	85,000	87,550	90,177	92,882	95,668
2. Fringe Benefits (30%)	76,500	78,795	81,159	83,594	86,101
B. Academic Administration Totals	**$398,100**	**$410,043**	**$422,344**	**$435,015**	**$448,065**
1. Program Director (also teaches 3 course per year) (assumes 3% annual increase)	100,000	103,000	106,090	109,273	112,551
2. Fringe Benefits (30%)	30,000	30,900	31,827	32,782	33,765
3. Full-time Coordinator (assumes 3% annual increase)	67,000	69,010	71,080	73,213	75,409
4. Fringe Benefits (30%)	20,100	20,703	21,324	21,964	22,623
5. Admin Asst (assumes 3% annual increase)	21,000	21,630	22,279	22,947	23,636
6. Teaching Assistants (4 per year) (tuition remission + stipend; assumes 3% annual increase)	160,000	164,800	169,744	174,836	180,081
C. Equipment, Materials and Supplies Totals	**$12,000**	**$12,360**	**$12,000**	**$12,000**	**$12,000**
Estimated equipment	10,000	10,300	10,000	10,000	10,000
Materials & Supplies	2,000	2,060	2,000	2,000	2,000
II. Marketing	**$15,000**	**$15,000**	**$15,000**	**$15,000**	**$15,000**
Estimated Marketing (by academic unit)	15,000	15,000	15,000	15,000	15,000
SUBTOTAL: DIRECT PROGRAM EXPENSES	**744,600**	**766,488**	**789,033**	**812,254**	**836,171**
III. Campus Administrative Fee	**$152,334**	**$103,587**	**$176,098**	**$179,620**	**$183,212**
15% of tuition revenue for OES administrative costs	152,334	103,587	176,098	179,620	183,212
Total Estimated Expenses	**$896,934.00**	**$870,075.12**	**$965,130.74**	**$991,873.69**	**$1,019,383.70**
Total Estimated Program Revenue	**$1,015,560**	**$1,035,871**	**$1,173,987**	**$1,197,467**	**$1,221,416**
Net Revenue	**$118,626**	**$165,796**	**$208,857**	**$205,593**	**$202,033**

Establish a Master of Science in Geospatial Intelligence (PCC 18051)

PRESENTED BY	**Janna Bianchini, Chair, Senate Programs, Curricula, and Courses Committee**
REVIEW DATES	**SEC – January 28, 2019 | SENATE – February 5, 2019**
VOTING METHOD	**In a single vote**
RELEVANT POLICY/DOCUMENT	**N/A**
NECESSARY APPROVALS	**Senate, President, University System of Maryland Board of Regents, and Maryland Higher Education Commission**

ISSUE

The Department of Geographical Sciences within the College of Behavioral and Social Sciences (BSOS) proposes to establish a Master of Science degree program in Geospatial Intelligence. This program exists currently as an iteration of the Master of Professional Studies (MPS) program. The 30-credit program has been in operation since 2016. The Master of Professional Studies program was approved in 2005 by the University System of Maryland Board of Regents and Maryland Higher Education Commission to allow for the expedited approval of curricula that respond to changing market needs of working professionals. Once a new iteration of the MPS is approved through campus PCC review, it only needs approval by the USM Chancellor to become official.

A limitation of offering the program as an MPS iteration is that all Professional Studies programs must use the same generic Federal Classification of Instructional Programs (CIP) code rather than a CIP code that accurately describes the program content. Searches that use CIP codes to find program offerings will not find the discipline-specific iteration, which reduces market visibility. Moreover, some CIP codes are designated as “STEM” eligible by the Department of Homeland Security, and international students with F1 visas who graduate from STEM designated programs may continue to work in the United States for two years longer than students in non-STEM designated programs. The generic CIP code for Professional Studies programs does not qualify as STEM-designated, even if the academic content of the Professional Studies program is STEM-related.

Consequently, the Geographical Sciences Department proposes to transition the program from a Master of Professional Studies program to a stand-alone Master of Science program in order to be classified more accurately. No changes are proposed to the program curriculum or administration. In a separate proposal, Geographical Sciences is proposing to convert its Professional Studies program in Geospatial Information Sciences to a stand-alone program. The Economics Department is also proposing to convert its Master of Professional Studies program in Applied Economics to a stand-alone program in a separate proposal.

The Geospatial Intelligence program provides workforce-focused training in cutting-edge topics in geospatial intelligence, geographic information science, remote sensing, and data science in the big

data era, providing the skills and expertise to graduates to lead new initiatives in the rapidly shifting landscape of defense and security applications.

The curriculum consists of 15 credits of core courses and 15 credits from a list of eligible GEOG courses. The core courses are as follows:

- GEOG661 Fundamentals of Geospatial Intelligence (3 Credits)
- GEOG662 Advances in Geographic Information Science and Remote Sensing (3 Credits)
- GEOG664 Geospatial Intelligence Systems and Platforms (3 Credits)
- GEOG665 Algorithms for Geospatial Intelligence Analysis (3 Credits)
- GEOG697 Capstone Project (3 Credits)

Electives include courses such as GEOG660 Advanced Remote Sensing Using Lidar, GEOG680 Geospatial Intelligence Networks, GEPG682 Open Source Intelligence, and GEOG683 Hazards and Emergency Management, among others.

Through the program, students develop a well-rounded understanding of the nature of geospatial intelligence and analysis. Students learn the core theory, methods, and protocols for gathering and management of geospatial intelligence data. They learn geospatial intelligence data analysis and visualization, and use the resulting products in operational settings. Students also learn about the ethical treatment of data and analysis throughout these procedures.

Although the field of geospatial intelligence was initially associated with national security, graduates will find opportunities in a variety of areas, including machine intelligence, business intelligence, criminology, government, and emergency management.

This proposal was approved by the Senate Programs, Curricula, and Courses committee on December 7, 2018.

RECOMMENDATION(S)

The Senate Committee on Programs, Curricula, and Courses recommends that the Senate approve this new degree program.

COMMITTEE WORK

The committee considered this proposal at its meeting on December 7, 2018. Ruibo Han, Director of the Master of Professional Studies Program in Geospatial Intelligence, presented the proposal. The proposal was approved by the committee.

ALTERNATIVES

The Senate could decline to approve this new degree program.

RISKS

If the Senate declines to approve this degree program, the university will lose an opportunity to take an existing program and make it more attractive to international students by simply classifying the program more accurately.

FINANCIAL IMPLICATIONS

There are no significant financial implications with this proposal as the program already exists as a Master of Professional Studies program.

University of Maryland PCC
Program/Curriculum/Unit Proposal

PCC Log No: **18051**

Program: Master of Science in Geospatial Intelligence

Department/Unit: Department of Geographical Sciences

College/School: College of Behavioral and Social Sciences

Proposal Contact Person (with email): Dr. Ruibo Han, ruibo@umd.edu

Type of Action (check one):

- ☐ Curriculum change (includes modifying minors, concentrations/specializations and creating informal specializations)
  - ☐ Curriculum change is for an LEP Program
- ☐ *Rename a program or formal Area of Concentration*
- ☐ *Establish/Discontinue a formal Area of Concentration*
- ☐ Other:
- ☒ *Establish a new academic degree/certificate program*
- ☐ Create an online version of an existing program
- ☐ Establish a new minor
- ☐ *Suspend/Discontinue a degree/certificate program*
- ☐ Establish a new Master or Certificate of Professional Studies program
  - ☐ New Professional Studies program will be administered by Office of Extended Studies

Italics indicate that the proposal must be presented to the full University Senate for consideration.

Approval Signatures - *Please print name, sign, and date. For proposals requiring multiple unit approvals, please use additional cover sheet(s).*

1. Department Committee Chair JULIE SHORT 10/10/18
2. Department Chair Chris Justice 10/11/18
3. College/School PCC Chair Karl Kurtz (for Karol Salton) 11/9/18
4. Dean Wayne Meisel 11/9/18
5. Dean of the Graduate School (if required) _____
6. Chair, Senate PCC Janna Bianchini 12-7-18
7. University Senate Chair (if required) _____
8. Senior Vice President and Provost _____

Instructions:
When approved by the dean of the college or school, please send the proposal and signed form to the Office of the Associate Provost for Academic Planning and Programs, 1119 Main Administration Building, Campus-5031, **and** email the proposal document as an MSWord attachment to pcc-submissions@umd.edu.

Summary of Proposed Action (use additional sheet if necessary):

The proposal is to establish a **Master of Science in Geospatial Intelligence (MS GEOINT)** to train a workforce for the expanding GEOINT industry in Maryland and the greater Washington, D.C. metropolitan area. The proposed MS GEOINT program will replace the current Master of Professional Studies in GEOINT. The proposed MS GEOINT will have a STEM designation that allows international students a longer term (24 months) to work in the United States after graduation. The proposed MS GEOINT program encompasses a **30-credit** (10 units of 3-credit courses) course structure comprising **five core courses** and **five elective courses**, which is unchanged from the current MPS GEOINT program. The MS GEOINT will be offered in spring/summer/fall/winter quarter terms, and courses will be delivered on-site and online simultaneously in a hybrid format.

Unit Code(s) (to be entered by the Office of Academic Planning and Programs):

The Capstone is an independent research project that demonstrates competence in geospatial intelligence technologies. This project can originate from an internship, from relevant work at a current or past employer, or can be developed in conjunction with CGIS faculty. The student will prepare a project report and presentation which shall contain an executive summary, background information including a literature review and establishment of requirements, a detailed technical description of the project data and methods, a discussion of results obtained, and final conclusions and recommendations. The final project submission will include all data, computer code and/or workflow documentation required to replicate the project results. In completing this project, students develop a concrete example of how GEOINT technologies can be applied to solve real-world problems, and begin developing a portfolio that can be presented to potential employers.

Program: Master of Science in Geospatial Intelligence

Date of Proposal: Oct 2, 2018

Start Term for New Program: Fall, 2019

A new degree program proposal will need to be approved not just by campus but also by the University System of Maryland (USM) Board of Regents and the Maryland Higher Education Commission (MHEC). New certificate programs need to be approved by the USM Chancellor and MHEC. The following prompts are based on academic policies for programs and reflect campus requirements and MHEC requirements. The prompts also include questions frequently asked by review committees. See http://mhec.maryland.gov/institutions_training/Pages/acadaff/AcadProgInstitApprovals/NewAcademicProgramProposals.aspx for more information about MHEC requirements. Please feel free to add additional information at the end of this document or in a separate appendix.

Mission and Purpose

1. Describe the program and explain how it fits the institutional mission statement and planning priorities. The University Mission Statement and Strategic Plan can be found on this site: https://www.umd.edu/history-and-mission.

The Department of Geographical Sciences at the University of Maryland, College Park, proposes to establish a **Master of Science in Geospatial Intelligence (MS GEOINT)** to address the immediate and growing need to train a workforce for the rapidly expanding local geospatial intelligence industry in Maryland and the greater Washington, D.C. metropolitan area.

The need for a well-trained workforce in geospatial intelligence is growing markedly. Yet despite the large employment potential, the State of Maryland has been lacking graduate-level degree programs to train students in this field. There is a gap between the supply of graduate-level instruction and the steady demand for well-trained students in geospatial intelligence.

To respond to this gap in instructional offerings, the Department of Geographical Sciences established a **Master of Professional Studies in Geospatial Intelligence (MPS GEOINT)** in 2016. This is a dedicated Master's program to provide workforce-focused training at the graduate level in geospatial data handling for defense and security applications, emergency response, and humanitarian relief among other topics, involving applied problem-sets, analysis schemes, big geospatial datasets, and software platforms that characterize today's geospatial intelligence.

The proposed **MS GEOINT** program will succeed the current **MPS GEOINT** program, and continue to provide workforce-focused technical training that gives graduates the skills and expertise to lead new initiatives

in the rapidly shifting landscape of GEOINT applications, data collection systems, analytic methods, and mission support. Domestic students include University of Maryland and Geographical Sciences alumni, students from other geospatial science programs in MD, VA, DE, and PA, individuals working in the Intelligence Community, and individuals from the GIS industry sector among others. The proposed MS GEOINT will have a STEM designation that allows international students a longer term (24 months) to work in the United States after graduation. Based on the number of inquiries from international students, we expect to attract a significant number of international students into the program, and a 24-month post-completion optional practical training (OPT) term will make our GEOINT program more competitive for international applicants.

Program Characteristics

2. Provide the catalog description of the proposed program. As part of the description, please indicate any areas of concentration or specializations that will be offered.

The Master of Science in Geospatial Intelligence (MS GEOINT) provides workforce-focused training in cutting-edge topics in geospatial intelligence, geographic information science, remote sensing, and data science in the big data era, providing the skills and expertise to graduates to lead new initiatives in the rapidly shifting landscape of defense and security applications.

3. What are the educational objectives of the program?

The MS GEOINT program will deliver fundamental and advanced courses in three main areas (labs and hands-on exercises in problem-solving will be integrated throughout the sequence):

1. Fundamentals of geospatial intelligence science and technology;
2. Geospatial data handling processes using advanced algorithms, models, and commercial and open source platforms;
3. Support systems for applying geospatial intelligence in behavioral and social science, emergency and security management, and computational science.

4. Describe any selective admissions policy or special criteria for students interested in this program.

The Graduate School of the University of Maryland admits applicants who have earned a four-year baccalaureate degree with a cumulative 3.0 GPA (on a 4.0 scale). Official transcripts of a post-secondary degree and a resumé are required along with the application. International applicants must meet all requirements for international admissions, which have specific standards for academic credentials, language proficiency, financial support, visa requirements, etc. Refer to http://www.gradschool.umd.edu/admissions/international-admissions for process and requirements for international applications.

In addition to the requirements from the Graduate School, the Department of Geographical Sciences also requires that applicants will have completed a sequence of course work equivalent to the Department of Geographical Sciences' 300-level offerings in statistics, remote sensing, and GIS. Students without this academic background may substitute with relevant professional experience. Applicants without academic or

professional backgrounds may be accepted with a conditional offer, given that applicants will take required prerequisite courses or workshops to address these core competencies.

As required by the Graduate School, all application materials are to be submitted electronically:

- Graduate Application
- College or University Transcripts
- Statement of Purpose
- Letters of Recommendation
- Program/Department Supporting Documents
- Non-refundable application fee ($75) for each program to which an applicant applies

Completed applications are reviewed by an admissions committee in each graduate degree program. The recommendations of the committees are submitted to the Dean of the Graduate School, who will make the final admission decision. Students seeking to complete graduate work at the University of Maryland for degree purposes must be formally admitted to the Graduate School by the Dean. To ensure the integrity of the application process, the University of Maryland authenticates submitted materials through **iThenticate for Admissions**.

5. Indicate the course requirements with course numbers, titles and credits. If applicable, indicate if any course will also count for a general education requirement. In an appendix, provide the course catalog information (credits, description, prerequisites, etc.) for all of the courses. Note that suffixed "selected" or "special" topics courses should be avoided. If suffixed-selected or special topics courses are offered regularly in the new program, you should make the courses permanent. Also, please review the basic requirements of degree programs or certificate programs to ensure that they meet the minimum policy requirements.

Please note: new courses or modifications to courses need to be submitted through the Testudo Curriculum Management system and will need to follow the normal VPAC course proposal review process. You may submit individual course changes to VPAC concurrently with the PCC proposal; however, the course changes may be held depending on the outcome of the PCC proposal.

The proposed MS GEOINT program encompasses a **30-credit** (10 units of 3-credit courses) course structure comprising **five core courses** and **five elective courses**, which is unchanged from the current MPS GEOINT program. These courses are currently being offered through the MPS GEOINT program.

Course Type	Course #	Course Title	Credit
Core	GEOG661	Fundamentals of Geospatial Intelligence	3
	GEOG662	Advances in Geographic Information Science and Remote Sensing	3
	GEOG664	Geospatial Intelligence Systems and Platforms	3
	GEOG665	Algorithms for Geospatial Intelligence Analysis	3
	GEOG697*	Capstone Project	3
Elective	GEOG651	Spatial Statistics	3
	GEOG656	Programming and Scripting for GIS	3
	GEOG657	Web Programing	3
	GEOG660	Advanced Remote Sensing Using Lidar	3

	GEOG663	Big Data Analytics	3
	GEOG680	Geospatial Intelligence Networks	3
	GEOG682	Open Source Intelligence	3
	GEOG683	Hazards and Emergency Management	3
	GEOG686	Mobile Computing and Geospatial Information Management	3
	GEOG684*	Image Analysis and Geovisualization	3
	GEOG685*	Machine Learning and Data Mining	3
	GEOG687*	Geospatial Intelligence for Security	3
	GEOG688*	Human and Activity-Based Intelligence	3
	GEOG690*	Data Visualization	3
	GEOG691*	Food Security	3

Note: * indicates courses that are being developed.

Course Catalog Information is provided in Appendix A.

6. Summarize the factors that were considered in developing the proposed curriculum (such as recommendations of advisory or other groups, articulated workforce needs, standards set by disciplinary associations or specialized-accrediting groups, etc.).

The few dedicated graduate programs for geospatial intelligence that exist in the United States are, in essence, programs for Geographic Information Systems (GIS) branded as "geospatial intelligence", often with very limited content (and sometimes none) that deals with intelligence. The UMD GEOINT program fills this gap.

Courses offered in the **MS GEOINT** will expose students to material that goes beyond the existing offerings in geospatial information sciences (GIS) at UMD, and provide education to a new population seeking employment and skills in the defense and security industry. The MS GEOINT program can train individuals for the higher end of the geospatial intelligence job market and will help UMD to distinguish itself from a growing cohort of university programs that are offering basic GIS courses aimed at more entry-level positions.

The MS GEOINT program will provide state-of-the-art training in the geospatial technologies (e.g., web mapping, mobile applications, geospatial programming), geographical knowledge (e.g., geostatistics, geospatial networks, spatial reasoning), and scientific methods to address issues of public administration and policy analysis; public safety; criminology; military intelligence; emergency response and preparedness; project and workflow management; environmental applications; urban studies and regional sciences; and transportation geography. Students are provided with knowledge and practical skills in geographic information science & technology (GIS&T), remote sensing, mapping and geo-visualization, computer programming to tackle geospatial intelligence problems such as pattern recognition and feature extraction, big geospatial computing, developing source-to-screen workflows, and communicating uncertainty to decision-makers. These skills range from project design, data collection and interoperation, software development, algorithm implementation, data-mining, analytic processing and management, visualizing results and reporting. Technical skills are closely intertwined with substantive topics in a range of applied geospatial intelligence contexts, from defense and homeland security to humanitarian response and emergency management.

7. Sample plan. Provide a term by term sample plan that shows how a hypothetical student would progress through the program to completion. It should be clear the length of time it will take for a typical student to graduate. For undergraduate programs, this should be the *four-year plan*.

The MS GEOINT will be offered in spring/summer/fall/winter quarter terms. This 12-week long quarter system allows working professionals or part-time students to concentrate on one or two courses in a short period, which contributes to better course performance. Students have the option to study full-time or part-time, and can skip a quarter term due to work or personal reasons. A full-time student will take two courses in a quarter term, and the degree of MS GEOINT will require at least five quarter terms (15 months) to complete.

The tables below provide information on which courses are offered in each quarter term and a sample plan of courses to take each term for a full-time student who plans to graduate in five quarter terms.

Quarter Term	Course Offered				Sample Plan	
Fall 2019	GEOG661 Fundamental of GEOINT	GEOG662 Advances in GIS and RS	GEOG686 Mobile Computing and Geospatial Information Management		GEOG661 Fundamental of GEOINT	GEOG662 Advances in GIS and RS
Winter 2019	GEOG664 GEOINT Systems and Platforms	GEOG665 Algorithms for GEOINT Analysis	GEOG682 Open Source Intelligence	GEOG651 Spatial Statistics	GEOG664 GEOINT Systems and Platforms	GEOG665 Algorithms for GEOINT Analysis
Spring 2020	GEOG661 Fundamental of GEOINT	GEOG697 Capstone Project	GEOG663 Big Data Analytics	GEOG683 Hazards and Emergency Management	GEOG663 Big Data Analytics	GEOG683 Hazards and Emergency Management
Summer 2020	GEOG680 GEOINT Networks	GEOG651 Spatial Statistics	GEOG656 Programming and Scripting for GIS		GEOG656 Programming and Scripting for GIS	GEOG680 GEOINT Networks
Fall 2020	GEOG661 Fundamental of GEOINT	GEOG662 Advances in GIS and RS	GEOG697 Capstone Project	GEOG682 Open Source Intelligence	GEOG697 Capstone Project	GEOG682 Open Source Intelligence

Note: Core courses are indicated by cell shading in the table above.

8. Indicate whether the program will be offered either online or off-campus. Please note that MHEC requires a separate proposal for off-campus delivery. If the program will be offered exclusively online or will have both a face-to-face and online version of the program, please complete this additional form and add as an appendix:
https://docs.google.com/document/d/1ojpUBt4mAWlNPCiQNzZ48UH68zGPYj31TPgEOfW3q1E/

Courses will be delivered in a hybrid format: instructors will present lectures and lead discussions in a regular classroom setting, while also streaming the lectures online. Students that can attend in person may do so, while those that require or prefer remote access can also participate (via WebEx). Similarly, laboratory sessions may be attended tangibly, or students may access instruction remotely using video conferencing and virtual machine access to our software and data in the Department of Geographical Sciences. Courses are scheduled in weekday evenings (e.g., 5:30 pm – 8:00 pm) to accommodate working professionals.

International students, however, are limited in the way they can take classes. According to F-1 Visa regulations by the United States Citizenship and Immigration Services (UCSIS), only one online or distance education course per semester can be counted toward the student's full course of study per academic period, and all other course work must be delivered in a "contact" classroom. Therefore, these students will need to attend lectures and lab sessions in person.

An Online Program Offering Supplemental Information form is attached in Appendix B.

9. If the program will be offered in a non-semester format, identify the term structure that will be used for the program:

- **Approved Campus 12-Week Term (see Academic Calendars)**
- ***Non-Standard Term**

***If you are using a non-standard term structure, indicate whether relevant offices, such as the Registrar's Office and International Scholar & Student Services, have been notified and support the program. Non-standard terms need to fit within the university's scheduling system calendar, and non-standard terms need to work with international student visa requirements.**

Term structure:

The proposed MS GEOINT will follow the approved campus 12-week Term Calendar. Each quarter is 12 weeks long, and an academic year is composed of four quarter terms (Fall, Winter, Spring, and Summer).

A standard course will have a lecture on one day and a lab on another day. As all courses are scheduled in the evenings, a student can only take one course each day and a full-time student can only take two courses each term. This 12-week long quarter system allows working professionals or part-time students to concentrate on one or two courses in a short period, which contributes to a better course performance.

The following schedule outlines the quarter terms for the 2018-2019 12-Week Academic Calendar:

Fall Term 8/26/2019 - 11/15/2019
Winter Term 11/25/2019 - 2/19/2020
Spring Term 2/27/2020 - 5/20/2020
Summer Term 6/1/2020 - 8/21/2020

A detailed holiday schedule calendar is available at https://www.provost.umd.edu/calendar/index.html#.

10. For Master's degree programs, describe the thesis requirement and/or the non-thesis requirement.

The proposed MS GEOINT program does not have a thesis requirement. Students must complete five core courses (including a Capstone Project GEOG 697) and five elective courses in order to earn the degree. A Capstone Project, a faculty-advised independent research project, is the culmination of the students' entire body of work, and is essential to determine if the student has met a sufficient number of the required competencies. In addition to demonstrating problem-solving and critical thinking in one or more of the technical areas within the GEOINT domain, students must also take the initiative in planning and organizing this project and demonstrate that they can communicate effectively in writing and through the Capstone project presentation. Students are encouraged to work with department faculties, employers, or our connections in GEOINT industry for Capstone projects.

11. List the intended student learning outcomes. In an appendix, provide the plan for assessing these outcomes.

Graduating students from the MS GEOINT program are expected to complete courses with the following outcomes:

1. A well-rounded understanding of the fundamental nature of geospatial intelligence and analysis, including the core theory, methods, and protocols for gathering and management of geospatial intelligence data, analyses and visualization of those data, use of the resulting products in operational settings for applied geospatial intelligence, and the ethical treatment of data and analysis throughout those procedures.
2. Advanced expertise in either or both of the challenges and opportunities for geospatial intelligence in human, security, and engineering domains; and technologies for future geospatial intelligence and analysis in computing, machinery, and software.
3. Practical, hands-on project and lab-style training with data collection procedures, data analysis, algorithm development, using commercial and open source modeling and analysis software and platforms.
4. The ability to design and implement strategies to solve real-world intelligence problems as they present across a variety of domains, including intelligence activities, security and defense, hazards and emergency response and management, and transportation and urban applications.
5. Training in analytic thinking and real-world problem solving for future success in the workforce. Skills include but are not limited to interpersonal communications and teamwork, creative and critical thinking, occupational planning and organizing, problem-solving and decision making.

The plan for assessing these outcomes is provided in Appendix C.

12. Identify specific actions and strategies that will be utilized to recruit and retain a diverse student body.

The MS GEOINT program provides workforce-focused technical training that gives graduates the technical skills and domain expertise to qualify for mid-level career opportunities in industry and government. We are primarily recruiting from two pools of prospective students: Graduating/graduated students and working professionals. The Department of Geographical Sciences has a current cohort of around 300 students in the GIS concentration of the Geographical Sciences undergraduate major, the GIS minor, and the minor in remote sensing and environmental change. There are similar undergraduate GIS programs in Maryland from which we expect to draw undergraduate students: UM Baltimore County (http://goo.gl/Z9JvB9), Salisbury (https://goo.gl/F4zmCn), Washington College (https://goo.gl/2dVl7J), Towson (http://goo.gl/IUzlKi), Bowie State (https://goo.gl/vg3yWk), Coppin State (https://goo.gl/H8CiC9), Frostburg State (http://goo.gl/NghF3J), UM Eastern Shore (https://goo.gl/bbD7Ip), and the Naval Academy (https://goo.gl/LwGsYF). In-class presentations, flyers, on-campus info sessions, advertisements on UMD shuttle buses and visitor guides have been our major efforts to reach to students from UMD and other universities. We have also been actively attending local- and national-level conferences and setting up a booth to increase the publicity of our program to working professionals. On-line information sessions have also been an effective way of introducing the program and answering questions from both groups of prospective students.

Most of our current students in the MPS GEOINT program are working professionals from the Washington Metropolitan Area. They are employed in a wide range of sectors, including active-duty military, large contractors, and small businesses. Most of our students have completed their Bachelor's degree in Geography, GIS, or a related geospatial field. Some are from a non-geospatial background but are interested in working in

the field of GEOINT after completing our program. We plan on accepting a cohort of 25-30 new students each year in the proposed MS GEOINT program in order to maintain a high-quality learning environment through close and frequent interactions between our faculty and students. We expect that our enrollments will increase over time as we continue to attract new students and have the ability to add new classes and instructors.

Relationship to Other Units or Institutions

13. If a required or recommended course is offered by another department, discuss how the additional students will not unduly burden that department's faculty and resources. Discuss any other potential impacts on another department, such as academic content that may significantly overlap with existing programs. Use space below for any comments. Otherwise, add supporting correspondence as an appendix.

Not applicable.

14. Accreditation and Licensure. Will the program need to be accredited? If so, indicate the accrediting agency. Also, indicate if students will expect to be licensed or certified in order to engage in or be successful in the program's target occupation.

The MS GEOINT program plans to seek the accreditation from the United States Geospatial Intelligence Foundation (USGIF). The USGIF is the only organization dedicated to promoting the geospatial intelligence tradecraft in the USA, and recently our Graduate Certificate in Geospatial Intelligence program (GC GEOINT) was awarded accreditation by USGIF. This makes our GC GEOINT program one of the 15 accredited programs in the USA.

Accredited programs benefit our students, college, university, industry, government, and the GEOINT Community at large, by ensuring current hiring needs are reflected in cross-disciplinary classroom coursework. A USGIF GEOINT Certificate proves to hiring organizations that the holder is ready to work in the GEOINT Community. An accredited Master's program goes even further to demonstrate that students have the skills to work in the ever-expanding, global GEOINT Community.

15. Describe any cooperative arrangements with other institutions or organizations that will be important for the success of this program.

Not applicable.

Faculty and Organization

16. Faculty and organization. Who will provide academic direction and oversight for the program? As an appendix, please indicate the faculty involved in the program. Include their titles, credentials, and courses they may teach for the program.

The MS GEOINT will be housed in the department of Geographical Sciences. The "Program Oversight Committee" is responsible for directing the program, while the program will be administrated and managed by the University of Maryland Center for Geospatial Information Science (CGIS). The program will also form an "MS GEOINT Advisory Committee".

Members of the Program Oversight Committee include:

- CGIS Director— Kathleen Stewart, Professor, Department of Geographical Science, College of Behavioral and Social Sciences, University of Maryland
- Graduate Director— Laixiang Sun, Professor, Department of Geographical Sciences, College of Behavioral and Social Sciences, University of Maryland

The "MS GEOINT Advisory Committee" will be formed internally from faculty in the MS GEOINT program, with two elected student representatives. The role of the Advisory Committee will be to provide term-to-term guidance on the running of the program, as well as strategic advice regarding future opportunities for the program.

The administrative and teaching team will be led by the CGIS Program Director:

- Ruibo Han — Senior Lecturer Department of Geographical Sciences, College of Behavioral and Social Sciences, University of Maryland

Faculty list is provided in Appendix D.

Resource Needs and Sources

17. Each new program is required to have a library assessment prepared by the University Libraries in order to determine any new library resources that may be required. Please contact your departmental/programmatic library liaison or Daniel Mack at dmack@umd.edu, Associate Dean of Collections, to request a library assessment that will be added as an appendix.

Library Assessment Report is provided in Appendix E.

18. Discuss the adequacy of physical facilities, infrastructure and instructional equipment.

The proposed MS GEOINT program will use existing resources and no additional library resources or support are required.

MS GEOINT students have access to two 25-seat GIS labs equipped with dual-monitor high-end workstations and connected to remote storage facilities. Students are also able to work from virtual desktops and servers supported by a VMware environment. The labs run a wide variety of commercial and open source software for GIS, remote sensing, statistical analysis, data access, image processing, mathematical analyses, graphics and 3D modeling, and software development. The Department of Geographical Sciences is also an ESRI Development Center.

The CGIS maintains a set of location-aware devices for teaching mobile GIS. These include (1) tablets equipped with positioning and motion sensors that students can learn how to program and extract data from, (2)

virtual reality media for immersive exploration of models and data, and (3) sensing devices for desktop and console computing that can generate real-time positioning, motion, and gesture captures.

The CGIS has two high-performance Hadoop-based computing clusters that have been purchased for research and student teaching. In each instance, the clusters are networked to other HPC resources in the Geographical Sciences department. The Department also maintains a Linux-based HPC cluster. Two IT professionals oversee, maintain, and guide the development of these computing resources. The CGIS and Department of Geographical Sciences also link to high-performance computing in the College of Behavioral and Social Sciences (the "BSWIFT" cluster), as well as to the University of Maryland Institute for Advanced Computer Studies (UMIACS), which operates several clusters. In partnership with the Mid-Atlantic Crossroads (MAX), we also have high-performance networking access to other high-performance computing sites around the country, as well as nimble access to commercial computing resources (Amazon AWS).

The University of Maryland maintains an Enterprise Learning Management System (ELMS) for coursework. ELMS is a Web-based platform for sharing course content, tracking assignments and grades, and enabling virtual collaboration and interaction. The MS GEOINT program will use ELMS for all its courses. The Department of Geographical Sciences also maintains a Cisco WebEx Online course delivery platform, by which lectures and discussions can be streamed virtually. The Department maintains two dedicated servers and shared storage for server-side delivery of GIS software.

19. Discuss the instructional resources (faculty, staff, and teaching assistants) that will be needed to cover new courses or needed additional sections of existing courses to be taught. Indicate the source of resources for covering these costs.

No additional instructional resources are required for the proposed MS GEOINT program.

The CGIS has two full-time Lecturers for the current MPS GEOINT program. These two dedicated lecturers will serve as instructors for most of the courses in the proposed MS GEOINT program, and some of the elective courses will be taught by other lecturers from the department. Initially, lecturers also provide lab instruction, but these responsibilities will be shifted to graduate teaching assistants as the program grows large enough to warrant the support of graduate TAs for supporting lab assignments.

