MOUNT ST. MARY'S UNIVERSITY

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January 28, 2020

Dr. James Fielder, Secretary
Maryland Higher Education Commission
6 North Liberty Street, 10th Floor
Baltimore, Maryland 21201

Dear Dr. Fielder,

On behalf of Mount St. Mary's University, I am submitting to you a new major program proposal for a bachelor of science in Neuroscience. Mount St. Mary's University is seeking approval from the Maryland Higher Education Commission to offer this program through our School of Natural Science and Mathematics.

Thank you in advance for your timely consideration of this proposal. I look forward to hearing from you.

Sincerely,

Boyd Creasman
Provost

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MHEC
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Cover Sheet for In-State Institutions
New Program or Substantial Modification to Existing Program

Institution Submitting Proposal	Mount St. Mary's University

Each action below requires a separate proposal and cover sheet.

- (●) New Academic Program
- ( ) New Area of Concentration
- ( ) New Degree Level Approval
- ( ) New Stand-Alone Certificate
- ( ) Off Campus Program
- ( ) Substantial Change to a Degree Program
- ( ) Substantial Change to an Area of Concentration
- ( ) Substantial Change to a Certificate Program
- ( ) Cooperative Degree Program
- ( ) Offer Program at Regional Higher Education Center

Payment Submitted:	Payment Type:	Payment Amount:	Date Submitted:
(●) Yes ( ) No	( ) R*STARS (●) Check	$850.00	

Department Proposing Program	Department of Psychology	
Degree Level and Degree Type	Bachelor of Science	
Title of Proposed Program	Neuroscience	
Total Number of Credits	120	
Suggested Codes	HEGIS: 042500	CIP: 26.1501
Program Modality	(●) On-campus	( ) Distance Education (*fully online*)
Program Resources	(●) Using Existing Resources	( ) Requiring New Resources
Projected Implementation Date	(●) Fall ( ) Spring ( ) Summer	Year: 2020
Provide Link to Most Recent Academic Catalog	URL: https://catalog.msmary.edu/	
Preferred Contact for this Proposal	Name: Kraig E. Sheetz	
	Title: Dean, School of Natural Science and Mathematics	
	Phone: (301) 447-8399	
	Email: k.e.sheetz@msmary.edu	
President/Chief Executive	Type Name: Timothy E. Trainor	
	Signature: [signature] Date: 01/28/2020	
	Date of Approval/Endorsement by Governing Board: 01/27/2020	

Revised 3/2019

Mount St. Mary's University

Proposal for a Baccalaureate Degree

Neuroscience