In the following years, we anticipate to hire one new lecturer and request two to three TA lines. In each case, resources for these hires will come from program revenues directly unless other sources can be identified.

20. Discuss the administrative and advising resources that will be needed for the program. Indicate the source of resources for covering these costs.

The program director and a Senior Faculty Specialist will play the major management roles for the program. The director and lecturers in the program will serve as academic advisors for students. Tuition revenue will cover the cost of these resources.

21. Use the Maryland Higher Education Commission (MHEC) commission financial tables to describe the program's financial plan for the next five years: https://docs.google.com/spreadsheets/d/1V6iSZG05edMitWP6CAOXjCoGO58Gf6VXxPaacKfrhZ4/edit#gid=0. Add these tables as attachments. Use the space below for any additional comments on program funding.

The program's five-year financial plan is provided in Appendix F.

Implications for the State (Additional Information Required by MHEC and the Board of Regents)
If the proposed program is for a Post-Baccalaureate Certificate that is derived entirely from existing courses within an existing Master's degree program, then you **only** need to respond to prompts 22 (on market demand) and 25 (curriculum of current master's degree program).

22. Explain how there is a compelling regional or statewide need for the program. Argument for need may be based on the need for the advancement of knowledge and/or societal needs, including the need for "expanding educational opportunities and choices for minority and educationally disadvantaged students at institutions of higher education." Also, explain how need is consistent with the Maryland State Plan for Postsecondary Education.

The growing field of *geospatial intelligence* was originally associated with *national security*—the National Geospatial-Intelligence Agency (NGA) is tasked with visualizing, analyzing, and assessing national security through collection and interpretation of geospatial data. These data now come from an ever-growing array of sources, including other intelligence agencies; grounded, airborne, and orbital sensor platforms; evolving silos of big data generated by Internet and Communications Technologies (ICTs); and actively and passively volunteered geographic information that populations and devices cast during their everyday actions and interactions. Geospatial intelligence has, however, begun to grow beyond its original security focus, and the field now encompasses a variety of arenas in which geospatial intelligence plays a role. In *machine intelligence*, geospatial intelligence is a core component of navigation systems for vehicles and robots, as well as computer vision schemes. In *business intelligence*, it forms the basis for geodemographics, customer management systems, marketing analytics, location-allocation and site selection support systems, and logistics. In *criminology*, geospatial intelligence is widely employed in managing public security and investigating crime. In *government and public policy*, geospatial intelligence is significant in resource allocation and assessment of service delivery. In *natural hazards and emergency response*, it provides key data management and analysis tools for monitoring, assessing, and mitigating capabilities in decision making, method preparedness, and early warning system. In *engineering and computing industries*, it forms an important component of systems engineering, particularly in the emerging area of cyber-physical systems and cyberspace systems using commercial and open-source platforms. In the *earth sciences*, geospatial intelligence is used to provide base mapping, geo-referencing, and data fusion for a variety of data products and sensor systems.

Our local surroundings play host to the center of influence for the geospatial intelligence industry in the United States. The National Geospatial-Intelligence Agency employs 8,500 people at the third largest federal building in the D.C. region at nearby Springfield, VA. The NASA Goddard Space Flight Center in nearby Greenbelt, and the United State Geological Survey in nearby Reston, VA serve as the nexus for the nation's earth science geospatial intelligence. The U.S. Census Bureau in nearby Suitland, MD is tasked with a decennial nationwide data collection exercise that mobilizes a huge workforce to perform geospatial intelligence gathering year-round.

The few dedicated graduate programs for geospatial intelligence that exist in the United States are, in essence, programs for Geographic Information Systems (GIS) branded as "geospatial intelligence", but which have very little (sometimes none) content that deals with intelligence. This has become an issue for the intelligence community, who are having to scramble to train GIS graduates on the job. As a result, there is a move to establish certification programs for geospatial intelligence (see a new initiative by the U.S. Navy at http://goo.gl/WPEB5H; and the US Geospatial Intelligence Foundation, who have accredited our graduate certificate program; https://usgif.org/education/accreditation). There is a gap in the supply of graduate-level instruction in this area, and a large demand for well-trained students.

23. Present data and analysis projecting market demand and the availability of openings in a job market to be served by the new program. Possible sources of information include industry or disciplinary studies on job market, the USBLS Occupational Outlook Handbook, or Maryland state Occupational and Industry Projections over the next five years. Also, provide information on the existing supply of graduates in similar programs in the state (use MHEC's Office of Research and Policy Analysis webpage for Annual Reports on Enrollment by Program) and discuss how future demand for graduates will exceed the existing supply. As part of this analysis, indicate the anticipated number of students your program will graduate per year at steady state.

The field of geospatial intelligence has recently and suddenly ballooned and major technology companies (Google, Apple, Facebook, Über, for example) have been scrambling to put together teams to get up to speed. These technology-based companies join already well-established geospatial intelligence divisions in major government contract companies in and around the Beltway, such as BAE Systems (http://goo.gl/9viLPl), Lockheed Martin (http://goo.gl/FEgEjl), Harris (http://goo.gl/Ww4UQJ), Northrup-Grumman (http://goo.gl/3MQz47); IDS (http://goo.gl/b2lWzs), and Leidos (https://goo.gl/8ekubo), as well as most banks and insurance companies, all of which have geospatial intelligence divisions. Entirely new companies are beginning to form around the topic of geospatial intelligence (see Palantir, which has offices locally in Tyson's Corner, VA; https://goo.gl/Wi1JQE). In early August 2015, Audi, BMW, and Daimler purchased the geospatial intelligence division of Nokia (known as "Here") for $3.1 *billion*.

The need for a well-trained and nimble workforce in geospatial intelligence is growing, markedly. The Bureau of Labor Statistics "Job outlook" statistics place graduates in geospatial intelligence in the "Much faster than average" category for employment prospects across each classification of relevance to the field (20% to 29% change in employment over the next ten years; see http://goo.gl/j8f1F1 and http://goo.gl/cnBXnT). Again, Maryland is enjoying some of the strongest increases in future job prospects for geospatial intelligence. We rank as the number one state for the highest employment level in the occupation, as well as the top state for highest concentration of jobs. The D.C. metropolitan area ranks the highest (by a factor of between four and seven!) in urban areas with the highest employment level in this category, job concentration, and mean wage. Maryland is ranked second (behind Virginia) for top paying states for the occupation. (Details are at http://goo.gl/Jw9M9G.)

We plan to graduate a cohort of 25-30 students each year in the proposed MS GEOINT program. We expect that our enrollments will increase over time as we continue to attract new students and graduate a highly-equipped labor force to the job market.

24. Identify similar programs in the state. Discuss any differences between the proposed program and existing programs. Explain how your program will not result in an unreasonable duplication of an existing program (you can base this argument on program differences or market demand for

graduates). The MHEC website can be used to find academic programs operating in the state: http://mhec.maryland.gov/institutions_training/pages/HEPrograms.aspx.

There is only one similar existing programs to the proposed MS GEOINT program in the State of Maryland: the Master of Science in Geospatial Intelligence at Johns Hopkins University (https://goo.gl/9kGpXT). Johns Hopkins University's MS GEOINT program is fairly recent (starting in Summer 2018), and it is a fully online program composed of courses compiled from two established programs at the university: GIS and Government.

Our MS GEOINT program will not result in an unreasonable duplication of this program based on the following aspects:

Our curriculum is dedicated to courses designed for Geospatial Intelligence with offerings including Open Source Intelligence, Mobile and Social Computing, Big Data Analytics, Hazards and Emergency Management. It is significantly different from Johns Hopkins' GEOINT program. It is also distinctive from current GIS, geoinformatics, remote sensing or government courses as it offers a specific intelligence focus. Course contents are based on the cutting-edge technologies and platforms used in the GEOINT industry including open source tools and methods and big data computing, instead of the more typical GIS focus on spatial data handling of other programs.

Our course delivery format is different from Johns Hopkins' GEOINT program as well. We adopt a hybrid format (on-site + online) to integrate the benefits of traditional classroom teaching style and modern remote education. Students who live near to campus can attend lectures or lab sessions in person if they so choose or select remote participation if that is a better fit for them. This facilitates a more dynamic learning environment for our students.

Our special quarter term system will allow our students to graduate sooner than traditional semester-based programs listed above. Students may finish 10 courses in as fast as 15 months (two courses every 3-month term) in our MS GEOINT program.

25. Discuss the possible impact on Historically Black Institutions (HBIs) in the state. Will the program affect any existing programs at Maryland HBIs? Will the program impact the uniqueness or identity of a Maryland HBI?

None of the Maryland HBIs currently offers a GEOINT program. We hope that graduates from HBI programs interested in a career in the geospatial intelligence field will consider our Master's program to extends their skills and background.

26. For new Post-Baccalaureate Certificates derived from existing master's programs only, include the complete curriculum of the existing master's program.

Not applicable.

Appendix A: Course Catalog

All the courses listed below are 3-credit courses.

GEOG 661:Fundamentals of GEOINT
Geospatial Intelligence (GEOINT) is the collection, analysis, visualization and dissemination of geospatial information to support decision-making. This course introduces the fundamental knowledge required to become a successful GEOINT practitioner, including the history of the GEOINT discipline, the intelligence applications of remote sensing and Geographic Information Systems (GIS) technologies, and how GEOINT products are used to support national security and humanitarian missions. Upon completion of this course you will understand the roles that technology, policy, doctrine, government, and industry play in shaping the Geospatial Intelligence discipline, and develop the technical knowledge and domain expertise to create basic GEOINT products that provide context for decision makers.

GEOG 662: Advances in GIS and Remote Sensing
Assuming a basic understanding of geographic information systems and services, and remote sensing techniques, this course focuses on state-of-the-art advances in geographic information science and remote sensing as they support geospatial intelligence. The course will focus on synergies between GIS and remote sensing in informatics, computer science, and spatial engineering, and their application to problem domains in human systems, physical systems, and cyberspace. Advances in GIS presents recent advances regarding fundamental issues of geo-spatial information science (space and time, spatial analysis, uncertainty modeling and geo-visualization), and new scientific and technological research initiatives for geo-spatial information science (such as spatial data mining, mobile data modeling, and location-based services). Advances in remote sensing will provide opportunity to understand and work with latest developments in the Remote Sensing datasets. The curriculum covers wide range of remote sensing data interpretation and their processing techniques.

GEOG 664: GEOINT Systems and Platforms
There are numerous systems and platforms that support the collection, visualization and dissemination of Geospatial Intelligence (GEOINT). Platforms such as satellites and aircraft carry sensors systems that can detect both physical and man-made objects on the earth. Ground-based processing systems are used to analyze and visualize sensor data, and also to create and disseminate GEOINT products that guide decision-making. In this course you will learn how to develop and implement source-to-screen GEOINT workflows, and will understand how to use a system of systems approach to describe the programmatic and technical strengths and weaknesses of many different GEOINT systems and platforms.

GEOG 665: Algorithms for GEOINT Analysis
With increasing sources and platforms of geospatial and imagery data, GEOINT analysts face new challenges in data exploitation and analytics. This course focuses on communicate the knowledge and capabilities that allow GEOINT analysts to be more efficient in analyzing and understanding the activities, relationships, and patterns discovered from these GEOINT sources. The purpose of this course is to expose students to fundamental algorithms in geospatial intelligence and their application in methodological and substantive domains, and their implementation in computer programs and software systems. This course provides an introduction to theoretical and applied aspects of GEOINT systems and quantitative methods with a focus on spatial analysis. Emphasis will be placed on the analysis of continuous and discrete geographical data for spatial problem solving in both the human and physical spatial sciences. We will explore algorithms, data structures, and advanced computational topics. Implementation of algorithms will be explored through pseudo-code and a variety of scripting, data access, and programming languages.

GEOG 697: Capstone Project

The Capstone is an independent research project that demonstrates competence in geospatial intelligence technologies. This project can originate from an internship, from relevant work at a current or past employer, or can be developed in conjunction with CGIS faculty. The student will prepare a project report and presentation which shall contain an executive summary, background information including a literature review and establishment of requirements, a detailed technical description of the project data and methods, a discussion of results obtained, and final conclusions and recommendations. The final project submission will include all data, computer code and/or workflow documentation required to replicate the project results. In completing this project, students develop a concrete example of how GEOINT technologies can be applied to solve real-world problems, and begin developing a portfolio that can be presented to potential employers.

GEOG651: Spatial Statistics
This course is about quantitative analysis of spatial data. It is intended to provide a broad survey of various spatial statistic methods. The course is geared towards helping students: (1) develop an understanding of the important theoretical concepts in spatial data analysis; and (2) gain practical experience in the application of spatial statistics to a variety of social and environmental problems using the advanced statistical software. This course covers five broad topical areas: (1) point pattern analysis; (2) area data analysis; (3) continuous data analysis; (4) spatial sampling; and (5) multivariate spatial and temporal analysis.

GEOG656: Programming and Scripting for GIS
This course teaches programming and scripting for GIS users. The concepts of scripting and object-oriented programming using the Python programming language are reviewed. This course teaches students to design clearly structured programs and introduces ArcPy, a library providing access to ArcGIS geoprocessing tools. ArcPy includes a series of modules such as data access, mapping, spatial analysis, and network analysis. Students will develop geoprocessing programs to edit, query, manipulate, and analyze spatial data (both vector and raster data) with Python, ArcPy, and other modules like NumPy.

GEOG657: Web Programming
Component-based web server design and efficient session and secure access management have become challenges to provide fast, robust, and flexible GIS services on the Internet. This course is designed to teach fundamental techniques required in developing both client-side and server-side web application for not only GIS but also non-GIS applications. This course covers web design and static web generation using HTML5 and CSS, client-side programming with JavaScript, and dynamic web development using PHP and MySQL. Basic web design using HTML, XHTML, CSS, etc. is helpful, but not required.

GEOG660: Advanced Remote Sensing using Lidar
This course will expand on remote sensing concepts with a focus on light detection and ranging (lidar) technology. Lidar, also known as laser scanning, is an active remote sensing tool that can produce high-resolution point clouds. This course will cover the fundamentals of lidar, explore current developments in lidar technology, and discuss different applications where it is being used. Students will get hands-on learning about lidar data management, processing, and analysis. It is recommended that students have some background in spatial modeling and computer programming.

GEOG 663: Big Data Analytics
This course is designed to introduce statistical analysis over big data sets (and tackling big data problems), primarily in geography and spatial sciences, but with broader appeal throughout the socio-behavioral sciences. Students will be introduced to a range of methods that can be applied to the exploration, modeling, and visualization of big quantitative data. This course explores data fusion, statistical analysis, and data-mining for geospatial and non-geospatial data in structured and unstructured form, with an emphasis on large silos of data across diverse sources and assumptions.

GEOG 680: Geospatial Intelligence Networks
Networks are an important part of the Geospatial Intelligence (GEOINT) cycle, from the sensor networks that are used to collect raw geospatial information to the telecommunication networks that are used to disseminate finished GEOINT products. Transportation networks, computer networks, social networks, and many other man-made and natural features can also be characterized by a link-node network topology, and can be studied using network science methods. Upon completion of this course you will be able characterize and classify real-world GEOINT networks and their components, understand network dynamics including routing, scalability, and robustness, and be able to apply engineering methods for network design and network analysis.

GEOG 682: Open Source Intelligence
Open Source Intelligence (OSINT) is information that is publicly available which is collected and analyzed to support decision-making. The collection and analysis of OSINT is often considered to be the first step in developing an "all-source" intelligence product, where OSINT is fused with Geospatial Intelligence (GEOINT), Signals Intelligence (SIGINT), and Measurement and Signature Intelligence (MASINT), and Human Intelligence (HUMINT). In this course you will learn about the sources, ethics, and methods that are associated with OSINT, and will also develop knowledge and skills related to open-source geospatial technologies and organizations such as the Open Geospatial Consortium (OGC).

GEOG 683: Hazards and Emergency Management
Timely and accurate Geospatial Intelligence (GEOINT) is essential for protecting people from hazardous events such as floods, wildfires, tsunamis, hurricanes, industrial accidents, and terrorist attacks. GEOINT plays a critical role in all four stages of emergency management: preparedness, mitigation, response, and recovery. The use of remote sensing and Geographic Information Systems (GIS) before, during, and after Hurricane Katrina and the 9/11 terror attacks are two of the case studies that are discussed during this course. You will develop a deeper understanding of the emergency management successes and failures that occurred during these historic and deadly events, and learn the technical skills to develop and disseminate GEOINT products that support decision-making at all four stages of emergency management.

GEOG 686: Mobile Computing and Geospatial Information Management
This course is designed as an introduction to mobile GIS, to the programming concepts underlying mobile GIS development, and more importantly, to the design and implementation of a mobile GIS application. The course covers how to develop, test, and publish mobile GIS native apps working across two mobile platforms: Android and iOS. It also leverages the capabilities of JavaScript, Swift, Google maps, ArcGIS Server and runtime SDK to developing and publishing mobile GIS apps.

GEOG684: Image Analysis and Geovisualization
This course explores image processing routines atop remotely-sensed data from a variety of multispectral, hyperspectral, radar, and microwave platforms, including data preparation and enhancement, feature transformation, classification, pattern detection, and feature extraction. It explore next-generation platforms for machine vision, including commercial sensors in location-aware devices and gaming devices, car sensor systems, and security cameras, and methods for object detection and tracking, structure from motion, and gait and expression analysis. It will also cover computer cartography, scientific visualization, handling high-dimensional data, and animation.

GEOG685: Machine Learning and Data Mining
This course provides a basic introduction to Machine learning and Data mining, a dynamic and fast evolving subfield of artificial intelligence that learn from past experience and find useful patterns in data. Topics include the three basic branches in this field: (1) Supervised learning to predict problems; (2) Unsupervised learning for clustering data and discovering patterns from data; and (3) Reinforcement learning for decision making. The

course will not only learn various machine learning and data mining techniques, but also learn how to apply them to real problems in practice including character recognition, speech recognition, text mining, document classification, pattern recognition, social media analysis, and information extraction from web pages.

GEOG687: Geospatial Intelligence for Security
This course focuses on security problem-sets, opportunities, methods, and applications of geospatial intelligence in security four main domains. First, in defense and homeland security, the course will examine how geospatial intelligence supports military operations (including operations other than war) and national security initiatives. Second, in the domain of crime, the course will explore how geospatial intelligence is used in law enforcement, crime prevention, and forensic analysis. Third, the course examines the role of geospatial intelligence in cyber-security, including topics such as cyber-crime, location spoofing, and space-time dynamics of computer virus and service attacks, fraud, and SPAM. Fourth, the course treats geospatial intelligence as it relates to the identification, analysis, evaluation, management, and response to hazards, crises, and critical scenarios. Here, we focus on both natural and on man-made phenomena and systems, as well as interactions between them.

GEOG688: Human and Activity-Based Intelligence
This course focuses on the applied human domain of geospatial intelligence and its relationship to social and behavioral science. It begins with a review of human geography, behavioral geography, political geography, and cultural geography and their relationships to human intelligence gathering. It then focuses on fundamental and emerging techniques for activity-based intelligence. Current topics include migration and flow, movement analytics, transportation analytics, time geography and event conceptualization, transactions and interactions, and social and cyber-physical networks.

GEOG690: Data Visualization
Data visualization techniques provide people with enhanced perceptual and cognitive abilities to understand and extract information from increasing amounts of data. This course will introduce a number of common data domains and corresponding analysis tasks, including multivariate data, networks, text, and spatial data. Students will learn offline data visualization tools as well as interactive web techniques to create visualizations that allow viewers from all backgrounds to interact with data, and gain insight into data through the data's presentation. This course will also cover computer cartography, handling high-dimensional data, and dynamic visualization.

GEOG691: Food Security
Measuring human food security is an important application of geospatial intelligence. Remote sensing resources can be used to identify regions where food insecurity may occur, and geospatial data fusion can help analysts understand and predict broader national security implications. Course topics include monitoring crop conditions using multispectral imagery, developing products to manage agricultural areas, analyzing the complexity and diversity of food production systems, and integrating socioeconomic and demographic data into geospatial analysis processes and decision support products.

Appendix B: Online Program Offering Supplemental Information

According to the Maryland Higher Education Commission, a new offering of "more than 50 percent" of an existing program in an online format requires MHEC approval. The following prompts are based on academic policies for online programs as well as questions frequently asked by review committees.

Discuss the role of faculty in the development, oversight, and teaching of this online program. Note that MHEC 13B.02.03.11(F) requires that "at least 50 percent of the total semester credit hours within the proposed program shall be taught by full-time faculty." Indicate any other unit or vendor that will be used to administer or deliver the program.

The MS GEOINT will be housed in the Graduate School. The "Program Oversight Committee" is responsible for directing the program, while the program will be administrated and managed by the University of Maryland Center for Geospatial Information Science (CGIS). The program will also form an "MS GEOINT Advisory Committee".

Members of the Program Oversight Committee include:

- CGIS Director— Kathleen Stewart, Professor, Department of Geographical Science, College of Behavioral and Social Sciences, University of Maryland
- Graduate Director— Laixiang Sun, Professor, Department of Geographical Sciences, College of Behavioral and Social Sciences, University of Maryland
- Graduate School Representative— Steve Fetter, Dean, Graduate School, University of Maryland

The "MS GEOINT Advisory Committee" will be formed internally from faculty in the MS GEOINT program, with two elected student representatives. The role of the Advisory Committee will be to provide term-to-term guidance on the running of the program, as well as strategic advice regarding future opportunities for the program.

The administrative and teaching team will be led by the CGIS Program Director:

- Ruibo Han — Senior Lecturer Department of Geographical Sciences, College of Behavioral and Social Sciences, University of Maryland

100 percent of the total credit hours in the proposed MS GEOINT program will be taught by full-time faculty from the Department of Geographical Sciences at the University of Maryland.

Discuss the resources available for training and supporting faculty in regard to course development and instructional technology.

All the courses in the proposed MS GEOINT program are fully developed and currently taught in the MPS GEOINT program.

Courses are subject to constant updates with the development of the technologies in the GEOINT industry. The Teaching and Learning Transformation Center at the University of Maryland inspires and supports effective,

engaging, efficient, and equitable teaching innovations among the University's instructors and assistants. This team provides faculty with training, resources, professional development activities, and individualized consultation to transform their classrooms and careers.

Discuss how courses will be taught using online technologies. Will courses be synchronous, asynchronous, or a combination of both? What technologies will be used to present material and evaluate the quality and authenticity of student work? How will these technologies be assessed?

The proposed MS GEOINT program will be delivered in a **hybrid** format: Instructors present lectures and lead discussions tangibly in a regular classroom setting, while also streaming the lectures online. Students that can attend in person may do so, while those who require or prefer remote access can also participate (via *WebEx*). Similarly, laboratory sessions may be attended tangibly, or students may access instruction remotely using video conferencing and virtual machine access to our software and data in the Department of Geographical Sciences.

The University of Maryland maintains an Enterprise Learning Management System (ELMS) for coursework. ELMS is a Web-based platform for sharing course content, tracking assignments and grades, and enabling virtual collaboration and interaction. The MS GEOINT program will use ELMS for all its courses.

The Department of Geographical Sciences also maintains a Cisco WebEx Online course delivery platform, by which lectures and discussions can be streamed virtually. WebEx is a Web conferencing application that can be used to host classes, office hours, and other meetings, in an online environment. Faculty, staff, and students can communicate in real-time using chat, voice (microphone and speakers), and video (webcam) with WebEx. WebEx allows for the ability to display presentations, annotate overtop slides, perform live editing of documents and even conduct a poll within the software.

Additionally, the Department maintains two dedicated servers and shared storage for server-side delivery of GIS software.

Discuss how the online program will be comparable to the existing program in terms of academic rigor. What are the learning outcomes for the online offering? Do they differ from the existing on-site program? How will the program be evaluated?

The proposed MS GEOINT program will be delivered in a **hybrid** format: Instructors present lectures and lead discussions tangibly in a classroom setting, while also streaming the lectures Online. Academic rigor can be challenging for online teaching and learning, especially when assessing a student's course work. We try to enhance the academic integrity by decreasing the amount/weight of exams which is difficult to control for online students, and increasing the amount/weight of personal projects or customized assignments.

We don't distinguish the students who study online from those whole who study on-site, as students may choose to mix the learning style during a term. The leaning outcomes stay the same as online and on-site students.

We will use various methods of assessments to evaluate the program, including In-class observation, Student participation, Student feedback, course evaluation, etc. Details are provided in Appendix C.

Describe the admissions criteria and procedures for the online program.

The proposed MS GEOINT program will be delivered in a **hybrid** format, so we don't distinguish the students who study online from those whole who study on-site. The admission criteria are the same for all applicants, which are listed in section 4 of this proposal.

Discuss how students will have reasonable and adequate access to the range of student support services (library materials, teacher interaction, advising, counseling, accessibility, disability support, and financial aid) needed to support their learning activities.

The proposed MS GEOINT program will be delivered in a hybrid format, thus all students have equal access to on-campus resources as regular graduate students. All available resources for our current MPS GEOINT program are listed on our program website (https://geospatial.umd.edu/education/resources), and the proposed MS GEOINT program will have the same access to these resources and services.

Discuss how the program will provide students with clear, complete, and timely information on the curriculum, technological competence and equipment needed for the program, admissions criteria, financial aid resources, complaint procedures, and cost and payment policies.

Program website http://geoint.umd.edu will serve as the portal to provide clear, complete, and prompt information on curriculum, requirement, course plan, admission procedure, resources, etc.

In addition to the broader program learning outcomes and student competencies, all courses in the GCPS GEOINT program have unique learning outcomes that are designed to ensure that one or more student competencies are met. Student assessment strategies vary by course as well, but typically include regular technical laboratories and a final project that emphasizes problem-solving and critical thinking in Geographic Information Systems (GIS), Remote Sensing, Spatial Analysis, Computer Programming, and Geospatial Intelligence. Students are encouraged to partner with faculty in the CGIS, the Department of Geographical Sciences, or other UMD departments to conduct their Capstone Project research. Students may also choose to integrate their current workplace duties into their research project. By encouraging research collaborations with both the academic and industry partners, we help ensure that student projects are relevant and applicable to current problems within the GEOINT domain.

Broader oversight of student competencies, learning outcomes, course development, and research is provided through several mechanisms. As the Director of the Center for Geospatial Information (CGIS), Dr. Kathleen Stewart ensures that the GCPS GEOINT program is aligned with the broader mission of the center, including scholarship and teaching of future-forward geospatial information science technologies and advanced computational approaches. In addition, a CGIS Advisory Committee meets quarterly to discuss and plan the future directions of the center and coordinate goals and activities across all of the Graduate Certificate and Master of Professional Studies Programs administered by the center. Finally, CGIS and GCPS GEOINT goals and program progress are discussed and defined at the quarterly Department of Geographical Sciences Committee Meetings, which are chaired by Dr. Chris Justice (Chair, Geographical Sciences).

Intellectual Property Policy. Units developing online programs should be familiar with the university's intellectual property policy. See https://www.president.umd.edu/iv-320a. Please indicate that the unit will comply with the university's intellectual property policy.

The department will comply with the university's intellectual property policy to deliver the proposed MS GEOINT program.

Discuss the instructional and administrative resources (faculty, staff, and teaching assistants) that will be needed to cover the cost of the program. Indicate the source of resources for covering these costs. These formatted tables can be used to indicate the resources and expenditures for the program: https://docs.google.com/spreadsheets/d/1V6iSZG05edMitWP6CAOXjCoGO58Gf6VXxPaacKfrhZ4/edit#gid=0.

The proposed MS GEOINT program has two full-time Lecturers to serve as instructors for most of the courses in the proposed MS GEOINT program, and some of the elective courses will be taught by other lecturers from the department.

In the following years, we anticipate to hire one new lecturer and request three to four TA lines. In each case, resources for these hires will come from program revenues directly unless other sources can be identified.

The program director and a Senior Faculty Specialist will play the major management roles for the program. The director and lecturers in the program will serve as academic advisors for students.

Tuition revenue will cover the cost of these resources.

A budget form is provided in Appendix F.

Describe the market demand for the program. Evidence may be research from industry or the discipline, and should also consider state and federal employment projections. Indicate the job opportunities available to those who would graduate from this program.

The need for a well-trained and nimble workforce in geospatial intelligence is growing, markedly. The Bureau of Labor Statistics "Job outlook" statistics place graduates in geospatial intelligence in the "Much faster than average" category for employment prospects across each classification of relevance to the field (20% to 29% change in employment over the next ten years; see http://goo.gl/j8f1F1 and http://goo.gl/cnBXnT). Again, Maryland is enjoying some of the strongest increases in future job prospects for geospatial intelligence. We rank as the number one state for the highest employment level in the occupation, as well as the top state for highest concentration of jobs. The D.C. metropolitan area ranks the highest (by a factor of between four and seven!) in urban areas with the highest employment level in this category, job concentration, and mean wage. Maryland is ranked second (behind Virginia) for top paying states for the occupation. (Details are at http://goo.gl/Jw9M9G.)

The field of geospatial intelligence has recently and suddenly ballooned and major technology companies (Google, Apple, Facebook, Über, for example) have been scrambling to put together teams to get up to speed. These technology-based companies join already well-established geospatial intelligence divisions in major government contract companies in and around the Beltway, such as BAE Systems (http://goo.gl/9viLPl), Lockheed Martin (http://goo.gl/FEgEjl), Harris (http://goo.gl/Ww4UQJ), Northrup-Grumman (http://goo.gl/3MQz47); IDS (http://goo.gl/b2lWzs), and Leidos (https://goo.gl/8ekubo), as well as most banks and insurance companies, all of which have geospatial intelligence divisions. Entirely new companies are beginning to form around the topic of geospatial intelligence (see Palantir, which has offices locally in Tyson's Corner, VA; https://goo.gl/Wi1JQE). These create abundant job opportunities for graduates from our proposed MS GEOINT program.

Appendix C: Assessment Of Learning Outcomes

To ensure that these outcomes are met, the MS GEOINT program will focus on coursework and course modules that emphasize:

1. *Well-rounded understanding*—Impose a core set of coursework to ensure that students develop a well-rounded education in the fundamentals of geospatial intelligence and analysis, with courses that cover basics of the profession and science, technical offerings, and ethics.
2. *Advanced expertise*—Offer a series of balanced electives that build on that core with advanced coverage of topics of a substantive nature and/or a technical nature.
3. *Practical training*—A capstone project will be required of all students, affording them the opportunity to develop hands-on problem-solving skills on operational intelligence tasks.
4. *Lab skills*—In each course, a set of projects or lab exercises will ensure that students apply their theoretical knowledge to actionable topics in geospatial intelligence and analysis.
5. *Workforce success*—A dedicated course will be offered to train students in the art and practice of thinking and acting entrepreneurially, so that they are well-prepared for success in the workplace.

Our success in guiding students through the outcomes will be evaluated using a set of varied metrics and instruments:

1. *In-class observation*–Assessments will be carried out throughout the program to gauge (1) student involvement, (2) student interest and engagement, (3) student performance, (4) faculty performance, and (5) the nature of the learning environment. This assessment will be carried out by informal observation by other faculties in the MS GEOINT program, as well as by faculty in the Department of Geographical Sciences. Unstructured (quick chats and check-ins) and structured (survey questions) data will be collected to support these observations.
2. *Student participation*—Will be gauged through checks on attendance and progression through course milestones (submitting assignments and projects in a timely manner). Where content is provided digitally (through Adobe Connect or via ELMS, for example), empirical metrics for students' access to course resources can also be evaluated.
3. *Student feedback*—Will be collected through open sessions (office hours or question-and-answer sessions) and formal evaluation events (end-of-course evaluation). Upon graduating from the course, we will also hold student exit interviews to gather feedback on their success in the course and in meeting our learning outcomes objectives.
4. *Capstone project*—The capstone project is one of the main culminating course experiences for the MS GEOINT program. Each capstone project will be evaluated in a dedicated review session and evidence of learning outcomes as they present in the projects will be assessed.

Appendix D: Program Faculty

CGIS faculty are actively pursuing research opportunities with DoD organizations (both government agencies and industry partners). This includes research on urban dynamics, mobility, event modeling, and cybersecurity topics. We are also working with collaborators at START, The National Consortium for the Study of Terrorism and the Responses to Terrorism, at the University of Maryland to pursue research in the field of geospatial intelligence. Dr. Stewart is currently the primary advisor for a PhD student who works at START and whose dissertation research relates to terrorism and geospatial modeling. Dr. Stewart has had research support from IARPA and NGA, particularly in the area of geospatial semantic data modeling. As the CGIS develops its research program in geospatial intelligence, we will work to provide opportunities for students in the MS GEOINT program to learn about these projects and even work with us through, for example, their capstone course projects.

Dr. Micah Brachman

Micah Brachman is a Lecturer in the Center for Geospatial Information Science at the University of Maryland, College Park. He holds a PhD (2012) and MA (2009) in Geography from the University of California, Santa Barbara and a BS (2000) in Geography from the University of Minnesota. Micah has extensive professional experience in GIS and Remote Sensing in the commercial, government, and non-profit sectors, and recently transitioned from a Geospatial Scientist position supporting the Army Geospatial Center to teach in the new Geospatial Intelligence (GEOINT) program. In addition to GEOINT, Micah is also actively engaged in teaching and scholarship in Hazards and Emergency Management, Network Science, and Active Transportation.

Courses to teach in the MS GEOINT program:

GEOG661, GEOG664, GEOG680, GEOG682, GEOG683

Dr. Junchuan Fan

Dr. Junchuan Fan is a postdoctoral research associate with the Center for Geospatial Information Science at the University of Maryland. His research is focused on spatiotemporal modeling and analysis of naturalistic driving behaviors, big geospatial data mining on human activity and movement dynamics, geospatial semantics, and smart cities. Dr. Fan has been involved in research projects funded by FDOT, MSHA, National Advanced Driving Simulator (NADS), and IARPA. He teaches courses on open source GIS, spatial databases, web mapping, and geospatial semantic data handling.

Courses to teach in the MS GEOINT program:

GEOG684, GEOG687, GEOG688

Dr. Ruibo Han

Dr. Ruibo Han is the Director and Senior Lecturer of the Master and Graduate Certificate programs of GEOINT in the Center for Geospatial Information Science at the University of Maryland, College Park. He also teaches courses in both of the program, as well as the graduate and undergraduate programs in the Department of Geographical Sciences. Ruibo earned his PhD in Geography from the University of Ottawa and formerly worked at the University of Ottawa and the University of Toronto teaching courses in GIS and Statistics. Ruibo's research and teaching interests include urban dynamics, web and mobile GIS, big data analytics, and public participatory geospatial systems, and he has received research funded and produced publications in these fields.

Courses to teach in the MS GEOINT program:

GEOG662, GEOG663, GEOG665, GEOG685, GEOG686, GEOG697

Dr. Eunjung Elle Lim

Dr. Lim earned a Ph.D degree in Geography (GIS specialty) from the State University of New York at Buffalo. Her dissertation is about methodology detecting a sequence of changes in dynamic spatiotemporal data and investigating patterns of detected changes. In her dissertation she dealt emergency vehicle location and allocation strategies coping with time-varying emergency 911 calls. Her specialty is geographic information sciences. In the realm of GIS, she has developed special interest and knowledge in GIS modeling, programming, network analysis, and spatial statistics. She has about 12 years of experience developing software using Java, C, C++, Visual Basic and relational databases. She is very interested in designing and developing new functionalities in GIS that provide abilities to make users perform tasks that they even haven't thought they can do with geographical knowledge.

Courses to teach in the MS GEOINT program:

GEOG651, GEOG657,

Dr. Jonathan Resop

Dr. Jonathan Resop earned his Ph.D. at Virginia Tech in Biological Systems Engineering. During his time at Virginia Tech, he worked on multiple projects related to spatial modeling and remote sensing, in particular problems that involve agricultural and environmental systems. His dissertation involved applying ground-based lidar to various ecological applications. After completing his Ph.D. he worked as a post-doc for the USDA-ARS in Beltsville in the Crop Systems and Global Change Lab, doing research related to simulating the potential production capacity of crops within regional food systems using a geospatial crop model. Jonathan received his undergraduate degrees at the University of Maryland, College Park in Biological Resources Engineering and Computer Science.

Courses to teach in the MS GEOINT program:

GEOG656, GEOG660

Dr. Kathleen Stewart

Kathleen Stewart is Director of the Center for Geospatial Information Science and works in the area of geographic information science with a particular focus on geospatial dynamics. This includes topics such as moving objects research (e.g., space-time trajectories, space-time scheduling) and event modeling for dynamic GIS. She is interested in mobility, spatial accessibility, big geospatial data, and currently investigates movement and mobility for a number of different application domains, for example, health and transportation. She is also interested in modeling geospatial semantics including geospatial ontologies and their role for geographic information system design, and spatiotemporal information retrieval. At the University of Maryland, Dr. Stewart is a member of the Program in Oncology at the University of Maryland Marlene and Stewart Greenebaum Comprehensive Cancer Center and also collaborates with researchers at the Institute for Global Health, the Center for Substance Abuse Research, the National Transportation Center, the School of Public Health, and among others. Her research is currently supported in part by grants from the National Institutes of Health, NASA, and the Federal Highway Administration, among other organizations, and she has also received support from IARPA, NGA and NSA. Dr. Stewart serves as a member of the Mapping Science Committee of

the National Academies of Sciences, Engineering and Medicine and the Board of Directors for the University Consortium of Geographic Information Science. She is a member of the steering committee for the Maryland Transportation Institute. She also serves as a member of the editorial boards for The International Journal of Geographical Information Science (IJGIS), Computers, Environment, and Urban Systems, Transactions in GIS, Geographical Analysis, and the open-access Journal of Spatial Information Science (JOSIS).

APPENDIX E: LIBRARY ASSESSMENT

DATE: September 18, 2018

TO: Dr. Kathleen Stewart
Director of the Center for Geospatial Information Sciences
Department of Geographical Sciences

Dr. Ruibo Han
Director of Programs, Center for Geospatial Information Sciences
Department of Geographical Sciences

CC: Daniel Mack, Associate Dean of Collections, UMD Libraries
Maggie Saponaro, Head, Collection Development, UMD Libraries
FROM: Kelley O'Neal, GIS and Spatial Data Librarian, UMD Libraries
RE: Library Resources to Support New Program – a Master of Science in Geospatial Intelligence (MS GEOINT)

We are providing this assessment in response to a proposal by the Department of Geographical Sciences in the college of Behavioral and Social Sciences to create a Master of Science in Geospatial Intelligence (MS GEOINT). The MS GEOINT program requested a collections resources assessment from the University of Maryland Libraries to determine how well the Libraries support the curriculum of this proposed program.

Serial Publications

The University of Maryland Libraries subscribe to a large number of scholarly journals, almost all in online format, focusing on Geospatial Intelligence and related topics including:

Geospatial Intelligence

International Journal of Intelligence and CounterIntelligence

Remote Sensing and Image Processing

Remote Sensing of Environment
ISPRS Journal of Photogrammetry and Remote Sensing
IEEE Transactions on Geoscience and Remote Sensing
International Journal of Applied Earth Observation and Geoinformation
IEEE Applied Earth Observations and Remote Sensing
IEEE Geoscience and Remote Sensing Letters
International Journal of Remote Sensing

Geographic Information Science (GISc)

International Journal of Geographical Information Science
Journal of Geographical Sciences
Transactions in GIS
Computers & Geosciences
Journal of Spatial Science

International Journal of Digital Earth
GeoInformatica
Computers, Environment and Urban Systems
The Cartographic Journal
Geographical Analysis
Cartographica: The International Journal for Geographic Information and Geovisualization

Big Data Analytics and Computation

Big Data and Society
Computational Intelligence: An International Journal
Advances in Artificial Intelligence
Data Mining and Knowledge Discovery
Neural Networks
IEEE Transactions on Neural Networks

In cases in which the Libraries do not subscribe to a particular journal of interest, articles within that journal likely will be available through Interlibrary Loan.

In addition to subscriptions, the following open access journals are another valuable resource to the Master of Science in Geospatial Intelligence program:

Remote Sensing
Public Library of Science One (PLOS One)
Journal of Spatial Information Science
International Journal of Spatial Data Infrastructures Research
Applied Computational Intelligence and Soft Computing

Databases

The Libraries' *Database Finder* (http://www.lib.umd.edu/dbfinder) resource offers online access to databases that provide indexing and access to scholarly journal articles, geospatial datasets, and other information sources. Databases relevant to the Master of Science in Geospatial Intelligence program include:

Policy Map - Policy Map is a cloud-based GIS and geospatial data tool that provides access to over 15,000 indicators related to housing, crime mortgages, health, jobs, demographics, and education from more than 150 authoritative public and proprietary sources. Data is cleaned and standardized and updated regularly. The database includes basic GIS tools to create reports and maps.

Social Explorer - Social Explorer is a cloud-based GIS and geospatial data tool that provides access to demographic information about the United States from 1790 to present. Available data includes Census, Public Use Microdata Sample (PUMS), and American Community Survey (ACS). The database includes basic GIS tools to create reports, maps, and slide shows.

SimplyAnalytics – SimplyAnalytics is a cloud-based GIS and geospatial data tool that contains extensive data including demographic, historic census, business, health, real estate, housing, employment, consumer spending, and marketing (over 70,000 variables total). Users can create customized maps and reports. Data is available at the State, County, City, ZIP Code, Census Tract, and Block Group levels for custom trade areas and the entire United States.

LandScan Global Population Dataset - LandScan is a global population database that shows geographical distribution of population at one-kilometer resolution over an average 24 hour period. LandScan datasets are compiled annually using different information sources and analytical techniques and should ideally not be compared across years.

EIU ViewsWire - Full-text country news daily that provides analysis and forecast information on worldwide politics, economics, business strategies & conditions and market trends in almost 200 countries.

Passport – Provides global statistics for 205 countries on economic indicators, health, foreign trade, environment, lifestyle, industrial and agriculture output, communications and more. It also includes market size data for over 300 consumer products and services, including reports covering analysis of drivers of the industry, industry risk, market data and segments, competitors and industry performance. It provides demographic trends, economic indicators, finance, foreign trade, health, labor force, industrial and agricultural production, environmental data, consumer expenditure patterns, retail sales, advertising and media patterns, consumer prices, household patterns, literacy rates, telecommunications, automotive and transport figures, travel and tourism, income and earnings potential.

IEEE Xplore - Provides full-text access to IEEE transactions, journals, magazines and conference proceedings published since 1988 and all current IEEE Standards. Includes access to Bell Labs Technical journal Archive (BLTJA) 1922-2015.

Communication & Mass Media - Communication & Mass Media Complete originated with the acquisition and subsequent merging of two popular databases in the fields of communication and mass media studies -- CommSearch (formerly produced by the National Communication Association (NCA)), and Mass Media Articles Index (formerly produced by Pennsylvania State University).

Encyclopedia of Statistical Sciences (Wiley) - Covers topics in statistics, biostatistics, quality control, economics, sociology, engineering, probability theory, computer science, biomedicine, psychology, survey methodology, and many other areas. Includes the full text of the first and second print editions, plus the supplemental volumes. The entries are self-contained and easily understood by readers with a limited statistical background.

Global Terrorism Database - Developed by the National Consortium for the Study of Terrorism and Responses to Terrorism and START: A Center of Excellence of the U.S. Department of Homeland Security, University of Maryland. The Global Terrorism Database is an open-source database including information on terrorist events around the world from 1970 through 2016 (with annual updates). Unlike many other event databases, the GTD includes systematic data on domestic as well as international terrorist incidents that have occurred during this time period and now includes more than170,000 cases.

Military & Government Collection- Designed to offer current news pertaining to all branches of the military, this database offers full text for nearly 300 journals, periodicals, and U.S. government documents. The database also includes full text for 245 pamphlets and offers indexing and abstracts for nearly 400 titles. Many full text titles are available in native (searchable) PDF, or scanned-in-color.

Also four multi-disciplinary databases, *Academic Search Ultimate, Nexis Uni, ScienceDirect,* and *Web of Science,* are good sources of articles relevant to this topic.

In most cases, these indexes offer full text copies of the relevant journal articles. In those instances in which the journal articles are available only in print format, the Libraries can make copies available to graduate students through either the Libraries' Scan & Deliver Program or via Interlibrary Loan.

Monographs

The Libraries acquire scholarly monographs regularly in geographical sciences and geospatial science and technology along with allied subject disciplines. Monographs not already part of the collection can usually be added upon request.

Even though most library research for this course/program likely will rely upon online journal articles, students may wish to supplement this research with monographs. Fortunately, more and more monographs are available as e-books. Even in instances when the books are only available in print, graduate students will be able to request specific chapters for online delivery through the Libraries' Scan & Deliver program (Note: see below).

A search of the University of Maryland Libraries' WorldCat UMD catalog (http://www.lib.umd.edu) was conducted, using a variety of relevant subject terms. This investigation yielded sizable lists of citations of books that we own. I provide here some example subjects within the field of geospatial intelligence, title counts for those subjects, and some example monographs available within our holdings.

Geospatial Intelligence = 89

From maps to models: augmenting the nation's geospatial intelligence capabilities (e-book) 2016
The five disciplines of intelligence collection (print) 2015
Future U.S. workforce for geospatial intelligence (e-book) 2013
Geospatial intelligence support in joint operations (e-book) 2012
U.S. national intelligence an overview (e-book) 2011

Open Source Intelligence = 37

Open source intelligence in the twenty-first century: new approaches and opportunities (print) 2014
Hacking web intelligence: open source intelligence and web reconnaissance concepts and techniques (e-book) 2015
Practical Cyber Intelligence: How action-based intelligence can be an effective response to incidents (e-book) 2018
Social engineering: the science of human hacking (e-book) 2018

Geographic Information Systems (GIS) = 1,666

Imagery and GIS: best practices for extracting information from imagery (e-book) 2017
Geographic information science & systems (print) 2015
Geographic information systems in action (e-book) 2017
Geographic information systems (GIS): techniques, applications and technologies (e-book) 2014
Geographic information systems (GIS) for disaster management (e-book) 2015

Mobile GIS = 22

Information fusion and geographic information systems (IF & GIS' 2015): deep virtualization for mobile GIS (e-book) 2015
Building web and mobile ArcGIS Server applications with JavaScript: master the ArcGIS API for Java Script, and build exciting, custom web and mobile GIS applications with the ArcGIS Server (e-book) 2014
Geospatial computing in mobile devices (print) 2014

Web GIS = 26

Mastering ArcGIS Enterprise Administration (e-book) 2017
Getting to know web GIS (print) 2016
ArcGIS for JavaScript Developers by Example (e-book) 2016
Tile-based geospatial information systems: principles and practices (e-book) 2010

Remote Sensing = 4,590

Earth observation open science and innovation (e-book) 2018
Urban remote sensing (e-book) 2018
Satellite Earth observations and their impact on society and policy (e-book) 2017
Remote Sensing of Aerosols, Clouds, and Precipitation (e-book) 2017
Remote sensing image fusion: a practical guide (e-book) 2017

Image Processing = 4,851

Digital image processing (print) 2018
Automatic Target Recognition (e-book) 2018
Digital Image Processing and Analysis with MATLAB and CVIPtools, Third Edition (e-book) 2017
Multisensor Image Fusion and Data Mining for Environmental Remote Sensing (e-book) 2017

Spatial Statistics = 112

Spatial Analytics with ArcGIS (e-book) 2017
Spatial econometrics (e-book) 2017
Computational and statistical methods for analysing big data with applications (e-book) 2016
Stochastic geometry, spatial statistics and random fields: models and algorithms (print) 2015

Network Analysis = 1,113

Environment, Politics and Society (e-book) 2018
Networks of international trade and investment: understanding globalization through the lens of network analysis (print) 2018
GIS and the social sciences: theory and applications (e-book) 2018
Sociometrics and human relationships: analyzing social networks to manage brands, predict trends, and improve organizational performance (e-book) 2017

Big Data Analytics = 121

Practical big data analytics: hands-on techniques to implement enterprise analytics and machine learning using Hadoop, Spark, NoSQL and R (e-book) 2018
Big data analytics: tools and technology for effective planning (print) 2018
Earth observation open science and innovation (e-book) 2018
Big Data Analytics with Hadoop 3 Build highly effective analytics solutions to gain valuable insight into your big data (e-book) 2018

Python = 812

Beginning Data Analysis with Python And Jupyter Use powerful industry-standard tools to unlock new, actionable insight from your existing data (e-book) 2018
Hands-On Data Analysis with NumPy and Pandas Implement Python Packages from Data Manipulation to Processing (e-book) 2018
Hands-On Automated Machine Learning A beginner's guide to building automated machine learning systems using AutoML and Python (e-book) 2018
Mastering Geospatial Analysis with Python Explore GIS processing and learn to work with GeoDjango, CARTOframes and MapboxGL-Jupyter (e-book) 2018

ArcPy = 10

ArcPy and ArcGIS - Second Edition (e-book) 2017
Introduction to GIS programming and fundamentals with Python and ArcGIS (print) 2017
ArcPy and ArcGIS, geospatial analysis with python: use the ArcPy module to automate the analysis and mapping of geospatial data in ArcGIS (e-book) 2015
Python for ArcGIS (print) 2015
Programming ArcGIS with Python cookbook: over 85 hands-on recipes to teach you how to automate your ArcGIS for Desktop geoprocessing tasks using Python (e-book) 2015

Hazards and Emergency Management = 659

Essentials of Public Health Preparedness and Emergency Management (e-book) 2018
Transforming Disaster Response Federalism and Leadership (e-book) 2018
Urban Emergency Management (e-book) 2017
GIS for critical infrastructure protection (e-book) 2016
Hazard mitigation in emergency management (e-book) 2015

A further search revealed that the Libraries' membership in the Big Ten Academic Alliance (BTAA) dramatically increases these holdings and citations. As with our own materials, graduate students can request that chapters be copied from these BTAA books if the books are not available electronically.

Geospatial Intelligence = 178

Open Source Intelligence = 86

Geographic Information Systems (GIS) = 4,954

Mobile GIS = 44

Web GIS = 60

Remote Sensing = 12,287

Image Processing = 10,767

Spatial Statistics = 4,181

Network Analysis = 3,239

Big Data Analytics = 1,427

Python = 2,127

ArcPy = 11

Hazards and Emergency Management = 1,465

Access Services: Scan & Deliver and Interlibrary Loan

These services offer online delivery of bibliographic materials that otherwise would not be available online. As a result, remote users who take online courses may find these services to be helpful. Scan & Deliver and Interlibrary Loan are available free of charge.

A special amenity for graduate students and faculty, the Scan & Deliver service scans and delivers journal articles and book chapters within three business days of the request--provided that the items are available in print on the UM Libraries' shelves or in microform. In the event that the requested article or chapter is not available on campus, Scan & Deliver will automatically refer the request to Interlibrary Loan (ILL). Interlibrary Loan is a service that enables borrowers to obtain online articles and book chapters from materials not held in the University System of Maryland.

Please note that one limitation of these services that might create some challenges for the online student is that the Libraries are not allowed to make online copies of entire books. The only way that a student can get access to a print copy of an entire book is to physically come to the Libraries and check out that book.

Additional Materials and Resources

In addition to serials, monographs and databases available through the University Libraries, students in the Master of Science in Geospatial Intelligence will have access to a wide range of media, datasets, software, and technology. Library Media Services (http://www.lib.umd.edu/lms) houses media in a variety of formats that can be utilized both on-site and via ELMS course media. GIS datasets are available through the GIS and Spatial Data Center website (http://www.lib.umd.edu/gis) which includes the BTAA Geoportal (https://geo.btaa.org/). Statistical consulting and additional research support is available through the Research Commons (http://www.lib.umd.edu/rc) while technology support and services are available through the Terrapin Learning Commons (http://www.lib.umd.edu/tlc).

The subject specialist librarian for geographic information systems (GIS) and spatial data, Dr. Kelley O'Neal (kelleyo@umd.edu), also serves as an important resource to Geographical Sciences and the upcoming Master of Science in Geospatial Intelligence program.

Other Research Collections

Because of the University's unique physical location near Washington D.C., Baltimore and Annapolis, University of Maryland students and faculty have access to some of the finest libraries, archives and research centers in the country vitally important for researchers in geospatial intelligence. These include the Library of Congress, the National Archives, National Agricultural Library, and the Smithsonian, to name just few.

Conclusion

With our substantial journals holdings and index databases, as well as additional support services and resources, the University of Maryland Libraries have resources to support teaching and learning in Geospatial Intelligence. These materials are supplemented by a strong monograph collection. Additionally, the Libraries' Scan & Deliver and Interlibrary Loan services make materials that otherwise would not be available online, accessible to remote users in online courses. As a result, our assessment is that the University of Maryland Libraries are able to meet the curricular and research needs of the proposed Master of Science in Geospatial Intelligence program.

APPENDIX F: FIVE-YEAR BUDGET

MS GEOINT Resources	Year 1	Year 2	Year 3	Year 4	Year 5
Resources					
Tuition Revenue	**$289,080**	**$540,580**	**$751,897**	**$971,451**	**$990,880**
Tuition per Credit Hour (assuming a 2% increase)*	$803	$819	$835	$852	$869
Number Full time students 1st year:	10	16	22	25	25
Full time load 10 credits term **	24	24	24	24	24
Number Fulltime students second year	0	10	20	30	30
Full time load 10 credits term **	0	6	6	6	6
Annual Full-time tuition revenue	$192,720	$363,663	$541,366	$664,677	$677,971
Number Part-time students	10	10	15	20	20
Part time load 6 credits term	12	12	12	12	12
Annual Part time tuition revenue	$96,360	$98,287	$100,253	$102,258	$104,303
Full-time = 2 course/term for 4 quarter terms					
Part-time = 1 course/term for 4 quarter terms					
* Tuition is subject to increase at the same rate as the university graduate school tuition/fees.					
** Fulltime Cohort graduate in 5 quarter terms so calculated at half load their second year					
Expenses					
Number of Courses	11	11	11	11	11
Lecturers (teaching)	2.0	2.0	2.0	2.0	2.0
Program Director (review applicants, recruit)			0.5	0.5	0.5
Total Lecturers including Program Director	2.0	2.0	2.5	2.5	2.5
Total Salary (Lecturers/Dir @85K, assuming a 3% increase)	$170,000	$175,100	$180,353	$185,764	$191,336
Program Coordinator Assistant ***			1	1	1
*** Existing Coordinator for GEOG MPS programs will be used. Additional may need to be hired as cohorts increase (60K)					
Total Salary Coordinators			$60,000	$60,000	$60,000
TAs					
Number		2.0	2.0	2.0	2.0
TA Salary ($20,603 step II)		$41,206	$41,206	$41,206	$41,206
Total TA Cost (including tuition remission)		$69,886	$69,886	$69,886	$69,886
Total Salary	**$170,000**	**$244,986**	**$310,239**	**$315,650**	**$321,222**
Total Benefits	$51,000	$73,496	$93,072	$94,695	$96,367
Campus 15% of Tuition for on campus programs	$43,362	$69,292	$96,243	$115,040	$117,341
Advertising including travel to conferences	$15,000	$15,000	$15,000	$15,000	$15,000
Supplies	$50,000	$50,000	$50,000	$50,000	$50,000
Total Expense	**$329,362**	**$452,774**	**$564,554**	**$590,385**	**$599,930**
Balance	**($40,282)**	**$9,176**	**$77,065**	**$176,550**	**$182,343**

Establish a Post-Baccalaureate Certificate in Computation and Mathematics for Biological Networks (COMBINE) (PCC 18054)

PRESENTED BY	**Janna Bianchini, Chair, Senate Programs, Curricula, and Courses Committee**
REVIEW DATES	**SEC – January 28, 2019 | SENATE – February 5, 2019**
VOTING METHOD	**In a single vote**
RELEVANT POLICY/DOCUMENT	**N/A**
NECESSARY APPROVALS	**Senate, President, University System of Maryland Chancellor, and Maryland Higher Education Commission**

ISSUE

The College of Computer, Mathematics, and Natural Sciences proposes to establish a 12-credit Post-Baccalaureate Certificate in Computation and Mathematics for Biological Networks (COMBINE). Network science has emerged as a new collaborative field including physicists, applied mathematicians, computer scientists, quantitative biologists, and social scientists. The goal of research in this area is to use networks, representing interaction patterns, to understand the behavior of complex systems. While network science has made significant strides in bringing together researchers from different fields based on common questions, huge cultural and communication barriers still exist that inhibit productive interdisciplinary collaboration.

The purpose of this certificate is to immerse graduate students in interdisciplinary education and research that integrates quantitative modeling methods from physics and mathematics with the data processing, analysis, and visualization tools from computer science, in order to gain deeper insights into the structural and dynamical principles governing living systems. Participants will utilize a network-based, data-driven approach, focusing on how interaction patterns can give insights into complex biological phenomena. COMBINE aims to prepare students to become experts in the process of transforming raw biological data into useful information from which new biological insights can be inferred, positioning them to pursue a range of Science, Technology, Engineering, and Mathematics (STEM) careers at the nexus of the computer, physical, and life sciences. The program will be open to students who already been admitted to a UMD doctoral program in one of three areas: life sciences, physical and mathematical sciences, and computational sciences.

The curriculum will consist of 12 credits in the following areas:

- Advanced Interdisciplinary coursework (8 credits):
  - PHYS798N Interdisciplinary Communication for Data-Driven Science (3 credits)
  - PHYS798T Network Science Literature Survey (1 credit)
  - PHYS798U Network Biology Research-in-Progress (1 credit)
  - CMSC828O Advanced Topics in Information Processing: Computational and Mathematical Analysis of Biological Networks across Scales (3 Credits)
- Discipline-Bridging Elective Coursework (4 credits)

- Students choose 2 courses from a list of coursework designed to help bridge the physical/mathematical, computational, and life sciences. The coursework must be chosen outside the student's discipline group and approved by the program director.

This program was developed as a part of a National Science Foundation (NSF)-funded Research Traineeship. Current UMD students are already participating in these courses. The official Post-Baccalaureate Certificate award will allow students to receive recognition on their transcripts that they completed the coursework. The program is designed to continue beyond the period of NSF funding.

This proposal was approved by the Graduate School Programs, Curricula, and Courses committee on November 30, 2018, and was approved by the Senate Programs, Curricula, and Courses committee on December 7, 2018.

RECOMMENDATION(S)

The Senate Committee on Programs, Curricula, and Courses recommends that the Senate approve this new certificate program.

COMMITTEE WORK

The committee considered this proposal at its meeting on December 7, 2018. Dr. Daniel Serrano, of the Institute for Research in Electronics and Applied Physics, presented the proposal and answered questions from the committee. The proposal was unanimously approved by the committee.

ALTERNATIVES

The Senate could decline to approve this new certificate program.

RISKS

If the Senate declines to approve this certificate program, the university will lose an opportunity to recognize, with a specific award program, UMD doctoral students who engage in interdisciplinary coursework and research dedicated to network biology.

FINANCIAL IMPLICATIONS

There are no significant financial implications with this proposal as the courses and administrative processes already exist through the College of Computer, Mathematics, and Natural Sciences.

University of Maryland PCC
Program/Curriculum/Unit Proposal

PCC Log No:	18054

Program: COMBINE- Computation and Mathematics for Biological Networks

Department/Unit: Institute for Physical Sciences and Technology (IPST)

College/School: The College of Computer, Mathematical, and Natural Science (CMNS)

Proposal Contact Person (with email): Michelle Girvan (girvan@umd.edu)

Type of Action (check one):

- ☐ Curriculum change (includes modifying minors, concentrations/specializations and creating informal specializations)
  - ☐ Curriculum change is for an LEP Program
- ☐ *Rename a program or formal Area of Concentration*
- ☐ *Establish/Discontinue a formal Area of Concentration*
- ☐ Other:
- ☒ *Establish a new academic degree/certificate program*
- ☐ Create an online version of an existing program
- ☐ Establish a new minor
- ☐ *Suspend/Discontinue a degree/certificate program*
- ☐ Establish a new Master or Certificate of Professional Studies program
  - ☐ New Professional Studies program will be administered by Office of Extended Studies

Italics indicate that the proposal must be presented to the full University Senate for consideration.

Approval Signatures - *Please print name, sign, and date. For proposals requiring multiple unit approvals, please use additional cover sheet(s).*

1. Department Committee Chair _____
2. Department Chair Christopher Jarzynski, 09/14/18 _____
3. College/School PCC Chair _____
4. Dean _____
5. Dean of the Graduate School (if required) _____
6. Chair, Senate PCC Janna Branchini 12-7-18
7. University Senate Chair (if required) _____
8. Senior Vice President and Provost _____

Instructions:
When approved by the dean of the college or school, please send the proposal and signed form to the Office of the Associate Provost for Academic Planning and Programs, 1119 Main Administration Building, Campus-5031, **and** email the proposal document as an MSWord attachment to pcc-submissions@umd.edu.

Summary of Proposed Action (use additional sheet if necessary):

Unit Code(s) (to be entered by the Office of Academic Planning and Programs):

Program: COMBINE- Computation and Mathematics for Biological Networks

Date of Proposal: November 2018

Start Term for New Program: January 2019

Mission and Purpose

1. Describe the program and explain how it fits the institutional mission statement and planning priorities. The University Mission Statement and Strategic Plan can be found on this site: https://www.umd.edu/history-and-mission.

In the continued effort to foster excellence in interdisciplinary research and education at the University of Maryland, and as part of the mission to provide the highest quality graduate and professional education, we propose to create a new Graduate Certificate in Network Biology to be administered by the Institute for Physical Science and Technology (IPST) at UMD. This Graduate Certificate program is designed to accompany the current NSF-funded Research Traineeship (NRT) program, which was award in 2016 and will continue through 2021. The graduate certificate program we propose is designed to continue beyond the period of NSF funding. This unique program is tailored to address important challenges at the forefront of data-enabled science and engineering by training currently enrolled doctoral students to pursue transformative research at the convergence of the physical/mathematical, computer, and life sciences.

In the last decade or so, network science has emerged as a new collaborative field including physicists, applied mathematicians, computer scientists, quantitative biologists, and social scientists. The goal of research in this area is to use networks, representing interaction patterns, to understand the behavior of complex systems. While network science has made significant strides in bringing together researchers from different fields based on common questions, huge cultural and communication barriers still exist that inhibit productive interdisciplinary collaboration. This urgent issue facing today's researchers, coping with the data explosion resulting from the advent of powerful new technologies, demands a transformation. Our proposed Network Biology program, COMBINE, aims to accomplish this mission by using a network science approach, which is inherently cross-disciplinary, to analyze these complex biological data drawn from a variety of different contexts.

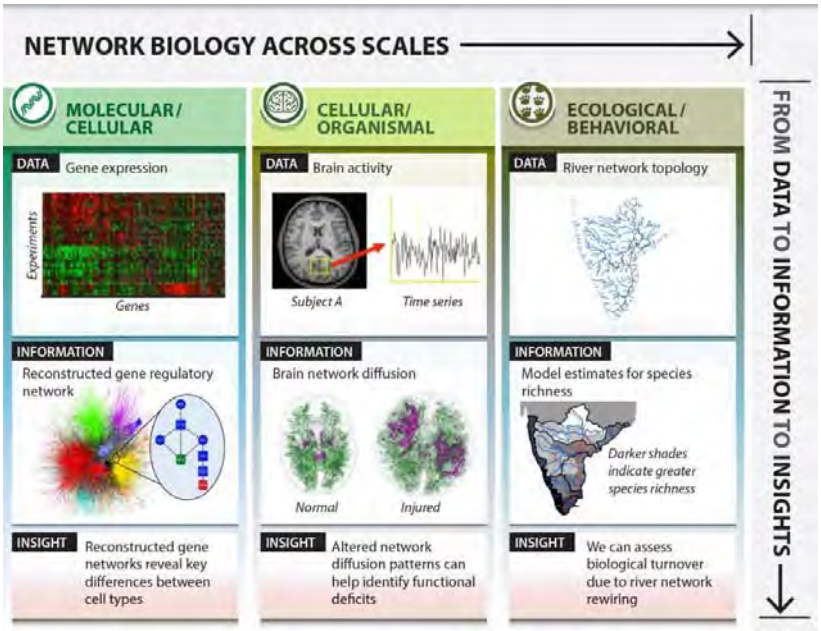
COMBINE immerses graduate students in interdisciplinary research and training that integrates: quantitative modeling methods from physics and mathematics with data processing, analysis, and visualization tools from computer science to gain deeper insights into the structural and dynamical principles governing living systems. Participants will utilize a network-based, data-driven approach, focusing on how interaction patterns can give insights into complex biological phenomena. COMBINE aims to prepare students to become experts in the process of transforming raw biological data into useful information from which new biological insights can be inferred, positioning them to pursue a range of Science, Technology, Engineering, and Mathematics (STEM) careers at the nexus of the computer, physical, and life sciences.

The Network Biology program strives to dissolve disciplinary barriers by offering innovations in graduate education. The program is designed to train students from different fields side-by-side so that, in helping to educate each other, they may discover the convergence of their differing perspectives and pave the way for ground-breaking new research.

Program Characteristics

2. Provide the catalog description of the proposed program. As part of the description, please indicate any areas of concentration or specializations that will be offered.

COMBINE: Computation and Mathematics for Biological Networks, is a new University of Maryland graduate program in Network Biology. COMBINE immerses graduate students in interdisciplinary education, research and training that integrates quantitative modeling methods from physics and mathematics with data processing, analysis, and visualization tools from computer science to gain deeper insights into the structural and dynamical principles governing living systems. Participants will utilize a network-based, data-driven approach, focusing on how interaction patterns can give insights into complex biological phenomena. COMBINE prepares students to become experts in the process of transforming raw biological data into useful information from which new biological insights can be inferred, positioning them to pursue a range of Science, Technology, Engineering, and Mathematics (STEM) careers at the nexus of the computer, physical, and life sciences.



COMBINE applies the methods of network science (developed largely within the physics, applied mathematics, and computer science communities) to the study of biological systems from microscopic to macroscopic scales.

Participants will receive training in four areas of network analysis: quantitative metrics for biological networks; mechanistic models of biological networks; network statistics and machine learning for biological applications; and visualization techniques for large, complex biological data sets. This training will provide the foundation for research in one or more of the following areas: bio-molecular, neuronal and/or ecological/behavioral networks. This training is covered within CMSC828O (described in item 1.4 below).

3. What are the educational objectives of the program?

The program's overarching goal is to build a new model for graduate education that intentionally and thoughtfully prepares students for scientific research at the interface of the physical/ mathematical, computer, and life sciences, while simultaneously providing the necessary training so that they may readily translate research experiences to a diverse set of potential careers. The program's training elements focus on:

1. *Integrated, interdisciplinary problem solving*: through coursework from multiple disciplines and weekly interdisciplinary seminar, we will prepare students to tackle complex cross-disciplinary problems by carefully integrating approaches from different fields. Our goal is to move beyond the ad-hoc combination of skills that characterizes many interdisciplinary interactions and to cultivate specific skills that are readily transferable and highly applicable to multiple disciplines.
2. *Communication to diverse audiences:* a major focus of our program will be to train students to effectively communicate complex scientific ideas to diverse audiences, including both scientists from disparate fields and non-scientists from industry and the general population. Students will develop their communication skills in our Intensive Data Project course and Career Development Workshop.

4. Describe any selective admissions policy or special criteria for students selecting this program.

The COMBINE certificate will be open to students who have already been admitted to a doctoral program on campus. Students who express an interest in the certificate program would be reviewed to ensure they have the necessary background to successfully complete the required coursework.

Students for the Network Biology program will be drawn from one of three different disciplines:

1. Life Sciences: Behavior, Ecology, Evolution, and Systematics; Molecular and Cellular Biology; Computational Biology, Bioinformatics and Genomics; and Neuroscience and Cognitive Sciences
2. Physical and mathematical sciences: from Physics, Biophysics, and Applied Mathematics.
3. Computational sciences: Computer Science, Electrical and Computer Engineering

5. Indicate the course requirements with course numbers, titles and credits. If applicable, indicate if any course will also count for a general education requirement. In an appendix, provide the course catalog information (credits, description, prerequisites, etc.) for all of the courses. Note that suffixed "selected" or "special" topics courses should be avoided. If suffixed-selected or special topics courses are offered regularly in the new program, you should make the courses permanent. Also, please review the basic requirements of degree programs or certificate programs to ensure that they meet the minimum policy requirements.

Please note: new courses or modifications to courses need to be submitted through the Testudo Curriculum Management system and will need to follow the normal VPAC course proposal review process. You may submit individual course changes to VPAC concurrently with the PCC proposal;

however, the course changes may be held depending on the outcome of the PCC proposal.

Note about course numbers: PHYS798N, PHYS798T, PHYS798U, and CMSC828O are are all temporary course numbers. We are working with Physics, AMSC (Applied Mathematics and Scientific Computing), and Computer Science to get permanent course numbers. PHYS798N, PHYS798T, and PHYS798U will receive new course numbers cross-listed between Physics and AMSC. CMSC828O will receive a new permanent CS course number.

In addition to completing their PhD degree requirements in one of three disciplinary areas, COMBINE program participants are required to complete the following courses. This means at least 12 credits total with 8 credits from the new required COMBINE courses (CMSC828O-3 credits, PHYS798N- 3 credits, PHYS798T – 1 credit, PHYS798U -1 credit) and 4 credits from elective discipline-bridging coursework: (A) one regular (3 or 4 credit) course at the graduate or advanced undergraduate level from one of the other two disciplines (chosen from a list of appropriate courses) and (B) one out-of-field graduate seminar course (1 credit or more) from the third discipline.

COMBINE students are required to fulfill at least 12 credits, as following: (Appendix A)

1. **Advanced Interdisciplinary coursework:**

1.1 PHYS 798N: Interdisciplinary Communication for Data-Driven Science (3 credits)
Students will work on a semester-long individual research project under the direction of a faculty mentor, and they will concurrently use this project to develop and refine their science communication skills. Class sessions will address interdisciplinary science communication with some discussion of data exploration, analysis, and visualization. The motivating idea behind this course is to fill a major gap in graduate science education by helping students develop and hone the skills necessary for communicating data-driven, interdisciplinary research. The course has a significant focus on developing skills for communication to diverse audiences. Students will learn to communicate with individuals in the same field, with individuals in another specified field to which their research is applicable, and with a general science audience. As such, this course might be more aptly called “Interdisciplinary Communication for Data Driven Research”.

1.2 PHYS798T: Network Science Literature Survey (1 credit)
For this course, students will work in pairs to present and lead discussion of data-driven interdisciplinary research articles dealing with network science. Some sessions will feature invited faculty or postdocs that will give research talks and career perspectives/advice. Students will practice communication of scientific results and concepts to individuals in their own field and with individuals in other field to which the students’ research is applicable.

1.3 PHYS798U: Network Biology Research-in-Progress (1 credit)
For this course, students will each deliver an oral research-in-progress presentation. Students will practice communication of scientific results and concepts to a general scientific audience (as opposed to an audience of their own immediate field). Presentations will be followed by instructor and peer feedback. Peer reviewing will also be implemented online. Some sessions will feature invited faculty or postdocs that will give research talks and career perspectives/advice.

1.4 CMSC828O: Advanced Topics in Information Processing; Computational and Mathematical Analysis of Biological Networks across Scales (3 credits)

At the end of this course, students will be able to describe, implement and analyze algorithms that solve fundamental problems in biological network analysis: descriptive summaries of network structure and properties, probabilistic and dynamical network models, statistical models for networked data and network visualization. They will also be able to apply these methods to data in networks from biological applications: molecular, neuronal and ecological networks by completing a semester-long project.

2. Discipline-bridging elective coursework (2 courses – at least 4 credits):

This introductory coursework is designed to help bridge the physical/ mathematical, computational, and life sciences. The students' discipline-bridging coursework, must be chosen outside their discipline group, and approved by the program director during the annual progress/study plan meeting.

- *BIOL704:* Cell Biology from a Biophysical Perspective (3 credits) L
- *BSCI404:* Cell Biology from a Biophysical Perspective (3 credits) L
- *BSCI453*: Cellular Neurophysiology (3 credits) L
- *BIPH704:* Cell Biology from a Biophysical Perspective (3 credits) L
- *CBMG 688Y:* Special Topics in Cell Biology and Molecular Genetics; Bioinformatics and Genomics (2 Credits)L
- *CBMG 688P:* Special Topics in Cell Biology and Molecular Genetics; Programming for Biology (2 Credits) C , L
- *BIOM601:* Biostatistics I (4 credits) M/P
- *NACS643*: Computational Neuroscience (4 credits) C , L
- *NACS641*: Introduction to Neurosciences (4 credits) C , L
- *PHYS615*: Nonlinear Dynamics of Extended Systems (3 credits) M/P
- *MATH420*: Mathematical Modeling (3 credits) M/P
- *AMSC660:* Scientific Computing (3 credits) M/P
- *BSCI474:* Mathematical Biology C
- *CMCS882T:* Advanced Topics in Information Processing; Vision, Planning and Control in Aerial Robotics (3 credits)
- BSCI 441: Plant Physiology (4 credits) L
- *PLSC 411*: Plant Sciences((4 credits) L

(Requirements: **L** life sciences,**C** computational, **M/P** Math/ Physics)

6. Summarize the factors that were considered in developing the proposed curriculum (such as recommendations of advisory or other groups, articulated workforce needs, standards set by disciplinary associations or specialized-accrediting groups, etc.).

An urgent issue facing today's researchers is coping with the data explosion resulting from the advent of powerful new technologies. More data is not the same as better information without the interdisciplinary techniques required for such a transformation.

The components of our curriculum exist to prepare graduate students to address these needs and tackle these issues. We expect that successful program participants will graduate as professionals ready to take on current challenges at the forefront of data-enabled science and engineering and pursue transformative research at the convergence of the physical/mathematical, computer, and life sciences.

The development of our curriculum was also shaped thanks to the input of the following parties:

1. The COMBINE faculty, which includes biologists, computer scientists, engineers, physicists, and mathematicians. (See Appendix B)
2. The Internal UMD Review Committee for the NSF Research Traineeship program call for proposals.
3. UMD Linguistics Prof. Colin Phillips, who has extensive experience in graduate interdisciplinary curriculum as Principal Investigator of an IGERT (Integrative Graduate Education and Research Traineeship) and an NRT program in language science.
4. The COMBINE NRT Evaluation and Assessment team and Advisory Board.

7. Sample plan. Provide a term by term sample plan that shows how a hypothetical student would progress through the program to completion. It should be clear the length of time it will take for a typical student to graduate. For undergraduate programs, this should be the *four-year plan*.

	Term in program			
	Fall I	Spring I	Fall II	Spring II
Interdisciplinary Coursework I (CMSC8280)	X			
Interdisciplinary Coursework II (PHYS798N)			X	
Discipline-bridging course		X		
Discipline-bridging seminar			X	
COMBINE seminar I (PHYS798T)	X			
COMBINE seminar II (PHYS798N)				X

8. Indicate whether the program will be offered in a non-standard delivery format, such as online delivery, off-campus, or through non-standard terms. Please note that MHEC requires a separate proposal for online or off-campus delivery. If the program will be offered in non-standard terms, describe the term structure and whether the Office of the Registrar and the Office of International Scholar and Student Services have been notified and support the proposal.

N/A

9. For Master's degree programs, describe the thesis requirement and/or the non-thesis requirement.

N/A

10. List the intended student learning outcomes. In an appendix, provide the plan for assessing these outcomes.

Outcomes:

- Survey important research results in network science. This will be achieved primarily through PHYS798T and assessed through class presentations and participation.
- Learn methods of network analysis. This will be achieved primarily through CMSC828O and will be assessed through student performance on problem sets.
- Develop an appreciation and understanding of the questions and methods of other fields. This will be achieved primarily through discipline-bridging coursework and assessed through performance therein.
- Apply methods of network analysis to biological data. This will be assessed through the evaluation of the final projects in CMSC828O and the final paper in PHYS798N.
- Develop interdisciplinary communication skills for:
    - Oral presentations. Included as parts of CMSC828O, PHYS798N, PHYS798U. Assessed through instructor created rubrics.
    - Poster presentations. Included as part of PHYS798N. Assessed through instructor created rubrics.
    - Developing manuscripts. Included as part of PHYS798N. Assessed through instructor created rubrics.

See Appendix C

11. Identify specific actions and strategies that will be utilized to recruit and retain a diverse student body.

We aim to support the University of Maryland's continuous efforts and strong record of educating minorities at all levels, therefore the recruitment process will focus on diversity in addition to engaging and retaining a group of outstanding students. Expanding the pool of talented students interested in pursuing research in the areas related to our program will be achieved by leveraging the University's participation-broadening initiatives. By working closely and replicating successful models at UMD such as the Applied Mathematics program, which is dedicated to recruiting and retaining both women and minority students, the program will be well-positioned to recruit students from underrepresented groups. An example of an effective practice for recruitment will be having faculty individually reach out to prospective applicants from underrepresented groups.

We will also engage with the two established, NSF-funded UMD programs for broadening participation: the Louis Stokes Alliances for Minority Participation (LSAMP), Bridge to the Doctorate (BD) Fellowship, and the ADVANCE program for increasing participation and advancement of women in academia. By connecting with the BD Fellowship program, which partially supports minority students during their PhD tenure, our Network Biology program will be well-positioned to recruit and support talented minority students. Interactions with UMD's ADVANCE program, e.g. a featured presentation by the ADVANCE program, a tour Career Development Workshop, will help our community better understand and overcome the challenges that

women face in the university setting. In addition, we will recruit through events like the Conference for Undergraduate Women in Physics, sponsored by the American Physical Society, and the Annual Biomedical Research Conference for Minority Students, the largest meeting in the U.S. for African-American and Hispanic students interested in graduate school in STEM disciplines.

12. If a required or recommended course is offered by another department, discuss how the additional students will not unduly burden that department's faculty and resources. Discuss any other potential impacts on another department, such as academic content that may significantly overlap with existing programs. Use space below for any comments, otherwise add supporting correspondence as an appendix.

Attached IPST letter of intention to continue support the program, past- NSF period, as well as AMSC and CS commitment to support the courses.

13. Accreditation and Licensure. Will program need to be accredited? If so, indicate the accrediting agency. Also, indicate if students will expect to be licensed or certified in order to engage in or be successful in the program's target occupation.

No.

14. Describe any cooperative arrangements with other institutions or organizations that will be important for the success of this program.

No cooperative agreements are crucial for the success of the program, but the program will benefit from UMD/NCI partnership, the UM Medical School/UMD collaboration (CHIB), the Brain Initiative efforts at UMD, CBCB, AMSC, Biophysics

Faculty and Organization

15. Faculty and organization. Who will provide academic direction and oversight for the program? As an appendix, please indicate the faculty involved in the program. Include their titles, credentials, and courses they may teach for the program.

Professor Michelle Girvan serves as the program Director, overseeing the students, faculty, and staff activities as chair of the Executive Committee. She will be assisted by the Deputy Director, which will be a rotating position filled by another COMBINE faculty member.

The PI/ Director and Deputy Director will receive input from the independent advisory board, from Dr. Gili Marbach-Ad, the program internal evaluator to ensure the program runs efficiently and effectively.

Resource Needs and Sources

16. Each new program is required to have a library assessment in order to determine any new library resources that may be required. Please contact your departmental/programmatic library liaison or Daniel Mack at dmack@umd.edu, Associate Dean of Collections, to request a library assessment that will be added as an appendix.

N/A

17. Discuss the adequacy of physical facilities, infrastructure and instructional equipment.

Each student will be placed in the laboratory or office space provided by the respective research advisor (their PhD advisor).

18. Discuss the instructional resources (faculty, staff, and teaching assistants) that will be needed to cover new courses or needed additional sections of existing courses to be taught. Indicate the source of resources for covering these costs.

One instructor with knowledge of the broad network science and network biology landscape and with expertise in network research for the spring Network Analysis course (currently CMSC828O). One instructor with expertise in interdisciplinary science communication at the intersection of the physical, computer, and life sciences for the spring Data Practicum course (currently PHYS798N) for Spring Data Practicum course. And an instructor for the spring and fall semesters.

See attached AMSC, PHYS, and CS letters of commitment to support the courses.

19. Discuss the administrative and advising resources that will be needed for the program. Indicate the source of resources for covering these costs.

The main program costs, as its currently operating, past NSF-grant would be:

1. Administrative support / managing
2. Other expenses, such as recruitment events and Symposiums

Attached IPST letter of intention to continue support the program.

20. Use the Maryland Higher Education Commission (MHEC) commission financial tables to describe the program's financial plan for the next five years: https://docs.google.com/spreadsheets/d/1V6iSZG05edMitWP6CAOXjCoGO58Gf6VXxPaacKfrhZ4/edit#gid=0. Add these tables as attachments.

TABLE 1: RESOURCES	2018	2019	2020	2021	2022
Resources Categories	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
1.Reallocated Funds		$ -	$ -	$ -	$ 82,840
2. Tuition/Fee Revenue (c+g below)	$ -	$ -	$ -	$ -	$ -
a. #FT Students	14	14	14	14	14
b. Annual Tuition/Fee Rate	$ 20,189	$ 20,794	$ 21,418	$ 22,061	$ 22,723
c. Annual FT Revenue (a x b)	-	-	-	-	-
d. # PT Students	0	0	0	0	0
e. Credit Hour Rate	$ 449.80	$ 463.29	$ 477.19	$ 491.51	$ 506.25
f. Annual Credit Hours	12	12	12	12	12
g. Total Part Time Revenue (d x e x f)	$ -	$ -	$ -	$ -	$ -
3. Grants, Contracts, & Other External Sources	$ 139,050	$ 142,442	$ 145,935	$ 149,533	$ -
4. Other Sources	$ -	$ -	$ -	$ -	$ -
TOTAL (Add 1 - 4)	**$139,050**	**$142,442**	**$145,935**	**$149,533**	**$82,840**

TABLE 2: EXPENDITURES					
Expenditure Categories	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
1. Faculty (b+c below)	$53,200	$54,796	$56,440	$58,133	$59,877
a. #FTE	0.4	0.4	0.4	0.4	0.4
b. Total Salary	$40,000	$41,200	$42,436	$43,709	$45,020
c. Total Benefits	$13,200	$13,596	$14,004	$14,424	$14,857
2. Admin. Staff (b+c below)	$46,550	$47,947	$49,385	$50,866	$10,478
a. #FTE	0.5	0.5	0.5	0.5	0.1
b. Total Salary	$35,000	$36,050	$37,132	$38,245	$7,879
c. Total Benefits	$11,550	$11,897	$12,253	$12,621	$2,600
3. Total Support Staff (b+c below)	$13,300	$13,699	$14,110	$14,533	$7,485
a. #FTE	0.2	0.2	0.2	0.2	0.1
b. Total Salary	$10,000	$10,300	$10,609	$10,927	$5,628
c. Total Benefits	$3,300	$3,399	$3,501	$3,606	$1,857
4. Equipment	$0	$0	$0	$0	$0
5. Library	$5,000	$5,000	$5,000	$5,000	$5,000
6. New or Renovated Space	$0	$0	$0	$0	$0
7. Other Expenses: Operational Expenses	$21,000	$21,000	$21,000	$21,000	$0
TOTAL (Add 1 - 7)	**$139,050**	**$142,442**	**$145,935**	**$149,533**	**$82,840**

21. Explain how there is a compelling regional or statewide need for the program. Argument for need may be based on the need for the advancement of knowledge and/or societal needs, including the need for "expanding educational opportunities and choices for minority and educationally disadvantaged students at institutions of higher education." Also, explain how need is consistent with the Maryland State Plan for Postsecondary Education.

Our program is designed to support the careers of STEM scientists who will be able to tackle complex problems in academic, industry, and government settings. This is in line with the state's priorities to increase the number of STEM degrees awarded to students in order to satisfy growing demand in STEM-related fields. Specifically in the context of our program, the demand for jobs that require (big) data analysis is expected to increase. This includes several industries, including biotechnology/biomedicine, which our biology-focused program can enable. The use of connectivity and artificial intelligence by various industries is also expected to grow and our network-focused curriculum prepares students to tackle problems in these areas.

22. Present data and analysis projecting market demand and the availability of openings in a job market to be served by the new program. Possible sources of information include industry or disciplinary studies on job market, the USBLS Occupational Outlook Handbook, or Maryland state Occupational and Industry Projections over the next five years. Also, provide information on the existing supply of graduates in similar programs in the state (use MHEC's Office of Research and Policy Analysis webpage for Annual Reports on Enrollment by Program) and discuss how future demand for graduates will exceed the existing supply. As part of this analysis, indicate the anticipated number of students your program will graduate per year at steady state.

The following tables summarize our most relevant findings on market demand and job openings for careers that our program enables:

From USBLS (https://www.bls.gov/ooh/):

Area	Jobs in 2016	Employment change 2016 to 2026
Biochemists and Biophysicists	31,500	3,600
Computer and Information Scientists	27,900	5,400
Computer programmers	294,900	-22,600
Mathematicians and Statisticians	40,300	12,300
Physicists	19,900	2,800

From MD Occupational and Industry Projections for PhD-holders (http://www.dllr.state.md.us/lmi/iandoproj/):

Area	Openings in 2014	Openings in 2024
Biochemists and Biophysicists	1,620	2,049
Computer and Information Research Scientists	2,544	3,221
Computer and Mathematical Occupations	129,260	165,444
Life Scientists	15,221	17,726
Mathematical Science Occupations	7,309	9,628
Mathematicians	336	452
Physical Scientists	10,188	11,576
Physicists	1,199	1,322
Software Developers, Applications	13,549	18,272
Statisticians	3,133	4,010

The following table summarizes our most relevant findings regarding the existing supply of graduates in similar programs in the state:

From MHEC (PhD degrees granted http://mhec.maryland.gov/publications/Documents/Research/AnnualReports/Degrees2016ByProgram.pdf.pdf):

Institution	Degree	Graduates between 2003 and 2016
University of Maryland College Park	Biophysics	5
Johns Hopkins	Applied and Computational Math	57
Johns Hopkins	Biostatistics	66
Johns Hopkins	Biophysics	133
University of Maryland Baltimore	Human Genetics	12

23. Identify similar programs in the state. Discuss any differences between the proposed program and existing programs. Explain how your program will not result in an unreasonable duplication of an existing program (you can base this argument on program differences or market demand for graduates). The MHEC website can be used to find academic programs operating in the state: http://mhec.maryland.gov/institutions_training/pages/HEPrograms.aspx.

To our knowledge there is no dedicated PhD program in Network Science or Network Biology in Maryland. Bowie State, Johns Hopkins, UMBC and UMCP offer Computer Science PhD degrees, while Johns Hopkins and UMCP offer Biophysics PhD degrees. However, none of these programs offers a formal curriculum-based focus on Network Biology.
The most similar program available is the Johns Hopkins Jenkins Biophysics Program, but this program (i) has a large focus on molecular sciences (while our program covers a broader range of research scales) and (ii) is ideal for students with strong math and computer science backgrounds, while our program is designed to cross-train students from diverse backgrounds (including those with strong math and computer science backgrounds but also those who come from biology and do not have extensive math/CS skills).

24. Discuss the possible impact on Historically Black Institutions (HBIs) in the state. Will the program affect any existing programs at Maryland HBIs? Will the program impact the uniqueness or identity of a Maryland HBI?

No significant impact expected beyond our intended outreach efforts to recruit students from minority-serving institutions, including HBIs.

25. For new Post-Baccalaureate Certificates derived from existing master's programs only, include the complete curriculum of the existing master's program.

Not applicable.

Appendix A: Course Descriptions

COMBINE- Core Courses:

PHYS 798N: **Interdisciplinary Communication for Data-Driven Science (3 credits)**

Students will work on a semester-long individual research project under the direction of a faculty mentor, and they will concurrently use this project to develop and refine their science communication skills. Class sessions will address interdisciplinary science communication with some discussion of data exploration, analysis, and visualization. The motivating idea behind this course is to fill a major gap in graduate science education by helping students develop and hone the skills necessary for communicating data-driven, interdisciplinary research. The course has a significant focus on developing skills for communication to diverse audiences. Students will learn to communicate with individuals in the same field, with individuals in another specified field to which their research is applicable, and with a general science audience. As such, this course might be more aptly called “Interdisciplinary Communication for Data Driven Research”.

PHYS798T: **Network Biology Literature Survey(1 credit)**

For this course, students will work in pairs to present and lead discussion of data-driven interdisciplinary research articles dealing with biological networks. Some sessions will feature invited faculty or postdocs that will give research talks and career perspectives/advice. Students will practice communication of scientific results and concepts to individuals in their own field and with individuals in other field to which the students’ research is applicable.

PHYS798U**:Network Biology Research-in-Progress (1 credit)**

For this course, students will each deliver an oral research-in-progress presentation. Students will practice communication of scientific results and concepts to a general scientific audience (as opposed to an audience of their own immediate field). Presentations will be followed by instructor and peer feedback. Peer reviewing will also be implemented online. Some sessions will feature invited faculty or postdocs that will give research talks and career perspectives/advice.

CMSC828O**: Advanced Topics in Information Processing; Computational and Mathematical Analysis of Biological Networks across Scales (3 credits)**

At the end of this course, students will be able to describe, implement and analyze algorithms that solve fundamental problems in biological network analysis: descriptive summaries of network structure and properties, probabilistic and dynamical network models, statistical models for networked data and network visualization. They will also be able to apply these methods to data in networks from biological applications: molecular, neuronal and ecological networks by completing a semester-long project.

Discipline- Bridging Courses:

(Requirements: [L] life sciences, [C] computational, [M/P] Math/ Physics)

BIOL704: **Cell Biology from a Biophysical Perspective (3 credits)** [L]

Also offered as: BSCI404.
Formerly: BIOL708O
An approach to cell biology by focusing on mechanisms and unifying paradigms. It will not assume a great deal of factual biological knowledge, but will expect a background that prepares students to think quantitatively and mechanistically.

BSCI404: **Cell Biology from a Biophysical Perspective (3 credits)** [L]

Formerly: BSCI338O
An approach to cell biology by focusing on mechanisms and unifying physical paradigms. It will not assume a great deal of factual biological knowledge, but will expect a background that prepares students to think mechanistically and quantitatively.

BSCI453**: Cellular Neurophysiology (3 credits)** [L]

The cellular and molecular basis of nervous system function.

BIPH704: **Cell Biology from a Biophysical Perspective (3 credits)** [L]

An approach to cell biology by focusing on mechanisms and unifying paradigms. It will not assume a great deal of factual biological knowledge, but will expect a background that prepares students to think quantitatively and mechanistically.

CBMG 688Y: **Special Topics in Cell Biology and Molecular Genetics; Bioinformatics and Genomics (2 Credits)** [L]

provides an overview of some major topics and research areas bioinformatics and genomics, and includes material from basic foundations through advanced concepts. The course consists of readings, lectures, discussions, collaborative learning activities, writing assignments, and exams.

CBMG 688P: **Special Topics in Cell Biology and Molecular Genetics; Programming for Biology (2 Credits)** [C, L]

Students should gain an ability to implement standard bioinformatics tools and manipulate large data files in a unix environment. Although true programming is beyond the scope of this course, students should achieve an ability to understand, use and edit programs in awk, Python and R.

BIOM601: **Biostatistics I (4 credits)** [M/P]

Prerequisite: BIOM301 or STAT464; or students who have taken courses with comparable content may contact the department.
Estimation and hypothesis testing, t tests, one and two way analysis of variance, regression, analysis of frequency data. Lecture will emphasize uses and limitations of these methods in biology, while the laboratory will emphasize the use of statistical analysis software for the analysis of biological data.

NACS643**: Computational Neuroscience (4 credits)** [C, L]

Prerequisite: NACS641; and must have completed a course in calculus; and permission of instructor.

Provides a mathematical foundation in computational neuroscience.

NACS641**: Introduction to Neurosciences (4 credits)** [C, L]

Detailed examination of neurophysiology and sensorimotor systems.

***PHYS615*: Nonlinear Dynamics of Extended Systems (3 credits)** [M/P]

Prerequisite: PHYS601.

Theory and applications of nonlinear dynamics of extended systems including nonlinear waves, pattern formation, turbulence, self-organized criticality and networks. Additional topics to be selected by instructor from areas of current research.

***MATH420*: Mathematical Modeling (3 credits)** [M/P]

Prerequisite: MATH240 or MATH461 or MATH341 and MATH241 or MATH340 and MATH246, or MATH341 and STAT400 And CMSC106 or CMSC131 or students who have taken courses with comparable content may contact the department.

Also offered as: AMSC420.

The course will develop skills in data-driven mathematical modeling through individual and group projects. Emphasis will be placed on both analytical and computational methods, and on effective oral and written presentation of results.

***AMSC660:* Scientific Computing (3 credits)** [M/P]

Prerequisite: Must have knowledge of C or Fortran. And AMSC460 or CMSC460; or (CMSC466 or AMSC466); or (must have knowledge of basic numerical analysis (linear equations, nonlinear integration, interpolation); and permission of instructor).

Monte Carlo simulation, numerical linear algebra, nonlinear systems and continuation method, optimization, ordinary differential equations. Fundamental techniques in scientific computation with an introduction to the theory and software of each topic.

***BSCI474:* Mathematical Biology** [C]

Prerequisite: MATH 130/MATH 131
Students develop quantitative reasoning skills through the understanding of mathematically based biological models. Models are chosen from a variety of biological disciplines, including biological population dynamics, infectious disease propagation, molecular evolution, and phylogenetic trees. Mathematical skills developed include: solving non-linear difference equations, eigenvector analysis, multi-dimensional stability analysis, and the use of Excel and Matlab to implement these algorithms as computer models.

***CMCS882T:* Advanced Topics in Information Processing; Vision, Planning and Control in Aerial Robotics (3 credits)** [C]

This is a comprehensive course on aerial robotics, with a focus on quadcopters and their related hardware and software implementations. The course will cover both the theoretical and practical aspects of quadcopters, with special focus on perception, planning and control algorithms involved in the same.

BSCI 441: Plant Physiology (4 credits) [L]

This course will provide an introduction to the basic physical and physiological principles necessary for understanding the interactions between plants and their environment. The overall objective is to understand plant responses and adaptations to the environment and the ecological relevance of these responses.

***PLSC 411*: Plant Sciences((4 credits)** L

Prerequisite: BSCI170; and BSCI171. Or PLSC201; or permission of AGNR-Plant Science & Landscape Architecture department.

An introduction to genetic principles and technologies in plants, centered on linking phenotype to genotype. Topics include Mendelian inheritance of single and complex traits, epigenetics, population genetics and plant breeding. Examples on creating and mapping genetic mutations in both model plants and non-model crops are discussed. Current genetic and genomic approaches are highlighted, such as genome engineering and reprogramming, TILLING, and genome-wide association mapping.

***ENEE 620*: Random Processes in Communications and Control (3 credits)** M/P

Prerequisite: ENEE 324 or equivalent.

Introduction to random processes: characterization, classification, representation; Gaussian and other examples. Linear operations on random processes, stationary processes: covariance function and spectral density. Linear least square waveform estimating Wiener-Kolmogroff filtering, Kalman-Bucy recursive filtering: function space characterization, non-linear operations on random processes.

Appendix B: COMBINE Faculty

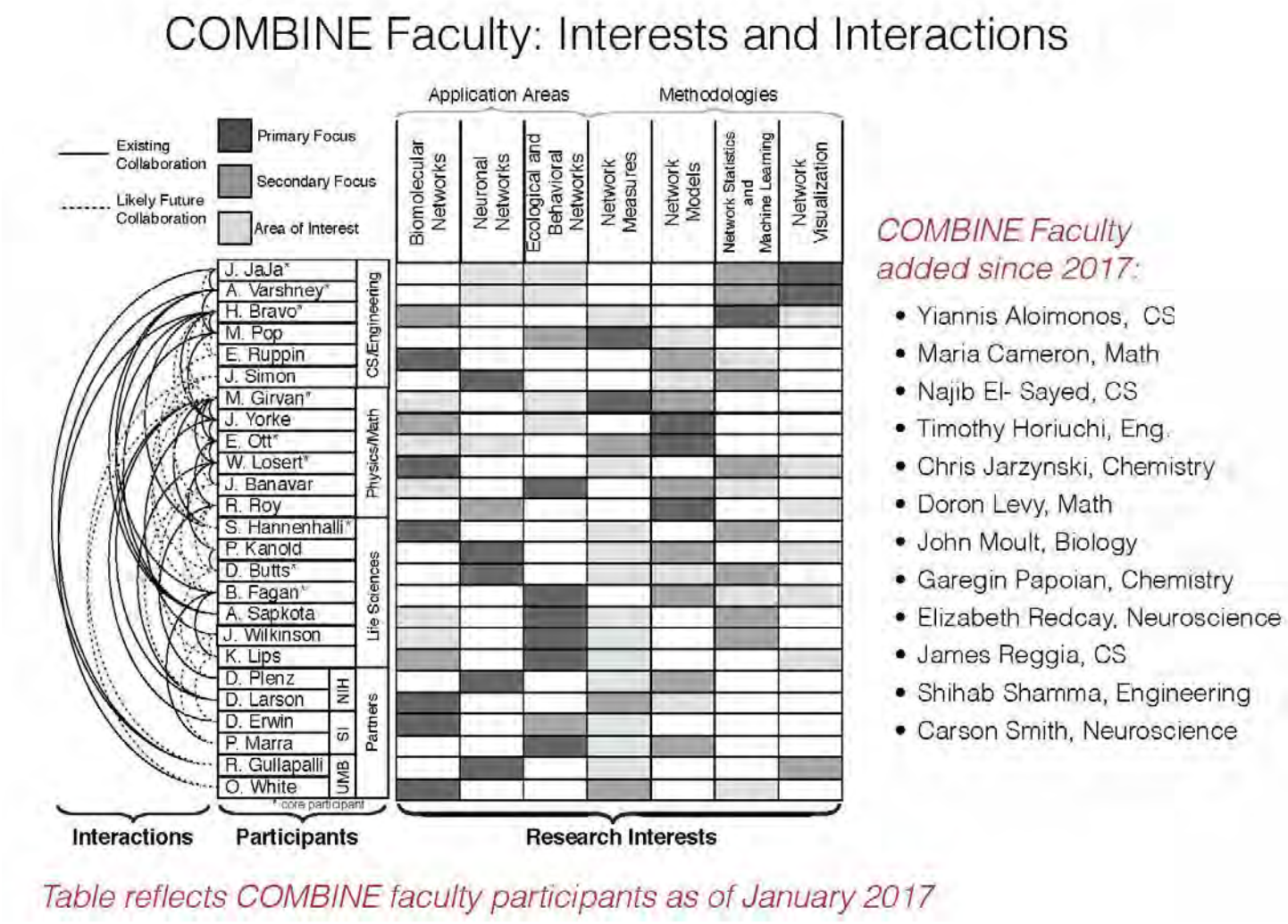


Table reflects COMBINE faculty participants as of January 2017

Appendix C - Plan for assessing student learning outcomes:

During the NSF-funded NRT program (i.e, through 2021), a multi-level strategy for producing and implementing constructive assessment on the program goals will be used, which encompasses the five levels of program evaluation: participation, satisfaction, education, application, and impact.

The evaluation strategy integrates both internal and external expertise, lead by:

1. Gili Marbach-Ad, Research Associate Professor in the College of Computer, Mathematical, and Natural Science (CMNS) at UMD and director of the CMNS Teaching and Learning Center.
2. Mark Connolly, Associate Research Scientist and Principal Investigator at the Wisconsin Center for Education Research, University of Wisconsin-Madison.

Together, the evaluation team, developed clear annual assessment goals, reflected on progress, successes, and challenges. Accordingly, assessment instruments that enable measurable and publishable outcomes will be developed, refined, validated, and implemented.

The Evaluation team's efforts are guided by an independent advisory committee comprising experts in interdisciplinary science research and professional development:

1. Luis Amaral
2. Steven Schiff
3. Neo Martinez
4. Jeffrey Chen
5. Robert Gentlemen

COMBINE has several overarching goals for individual trainees. First and foremost, we seek to prepare students for interdisciplinary research and diverse careers at the interface of the physical, mathematical, computer, and life sciences. Furthermore, we aim for our trainees to develop a suite of transferable skills, including the ability to communicate science to diverse audiences, to collaborate productively as leaders and team members, and to serve as mentors to their peers and more junior science students.

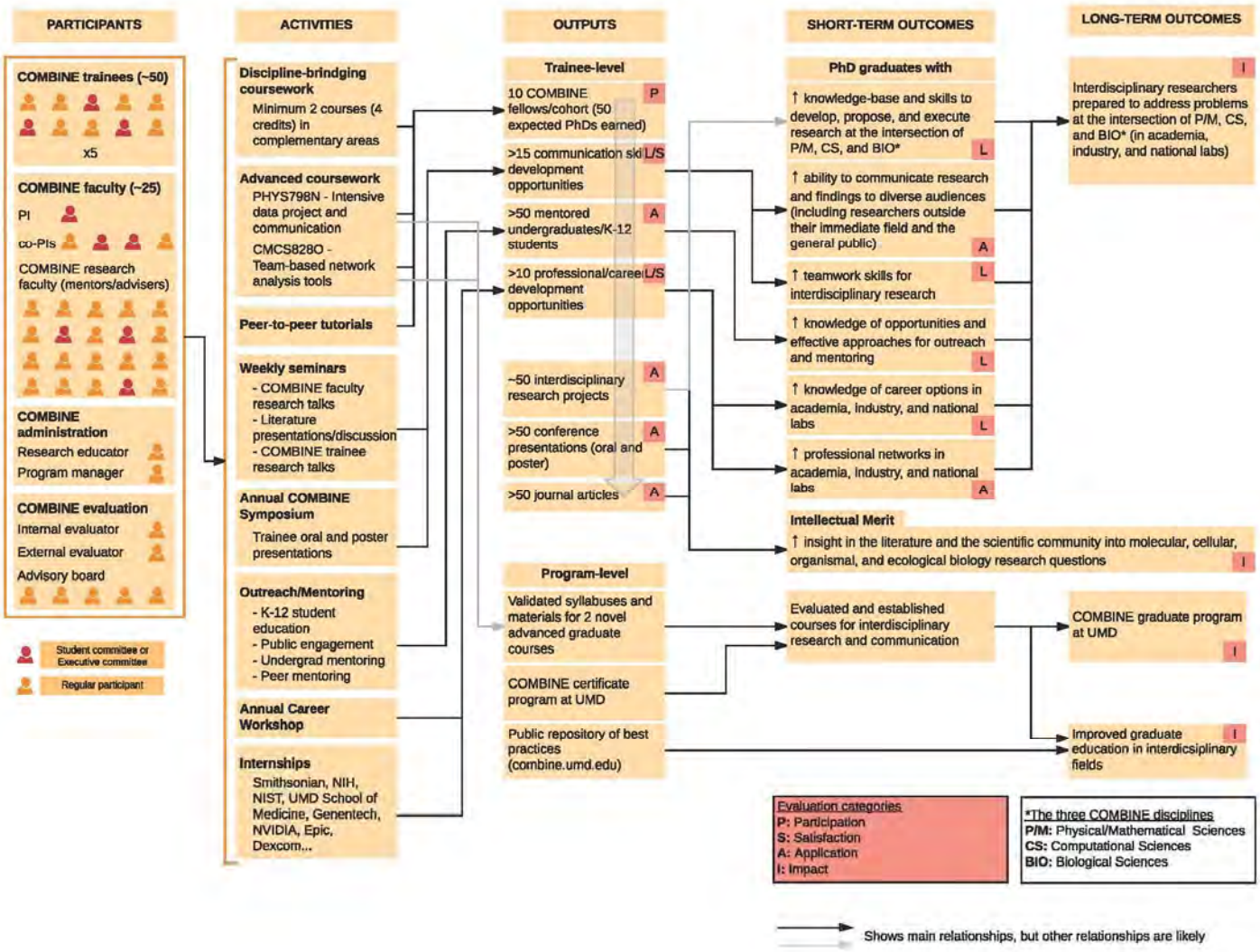
The main training goals of the project are to expose graduate students to interdisciplinary career opportunities in academia, industry, and national labs and prepare them to successfully pursue any of these pathways.

We probe the students' skills and knowledge gained by participating in the training program activities, by using surveys of all program participants and case studies of the subset of participants. Collecting data in the form of publications, conference abstracts, course specific writing assignments, and more, the level of application of those new gained skills will be determined.

After the period of NSF funding has been completed in 2021. Our plan is to incorporate the results of the extensive assessment activities conducted during the period of NSF funding (2016-2021) in order to make improvements to the program so that after the NSF funding, a simpler assessment can be effectively used to evaluate the student learning outcomes. The list below gives the student learning outcomes and the plan for achieving and assessing them. These assessment methods will continue after NSF funding is complete.

- Survey important research results in network science. This will be achieved primarily through PHYS798T and assessed through class presentations and participation.
- Learn methods of network analysis. This will be achieved primarily through CMSC828O and will be assessed through student performance on problem sets.
- Develop an appreciation and understanding of the questions and methods of other fields. This will be achieved primarily through discipline-bridging coursework and assessed through performance therein.
- Apply methods of network analysis to biological data. This will be assessed through the evaluation of the final projects in CMSC828O and the final paper in PHYS798N.
- Develop interdisciplinary communication skills for:
    - Oral presentations. Included as parts of CMSC828O, PHYS798N, PHYS798U. Assessed through instructor created rubrics.
    - Poster presentations. Included as part of PHYS798N. Assessed through instructor created rubrics.
    - Developing manuscripts. Included as part of PHYS798N. Assessed through instructor created rubrics.
- Surveys of students and faculty will also continue

Program outcome assessment plan during the NSF-funded period (i.e. until 2021) of the Certificate Program



UNIVERSITY OF MARYLAND
DEPARTMENT OF PHYSICS

Peter S. Shawhan
Physical Sciences Complex, Room 2120
College Park, Maryland 20742-2440
Tel: (301) 405-1580 Fax: (301) 314-9525
pshawhan@umd.edu

October 12, 2018

To the review committee:

I am writing this letter in my capacity as Associate Chair for Graduate Education for the University of Maryland Department of Physics to affirm that I will be working with the COMBINE (Computation and Mathematics for Biological Networks) program team to obtain permanent course numbers for the following courses that have been offered with temporary course numbers in 2018:

- PHYS798N: Interdisciplinary Communication for Data-Driven Science
- PHYS798T: Network Science Literature Survey
- PHYS798U: Network Science Research-in-Progress

We will obtain permanent PHYS course numbers and intend to have them cross-listed with the Applied Math and Scientific Computing (AMSC) Program here at the university. See also the letter of support from the Chair of the Physics Department, Steve Rolston.

Regards,

Peter Shawhan

Dr. Peter S. Shawhan
Professor & Assoc. Chair for Graduate Education
Department of Physics
The University of Maryland

UNIVERSITY OF MARYLAND

William E. Kirwan Hall, 3103
College Park, Maryland 20742
301.405.0924 TEL

APPLIED MATHEMATICS & STATISTICS, AND SCIENTIFIC COMPUTING PROGRAM

October 25, 2018

To: PCC Review Committee, University of Maryland
Re: UMD Network Biology Program

To whom it my concern:

Following the commitment of the Institute for Physical Science and Technology (IPST) to administer UMD's NSF-funded Network Biology program for graduate students, COMBINE (Computation and Mathematics for Biological Networks), the Applied Mathematics & Statistics, and Scientific Computation (AMSC) program commits to continue the following course and seminars and apply for regular course numbers to be cross-listed between AMSC and Physics:

- Interdisciplinary Communication for Data-Driven Research, 3 credits (currently offered as "Data practicum at the intersection of the physical, computer, and life sciences," PHYS798N)
- Network Science Literature Survey, 1 credit (currently offered as PHYS798T)
- Network Science Research in Progress Seminar, 1 credit (currently offered as PHYS798U)

The certificate program's goal is to offer these courses once per year, cross-listed between Physics and AMSC, as long as there is sufficient enrollment (~10 students per course per semester). If the enrollment falls well below this level (which is not expected), the courses may be offered less frequently, but often enough to meet the needs of students enrolled in the certificate program. The AMSC program will work with the Physics Department to provide the teaching resources for these courses. Joint Physics/IPST faculty who are part of AMSC are suitable and likely candidates to serve as instructors of these courses.

The AMSC program has a long tradition of encouraging and supporting interdisciplinary programs of this type and we are pleased to offer this support.

Sincerely,

Howard Elman

Howard Elman
Professor and Director of AMSC

Prof. Ramani Duraiswami
Department of Computer Science
Institute for Advanced Computer Studies
3361 A.V. Williams Building; #115
College Park, MD 20742, USA

October 15, 2018

To Whom it May Concern:

The letter is to confirm the support of the Department of Computer Science for UMD's Network Biology program for graduate students, COMBINE (Computation and Mathematics for Biological Networks), for the remaining period of NSF funding (approximately 4 years, including the no-cost extension period), and also beyond that timeframe. The Computer Science Department is committed to continuing to allocate teaching resources for the following new course:

Advanced Topics in Information Processing; Computational and Mathematical Analysis of Biological Networks across Scales (CMSC828O)

This course promotes training in interdisciplinary research, and the CS department will continue to offer it once per year with sufficient enrollment. If the enrollment falls below 15 students, the course may be offered less frequently. The department will also apply for a permanent course number for this new interdisciplinary course, through its normal education committee review process.

Sincerely,

Ramani Duraiswami, Ph.D.
Professor and Associate Chair for Graduate Education
Department of Computer Science
Director, Perceptual Interfaces and Reality Lab.
University of Maryland at College Park, MD 20742
Phone: (301) 405 6710
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http://www.ipst.umd.edu

September 28, 2018

Professor Michelle Girvan
Department of Physics
3341 A.V. Williams Building
Campus

Dear Professor Girvan:

This letter is to express support for the COMBINE (Computation and Mathematics for Biological Networks) graduate certificate program in Network Biology. Currently, COMBINE is an NSF-funded NRT (NSF Research Traineeship Program) that has recently completed its second of five years of funding, with an expected one year no-cost extension. The COMBINE program is applying for a graduate certificate program in Network Biology that will begin during the period of NSF funding and continue after NSF funding is complete.

The Institute for Physical Science and Technology (IPST) is committed to administering and supporting this graduate certificate program, both for the remainder of the NSF funding period and after NSF funding is complete. IPST will work with CMNS and the Provost's office to ensure the success of this new graduate certificate program.

Three of the four new COMBINE courses (currently listed as PHYS798N, PHYS798T, and PHYS798U), will be cross-listed with the Physics Department and Applied Mathematics & Statistics, and Scientific Computation (AMSC) program, which is run jointly by IPST, the Department of Mathematics and the Center for Scientific Computation and Mathematical Modeling. IPST will work with the AMSC program as necessary to help procure permanent course numbers for these courses.

Sincerely,

Christopher Jarzynski, Distinguished University Professor
Director, Institute for Physical Science and Technology
Professor, Department of Chemistry and Biochemistry
Professor, Department of Physics

UNIVERSITY OF MARYLAND
DEPARTMENT OF PHYSICS
Office of the Chair

0208 Physical Sciences Complex
College Park, Maryland 20742-411
Tel: (301) 405-5946 Fax: (301) 405-0327
http://www.umdphysics.umd.edu

March 12, 2018

To whom it may concern:

The Department of Physics at the University of Maryland intends to continue its support of the COMBINE (Computation and Mathematics for Biological Networks) Program for the 5-year duration of NSF funding (expected end date of August 2022), and also beyond that timeframe. The department will continue to provide teaching resources for the following COMBINE advanced interdisciplinary course and seminar:

- Interdisciplinary Research Communication (Currently offered as "Data practicum at the intersection of the physical, computer, and life sciences", PHYS798N - 3 credits)
- Interdisciplinary Network Science Seminar (PHYS798T- 1 credit)

These two courses will be offered once per year by the Physics Department (and cross-listed with the Applied Mathematics & Statistics, and Scientific Computation (AMSC) program, as long as there is sufficient enrollment (~10 students per course per semester). If the enrollment falls well below this level (which is not expected), the courses may be offered less frequently. The Physics Department will work together with the AMSC program and its parent institute, the Institute for Physical Science and Technology (IPST), to provide the teaching resources for these courses. Joint Physics/IPST faculty are likely candidates to serve as instructors of these courses.

Sincerely,

Steven L. Rolston
Professor and Chair
Department of Physics

UNIVERSITY SENATE | TRANSMITTAL | #18-19-22

Senate Programs, Curricula, & Courses Committee

Establish a Post-Baccalaureate Certificate in Innovation and Entrepreneurship (PCC 18013)

PRESENTED BY	**Janna Bianchini, Chair, Senate Programs, Curricula, and Courses Committee**
REVIEW DATES	**SEC – January 28, 2019 | SENATE – February 5, 2019**
VOTING METHOD	**In a single vote**
RELEVANT POLICY/DOCUMENT	**N/A**
NECESSARY APPROVALS	**Senate, President, University System of Maryland Chancellor, and Maryland Higher Education Commission**

ISSUE

The Robert H. Smith School of Business proposes to establish a twelve-credit Post-Baccalaureate Certificate in Innovation and Entrepreneurship. The purpose of this certificate is to offer professional development to practitioners, innovators, and potential entrepreneurs. Entrepreneurship sits at the heart of job creation in the economy, and improving entrepreneurial outcomes will benefit students and the Maryland economy as a whole. The certificate will be beneficial to people with ideas and/or technological skills but who lack entrepreneurial know-how.

The curriculum will consist of six two-credit courses for a total of twelve credits. The six courses are as follows:

- BUMO 732: Entrepreneurship & New Ventures
- BUMO 752: Strategic Growth for Emerging Companies
- BUSI 771: New Venture Financing
- BUMO 758T: Technology Entrepreneurship
- BUMO 758G: Innovation Management
- BUMO 794: Essentials of Negotiations

The curriculum will focus on key entrepreneurial competencies including opportunity assessment, problem/solution validation, risk mitigation, and venture financing. To address the void of management talent in the venture labor pool, the certificate will also address essential management skills including negotiations, team building, and leadership. The certificate program will culminate in a course (BUMO 758T Technology Entrepreneurship) where students will have the opportunity to create a strategy to develop their own idea.

This proposal was approved by the Graduate School Programs, Curricula, and Courses committee on November 30, 2018, and was approved by the Senate Programs, Curricula, and Courses committee on December 7, 2018.

RECOMMENDATION(S)

The Senate Committee on Programs, Curricula, and Courses recommends that the Senate approve this new certificate program.

COMMITTEE WORK

The committee considered this proposal at its meeting on December 7, 2018. Robert H. Smith School representatives Michael Marcellino, Assistant Dean of MBA & Master of Science programs, and Brent Goldfarb, Associate Professor, presented the proposal and answered questions from the committee. The proposal was unanimously approved by the committee.

ALTERNATIVES

The Senate could decline to approve this new certificate program.

RISKS

If the Senate declines to approve this certificate program, the university will lose an opportunity to provide specialized training in innovation and entrepreneurship for students who do not wish to enroll in a full Master's program in order to receive this training.

FINANCIAL IMPLICATIONS

There are no significant financial implications with this proposal as the courses and administrative processes already exist through Robert H. Smith School of Business master's programs.

University of Maryland PCC Program/Curriculum/Unit Proposal

PCC Log No: 18013

Program: Certificate in Innovation and Entrepreneurship

Department/Unit:

College/School: Robert H. Smith School of Business

Proposal Contact Person (with email):

Type of Action (check one):

- ☐ Curriculum change (includes modifying minors, concentrations/specializations and creating informal specializations)
  - ☐ Curriculum change is for an LEP Program
- ☐ *Rename a program or formal Area of Concentration*
- ☐ *Establish/Discontinue a formal Area of Concentration*
- ☐ Other:
- ☒ *Establish a new academic degree/certificate program*
- ☐ Create an online version of an existing program
- ☐ Establish a new minor
- ☐ *Suspend/Discontinue a degree/certificate program*
- ☐ Establish a new Master or Certificate of Professional Studies program
  - ☐ New Professional Studies program will be administered by Office of Extended Studies

Italics indicate that the proposal must be presented to the full University Senate for consideration.

Approval Signatures - *Please print name, sign, and date. For proposals requiring multiple unit approvals, please use additional cover sheet(s).*

1. Department Committee Chair
2. Department Chair
3. College/School PCC Chair Anil Gupta
4. Dean Alexander J. Triantis
5. Dean of the Graduate School (if required)
6. Chair, Senate PCC Janna Bianchini 12-7-18
7. University Senate Chair (if required)
8. Senior Vice President and Provost

Instructions:
When approved by the dean of the college or school, please send the proposal and signed form to the Office of the Associate Provost for Academic Planning and Programs, 1119 Main Administration Building, Campus-5031, **and** email the proposal document as an MSWord attachment to pcc-submissions@umd.edu.

Summary of Proposed Action (use additional sheet if necessary):

The Robert H Smith School of Business is proposing a new Post-Baccalaureate Certificate in Innovation & Entrepreneurship. The purpose of this certificate is to offer professional development to practitioners and innovators and potential entrepreneurs. Entrepreneurship sits at the heart of job creation in the economy, and improving entrepreneurial outcomes will benefit students and the Maryland economy as a whole. The certificate will target knowledge workers interested in integrating into the entrepreneurial ecosystem or seeking to increase entrepreneurial skills for innovation in their jobs in the greater DC and Baltimore metro areas. Students in professional and technical programs across the university of Maryland system, including students in UMB medical and pharmacy schools, engineering, and computer science. The 12 credit format will allow certification in a single semester. The ~~reputation~~ of the Dingman Center for Entrepreneurship will facilitate mentorship and practical business advice for certificate students.
relationships

Unit Code(s) (to be entered by the Office of Academic Planning and Programs):

In order to complete this form, you will need to copy this template to your own document, then complete, print, and submit this proposal with the PCC Cover Sheet

Program: CERTIFICATE IN INNOVATION & ENTREPRENEURSHIP

Date of Proposal:

Start Term for New Program: Proposed Initiation Date: Fall 2019

A new degree program proposal will need to be approved not just by campus but also by the University System of Maryland (USM) Board of Regents and the Maryland Higher Education Commission (MHEC). New certificate programs need to be approved by the USM Chancellor and MHEC. The following prompts are based on academic policies for programs and reflect campus requirements and MHEC requirements. The prompts also include questions frequently asked by review committees. See http://mhec.maryland.gov/institutions_training/Pages/acadaff/AcadProgInstitApprovals/NewAcademicProgramProposals.aspx for more information about MHEC requirements. Please feel free to add additional information at the end of this document or in a separate appendix.

Mission and Purpose

1. Describe the program and explain how it fits the institutional mission statement and planning priorities. The University Mission Statement and Strategic Plan can be found on this site: https://www.umd.edu/history-and-mission.

The entrepreneurship certificate will target knowledge workers interested in integrating into the entrepreneurial ecosystem or seeking to increase entrepreneurial skills for innovation in their jobs in the greater DC and Baltimore metro areas. We expect this to appeal to students in professional and technical programs across the university of Maryland system, including students in UMB medical and pharmacy schools, engineering, and computer science. The 12 credit format will allow certification in a single semester (14-15 weeks) on a full-time basis or over two semesters (Fall and Spring) on a part-time basis (4-8 credits per semester).

Program Characteristics

2. Provide the catalog description of the proposed program. As part of the description, please indicate any areas of concentration or specializations that will be offered.

The Robert H Smith School of Business is proposing a new Post-Baccalaureate Certificate in Innovation & Entrepreneurship. The purpose of this certificate is to offer professional development to practitioners and innovators and potential entrepreneurs. Entrepreneurship sits at the heart of job creation in the economy, and improving entrepreneurial outcomes will benefit students and the Maryland economy as a whole. The certificate will be beneficial to people with ideas and / or technological skills but who lack entrepreneurial know-how.

3. What are the educational objectives of the program?

The course sequence will consist of 6 courses that are each 2 credits, for a total of twelve credits. The program will be offered to students with the ability to complete the program in one semester or in two semesters. The content of these courses will enable better decision making and outcomes in an entrepreneurial environment. Within the program students will have opportunities to develop their business ideas and interact with the network of the Dingman Center for Entrepreneurship.

Upon completion, the participants will receive a Post-Baccalaureate Certificate in Innovation & Entrepreneurship from the University of Maryland. Completers will also have the option of transferring these credits towards a MS in Business and Management or a Master of Business Administration (MBA).

Students seeking both a certificate and a Masters degree offered by the Smith School (for instance the MS in Business and Management, the Master of Business Administration) may double count course credits towards both the certificate and the Masters degree. A total of thirty percent of the total credits taken towards the Masters degree may be double counted towards both the certificate and the Masters degree. So a student enrolled in both the certificate program and the MS in Business and Management can count a total of nine credits (30% of the 30 credits in the MS degree) towards the certificate. A student enrolled in the MBA program can count all twelve of the certificate course credits towards the MBA degree. Only one certificate program can be double counted towards a Masters degree. Certificate course credits cannot be counted towards the completion of another certificate program.

4. Describe any selective admissions policy or special criteria for students selecting this program.

Applicants to the Entrepreneurship certificate program must have completed all of the requirements for a baccalaureate degree prior to their acceptance into the program with a minimum GPA of 3.0. A complete online application form that includes a written essay articulating qualifications and motivation for pursuing advanced education, one letter of recommendation from supervisors or from professors competent to judge the applicant's probability of success in graduate school will also be required.

In addition, an admissions interview may be required. After initial screening, the Admissions Office may select candidates for interviews which may be done in person or by telephone. Proof of English language proficiency (TOEFL or IELTS official scores) is also required unless the applicant has received an undergraduate or graduate degree from a select list of countries. For international student needing an F1 visa, a completed certification of finance form and supporting financial documentation are required.

In addition to Graduate School requirements, admission decisions for the Entrepreneurship certificate program will be based on the quality of previous undergraduate and graduate coursework (if applicable), the relevance of prior work and research experience, and the congruence of professional goals with those of the program. Students should submit application materials at least 30 days prior to the start date of the program.

While some students in the certificate program may already have MBA degree, the ever-changing nature of the business environment for entrepreneurship would still necessitate continuing education in this topic. The faculty of the Smith school have experience teaching courses with heterogeneous student groups. In fact the variation in experience enhances the learning outcomes because it facilitates discussion relevant class materials by those who have had practical experience or prior exposure to business knowledge.

5. Indicate the course requirements with course numbers, titles and credits. If applicable, indicate if any course will also count for a general education requirement. In an appendix, provide the course catalog information (credits, description, prerequisites, etc.) for all of the courses. Note that suffixed "selected" or "special" topics courses should be avoided. If suffixed-selected or special topics courses are offered regularly in the new program, you should make the courses permanent. Also, please review the basic requirements of degree programs or certificate programs to ensure that they meet the minimum policy requirements.

Please note: new courses or modifications to courses need to be submitted through the Testudo Curriculum Management system and will need to follow the normal VPAC course proposal review process. You may submit individual course changes to VPAC concurrently with the PCC proposal; however, the course changes may be held depending on the outcome of the PCC proposal.

BUMO 732: Entrepreneurship & New Ventures
BUMO 752: Strategic Growth for Emerging Companies
BUSI 771: New Venture Financing
BUMO 758T: Technology Entrepreneurship (permanent number being sought)
BUMO 758G: Innovation Management (permanent number being sought)
BUMO 794: Essentials of Negotiations

6. Summarize the factors that were considered in developing the proposed curriculum (such as recommendations of advisory or other groups, articulated workforce needs, standards set by disciplinary associations or specialized-accrediting groups, etc.).

The certificate program will focus on key entrepreneurial competencies including opportunity assessment, problem/solution validation, risk mitigation, venture financing, etc. To address the void of management talent in the venture labor pool, the certificate will also address essential management skills including negotiations, team building and leadership. The certificate program will culminate in a course (BUMO 758T Technology Entrepreneurship) where students will have the opportunity to develop a strategy to develop their own entrepreneurial idea.

7. Sample plan. Provide a term by term sample plan that shows how a hypothetical student would progress through the program to completion. It should be clear the length of time it will take for a typical student to graduate. For undergraduate programs, this should be the *four-year plan*.

Below is a table showing how a student can complete the required coursework in a single semester.

**Student Schedule for the certificate if taken full-time. This coursework can be completed in a single semester. Students can also choose to take the program over a year on a part-time basis. **

One Semester Option:

Term I (7 weeks)	Term II (7 weeks)
BUMO 758G: Innovation Management BUMO 732: Entrepreneurship & New Ventures BUMO 794: Essentials of Negotiations	BUMO 758T: Technology Entrepreneurship BUMO 752: Strategic Growth for Emerging Companies BUSI 771: New Venture Financing

Two Semester Option:

FALL SEMESTER	SPRING SEMESTER
Term A: BUMO 758G: Innovation Management BUMO 732: Entrepreneurship & New Ventures **Term B:** BUSI 771: New Venture Financing BUMO 794: Essentials of Negotiations	**Term C:** BUMO 752: Strategic Growth for Emerging Companies **Term D:** BUMO 758T: Technology Entrepreneurship

8. Indicate whether the program will be offered in a non-standard delivery format, such as online delivery, off-campus, or through non-standard terms. Please note that MHEC requires a separate proposal for off-campus delivery. If the program will be offered in non-standard terms, describe the term structure and whether the Office of the Registrar and the Office of International Scholar and Student Services have been notified and support the proposal. If the program will be offered exclusively online or will have both a face-to-face and online version of the program, please complete this additional form and add as an appendix:
https://docs.google.com/document/d/1ojpUBt4mAWlNPCiQNzZ48UH68zGPYj31TPgEOfW3q1E/

To accommodate students from around the metro area, the classes will be held in person with some content being delivered online. In person meetings will be offered on the UMCP campus, at our DC location in the Ronald

Reagan Building and International Trade Center, our Baltimore facility in the University of Maryland BioPark, or our facility at The Universities at Shady Grove. Classes will be held in the late afternoon, evening or during weekends to accommodate the schedules of our working professional students.

9. For Master's degree programs, describe the thesis requirement and/or the non-thesis requirement.

N/A

10. List the intended student learning outcomes. In an appendix, provide the plan for assessing these outcomes.

Learning Outcome 1: The Entrepreneurial Skillset

- Reach innovative/unconventional solutions by iteratively proposing ideas/strategies, receiving feedback, incorporating feedback and learning from failed approaches;
- Collaborate with others on developing an innovative analysis, project or solution, by incorporating different viewpoints and experiences;
- Develop business models that incorporate feedback from customers and pivot based upon the needs of the market;
- Present the business idea to investors or other outside stakeholders;
- Develop a profitable minimal viable product (MVP).

Learning Outcome 2: Entrepreneurial Growth

- Understand basics of financial modeling based on product, service or web business
- Develop 3 year financial projections based on key revenue & cost assumptions
- Determine risk tolerance and personal funding capabilities based on startup funding needs and any projected losses
- Understand founding documents, equity structures, operating agreements and capitalization.
- Understand various mechanisms for new venture finance.
- Understand how to plan and structure a business for growth.

Learning Outcome 3: Strategic Thinking in Entrepreneurial Environments

- Develop skills for decision making in ambiguous environments.
- Develop skills to learn from and enhance social capital and networks.

See the **Appendix** for the measures, criterion and method of assessment of the three learning objectives.

11. Identify specific actions and strategies that will be utilized to recruit and retain a diverse student body.

The Robert H. Smith School of Business community is multifaceted at every level – students, staff and faculty represent a diverse blend of backgrounds, nationalities, ethnicities and experiences. About a dozen Smith School

and student clubs are focused on bringing members together who have similar interests in gender, nationality, religion, and sexual orientation.

To attract the most diverse population possible for the proposed Innovation and Entrepreneurship certificate program, Smith School recruiting staff will focus on domestic efforts. These efforts will be targeted at recruiting U.S. minorities and American women of all ethnicities.

Current efforts include:

- Representing Masters programs in U.S. MBA and Masters Fairs and Tours
- Representing Masters programs in International MBA and Masters Fairs and Tours
- Online Chats
- U.S. College Visits
- International College Visits
- GMASS-based Mailings
- GRE-based Mailings
- Direct Mail
- Email Campaigns
- Outreach to College and Campus Organizations and Clubs
- Participating in Career/Graduate Study Panels or Workshops
- Presentations at Professional Conferences
- Creation of "Leap Your Career Forward" for Current UMD Students Looking At MBA and Masters Study Post-Undergraduate Studies (An Annual Event)
- Advertising in UMD Campus Newspapers
- Masters Only Education Fairs (Fall And Spring) Throughout the U.S.
- Participation in a Masters-focused Business School Alliance
- Participant in Graduate Business Education Events Targeted for Underrepresented Populations, Particularly U.S. Minorities and Women
- Including Master's Level Programming in Marketing Content Targeted to U.S. Military/Veterans
- Outreach to College Organizations in the Washington, D.C. Area
- Enhancement of Website for All Masters Programs
- Inclusion of Spotlight and Vignettes of Masters Alumni and Current Students who Reflect Diversity
- Participation in Events Targeted for Women Seeking Graduate Study (General And Non-MBA Based Events) Social Media and Online Advertising within U.S. Markets

Relationship to Other Units or Institutions

12. If a required or recommended course is offered by another department, discuss how the additional students will not unduly burden that department's faculty and resources. Discuss any other potential impacts on another department, such as academic content that may significantly overlap with existing programs. Use space below for any comments, otherwise add supporting correspondence as an appendix.

N/A

13. Accreditation and Licensure. Will program need to be accredited? If so, indicate the accrediting agency. Also, indicate if students will expect to be licensed or certified in order to engage in or be successful in the program's target occupation.

N/A

14. Describe any cooperative arrangements with other institutions or organizations that will be important for the success of this program.

N/A

Faculty and Organization

15. Faculty and organization. Who will provide academic direction and oversight for the program? As an appendix, please indicate the faculty involved in the program. Include their titles, credentials, and courses they may teach for the program.

As one of the top academic entrepreneurship and strategy departments in the world, the Management and Organization faculty at the University of Maryland, College Park, is positioned to offer this post-baccalaureate certificate program. This, together with, the quality and reputation of the Dingman Center for Entrepreneurship will facilitate mentorship and practical business advice for certificate students.

Resource Needs and Sources

16. Each new program is required to have a library assessment in order to determine any new library resources that may be required. Please contact your departmental/programmatic library liaison or Daniel Mack at dmack@umd.edu, Associate Dean of Collections, to request a library assessment that will be added as an appendix.

17. Discuss the adequacy of physical facilities, infrastructure and instructional equipment.

Launching this certificate within the existing Part Time MBA program will allow the Robert H. Smith School of Business to utilize its physical facilities, infrastructure and instructional equipment available in the off-site locations of the Ronald Reagan Building campus in Washington, D.C., the Universities at Shady Grove campus in Rockville, Md and/or the University of Maryland Bio Park campus in Baltimore, Md.

18. Discuss the instructional resources (faculty, staff, and teaching assistants) that will be needed to cover new courses or needed additional sections of existing courses to be taught. Indicate the source of resources for covering these costs.

All of the courses being offered for this certificate will be drawn from existing Part Time MBA program courses. All courses will be offered at our DC campus but some may be offered at our other locations as well. Faculty who teach courses in this program shall be drawn from the faculty of the Robert H. Smith School of Business, particularly the Management and Organizations Department. The Management and Organizations department of the Robert H Smith School of Business currently has 31 FTE faculty. 21 of these are full-time tenure / tenure track. All of these faculty have doctoral degrees in Economics, Strategic Management, or Organizational Behavior, Psychology, Sociology, History or Political Science.

19. Discuss the administrative and advising resources that will be needed for the program. Indicate the source of resources for covering these costs.

Primary oversight of this program will be provided by the Dingman Center Academic Director A committee of faculty members has been created to address issues including admissions, academic policies, student activities, and internship / placement opportunities. The program would also be overseen by the chair of the Management and Organizations department and the Dean's office. The Robert H. Smith School of Business will use existing Part Time MBA program resources.

20. Use the Maryland Higher Education Commission (MHEC) commission financial tables to describe the program's financial plan for the next five years: https://docs.google.com/spreadsheets/d/1V6iSZG05edMitWP6CAOXjCoGO58Gf6VXxPaacKfrhZ4/edit#gid=0. Add these tables as attachments. Use the space below for any additional comments on program funding.

Implications for the State (Additional Information Required by MHEC and the Board of Regents)

If the proposed program is for a Post-Baccalaureate Certificate that is derived entirely from existing courses within an existing Master's degree program, then you **only** need to respond to prompts 21 (on market demand) and 24 (curriculum of current master's degree program).

21. Explain how there is a compelling regional or statewide need for the program. Argument for need may be based on the need for the advancement of knowledge and/or societal needs, including the need for "expanding educational opportunities and choices for minority and educationally disadvantaged students at institutions of higher education." Also, explain how need is consistent with the Maryland State Plan for Postsecondary Education.

The Post-Baccalaureate Certificate will meet the needs of practitioners looking to enhance their skills in Entrepreneurship and participate in the innovation economy. The demand for entrepreneurial skills is at an all-time high, be it to start new firms or to innovative within existing firms. Discussions with representatives from professional programs such as the University of Maryland School of Pharmacy suggest a need for graduate-level training in entrepreneurship for our science and engineering workforce. Graduate certificates are also offered locally at the Kogod School at American University, and in other schools such as Georgia Tech, Harvard Extension and Duke Continuing Studies. We believe we can effectively compete in this market.

22. Present data and analysis projecting market demand and the availability of openings in a job market to be served by the new program. Possible sources of information include industry or disciplinary studies on job market, the USBLS Occupational Outlook Handbook, or Maryland state Occupational and Industry Projections over the next five years. Also, provide information on the existing supply of graduates in similar programs in the state (use MHEC's Office of Research and Policy Analysis webpage for Annual Reports on Enrollment by Program) and discuss how future demand for graduates will exceed the existing supply. As part of this analysis, indicate the anticipated number of students your program will graduate per year at steady state.

As the entrepreneurial and high-tech sectors expand in Maryland and across the country, a well-developed entrepreneurial and innovation management skill set will be necessary to achieve success. Entrepreneurial firms often fail due to poor management choices, poor strategic choices or poor mentoring. This entrepreneurship program will focus on the entrepreneurial skillsets necessary to enact new ideas and turn them into thriving businesses including entrepreneurial thinking, leadership and negotiations, designing organizations, managing innovation, strategic positioning, and financing new firms. A particular emphasis will be placed on entrepreneurship in high technology sectors. Entrepreneurial skills are necessary to promote the success of the entrepreneurial economy. For example, Baltimore is losing startups to Boston, especially in healthcare because of a lack of managerial talent. An entrepreneurship certificate will help create skilled labor to work throughout the entrepreneurial ecosystem in areas that most matter to the state, including biotechnology and cybersecurity.

23. Identify similar programs in the state. Discuss any differences between the proposed program and existing programs. Explain how your program will not result in an unreasonable duplication of an existing program (you can base this argument on program differences or market demand for graduates). The MHEC website can be used to find academic programs operating in the state: http://mhec.maryland.gov/institutions_training/pages/HEPrograms.aspx.

N/A

24. Discuss the possible impact on Historically Black Institutions (HBIs) in the state. Will the program affect any existing programs at Maryland HBIs? Will the program impact the uniqueness or identity of a Maryland HBI?

25. For new Post-Baccalaureate Certificates derived from existing master's programs only, include the complete curriculum of the existing master's program.

MBA Curriculum - CORE:

BUSI 610 Introduction to Financial Accounting
BUSI 611 Managerial Accounting
BUSI 621 Strategic and Transformation IT
BUSI 630 Data Models and Decisions
BUSI 634 Operations Management
BUSI 640 Financial Management
BUSI 650 Marketing Management
BUSI 664 Leadership & Teamwork
BUSI 681 Managerial Econ & Public Policy
BUSI 683 The Global Economic Environment
BUSI 690 Strategic Management
(22 core credits)

ELECTIVES: The MBA program has many electives in areas such as Finance, Management and Organization, Logistics and Supply Chain Management, Accounting, Marketing and Decision and Information Technologies. Students in this program will choose electives within any of these departments.

The courses being offered for the Innovation and Entrepreneurship certificate are offered as electives in this program with all courses being offered in our Washington DC campus.

Appendix: Course and Catalog Descriptions

BUMO 732: Entrepreneurship & New Ventures **2 Credits**
Provides an introduction to important tools and skills necessary to create and grow a successful new venture. Integrates research findings from a range of different practical and intellectual perspectives, including psychology, sociology, economics, strategic management, and history into practical, hands on lessons for an entrepreneur. Class projects provide the foundations for new, real businesses.

BUMO 752: Strategic Growth for Emerging Companies **2 Credits**
Offers practical management tools that are needed to build a new venture into a significant enterprise. The competencies, strategies and structures of successful high performance businesses are studied through cases, videos and guest lecturers. Topics include leadership, internal growth strategies, merger, acquisition and franchising.

BUSI 771: New Venture Financing **2 Credits**

This practical course is designed primarily to improve the student's ability to finance a new or growing venture. Students learn basic accounting including income statement and balance sheets. Basic capital structure of firms and time value of money and financial modeling. The advantages and disadvantages of the sources of new venture capital are studied from the entrepreneur's viewpoint. Core topics include bootstrapping, government loans and grants, crowdfunding, commercial banking, angels, middle market private placements, DPOs, venture capital, venture banking, and small IPOs. A review of financial terms, financial statements, capital structure, valuation, deal structure, due diligence, and term sheets is provided.

BUMO 758T: Technology Entrepreneurship **2 Credits**

This course provides an integrated strategy framework for innovation-based entrepreneurs. The course is structured to provide a deep understanding of the core strategic choices facing start-up innovators, a synthetic framework for the development and implementation of entrepreneurial strategy in dynamic environments, and the ability to scale those ventures over time. A central theme of the course is that, to achieve competitive advantage, technology entrepreneurs must balance the process of experimentation and learning inherent to entrepreneurship with the selection and implementation of a strategy that establishes competitive advantage. The course identifies the key choices entrepreneurs make to take advantage of a novel opportunity and the logic of particular strategic commitments and positions that allow entrepreneurs to establish competitive advantage.

The course combines interactive lectures, case analyses, and direct engagement with start-ups. The course draws on a rapidly emerging body of research in entrepreneurship, strategy, and economics that moves beyond the "one size fits all" approach to start-ups and instead focuses on the key choices that founders face as they start and scale their business. The cases and assignments offer an opportunity to integrate and apply the entrepreneurial strategy framework in a practical way, and draws from a diverse range of industries and settings

BUMO 758G: Innovation Management **2 Credits**

The course is designed to give students a broad view on issues related to the management of innovations. It covers both external dynamics of innovations and internal management activities, with special emphasis on knowledge development and learning processes within organizations.

BUMO 794: **Essentials of Negotiations** **2 Credits**

This course provides skills necessary for successful negotiations and leadership skills. Using a series of simulations and debriefings, within the broad spectrum of different kinds of negotiations, this course will give students the opportunity to develop their negotiation skills and be able to evaluate different negotiation contexts that can be applied in the workplace.

Appendix: Learning Outcomes and Assessment

Learning Outcome 1: the Entrepreneurial Skillset.

- Reach innovative/unconventional solutions by iteratively proposing ideas/strategies, receiving feedback, incorporating feedback and learning from failed approaches;

- Collaborate with others on developing an innovative analysis, project or solution, by incorporating different viewpoints and experiences;
- Develop business models that incorporate feedback from customers and pivot based upon the needs of the market;
- Present the business idea to investors or other outside stakeholders;
- Develop a profitable minimal viable product (MVP).

Learning Outcome 2: Entrepreneurial Growth. *Smith certificate students demonstrate a fluency in obtaining resources for new enterprise*

- Understand basics of financial modeling based on product, service or web business
- Develop 3 year financial projections based on key revenue & cost assumptions
- Determine risk tolerance and personal funding capabilities based on startup funding needs and any projected losses
- Understand founding documents, equity structures, operating agreements and capitalization.
- Understand various mechanisms for new venture finance.
- Understand how to plan and structure a business for growth.

Learning Outcome 3: Strategic Thinking in Entrepreneurial Environments.

- Develop skills for decision making in ambiguous environments.
- Develop skills to learn from and enhance social capital and networks.

For all learning objectives, the measures, criterion and method of assessment are:

Measure:	Students will be evaluated based on project based work in each course. Projects are designed to assess how well theoretical concepts are applied to entrepreneurial settings.
Criterion:	At least 90% of students will receive an average rating of "Meets Standards" or better on projects. The Academic Director will meet with students rated below "Meets Standards" to help improve their performance or determine their continued participation in the program.
Assessment:	Every Year, starting in the 2018-2019 academic year.

Appendix: Faculty

Rajshree Agrawal, Rudolph P. Lamone Chair and Professor in Entrepreneurship
Teaching / Research Focus: Entrepreneurship, High Technology Industries, Labor Mobility
Course(s): BUMO 732, Entrepreneurship & New Ventures; BUMO 758T, Technology Entrepreneurship; BUMO 758G, Innovation Management

Christine Beckman, Professor
Teaching / Research Focus: organizational learning, interorganizational networks, and entrepreneurship
Course(s): BUMO 732, Entrepreneurship & New Ventures;

Serguey Braginsky, Associate Professor
Teaching / Research Focus: industry evolution, entrepreneurship, innovation, growth and development
Course(s): BUMO 732, Entrepreneurship & New Ventures; BUMO 758G, Innovation Management

Rellie Derfler-Rozin, Ph.D., Assistant Professor.
Teaching / Research Focus: decision making in the social context
Course: BUMO 794: Essentials of Negotiations

Waverly Ding, Ph.D., Associate Professor
Teaching / Research Focus: Entrepreneurship, Strategy, Technology Commercialization
Courses: BUMO 732: Entrepreneurship & New Ventures, BUMO 758T: Technology Entrepreneurship, BUMO 758G: Innovation Management

Brent Goldfarb, Ph.D., Associate Professor, Academic Director Dingman Center for Entrepreneurship
Teaching / Research Focus: Entrepreneurship, High Technology Industries
Course(s): BUMO 732, Entrepreneurship & New Ventures; BUMO 758T, Technology Entrepreneurship; BUMO 758G, Innovation Management, BUSI 771: New Venture Financing, BUMO 752: Strategic Growth for Emerging Companies

Anil K. Gupta, Ph. D., Michael D. Dingman Chair in Strategy and Entrepreneurship
Teaching / Research Focus: Emerging Markets (especially China and India), Frugal Innovation, Global Strategy & Organization, Corporate Innovation and Entrepreneurship
Courses: BUMO 732, Entrepreneurship & New Ventures; BUMO 758T, Technology Entrepreneurship; BUMO 758G, Innovation Management, BUSI 771: New Venture Financing

David A. Kirsch, Ph.D., Associate Professor
Teaching / Research Focus: History of modern technology, Entrepreneurial and technological failure, Internet Technology Entrepreneurship, Global environmental management systems
Courses: BUMO 732, Entrepreneurship & New Ventures; BUMO 758T, Technology Entrepreneurship; BUMO 758G, Innovation Management, BUMO 752: Strategic Growth for Emerging Companies, BUSI 771 New Venture Financing

David Kressler, Ph.D., Lecturer
Teaching / Research Focus: Business Strategy, Early Stage Entrepreneurship
Courses: BUMO 732, Entrepreneurship & New Ventures; BUMO 758T, Technology Entrepreneurship; BUMO 758G, Innovation Management, BUMO 752: Strategic Growth for Emerging Companies, BUSI 771 New Venture Financing

Gosia Langa, Ph. D., Lecturer

Teaching / Research Focus: Negotiations and Negotiation Process, Leadership Coaching and Development, Personality and Individual Differences focusing on Emotional Intelligence and Core Self-Evaluations , Cross-Cultural Management
Courses: BUMO 794 Essentials of Negotiations

Hui Lao, Ph. D., Smith Dean's Professor in Leadership and Management
Teaching / Research Focus: Leadership, Creativity and Proactivity, Cross-Cultural Management
Courses: BUMO 794 Essentials of Negotiations

Jennifer Carson Marr, Ph. D., Assistant Professor
Teaching / Research Focus: Dynamics of status hierarchies and motivational goals.
Courses: BUMO 794 Essentials of Negotiations

Paulo Procho, Ph. D., Clinical Professor
Teaching / Research Focus: knowledge management, organizational routines, cross-border management and manufacturing strategy
Courses: BUMO 758T Technology Entrepreneurship, BUMO758G Innovation Management

Oliver Schlacke, Ph. D., Clinical Professor
Teaching / Research Focus: Innovation Strategy, Scenario Planning, R&D Portfolio Optimization, Early Stages of Venture Creation, Business Creativity
Courses: BUMO 732, Entrepreneurship & New Ventures; BUMO 758T, Technology Entrepreneurship; BUMO 758G, Innovation Management, BUMO 752: Strategic Growth for Emerging Companies, BUMO 758G: Innovation Management, BUSI 771 New Venture Financing

Subra Tangirala, Ph.D., Associate Professor
Teaching / Research Focus: interpersonal communication in organizations.
Courses: BUMO 794: Essentials of Negotiations

Vijaya Venkataramani, Ph.D., Associate Professor
Teaching / Research Focus: informal social relationships and social networks at work influence leadership, creativity, and discretionary employee behaviors in organizations
Courses: BUMO 794: Essentials of Negotiations

UNIVERSITY SENATE | **TRANSMITTAL | #18-19-08**

Senate Elections, Representation, & Governance Committee

Revisions to the University of Maryland Libraries Plan of Organization

PRESENTED BY	**Andy Horbal, Chair**
REVIEW DATES	**SEC – January 26, 2019 | SENATE – February 5, 2019**
VOTING METHOD	**In a single vote**
RELEVANT POLICY/DOCUMENT	**UMD Plan of Organization for Shared Governance, University Senate Bylaws**
NECESSARY APPROVALS	**Senate, President**

ISSUE

The University of Maryland Plan of Organization for Shared Governance mandates that all Colleges, Schools, and the Libraries be governed by a Plan of Organization. These Plans must conform to provisions and principles set forth in the University's Plan, the Bylaws of the University Senate, the Policy on Shared Governance in the University System of Maryland, and best practices in shared governance. Revisions to the Plan of Organization of each College, School, and the Libraries must be reviewed and approved by the University Senate. The Senate Elections, Representation, & Governance (ERG) Committee is the standing committee responsible for conducting these reviews. The University of Maryland Libraries (LIBR) submitted changes to its Plan of Organization to the University Senate for review in September 2018.

RECOMMENDATIONS

The ERG Committee recommends that the Senate approve the revised University of Maryland Libraries Plan of Organization.

COMMITTEE WORK

The ERG Committee reviewed the LIBR Plan in September of 2018. The section of the Plan that addressed LIBR's appointment, promotion, and permanent status (APPS) policy were sent for review and approval to the Faculty Affairs Committee in November 2018. ERG returned its feedback on the LIBR Plan in October 2018, recommending that LIBR clarify its division between certain administrative and shared governance functions and procedures; provide specifications for representation and quorum on various bodies; explicitly include professional track (PTK) faculty on several bodies; and eliminate ambiguity regarding the duties of the Chair and Vice Chair of the Library Assembly.

LIBR submitted a revised draft in October 2018 that addressed the feedback from ERG, and worked with the committee to resolve remaining ambiguities and minor inconsistencies in November 2018.

The ERG Committee voted to approve the revised Plan at its meeting on November 27, 2018, contingent on the approval of the APPS section of the Plan by the Faculty Affairs Committee. The Faculty Affairs Committee subsequently approved that section at its November 28, 2018, meeting.

The Library Assembly approved the revised version of its Plan in a vote concluding on December 10, 2018.

ALTERNATIVES

The Senate could reject the revised Plan of Organization and the existing Plan would remain in effect.

RISKS

There are no associated risks.

FINANCIAL IMPLICATIONS

There are no financial implications.

UNIVERSITY SENATE | REPORT | #18-19-08
Senate Elections, Representation, & Governance Committee

Revisions to the University of Maryland Libraries (LIBR) Plan of Organization

2018-2019 Committee Members

Andy Horbal (Chair)
Leigh Ann DePope (Faculty)
Jonathan Herrington (Ex-Officio UHR Rep)
Wendell Hill (Faculty)
Alexander Houck (Non-Exempt Staff)
Christine Johnson (Faculty)
Sharon La Voy (Ex-Officio Associate VP IRPA Rep)
Lisha Lai (Graduate Student)
Elizabeth Lathrop (Faculty)
Olivia Mandell (Undergraduate Student)
Elizabeth McClure (Faculty)
MacGregor Obergfell (Graduate Student)
Bria Parker (Faculty)
Benjamin Reichard (Undergraduate Student)

Date of Submission
January 2019

BACKGROUND

The University of Maryland Plan of Organization for Shared Governance mandates that all Colleges, Schools, and the Libraries be governed by a Plan of Organization. These Plans must conform to provisions and principles set forth in the University's Plan, the Bylaws of the University Senate, the Policy on Shared Governance in the University System of Maryland, and best practices in shared governance. Revisions to the Plan of Organization of each College, School, and the Libraries must be reviewed and approved by the University Senate. The Senate Elections, Representation, & Governance (ERG) Committee is the standing committee responsible for conducting these reviews. The University of Maryland Libraries (LIBR) submitted changes to its Plan of Organization to the University Senate for review in September 2018.

COMMITTEE WORK

An ERG subcommittee reviewed the revised Plan in September of 2018. ERG also submitted the section of the Plan that address the LIBR's appointment, promotion, and permanent status (APPS) policy to the Faculty Affairs Committee in November 2018 for its review. The full ERG Committee reviewed the subcommittee's recommendations and returned its feedback to LIBR in October 2018.

Feedback from the ERG Committee identified areas where the Plan's structure and its division between administrative and shared governance functions could be clarified, noted missing or ambiguous information related to representation and quorum for various bodies, and asked that the LIBR create a section establishing election procedures for a range of positions. Additionally, the committee shared concerns that several bodies did not explicitly include professional track (PTK) faculty and pointed out ambiguous language regarding the duties of the Chair and Vice Chair of the Library Assembly.

LIBR submitted a revised draft that addressed the committee's concerns in October 2018. It increased the involvement of PTK faculty and clarified the level of Assembly representation for graduate assistants and exempt and non-exempt staff. It revised the method for determining quorum for various bodies, and better distinguished between the duties of the Assembly Chair and Vice Chair. It also created a new section dedicated to elections. Throughout November 2018, the ERG Committee and LIBR worked to resolve remaining ambiguities and minor inconsistencies. The

ERG Committee voted to approve the revised Plan at its meeting on November 27, 2018, contingent on the approval of the APPS section of the Plan by the Faculty Affairs Committee. The Faculty Affairs Committee subsequently approved that section at its November 28, 2018, meeting.

The LIBR Assembly approved the revised version of the Plan in a vote concluding on December 10, 2018.

RECOMMENDATIONS

The Elections, Representation, & Governance Committee recommends that the Senate approve the revised Plan of Organization for the University of Maryland Libraries.

APPENDICES

Appendix 1—2013 University of Maryland Libraries Plan of Organization

Proposed LIBR Plan of Organization

The University of Maryland Libraries

Plan of Organization

Approved by vote of the Library Assembly December 10, 2018

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PREAMBLE

The Plan of Organization of the University of Maryland Libraries, hereafter referred to as the Plan, serves several purposes:

1. It establishes the framework for the conduct of the Libraries' affairs as an academic unit of the University of Maryland.

2. It specifies details of the University of Maryland Libraries' organization.

3. It ensures that all activities of the Libraries are consonant with the policies, procedures, and regulations for the governance of the University of Maryland.

4. It embodies the University of Maryland Libraries' commitment to free and open participation in shared governance among the library faculty, exempt staff, non-exempt staff, graduate assistants, and administrators at every level, thereby promoting good will and mutual regard.

5. It further strives to ensure academic and professional growth among all employees for the purpose of achieving the Libraries' mission to the University of Maryland.

Achieving these purposes depends upon the University of Maryland Libraries having a diverse body of employees. The University of Maryland Libraries is committed to creating an equitable, inclusive, and supportive environment that nurtures growth and productivity.

ARTICLE I: NAME, MISSION, AND DEFINITIONS

SECTION 1. NAME

The name of the unit shall be the University of Maryland Libraries, hereafter referred to as the Libraries. The Libraries is a non-departmentalized unit and is governed by the University in the same manner as a College or School.

SECTION 2. MISSION

The Libraries enables the intellectual inquiry and learning required to meet the education, research, and community outreach mission of the University.

SECTION 3. DEFINITIONS

The following terms used in the Plan have the meanings set forth below.

A. "Employees" includes all personnel holding appointments in the Libraries, including

permanent status and permanent status-track faculty, professional track faculty, exempt staff, and non-exempt staff. It does not, for the purposes of this Plan, include graduate assistants, hourly student workers, or volunteers.

B. "Faculty" includes the following constituencies unless otherwise indicated:
    1. Permanent Status and Permanent Status-Track Faculty: All permanent status and permanent-status track faculty, as defined in the University of Maryland Policy on Appointment, Promotion, and Permanent Status of Library Faculty. Such faculty hold the rank of Librarian I, Librarian II, Librarian III, or Librarian IV.
    2. Professional Track Faculty: All faculty in ranks which are not eligible for permanent status, as defined in the University of Maryland Libraries Policy on Appointment, Reappointment, and Promotion of Professional Track Faculty. Such faculty hold the rank of Faculty Specialist, Senior Faculty Specialist, or Principal Faculty Specialist.

C. "Staff" includes the following constituencies unless otherwise indicated:
    1. "Exempt Staff" hold appointments classified by the University as Exempt.
    2. "Non-Exempt Staff" hold appointments classified by the University as Non-Exempt.

D. "Graduate Assistant" refers to a registered graduate student enrolled in a degree program at the University and holding an appointment in the Libraries classified by the University as a Graduate Assistant. This constituency does not, for the purposes of this Plan, include hourly graduate student workers.

E. "Consecutive Terms" shall refer to full terms of office occurring in succession, with no gap between them. Partial terms, for example those served by appointment to vacant positions, shall not count toward "consecutive" terms.

F. "Staggered Terms" shall refer to an arrangement whereby only a certain number of committee members or Representatives are elected in a given year. If an unanticipated vacancy disrupts staggering for a committee or group of elected Representatives, the term length for that position may be shortened in the next election in order to restore staggering.

G. *Ex Officio* shall be used to refer to a person serving on a committee or other body by virtue of the position or title the person holds. Unless otherwise indicated, *ex officio* members shall be non-voting members of the committees on which they serve. *Ex officio* members may not serve as chairs or vice chairs of those committees.

H. "Quorum" is the number of voting members required to be present for the body to conduct official business. Quorum is defined for each body below.

ARTICLE II. PURPOSE AND SUPERSEDING AUTHORITY

This Plan is formulated pursuant to the *Plan of Organization for Shared Governance at the University of Maryland, College Park*, and the University of Maryland Board of Regents *Policy on Shared Governance in the University System of Maryland.* At the University of Maryland, executive authority flows from the Senior Vice President for Academic Affairs and Provost through the Dean of Libraries, whereas shared governance authority originates in the University's Plan of Organization and flows through the Senate to the Colleges and Libraries. This Plan is intended to provide for the internal shared governance of the Libraries; to define further the rights and responsibilities of the Dean of Libraries, the faculty, exempt staff, non-exempt staff, and graduate assistants; and to guide in the appointment and conduct of Libraries committees.

ARTICLE III: LIBRARY ADMINISTRATION

SECTION 1. THE DEAN OF LIBRARIES

A. Appointment.

The Dean of Libraries shall be appointed by the Senior Vice President for Academic Affairs and Provost, hereafter referred to as the Provost, and approved by the President of the University.

B. Duties and Responsibilities.

The Dean of Libraries, hereafter referred to as the Dean, shall:

1. Be the chief administrative officer of the Libraries;

2. Ordinarily hold a tenured appointment as Professor or its equivalent in an academic department or the rank of Librarian IV with Permanent Status in the Libraries;

3. Fulfill the service and scholarship criteria of a faculty appointment;

4. Report to the Provost;

5. Consult with the University Library Council, as established by the *Bylaws of the University Senate*, on policies, services, and programs; report to the Library Assembly on outcomes of the University Library Council's meetings;

6. Execute University policies insofar as they affect the Libraries;

7. Formulate and present policies and priorities to the Library Assembly for its consideration;

8. Report regularly to the Library Assembly and its committees on actions taken as a result of the Assembly's recommendations;

9. Prepare, submit, and present an annual report to the Library Assembly; prepare and submit an annual report to the Provost;

10. Prepare and manage the budget of the Libraries in consultation with the Library Management Group (LMG), the Library Assembly Advisory Council, and others as appropriate; prepare and present to the Library Assembly annually a budget for the Libraries for the upcoming year and a report on expenditures of the prior year;

11. Recommend the appointment, reappointment, non-reappointment, permanent status, affiliate and emeritus status, promotion, and research leave of faculty members with the advice of the faculty, the Appointment, Promotion, and Permanent Status Committee, the Professional Track Faculty Oversight Committee, or search committees;

12. Appoint members and chairs of Comprehensive Review Committees, as needed;

13. Receive and review merit and salary review recommendations from the Faculty Merit and Annual Review Committee (FMARC) and the Professional Track Faculty Oversight Committee (PTKOC); distribute merit pay funds to faculty in accordance with the *University of Maryland Policy on Faculty Merit Pay Distribution*;

14. Report annually to the Library Assembly on merit and salary issues;

15. Periodically review the management, training, and advancement of exempt and non-exempt staff in consultation with the Staff Affairs Committee, exempt and non-exempt Representatives, and others as appropriate; address matters as findings dictate; and report to the Library Assembly on these activities;

16. Organize and conduct annual reviews for employees who report directly to the Dean; evaluate the Assistant and Associate Deans at least once every five years, in accordance with the University of Maryland Policy on the Review of Department Chairs and Directors of Academic Units (I-6.00(C));

17. Create and dissolve administrative committees and other groups or partnerships as needed to achieve the mission of the Libraries in consultation with LMG and others as appropriate;

18. Represent the Libraries, in person or by proxy, for official business of the Libraries, to the University community, consortial partners including the

University System of Maryland and Affiliated Institutions and the Big Ten Academic Alliance, professional and scholarly organizations, and the public at large; report on such business regularly to the Library Assembly;

19. Prepare and implement the Libraries' Strategic Plan in consultation with LMG, the Library Assembly, and others as appropriate; report on strategic planning regularly to the Assembly.

C. Evaluation.

The Dean shall be evaluated at least once every five years in accordance with the University of Maryland Policy on the Review of Deans of Academic Units (1-6.00(B)).

SECTION 2: THE ASSISTANT AND ASSOCIATE DEANS

The Assistant and Associate Deans are the chief administrative officers of the Libraries' divisions. Divisions are the major administrative units of the Libraries, as reflected in the organizational chart.

A. Appointment.

The Assistant and Associate Deans are appointed by the Dean and with the approval of the Provost.

B. Duties and Responsibilities.

The Assistant and Associate Deans report to the Dean and shall be responsible for all tasks delegated to them by the Dean.

C. Evaluation.

The Assistant and Associate Deans shall be evaluated at least once every five years in accordance with the University of Maryland Policy on the Review of Department Chairs and Directors of Academic Units (1-6.00(C)).

SECTION 3. THE LIBRARY MANAGEMENT GROUP

The Library Management Group (LMG) consists of the Dean, the Assistant and Associate Deans, the Chair of the Library Assembly, the Diversity Officer, and others the Dean may appoint. LMG constitutes the senior administrative group of the Libraries and is responsible for advising and assisting the Dean on establishing the overall direction of the Libraries, which includes issues of budget, policy, faculty and staff hiring priorities, strategic planning, facilities planning, and operations. As appropriate, LMG shall invite individuals or committees to report on specific matters under consideration. LMG will also meet at least twice per year with the Library Assembly Advisory Council.

ARTICLE IV. THE LIBRARY ASSEMBLY

The Library Assembly, hereafter referred to as the Assembly, shall include all faculty, as well as Representatives of exempt staff, non-exempt staff, and graduate assistants employed by the Libraries. The Assembly shall:

1. Discuss and advise on proposed policies, procedures, services, and programs, and discuss and advise on any matter of concern to the Libraries brought before the Assembly by any member or group of members;

2. Participate in the continued development of the organization;

3. Discuss and advise on updates and revisions of the Strategic Plan;

4. Share information with and promote the skills and abilities of all library employees and graduate assistants;

5. Advise on the creation of opportunities for the professional growth and development of all Libraries employees and graduate assistants.

SECTION 1. MEMBERSHIP

The membership of the Assembly shall consist of:

A. All faculty who have an appointment of at least 50 percent in the Libraries, and emeritus faculty. They shall each have one vote and shall be eligible for membership on Assembly committees except for committees for which membership is specifically limited by this Plan.

B. Elected Representatives of the exempt staff, non-exempt staff, and graduate assistants. To qualify for election, an individual must have a permanent, contractual, or graduate assistant appointment of at least 50 percent in the Libraries. Representation shall equal 30 percent of the population of each constituency. The Representatives of the exempt and non-exempt staff shall be elected for staggered three-year terms, with approximately one-third of each group elected annually, up to a maximum of two consecutive terms. The Representatives of the graduate assistants shall serve one-year terms, up to a maximum of two consecutive terms. Each Representative shall have one vote and be eligible for membership on Assembly committees, except for those committees for which membership is specifically limited by this Plan. In the event that a Representative cannot complete the term of office, the Chair of the Assembly, in consultation with the remaining elected Representatives from the relevant constituency and the Library Assembly Advisory Council, will appoint a replacement to fill the vacancy until the next regular election for that constituency. Replacement Representatives shall be from the same constituency as the Representative being replaced.

C. All officers of the Assembly shall be voting members. They shall each have one vote, except as noted in Article IV, Section 2.

D. The Dean shall be a non-voting *ex officio* member of the Assembly.

E. The responsibilities of each officer, committee member, and Representative shall be considered part of the employee or graduate assistant's official duties.

SECTION 2. OFFICERS

The officers of the Assembly shall consist of a Chair, Vice Chair, Immediate Past Chair, Secretary, and Parliamentarian. All officers shall serve on the Library Assembly Advisory Council. (See Article IV, Section 3 for details.) The Dean, Assistant Deans, and Associate Deans are not eligible for election to Assembly offices set forth in this section.

A. Vice Chair.

A Vice Chair shall be elected annually by and from the Assembly for a three-year term; the first year shall be as Vice Chair, the second year as Chair, and the third year as Immediate Past Chair. Graduate Assistants and the Immediate Past Chair are not eligible for this position. The duties of the Vice Chair shall be to assist the Chair, and to preside over meetings of the Assembly and Library Assembly Advisory Council in the Chair's absence.

In the event that the Vice Chair is unable to complete the first year of the term of office, a new Vice Chair shall be elected by and from the Assembly.

B. Chair.

The Vice Chair shall assume the duties of Chair during the second year of the three-year term. The Chair shall be the presiding officer of the Assembly and Library Assembly Advisory Council, and the Assembly's representative on LMG. The Chair shall be a non-voting member of the Assembly, except in cases of a ballot vote or when the Chair's vote would affect the outcome. In consultation with the Library Assembly Advisory Council, the Chair may appoint persons to take on specific technical roles for the Assembly, e.g. webmaster or electronic list manager. The Chair may appoint persons to fill vacancies of Representatives and on committees, as needed.

In the event that the Chair is unable to complete the second year of the term of office, the Vice Chair will become Chair and a new Vice Chair shall be elected by and from the Assembly.

C. Immediate Past Chair.

The Chair shall assume the duties of Immediate Past Chair during the third year of the three-year term. The Immediate Past Chair shall serve in an advisory capacity to the current Chair.

If the Immediate Past Chair is unable to complete the third year of the term of office, the Chair, in consultation with the Library Assembly Advisory Council, shall appoint a previous Chair to serve as Immediate Past Chair.

D. Secretary.

The Secretary shall be elected annually by and from the Assembly for a one-year term and may serve a maximum of two consecutive terms. If the Secretary is unable to complete the term of office, the Chair, in consultation with the Library Assembly Advisory Council, shall appoint a replacement. Duties of the Secretary shall include recording and preserving minutes of Assembly and Advisory Council meetings and ensuring that Assembly documents are properly archived.

E. Parliamentarian.

The Chair, in consultation with the Vice Chair and Secretary, shall appoint annually the Parliamentarian from the Assembly to advise the Chair on questions of procedure. The Parliamentarian shall be a non-voting member of the Assembly except in the case of a ballot vote. The Parliamentarian shall serve a one-year term, up to a maximum of two consecutive terms. If the Parliamentarian is unable to complete the term of office, the Chair, in consultation with the Library Assembly Advisory Council, shall appoint a replacement.

SECTION 3. THE LIBRARY ASSEMBLY ADVISORY COUNCIL

A. Charge.

The Library Assembly Advisory Council, hereafter referred to as the Advisory Council, acts as an executive committee of the Assembly and functions as the Libraries' Faculty Advisory Council as described in the *Plan of Organization for Shared Governance at the University of Maryland, College Park*. It consults regularly with the Dean and LMG on matters of interest and concern to the Libraries, including budget, policy, faculty and staff hiring priorities, strategic planning, facilities planning, and operations. The Advisory Council assists the Chair with the preparation of Assembly meeting agendas and reviews requests for special committees. The Advisory Council reports regularly to the Assembly on all of its activities.

B. Membership.

The Advisory Council consists of the Chair, the Vice Chair, the Immediate Past Chair, the Secretary, the Parliamentarian, chairs of the standing committees, a Senator elected by the current University Senators, the Professional Track Faculty Senator, one faculty member elected by and from the faculty, one exempt staff member elected by and from the exempt staff Representatives, one non-exempt staff member elected by and from the non-exempt staff Representatives, and one graduate assistant member elected by and from the graduate assistants. The Chair shall be the presiding officer of the Advisory Council.

C. Meetings.

The Advisory Council shall meet as needed with a minimum of one meeting per semester. The Chair may invite appointed technical advisors (e.g., the webmaster) or guests to participate in Advisory Council meetings as appropriate.

D. Minutes.

Minutes of each meeting shall be recorded by the Secretary and published.

E. Quorum.

A quorum shall be equal to more than half of the Advisory Council's voting members.

SECTION 4. MEETINGS

A. Meetings of the Assembly.

Meetings of the Assembly are open to all Libraries employees and graduate assistants. Any Libraries employee or graduate assistant may speak at Assembly meetings, regardless of voting status. All employees and graduate assistants are entitled to release time for participation in Assembly meetings.

1. The Chair or the Vice Chair shall preside at meetings of the Assembly.

2. Types of Meetings.

    a. Regular Meetings. The regular meetings of the Assembly shall be held as needed with a minimum of one per semester.

    b. Special Meetings. The Chair or the Advisory Council may call special meetings of the Assembly as needed, or upon the request of ten members of the Assembly.

3. Agenda and Notice of Meeting.

    a. Regular Meetings. The Chair shall issue a notice of meeting and call for agenda items to all Libraries employees and graduate assistants prior to preparing an agenda in consultation with the Advisory Council. The agenda shall be shared at least seven days in advance of the meeting.

    b. Special Meetings. All Libraries employees and graduate assistants shall be sent notice of a special meeting, along with an agenda, normally seven days in advance of the meeting.

4. Minutes.

    The Secretary shall record and preserve minutes of all meetings. The Chair will distribute them to all Libraries employees and graduate assistants with the agenda for the next Assembly meeting.

5. Quorum.

    A quorum shall consist of 35 percent of the voting members of the Assembly. Members of the Assembly attending the meeting online shall count toward quorum. Prior to the beginning of each semester, the Nominations, Elections, and Voting Procedures Committee shall identify the total voting membership. If no business can be transacted due to a lack of quorum, the Chair may wait a reasonable amount of time to allow a quorum to be assembled. Failing that, the Chair will adjourn the meeting.

6. The latest edition of *Robert's Rules of Order, Newly Revised* shall govern meetings of the Assembly when not in conflict with this Plan.

7. Voting.

    a. Voting on motions is normally accomplished by voice vote. A simple majority carries the motion.

    b. A show of hands shall be used to verify an inconclusive voice vote; to vote on motions requiring two-thirds for adoption; or upon request of a member of the Assembly. A secret ballot may also be used instead of voice or hand votes upon request of a member of the Assembly.

    c. In the case of a vote conducted by show of hands or secret ballot, electronic voting shall be conducted for Assembly members attending the meeting online. Electronic votes shall be tallied together with the votes of those physically present to determine if the motion passes.

B. Meetings of the Faculty and the Staff.

As an element of shared governance, the Libraries faculty, exempt staff, non-exempt staff, and graduate assistants may meet separately from the Library Assembly to discuss matters of interest and concern. These meetings shall be open to all interested parties. Such meetings may result in proposals for consideration by the Library Assembly.

1. Responsibility.

   Such meetings may be called by a member of the Advisory Council or by a Representative. Such meetings shall be presided over by the Advisory Council member(s) or Representative(s) who called the meeting.

2. Agenda and Notice of Meeting.

   The presiding Advisory Council member, Representative, or designee shall issue a notice of meeting and agenda, typically at least seven days in advance of the meeting.

3. Minutes.

   The presiding Advisory Council member, Representative, or designee shall record minutes of the meeting and forward them to the Secretary for preservation.

SECTION 5. COMMITTEES

The Assembly may establish standing and special committees as necessary to conduct its activities and fulfill its purpose.

A. Standing committees support the work of the Assembly on a continuing basis. The Assembly shall review each standing committee at least every ten years. Standing committees may create and revise policies within the scope of their charge and may create and revise procedures to implement these policies. These policies and procedures shall be posted on the Assembly's website. Any policy established or revised by a standing committee must be approved by the Assembly. Standing committees shall meet as needed with a minimum of one meeting per semester.

1. Creation and dissolution of standing committees.

   The Assembly shall create or dissolve standing committees with the guidance of the Committee on Committees in accordance with the amendment process as specified in Article VI. The charge, membership, terms of office, and the manner of selecting the chair of each standing committee shall be specified in Article IV, Section 6.

2. Membership on standing committees.

   All employees and graduate assistants who have an appointment of at least 50 percent in the Libraries are eligible to serve on standing committees, except as determined by Article IV, Section 6. The Assembly shall elect members to its standing committees. Any employee or graduate assistant may nominate candidates to serve on standing committees. The Assembly Chair, in consultation with the Advisory Council, may make temporary appointments to fill vacancies on standing committees to serve until the next annual election. Replacement members shall be from the same constituency as the member being replaced.

B. Special committees undertake work falling outside the role and scope of standing committees. A special committee shall not be established when the specific problem or issue may reasonably be assigned to a standing committee. However, a standing committee may request that a special committee be formed to do clearly defined work on a problem or issue falling within its role and scope when the standing committee cannot accomplish the task in a timely fashion.

   1. Creation and dissolution of special committees.
      a. Any standing committee or member of the Assembly may propose the creation of a special committee.
      b. The Advisory Council shall review the request for the special committee.
      c. The Committee on Committees shall draft the charge, membership requirements, term of operation, and method for selecting the chair of the committee. The draft charge and accompanying documentation shall be presented to the Assembly for discussion and approval.
      d. A majority vote of the Assembly shall be required to create the special committee and approve the charge and accompanying documentation.
      e. The Committee on Committees shall monitor the progress of the special committee.
      f. The special committee's final report shall be presented to the Assembly.

   2. Membership on special committees.

      All employees and graduate assistants who have an appointment of at least 50 percent in the Libraries are eligible to serve on special committees. Members shall be appointed by the Advisory Council upon recommendation from the Committee on Committees. The Assembly Chair, in consultation with the Advisory Council, may make temporary appointments to fill vacancies on special committees. Replacement members shall be from the same constituency as the member being replaced.

C. Quorum shall be equal to more than half of a committee's voting members.

SECTION 6. STANDING COMMITTEES

The Assembly shall maintain the following standing committees:

A. Appointment, Promotion, and Permanent Status Committee.

1. Charge.

   The Appointment, Promotion, and Permanent Status Committee (APPSC) manages the procedures governed by the *University of Maryland Policy on Appointment, Promotion, and Permanent Status of Library Faculty*.

2. Membership.

   The committee shall consist of six faculty members above the rank of Librarian II, two of whom must be at the Librarian IV rank, elected by and from the permanent status and permanent status-track faculty. All committee members must have achieved permanent status. The Dean of Libraries and Assistant and Associate Deans are ineligible for service on the committee.

3. Term of Office.

   Members shall serve two-year staggered terms. Members may serve no more than two consecutive terms.

4. Chair.

   Following each year's election, the committee shall meet to elect a chair. The committee may also elect a vice chair, as appropriate for its work. The chair and/or vice chair must hold the rank of Librarian IV. The APPSC chair shall preside at meetings that deal with appointment, promotion, and permanent status decisions. If the APPSC chair or vice chair cannot or is not eligible to attend a meeting dealing with these decisions, the APPSC member in attendance with the most years of service to the Libraries shall call the meeting to order and preside over the selection of a chair *pro tem* for the meeting.

B. Committee on Committees.

1. Charge.

   The Committee on Committees (COC) shall write or provide guidance in the writing of the charge, the membership requirements, the term of operation, and the method for selecting the chair for each of the Assembly's committees. The Committee on Committees shall oversee the establishment and monitor the progress of special committees of the Assembly. The Committee on Committees shall provide a slate of candidates from within the Libraries, from which administrators may appoint representatives to participate in the search, nomination, and review of the Dean, Assistant Deans, and Associate Deans. The Committee on Committees is responsible for the ten-year reviews of standing committees. The Committee on Committees shall communicate its work and transmit all reports of special committees to the Advisory Council.

2. Membership.

   The committee shall consist of three members, one elected by and from the exempt and non-exempt staff, and two elected at large by and from the Assembly.

3. Term of Office.

   Members shall serve three-year staggered terms. Members may serve no more than two consecutive terms.

4. Chair.

   Following each year's election, the committee shall meet to elect a chair. The committee may also elect a vice chair, as appropriate for its work.

C. Faculty Mentoring Committee.

1. Charge.

   The Faculty Mentoring Committee (FMC) creates guidelines and procedures for and monitors and reports on the effectiveness of the faculty mentoring process for all faculty. This committee shall ensure appropriate mentoring for faculty pursuing promotion and permanent status as well as for professional track faculty.

2. Membership.

   The committee shall consist of four members. Three members shall be elected by and from the faculty. The Director of the Libraries' Human Resources or designee serves as a non-voting *ex officio* member of the committee.

3. Term of Office.

   Elected members shall serve two-year staggered terms. Members may serve no more than two consecutive terms.

4. Chair.

   Following each year's election, the committee shall meet to elect a chair. The committee may also elect a vice chair, as appropriate for its work.

D. Faculty Merit and Annual Review Committee.

1. Charge.

   The Faculty Merit and Annual Review Committee (FMARC) conducts an annual assessment of all eligible permanent status and permanent status-track faculty members to provide peer review of merit applications for the purpose of advising the Dean on merit pay awards, and of annual review for the purpose of facilitating continued professional development of the faculty. It is responsible for monitoring,

evaluating, and reporting on the effectiveness of the merit and annual review processes for permanent status and permanent status-track faculty.

2. Membership.

   The committee shall consist of six members, five of which are elected by and from the permanent status and the permanent status-track faculty. The composition shall contain a distribution of faculty from the permanent status and the permanent status-track ranks, with at least one member representing each constituency. The Director of the Libraries' Human Resources or designee serves as a non-voting *ex officio* member of the committee. The members of FMARC, with the exception of the Director of Libraries' Human Resources, serve as the Merit Pay Committee for the permanent status and permanent-status track faculty. The Dean, Assistant Deans, and Associate Deans are ineligible for service on this committee.

3. Term of Office.

Elected members shall serve two-year staggered terms. Members may serve no more than two consecutive terms.

4. Chair.

   Following each year's election, the committee shall meet to elect a chair. The committee may also elect a vice chair, as appropriate for its work.

E. Library Research Fund Committee.

1. Charge.

   The Library Research Fund Committee (LRFC) shall award funds from the Library Research Fund to conduct research, investigate innovative practices, and pursue other scholarly and creative activities. The committee shall solicit and evaluate proposals, oversee the expenditures of funds, and promote and publicize the research fund process. The committee shall encourage faculty and exempt staff in their research through relevant activities, such as workshops, and act as a resource for other committees.

2. Membership.

   The committee shall consist of five members, three elected by and from the faculty, at least one of whom shall represent professional track faculty; one elected by and from the exempt staff; and one elected by and from the graduate assistants.

3. Term of Office.

   Members shall serve two-year staggered terms. Members may serve no more than two consecutive terms.

4. Chair.

   Following each year's election, the committee shall meet to elect a chair. The committee may also elect a vice chair, as appropriate for its work.

F. Nominations, Elections, and Voting Procedures Committee.

1. Charge.

   The Nominations, Elections, and Voting Procedures Committee (NEVPC) shall be responsible for the overall supervision and conduct of nominations and elections of the Assembly officers, standing committee members, Assembly Representatives, and representatives to the Advisory Council; for coordinating elections of University Senators in accordance with the *Plan of Organization for Shared Governance at the University of Maryland, College Park*; for conducting the balloting to amend this Plan; and for coordinating the election of the special committee to review this Plan.

2. Membership.

   The committee shall consist of five members, one elected by and from the exempt and non-exempt staff, and four elected at large by and from the Assembly. In accordance with the University's requirements for electing Senators, at least one of the at large positions must represent the permanent status/permanent status-track faculty and at least one must represent the Librarian I/professional track faculty.

3. Term of Office.

   Members shall serve three-year staggered terms. Members may serve no more than two consecutive terms.

4. Chair.

   Following each year's election, the committee shall meet to elect a chair. The committee may also elect a vice chair, as appropriate for its work.

G. Professional Track Faculty Oversight Committee.

1. Charge.

   The Professional Track Faculty Oversight Committee (PTKOC) monitors the professional track faculty annual review process, recommends rank at appointment for new professional track faculty, reviews professional track faculty merit applications for the purpose of advising the Dean on merit pay awards, serves as the promotion committee for professional track faculty applications, and reviews all professional track faculty documentation on an annual basis.

2. Membership.

The committee shall consist of four members, three of which are elected by and from the faculty. At least one member must have permanent status, and at least one member must be a professional track faculty member. The Director of the Libraries' Human Resources or a designee shall serve as a non-voting *ex officio* member.

3. Term of Office.

   Elected members shall serve two-year staggered terms. Members may serve no more than two consecutive terms.

4. Chair.

   Following each year's election, the committee shall meet to elect a chair. The committee may also elect a vice chair, as appropriate for its work.

H. Staff Affairs Committee.

1. Charge.

   The Staff Affairs Committee (SAC) shall review Libraries policies as they affect exempt staff, non-exempt staff, graduate assistants, and hourly student workers; research issues affecting these groups; recommend new policies or practices; promote training and other opportunities to constituencies; serve as an additional point of contact for employees and graduate assistants who are not members of the Assembly; and actively promote understanding of and opportunities for involvement, particularly from exempt and non-exempt staff, in shared governance at every administrative level.

2. Membership.

   The committee shall consist of six members. Two members shall be elected by and from the exempt staff; two members shall be elected by and from the non-exempt staff; one member shall be elected by and from the faculty; and one member shall be elected by and from the graduate assistants. The chair of the Staff Affairs Committee, in consultation with other committee members and the elected staff Representatives, shall appoint annually a member to coordinate the work of the committee and the elected Representatives.

3. Term of Office.

   Faculty, exempt staff, and non-exempt staff shall serve two-year staggered terms, with at least one member within each membership group elected annually. The graduate assistant shall serve a one-year term. Members may serve no more than two consecutive terms.

4. Chair.

   Following each year's election, the committee shall meet to elect a chair. The

committee may also elect a vice chair, as appropriate for its work.

SECTION 7: ELECTIONS

A. Responsibility.

NEVPC is responsible for coordinating the nominations and elections of all shared governance positions outlined in this Plan. It shall establish and make public the procedures and timelines associated with the elections it conducts. These procedures shall provide adequate notification for all members of the Libraries and ensure a fair and transparent process. The committee, in consultation with the Libraries' Business and Human Resources Offices, shall determine the eligible population within each constituency prior to each election. While NEVPC oversees the nominations process, it is the responsibility of the Advisory Council, standing committees, and the Assembly to nominate employees and graduate assistants for open positions. The composition of committees should represent as broad a spectrum of interests as possible, consistent with the functions of committees and the availability of candidates to serve.

B. Timeline.

Shared governance elections are usually held four times annually:

1. Graduate assistant Representatives to the Assembly and graduate assistant members of the Advisory Council are elected in the fall.
2. Assembly officers, standing committee members, and exempt and non-exempt Representatives to the Assembly are elected in the spring.
3. Faculty, exempt, and non-exempt representatives to the Advisory Council are elected in the summer.
4. University Senators are elected by the deadline provided by the University Senate.

The opening and closing of nomination periods should be scheduled to coincide with Assembly meetings whenever possible. Election timelines shall be published and shared with all Libraries employees and graduate assistants via email.

C. Procedures.

1. Nominations.

NEVPC shall open nominations at least two weeks before the nomination deadline. Nominations are gathered using an electronic form and (when possible) on the floor of the Assembly before the nomination period closes. Any employee or graduate assistant may submit a nomination, and self-nominations are encouraged. A preliminary slate of eligible nominees should be distributed seven days before nominations close. Nominees must accept the nomination to appear on the slate or ballot.

2. Ballot Distribution and Voting.

   All elections are conducted electronically, with ballots distributed to eligible voters via email. Ballots for electing standing committee members shall be constructed to ensure appropriate representation and distribution according to Article IV, Section 6 of this Plan. Each constituency shall receive its own ballot for relevant elections; Assembly members shall receive a separate ballot for positions elected by and from the Assembly. Each individual may vote only once per ballot, and ballots shall be anonymous. Voting shall remain open for at least two weeks; any ballots submitted after the deadline shall not be counted.

3. Ballot Counting.

   A quorum of NEVPC members must be present in order to count ballots. Votes shall be counted according to the latest edition of *Robert's Rules of Order, Newly Revised*. Depending on the number of candidates and positions available, preferential voting may be used.

ARTICLE V: APPOINTMENT, PROMOTION, PERMANENT STATUS, AND PERIODIC EVALUATION OF LIBRARY FACULTY

Appointment, Promotion, and Permanent Status in the Libraries is governed by the *University of Maryland Policy on Appointment, Promotion, and Permanent Status of Library Faculty, II-1.00(B)*. The Libraries' Appointment, Promotion, and Permanent Status Committee (APPSC), described in Article IV, Section 6.A, manages the procedures governed by this policy. Additional information on the process and procedures are described in the *Guidelines for Appointment, Promotion, and Permanent Status of Library Faculty*, approved by the Assembly.

Periodic review of the Libraries faculty is governed by the *University of Maryland, College Park Policy on Periodic Evaluation of Faculty Performance, II-1.20(A)*. The Libraries' Faculty Merit and Annual Review Committee (FMARC), described in Article IV, Section 6.D in this Plan, manages the procedures governed by this policy. Additional information on the process and procedures are described in the *Library Faculty Annual Performance and Merit Review Policy* and *University of Maryland Libraries Faculty Annual Performance and Merit Review Guidelines.*

SECTION 1. APPOINTMENT, PROMOTION, AND PERMANENT STATUS

A. Initial Advisory Subcommittee Review.

   1. Criteria.

a. Promotion criteria, as established by the *University of Maryland Policy on Appointment, Promotion, and Permanent Status of Library Faculty (II-1.00(B)*), are available to the candidate at the time of appointment.

2. Rules for the Advisory Subcommittee.

a. An Advisory Subcommittee (ASC) guides the process for each application for promotion and/or permanent status, including assembling the dossier, soliciting internal and external evaluations, and reporting to the eligible faculty on its findings and recommendations.
b. Three or more members of the APPSC serve as the ASC for promotions from Librarian I to II, and for new appointments at the rank of Librarian III with permanent status
c. The Librarian IV members of APPSC coordinate the creation of the ASC for new appointments at the rank of Librarian IV.
d. The APPSC shall assign an ASC for each application for permanent status and/or promotion to Librarian III or Librarian IV.
e. Normally, each ASC will have three members, consisting of librarians at or above the rank for which the candidate is applying. ASC membership should include one librarian who is familiar with the work of the candidate, one librarian in a related field, and one librarian from anywhere in the Libraries. All ASC members from the Libraries must have permanent status.
f. The APPSC may appoint additional outside members (for example, academic faculty in a relevant department) to an ASC for applications for Librarian III or Librarian IV when appropriate. Such members must hold a rank at or above the rank for which the candidate is applying; for non-Libraries faculty, the comparable ranks are Associate Professor for Librarian III and Professor for Librarian IV. Such members shall be full voting members of the ASC, and thus have a vote in the ASC's recommendation.
g. If there are fewer than three eligible faculty members, the Dean shall appoint eligible faculty members from related departments to ensure that the ASC contains three persons. Such members must hold a rank at or above the rank for which the candidate is applying; for non-Libraries faculty, the comparable ranks are Associate Professor for Librarian III and Professor for Librarian IV. Such members shall be full voting members of the ASC, and thus have a vote in the ASC's recommendation.
h. The ASC shall meet to elect a chair. The ASC chair must be a librarian at or above the rank for which the candidate is applying.
i. If an ASC contains members from outside of the Libraries, those members may attend the meeting of eligible faculty and may have a voice, but not a vote, in that meeting.

B. Libraries Review.

1. Voting Rights.

a. In decisions on permanent status and/or promotion to Librarian III and Librarian IV, library faculty eligible to vote are those librarians with permanent status at or above the rank for which the candidate has applied.
b. The Dean may attend and have a voice at the meeting of eligible faculty but does not vote.
c. The direct supervisor who writes an internal evaluation may attend and have a voice at the meeting of eligible faculty, but does not vote.
d. The APPSC will call a meeting of the eligible library faculty. A quorum consisting of seventy-five percent of the eligible faculty must be in attendance. A two-thirds majority of those voting is required for a positive recommendation for permanent status and/or promotion.
e. Votes by proxy are not permitted.
f. Votes shall be conducted via secret ballot.

2. The Role of the Chair/Vice Chair.

a. The election and duties of the chair of the APPSC are described under Article IV, Section 6.A.4. The APPSC chair or vice chair shall ensure that transactions of the meeting of the eligible faculty are recorded. The APPSC chair, vice chair, or designee will prepare a written report stating the faculty's vote and recommendation on whether or not to grant permanent status and/or promotion, and explaining the basis for the faculty's recommendation insofar as that basis has been made known in the discussion. The APPSC chair or vice chair shall serve as the Libraries spokesperson at higher levels of review, if needed.
b. The Dean will review the documentation and recommendation of the faculty and make an independent assessment. The Dean shall forward a recommendation to the Provost.
c. Requests for information from higher-level review units shall be transmitted to both the chair of the APPSC and the Dean.

3. Notification.

a. Within two weeks of the date of forwarding the decision to the Provost, the Dean will inform the candidate whether the recommendations made by the eligible faculty and the Dean were positive or negative (including specific information on the number of faculty who voted for promotion and/or permanent status and the number who voted against) and prepare a letter that will summarize in general terms the nature of the considerations on which those decisions were based.

C. Other Procedural Issues.

1. Confidentiality.

a. Members of an Advisory Subcommittee and participants in the eligible faculty meeting must maintain absolute confidentiality in their consideration of cases, including the content of dossiers. Outside of the committee meetings, members of the subcommittee shall not discuss specific cases with anyone who is not a member of the subcommittee. The membership of the subcommittee shall be made public at the time of the subcommittee's appointment. Every member of the campus community must respect the integrity of the appointment, permanent status, and promotion process and must refrain from attempting to discuss cases with subcommittee members or to lobby them in any way.

SECTION 2. PERIODIC EVALUATION

A. Performance Review.

Faculty shall undergo annual performance review in accordance with University policy and guidelines established by the Faculty Merit and Annual Review Committee and approved by the Assembly. Faculty members with permanent status and professional track faculty shall undergo annual review with the direct supervisor and an optional Performance Review Committee (PRC). Faculty members without permanent status shall undergo annual review with the direct supervisor and a mandatory PRC.

Separate reviews mandated for consideration for promotion and/or permanent status, for reappointment review, or for review of faculty administrators may substitute for this faculty review. In those cases, those review policies shall take precedence.

B. Merit Review.

Faculty also undergo annual merit review in accordance with University policy, the *Library Faculty Annual Performance and Merit Review Policy*, the *Professional Track Faculty Oversight Committee (PTKOC) Merit Pay Policy*, and the *University of Maryland Libraries Faculty Annual Performance and Merit Review Guidelines*, approved by the Assembly.

C. Comprehensive Review.

Two consecutive periodic reviews that indicate that a faculty member is materially deficient in meeting expectations shall occasion an immediate comprehensive review. For library faculty members without permanent status, including professional track faculty, the reappointment review process substitutes for the comprehensive review. For Libraries faculty members with permanent status, the Dean will appoint three librarians with permanent status and rank equal to or higher than the faculty member under review to the Comprehensive Review Committee. Consistent with the general principles of peer review, the faculty member's mentor, PRC members, direct supervisor, director, or Assistant or Associate Dean cannot serve on the Comprehensive Review Committee. The Dean will appoint one of the members of the Comprehensive Review Committee as chair.

ARTICLE VI: AMENDMENTS AND REVIEW

SECTION 1. PROPOSAL OF AMENDMENTS

Amendments to this Plan may be proposed by committees of the Assembly or through written petition signed by three or more members of the Assembly.

SECTION 2. RATIFYING AMENDMENTS

A. Proposed amendments shall be presented in writing to the Chair of the Assembly, who shall transmit them to members of the Assembly at least seven days in advance of any regular or special meeting.

B. Within fourteen days after the regular or special Assembly meeting, the Nominations, Elections, and Voting Procedures Committee will distribute a ballot on the proposed amendment/s.

C. The ballots must be received by the Nominations, Elections, and Voting Procedures Committee by the deadline indicated on the ballot.

D. Adoption shall require the support of two-thirds of those voting. If approved, the amendments shall be in effect once approved by the University Senate Elections, Representation, and Governance (ERG) Committee, the University Senate, and the University President.

SECTION 3. REVIEW OF THE PLAN OF ORGANIZATION

A. Review of this Plan of Organization shall be undertaken every tenth year by a special committee formed and elected in accordance with Article 11.3 of the *Plan of Organization for Shared Governance at the University of Maryland, College Park.*

B. The special committee shall include representation of each constituency (permanent status/permanent status-track faculty, professional track faculty, exempt staff, non-exempt staff, and graduate assistants) of the Assembly and shall be constructed to reflect the proportional relationship of those constituencies within the Assembly.

C. The special committee shall elect its own chair.

D. Members of the special committee shall serve until their report has been presented to the Assembly. That report should be presented no later than six months after the date of the first meeting of the special committee.

E. The requirements for adopting proposed revisions resulting from the special committee review shall be the same as those for adopting amendments to this Plan as described in Article VI, Section 2.

Committee on the Plan of Governance:
Sue Baughman, Betty Day, Angela Domanico, David Glenn, Beth Guay, Douglas McElrath, Gary Phillips, Carol Spector, Cynthia Todd, Philip Vandermeer (Chair), Desider Vikor, Jane Williams, Bruce Wilson
Ratified by the University of Maryland Library Faculty on April 16, 2001.

Task Force for Revision of the Library Faculty Assembly Plan of Governance:
Peter Armstrong, Lulu Barnachea, Marian Burright, Elizabeth Borja, David Glenn, Charles Howell, Bobbie Mallett, Douglas McElrath (Chair), Bruce Wilson.
Report to the Assembly on April 16, 2003 and May 12, 2003.
Approved by vote of the Assembly May 30, 2003
Amended by vote of the Assembly November 17, 2003.
Amended by vote of the Assembly November 30, 2004.

Task Force for Revision of the Plan of Governance:
Patricia Kosco Cossard, Irma Dillon, Jill Fosse, Paula Greenwell, Charles Howell (Chair), Alan Mattlage, Ashley Rogers, Laura Wrubel.
Report to the Assembly on February 27, 2007.
Approved by vote of the Assembly on March 26, 2007.
Amended by vote of the Assembly on November 14, 2007

Plan of Organization Review Special Committee:

Bryan Draper, Jill Fosse, Beth Guay (Chair, 2013), Rebecca Kemp (*ex officio* Parliamentarian), Vincent Novara, Lara Otis, Caitlin Wells, Jane Williams (Chair, 2012), Michael Zeliff
Report to the Library Assembly on April 25, 2013
Approved by vote of the Library Assembly, May 6, 2013

Plan of Organization Review Special Committee:
Laura Cleary, Brittany de Gail, Jen Eidson, Beth Guay, Tim Hackman (Chair), Anne Hendrick, Charlotte Johnson, Yitzy Paul, James Spring, Hilary Thompson
Report to the Library Assembly on November 28, 2018
Approved by vote of the Library Assembly on December 10, 2018.

Appendix 1: 2013 LIBR Plan of Organization

UNIVERSITY
LIBRARIES

The University of Maryland Libraries

Plan of Organization

Approved by vote of the Library Assembly, May 6, 2013

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PREAMBLE

The Plan of Organization of the University of Maryland Libraries serves several purposes:

1. It establishes the framework for the conduct of the Libraries' affairs as an academic unit of the University of Maryland;

2. It specifies details of the Libraries' organization; and

3. It ensures that all activities of the University of Maryland Libraries are consonant with the policies, procedures, and regulations for the governance of the University of Maryland.

4. It embodies the Libraries' commitment to free and open participation in shared governance among the library faculty, staff and administrators at every level, thereby promoting good will and mutual regard. [1]

5. It further strives to ensure academic and professional growth among all employees for the purpose of achieving the Libraries' mission to the University.

ARTICLE I: NAME AND MISSION

The name of the unit shall be the University of Maryland Libraries.

The University of Maryland Libraries enable the intellectual inquiry and learning required to meet the education, research and community outreach mission of the University.[2]

ARTICLE II. PURPOSE AND SUPERSEDING AUTHORITY

This Plan of Organization is formulated pursuant to the University Senate *Plan of Organization* and the University of Maryland Board of Regents *Policy on Shared Governance in the University System of Maryland* and is intended to provide for the internal shared governance of the Libraries, to define further the rights and responsibilities of the Dean of Libraries, the faculty, staff, and graduate assistants, and to guide in the appointment and conduct of library committees.

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[1] Adapted from the Preamble of the 2006 Revised Plan of Organization for the University of Maryland
[2] From the Libraries' 2010 strategic plan

ARTICLE III: LIBRARY ADMINISTRATION

SECTION 1. THE DEAN OF LIBRARIES

A. Appointment.
The Dean of the University of Maryland Libraries shall be appointed by the Senior Vice President for Academic Affairs and Provost and approved by the President of the University.

B. Duties and Responsibilities.
The Dean of the University of Maryland Libraries shall:

1. Be the chief administrative officer of the Libraries;

2. Ordinarily hold a tenured appointment as Professor or its equivalent in an academic department or the rank of Librarian IV with Permanent Status in the Libraries;

3. Fulfill the service and scholarship criteria of a faculty appointment;

4. Report to the Senior Vice President for Academic Affairs and Provost;

5. Consult with the University Library Council on policies, services and programs;

6. Execute University policies insofar as they affect the Libraries;

7. Formulate and present policies to the Library Assembly for its consideration;

8. Prepare an annual report that will be submitted to the Library Assembly and campus;

9. Prepare and manage the budget of the Libraries in consultation with the Library Management Group (LMG) and other appropriate staff;

10. Recommend the appointment, reappointment, non-reappointment, permanent status, affiliate and emeritus status, promotion, and research leave of members of the library faculty with the advice of the library faculty, the Appointment, Promotion, and Permanent Status Committee or search committees;

11. Periodically review the management, training and advancement of non-faculty staff and address matters as findings dictate;

12. Organize and conduct annual reviews for associate or assistant deans, directors and others who report directly to the Dean;

13. Create and dissolve administrative committees and other units or partnerships as needed to achieve the mission of the Libraries in consultation with LMG and other appropriate staff;

14. Represent the Libraries, in person or by proxy, for official business of the Libraries, to Campus and University communities, professional and scholarly organizations, and the public at large; and

15. Prepare and implement the Libraries' Strategic Plan in consultation with LMG, the Library Assembly, and other appropriate staff.

C. Evaluation.
The Dean of Libraries shall be evaluated at least once every five years in accordance with the provisions of the most current version of the University Senate *Plan of Organization* for the University of Maryland.

SECTION 2: THE DIVISION HEADS

The division heads are the chief administrative officers of their divisions.

A. Appointment
The division heads are appointed by the Dean and with the approval of the Provost.

B. Duties and Responsibilities
The division heads report to the Dean and shall be responsible for all tasks delegated to them by the Dean.

C. Evaluation
The division heads shall be evaluated at least once every five years in accordance with the provisions of the most current version of the University Senate *Plan of Organization* for the University of Maryland.

SECTION 3. THE LIBRARY MANAGEMENT GROUP

The Library Management Group (LMG) consists of the Dean of Libraries, the division heads, the Chair of the Library Assembly, and others the Dean may appoint. LMG constitutes the senior administrative staff of the Libraries and is responsible for establishing the overall direction of the Libraries, which includes issues of budget, policy, strategic planning, and operations.

As appropriate, LMG shall invite faculty and staff to report on specific matters under consideration. LMG will also meet at least twice per year with the Library Assembly Advisory Council.

ARTICLE IV. THE LIBRARY ASSEMBLY

The Library Assembly, hereafter referred to as the Assembly, shall include all faculty and representatives of staff and graduate assistants employed by the University of Maryland Libraries. The Assembly shall:

a. Discuss and advise on proposed policies, procedures, services, and programs and discuss and advise on any matter of concern to the Libraries and brought before the Assembly by any member or group of members;

b. Participate in the continued development of the organization;

c. Discuss and advise on updates and revisions of the Strategic Plan;

d. Share information with and promote the skills and abilities of the faculty, staff, and graduate assistants;

e. Advise on the creation of opportunities for the professional growth and development of faculty, staff, and graduate assistants;

f. Make recommendations to the Dean on annual merit and salary review for library faculty.

SECTION 1. MEMBERSHIP

The membership of the Assembly shall consist of:

A. All library faculty including contractual faculty with the academic rank of Librarian I and above and who have an appointment of at least 50 percent in the Libraries, emeritus faculty, and affiliate library faculty. They shall each have one vote and shall be eligible for membership on Assembly committees.

B. Elected representatives of the exempt and non-exempt staff and the graduate assistants (who are employees of the Libraries). To qualify for election as a representative from the staff groups, an individual must have a permanent or contractual appointment of at least 50 percent in the Libraries. Representation shall equal 20 percent of the population of each employment group. The representatives of the exempt and non-exempt staff shall be elected for staggered three-year terms, with approximately one-third of each of the two staff groups elected annually. The representatives of the graduate assistants shall serve one-year terms renewable for a maximum of two years' service. All representatives shall have one vote and shall be eligible for membership on Assembly committees except for those whose membership is specifically limited by this Plan of Organization or by a superseding authority. In the event that an elected representative of exempt or non-exempt staff or graduate assistants cannot complete his or her term of office, the Chair of the Assembly, in consultation with the remaining elected representatives, will appoint a

replacement to fill the vacancy until the next election. The Nominations, Elections, and Voting Procedures Committee, in consultation with the Libraries' Human Resources Office, will determine the eligible population within each employment group prior to the annual election for staff and graduate assistant representatives.

C. All elected officers of the Assembly shall be voting members, regardless of their employment categories.

D. The dean and the division heads shall be *ex officio* members of the Assembly with full voting privileges.

SECTION 2. OFFICERS

The officers of the Assembly shall be elected by the Assembly and shall consist of a Chair, Vice Chair, immediate past Chair, and Secretary, as well as a Parliamentarian and a Webmaster appointed by the Chair with the advice and consent of the Vice Chair and Secretary. All officers shall also serve on the Advisory Council. (See Section 4 for details.) Members of the LMG are not eligible for election to Assembly offices set forth in this section.

A. The Assembly shall elect a Vice Chair/Chair Elect from the library faculty and staff representatives for a three-year term. The Vice Chair shall assume the duties of Chair during his or her second year and of immediate past Chair in the third year. The Chair shall be the presiding officer of the Assembly and the Assembly's representative on LMG. The Vice Chair shall preside in the Chair's absence. The immediate past Chair shall serve in an advisory capacity to the current Chair.

   In the event that the Vice Chair is unable to complete her or his term of office, a new Vice Chair shall be elected by the Assembly. In the event that the Chair is unable to complete her or his term of office, the Vice Chair will become Chair and a new Vice Chair shall be elected by the Assembly. In the event that the immediate past Chair is unable to complete her or his term of office, the Advisory Council shall appoint a previous Chair to serve as immediate past Chair.

B. Secretary. The Secretary of the Assembly shall be elected annually from the Library Assembly membership and may serve a maximum of two successive terms. In the event that the Secretary is unable to complete her or his term of office, the Advisory Council shall appoint a replacement. Duties of the Secretary shall include:

   1. Recording and preserving minutes of Assembly and Advisory Council meetings;

   2. Ensuring that Assembly documents are properly archived.

C. Parliamentarian. The Chair shall appoint annually, with the advice and consent of the Vice Chair and Secretary, the Parliamentarian to advise the Chair on questions of procedure. In the event that the Parliamentarian is unable to complete her or his term of office, the Chair, with the advice and consent of the Vice Chair and Secretary, shall appoint a replacement.

D. Webmaster. The Chair shall appoint annually a Webmaster to manage the content of the Assembly web site.

SECTION 3. MEETINGS

A. Meetings of the Assembly.

Meetings of the Assembly are open to all library faculty, staff, and graduate assistants. Any library faculty, staff member, or graduate assistant may speak at Assembly meetings, regardless of voting status.

1. The Chair or the Vice Chair shall preside at meetings of the Assembly.

2. Types of Meetings

   A. Regular Meetings. The regular meetings of the Assembly shall be held as needed with a minimum of one per semester. A call for agenda items shall be issued prior to each regular meeting.

   B. Special Meetings. The Chair may call Special meetings of the Assembly on the request of ten members of the Assembly.

3. Notice of Meeting. All library faculty, staff, and graduate assistants shall receive notice of each regular meeting at least ten days before the meeting. All library faculty, staff, and graduate assistants shall be sent notice of a special meeting in advance of the meeting. A written agenda prepared by the Chair in consultation with the Library Assembly Advisory Council shall be provided at least five days in advance of a regular meeting.

4. Minutes. The Secretary shall record and preserve minutes of all meetings. The Chair will distribute them to all library faculty, staff, and graduate assistants with the agenda for the next Assembly meeting.

5. Quorum. A quorum shall consist of 35 percent of the voting members of the Assembly. Prior to the beginning of each semester the Secretary shall identify the total voting membership. If no business can be transacted due to a lack of quorum, the Chair may wait a reasonable amount of time to allow a quorum to be assembled. Failing that, the Chair will adjourn the meeting.

6. The latest edition of *Robert's Rules of Order* shall govern meetings of the Assembly when not in conflict with these Articles.

7. Voting.

   A. Voting on motions is normally accomplished by voice vote. A simple majority carries the motion. A show of hands is used to verify an inconclusive voice vote and to vote on motions requiring two-thirds for adoption.

   B. On request of a member of the Assembly, a secret ballot shall be used instead of voice or hand votes.

B. Meetings of the Faculty and the Staff.

As an element of shared governance, the library faculty and staff may meet separately from the Library Assembly to discuss matters of interest and concern. These meetings shall be open to all interested parties. Such meetings may result in proposals for consideration by the Library Assembly.

1. Library Faculty Meetings. Either the chair of the Appointment, Promotion, and Permanent Status Committee (APPSC) or the Faculty Merit and Annual Review Committee (FMARC) may call a meeting of the library faculty, including those holding contractual appointments. Library faculty meetings also may be called by either the chair of APPSC or FMARC at the request of ten or more members of the library faculty. Such meetings are separate from meetings of the eligible library faculty called to vote on promotion and permanent status cases.

2. Library Staff Meetings. Either the chair of the Staff Affairs Committee or the staff representatives to the Library Assembly Advisory Council may call a meeting of the library staff. Such meetings may also be called at the request of ten or more exempt, non-exempt or contractual library staff members.

SECTION 4. THE LIBRARY ASSEMBLY ADVISORY COUNCIL

The Advisory Council of the Assembly consists of the Chair, the Vice Chair, the immediate past-Chair, the Secretary, the Parliamentarian, chairs of the standing committees, a senator elected by the current senators, and one non-exempt and one exempt staff member who are Assembly members elected by the staff representatives of the Assembly. The Chair also may invite guests to participate in Advisory Council meetings as appropriate. Minutes of the meetings shall be published. The Advisory Council acts as an executive committee of the Assembly. It consults regularly with the

Dean and LMG on matters of interest and concern to the Libraries, including budget decisions and facility planning. The Dean shall report to the Advisory Council regarding action on and status of recommendations from the Assembly. The Advisory Council may appoint persons to take on specific technical roles for the Assembly, e.g. webmaster and electronic list manager. The Advisory Council shall report regularly to the Assembly on all of its activities.

SECTION 5. COMMITTEES

The Assembly may establish committees as necessary to conduct its activities and fulfill its purpose.

Types of committees. The Assembly may have standing committees and special committees. Special committees shall not be established when the specific problem or issue may reasonably be assigned to a standing committee within its role and scope. However, standing committees may request that a specific problem or issue falling within its role and scope be assigned to a special committee when the standing committee cannot accomplish the task in a timely fashion.

A. Standing committees support the work of the Assembly on a continuing basis. The Assembly shall review each standing committee at least every five years. Standing committees may create and revise policies within the scope of their charge and may create and revise procedures to implement these policies. These policies and procedures shall be posted on the Assembly's web site. Any policy established or revised by a standing committee must be approved by the Assembly.

    1. Creation and dissolution of standing committees. The Assembly shall create standing committees with the guidance of the Committee on Committees in accordance with the Plan of Organization amendment process. The charge, membership, terms of office, and the manner of selecting the chair of each standing committee shall be specified in the Plan of Organization. Standing Committees may be dissolved only by amendment to the Plan of Organization.

    2. Membership on Standing Committees. The Assembly shall elect members to its standing committees. Any member of the Assembly may nominate candidates to serve on standing committees. All faculty, staff, and graduate assistants who have an appointment of at least 50 percent in the Libraries are eligible to serve on standing committees, except as determined by Article IV, Section 5, Subsection C of this Plan of Organization or by a superseding authority. The Assembly Chair, in consultation with the Advisory Council, may make temporary appointments to fill vacancies on standing committees to serve until the next election.

B. Special committees undertake work falling outside the role and scope of standing committees. At the request of a standing committee, a special committee may be formed to do clearly defined work within the scope of the standing committee, and its progress will be monitored by the Committee on Committees.

1. Creation and dissolution of special committees. Any member of the Assembly may propose the creation of a special committee. A majority vote of the Assembly shall be required to create a special committee. It is the responsibility of the Committee on Committees to draft the charge, the membership requirements, the term of operation, and the method for selecting the chair of the committee. The draft charge and accompanying documentation shall be presented to the Assembly for discussion and approval by a majority vote. The charge of a special committee shall include a time limit for completing its work. The final reports of special committees shall be presented to the Assembly.

2. Membership on Special Committees. All faculty, staff, and graduate assistants who have an appointment of at least 50 percent in the Libraries are eligible to serve on special committees, except as determined by a superseding authority. Members shall be appointed by the Advisory Council upon recommendation from the Committee on Committees. The Assembly Chair, in consultation with the Advisory Council, may make temporary appointments to fill vacancies on the special committees.

C. Standing Committees. The Assembly shall maintain the standing committees listed below:

1. Nominations, Elections, and Voting Procedures Committee

a. Charge:
The Nominations, Elections, and Voting Procedures Committee shall be responsible for the overall supervision and conduct of nominations and elections of Library Assembly officers, staff representatives to the Advisory Council, standing committee members, representative staff and graduate assistants to the Assembly, and university senators representing the Libraries; for coordinating University Senate representation according to the bylaws of the University Senate; and for conducting the balloting to amend the Libraries' Plan of Organization. The committee may use preference voting when conducting elections. The composition of committees should represent as broad a spectrum of interests as possible, consistent with the functions of committees and the availability of candidates to serve. The committee, in consultation with the Libraries' Human Resources Office, will determine the

eligible population within each employment group prior to the annual election for staff and graduate assistant representatives for the Library Assembly.

b. Membership:
The Committee shall consist of four members, three of whom shall be elected at large by and from the Assembly, and one elected by and from the exempt and non-exempt library staff.

c. Term of Office:
Members shall serve three-year staggered terms, with at least one member elected annually. Members may serve no more than two consecutive terms.

d. Chair:
Following each year's election the committee shall meet to elect a chair.

2. Appointment, Promotion, and Permanent Status Committee

a. Charge:
The Appointment, Promotion, and Permanent Status Committee (APPSC) coordinates the procedures governed by the University of Maryland Policy on Appointment, Promotion, and Permanent Status of Library Faculty.

b. Membership:
The Committee shall consist of six library faculty members above the rank of Librarian II, two of whom must be at the Librarian IV rank, elected at large by and from the library faculty. All committee members must hold regular appointments (non-temporary, non-contractual) in the UM Libraries and must have achieved permanent status. The Dean of Libraries is ineligible for service on the committee.

c. Term of Office:
Members shall serve a two-year term for no more than two consecutive terms. Members shall serve staggered terms.

d. Chair:
Following each year's election, the committee shall meet to elect a chair. The APPSC chair shall preside at meetings that deal with appointment, promotion, and permanent status decisions. If the APPSC chair cannot or is not eligible to attend a meeting dealing with these decisions, the APPSC member in attendance with the

most years of service to the Libraries shall call the meeting to order and preside over the selection of a chair *pro tem* for the meeting.

3. Committee on Committees

a. Charge:
The Committee on Committees shall write or provide guidance in the writing of the charge, the membership requirements, the term of operation, and the method for selecting the chair of the Assembly's committees. The Committee on Committees shall oversee the establishment and monitor the progress of special committees of the Assembly. The Committee on Committees shall communicate its work and transmit all reports of special committees to the Advisory Council. The Committee on Committees is responsible for the five-year reviews of standing committees.

b. Membership:
The Committee shall consist of three members, elected at large by and from the Assembly.

c. Term of Office:
Members shall serve a three-year staggered term, with one member elected annually. Members shall serve no more than two consecutive terms.

d. Chair:
Following each year's election the committee shall meet to elect a chair.

4. Faculty Merit and Annual Review Committee

a. Charge:
The Faculty Merit and Annual Review Committee conducts an annual assessment of all eligible library faculty members to provide peer review of merit applications for the purpose of advising the Dean of Libraries on merit pay awards, and is responsible for monitoring, evaluating, and reporting on the effectiveness of the Annual Review Process for library faculty.

b. Membership:
The Committee shall consist of five library faculty members, elected at large by and from the library faculty. The Director of the Libraries' Human Resources or her/his designee shall also serve as an *ex officio* member of the committee.

Members of the Library Management Group are ineligible for service on this Committee.

c. Term of Office:
Members shall serve for two years. Members may serve no more than two full consecutive terms. Members shall serve staggered terms.

d. Chair
Following each year's election the committee shall meet to elect a chair.

5. Staff Affairs Committee

a. Charge:
The Staff Affairs Committee shall review library policies as they affect staff members, recommend new policies, serve as a point of contact for staff who are not members of the Assembly, and actively promote understanding of and opportunities for staff involvement, particularly from non-faculty, in shared governance at every administrative level.

b. Membership:
The Committee shall consist of seven members. Two members shall be elected by and from the exempt library staff; two members shall be elected by and from the non-exempt staff; two members shall be elected by and from the library faculty; and one member shall be elected by and from the library graduate assistants.

c. Term of Office:
Exempt and non-exempt staff members and library faculty members shall serve two-year staggered terms, with at least one member within the two membership groups elected annually. Members may serve no more than two consecutive terms. The Graduate Assistant shall serve a one-year term.

d. Chair:
Following each year's election the committee shall meet to elect a chair.

6. Library Research Fund Committee

a. Charge:
The Library Research Fund Committee shall award funds from the Library Research Fund to conduct research and other scholarly and

creative activities. The committee shall solicit and evaluate proposals, oversee the expenditures of funds, and promote and publicize the research fund process. The committee shall encourage library faculty and exempt staff in their research through relevant activities, such as workshops.

b. Membership:
The committee shall consist of three library faculty members, elected at large by and from the library faculty and at least one of whom should have permanent status, and one library staff member, elected at large by and from the library exempt staff.

c. Term of Office:
Members shall serve two-year staggered terms. Members may serve no more than two consecutive terms.

d. Chair:
Following each year's election the committee shall meet to elect a chair.

7. Faculty Mentoring Committee

a. Charge:
The Faculty Mentoring Committee creates guidelines and procedures for and monitors and reports on the effectiveness of the faculty mentoring process for all library faculty. This committee shall ensure appropriate mentoring for library faculty pursuing promotion and permanent status.

b. Membership:
The committee shall consist of three library faculty members, elected at large by and from the library faculty and at least one of whom should have permanent status, and the Head of the Libraries' Human Resources Office (*ex-officio*) or her or his designee.

c. Term of Office:
Elected members shall serve two-year staggered terms. Members may serve no more than three consecutive terms.

d. Chair:
Following each year's election the committee shall meet to elect a chair.

ARTICLE V: THE UNIVERSITY LIBRARY COUNCIL

The University Library Council (ULC) provides advice about policy issues concerning the Libraries to the University Senate, to the Provost, and to the Dean of Libraries. The ULC meets regularly, usually with the Dean of Libraries.

Members of the ULC are appointed jointly by the Provost and the University Senate according to the *Bylaws of the University Senate.*

ARTICLE VI: AMENDMENTS AND REVIEW

SECTION 1. PROPOSAL OF AMENDMENTS

Amendments to these articles may be proposed by committees of the Assembly or through written petition signed by three or more members of the Assembly.

SECTION 2. RATIFYING AMENDMENTS

A. Proposed amendments shall be presented in writing to the Chair of the Assembly, who shall transmit them to members of the Assembly at least ten working days in advance of any regular or special meeting.

B. Within fourteen days after the regular or special Assembly meeting, the Nominations, Elections, and Voting Procedures Committee will distribute a ballot on the proposed amendment/s.

C. The ballots must be received by the Nominations, Elections, and Voting Procedures Committee by the deadline indicated on the ballot.

D. Adoption shall require the support of two-thirds of those voting. The amendments shall be in effect immediately after the announcement by the Nominations, Elections, and Voting Procedures Committee that the required number of votes for adoption has been obtained.

SECTION 3. REVIEW OF THE PLAN OF ORGANIZATION

A. Review of the Plan of Organization shall be undertaken every fifth year by a special committee established by the Advisory Council.

B. That special committee shall include representation of each employment group (faculty, exempt staff, non-exempt staff, and graduate assistants) of the Assembly and

shall be constructed to reflect the proportional relationship of those constituencies within the Assembly.

C. The special committee shall elect its own chair.

D. Members of the special committee shall serve until their report has been presented to the Assembly. That report should be presented no later than six months after the date of the first meeting of the special committee.

E. The requirements for adopting proposed revisions resulting from the special committee review shall be the same as those for adopting amendments to the Plan of Organization as described in Article VI, Section 2.

Committee on the Plan of Governance:
Sue Baughman, Betty Day, Angela Domanico, David Glenn, Beth Guay, Douglas McElrath, Gary Phillips, Carol Spector, Cynthia Todd, Philip Vandermeer (Chair), Desider Vikor, Jane Williams, Bruce Wilson
Ratified by the University of Maryland Library Faculty on April 16, 2001.

Task Force for Revision of the Library Faculty Assembly Plan of Governance:
Peter Armstrong, Lulu Barnachea, Marian Burright, Elizabeth Borja, David Glenn, Charles Howell, Bobbie Mallett, Douglas McElrath (Chair), Bruce Wilson.
Report to the Assembly on April 16, 2003 and May 12, 2003.
Approved by vote of the Assembly May 30, 2003
Amended by vote of the Assembly November 17, 2003.
Amended by vote of the Assembly November 30, 2004.

Task Force for Revision of the Plan of Governance:
Patricia Kosco Cossard, Irma Dillon, Jill Fosse, Paula Greenwell, Charles Howell (Chair), Alan Mattlage, Ashley Rogers, Laura Wrubel.
Report to the Assembly on February 27, 2007.
Approved by vote of the Assembly on March 26, 2007.
Amended by vote of the Assembly on November 14, 2007

Plan of Organization Review Special Committee:

Bryan Draper, Jill Fosse, Beth Guay (Chair, 2013), Rebecca Kemp (*ex officio* Parliamentarian), Vincent Novara, Lara Otis, Caitlin Wells, Jane Williams (Chair, 2012), Michael Zeliff
Report to the Library Assembly on April 25, 2013
Approved by vote of the Library Assembly, May 6, 2013

Sexual Assault Prevention at the University of Maryland

Julia Strange, MSW

Assistant Director, Prevention
Campus Advocates Respond and Educate (CARE) to Stop Violence

Chair
Sexual Assault Prevention Committee

UNIVERSITY HEALTH CENTER

Agenda

- ➔ Introduction
- ➔ Sexual Assault Prevention Task Force (SAPTF) Recommendations
- ➔ Sexual Assault Prevention Committee (SAPC) Membership
- ➔ Implementation Timeline
- ➔ Current Activities

Introduction

Hello!

Sexual Assault Prevention Task Force (SAPTF)

Background

- ➔ Convened in Fall 2016
- ➔ Gathered information:
  - ◆ Peer institutions
  - ◆ Research evidence
  - ◆ Campus community feedback
  - ◆ Federal government guidance on prevention

Results

- ➔ Released report with recommendations in Spring 2017
- ➔ Report approved by University Senate

SAPTF Recommendations

- ➔ Establishment of coordinating committee (Sexual Assault Prevention Committee)
- ➔ Required sequential programming for undergraduate and graduate students.
- ➔ Additional programming for:
  - ◆ Student organizations, Fraternities and Sororities, University Athletics, etc.

SAPTF Recommendations (cont.)

- ➔ College Action Plans
- ➔ University-sponsored events
- ➔ Centralized Prevention Website
- ➔ Messaging Campaign

Sexual Assault Prevention Committee

- ➔ Athletics
- ➔ Department of Fraternity and Sorority Life (DFSL)
- ➔ Graduate School
- ➔ Graduate Student Government (GSG)
- ➔ Office of Civil Rights and Sexual Misconduct (OCRSM)
- ➔ Orientation, Undergraduate Studies
- ➔ Preventing Sexual Assault (PSA) - student organization
- ➔ Provost's Office
- ➔ Resident Life
- ➔ School of Public Health (SPH) - faculty member, evaluation expert
- ➔ Strategic Communications
- ➔ Student Government Association (SGA) Sexual Misconduct Prevention Committee
- ➔ Title IX Student Advisory Board
- ➔ University Health Center

Implementation Timeline

2018-19:

- ➔ Plan for assessment of current prevention training initiatives
- ➔ Centralized Website*
- ➔ Messaging Campaign*
- ➔ Plan for monitoring of intervention fidelity (first-year in-person training)*

2019-20:

- ➔ First-year undergraduate programming (in-person)*
- ➔ Graduate student orientation programming*
- ➔ Implementation of College Action Plans*
- ➔ New Faculty Orientation presentation*
- ➔ Implementation of plan for monitoring of intervention fidelity (first-year in-person training)*
- ➔ Implementation of plan for assessment of current prevention training initiatives*

Implementation Timeline (cont.)

2020-21:

- ➔ Second-year undergraduate programming (online)*
- ➔ Student organization leadership programming (online)*
- ➔ Graduate assistant programming (online)*

2021-22:

- ➔ Third-year undergraduate programming (online)*
- ➔ Student leader summit (in-person)*

2022-23:

- ➔ Fourth-year undergraduate programming (in-person, not required)*
- ➔ Additional non-required programming for faculty, staff, students (in-person)*

Current Activities of the SAPC

- ➔ EverFi Contract Addendum
- ➔ Messaging Campaign
- ➔ Centralized Prevention Website
- ➔ University-wide events
- ➔ Review of current programming

Step UP! Bystander Intervention Training

- ➔ Since 2014
- ➔ Focus on sexual assault prevention
- ➔ Fall 2018:
  - ◆ 4,084 students
  - ◆ 87% of incoming first-year students
  - ◆ 125 presentations

CARE to Stop Violence is the **free, confidential** victim/survivor advocacy, counseling, and education service on campus.

University Health Center
Ground Floor
Mon-Fri 9 AM - 5 PM
NO APPOINTMENT NEEDED
301.314.2222
uhc-care@umd.edu

Crisis Cell: 301.741.3442

health.umd.edu/care

@CAREUMD

Emotional support, crisis intervention, & access to resources including:

- ➔ Medical care
- ➔ Limited academic support
- ➔ Legal services/reporting options
- ➔ Housing options
- ➔ Financial assistance
- ➔ Short-term therapy

Workshops, events, and outreach activities:

- ➔ The Clothesline Project, Purple Light Night, Take Back the Night, and more!
- ➔ Workshop topics: sexual violence, relationship violence, Step UP!, CARE 101

UNIVERSITY SYSTEM of MARYLAND

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WWW.USMD.EDU // 301.445.1901

OFFICE OF THE CHANCELLOR

February 5, 2019

Christopher Walsh
Chair, University Senate
University of Maryland, College Park
1100 Marie Mount Hall
7814 Regents Drive
College Park, MD 20742

Dear Chris,

I would like to thank you, Pamela, and Reka for meeting with me and Board of Regents Chair Linda Gooden last week to discuss the search for the University of Maryland, College Park's new president. Our discussions have been very helpful in developing what I believe is a mutual understanding of the campus' perspective and the board's role in the search process.

As Linda and I have shared, the selection of university presidents is among the Board of Regents most important responsibilities. The search for the next leader of Maryland's flagship, the University of Maryland, College Park (UMCP), will be critically important to the future of the university and of the entire state.

Since I became Chancellor, the board has conducted five presidential searches that have resulted in the appointment of exceptional presidents. Each of these presidents has been instrumental in advancing their institutions in many ways and have the support of their campus communities.

These searches have been guided by the USM's Guidelines for Presidential Searches, which builds upon the board's statutory authority to select and appoint presidents. These guidelines provide a procedural framework for consistency in the search and selection process among USM institutions. They also offer flexibility to allow for institution-specific elements in each search.

As outlined in the guidelines and in accordance with practice, the chancellor appoints a regent as the search committee chair. As a non-voting member of the committee, the regent in the capacity of committee chair leads and coordinates the committee's work and provides an important external perspective. Regent Gary Attman (BS '76) was selected in recognition of his longstanding relationship with UMCP, his understanding of the critical role that the flagship campus plays in the lives of its students, faculty and staff, and his commitment to public higher education in Maryland. He is the founder of FutureCare-Health and Management Corporation.

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The chancellor also, as stated in the guidelines, appoints the members of the search committee. The committee is comprised of 12 – 15 individuals representing a host of university constituencies, including faculty, students, administrators, staff, alumni, foundation boards, boards of visitors, and, often, the community in which the institution is located. Additionally, the chancellor will appoint a non-voting liaison to serve as a resource and the institution will assign a university administrator to staff the committee.

In our meeting, you provided valuable insight on the campus' priorities related to the composition of the search committee, and we are open to incorporating some of your suggestions as we assemble a well-rounded body that will serve as a team bringing diverse perspectives to this critical task. You emphasized the campus' desire for a dean to lead the search. In response, we will appoint one of the academic deans as vice chair to assist Regent Attman in leading the committee. Additionally, we will increase the size of the committee to 18 members, recognizing the scope of UMCP's impact and the need to ensure that as any perspectives as reasonably possible are represented.

With regard to timeline, the presidential search guidelines recommend completing searches expeditiously to "protect the candidate pool". Our primary goal is to select the best candidate for the presidency and, toward this goal, we will take the time needed to hear from the community and to recruit and review a robust candidate pool. As stated, we foresee this search taking approximately a year, which is in line with similar searches at other Big Ten institutions and national research institutions similar to UMCP.

Chair Gooden, Regent Attman, and I will continue to work with the University Senate and campus community to learn more about the campus' priorities for both the composition of the search committee and desired attributes of the next president. To that end, we will spend a day on campus in early March to launch the search process and to meet with and hear from key constituent groups. At that time, we will invite the community to submit search committee nominations for consideration along with the list of individuals that you provided.

Again, thank you for taking time to meet with us.

Sincerely yours,

Robert L. Caret
Chancellor

cc: Linda Gooden, Chair, BOR
Gary Attman, Regent
Wallace Loh, President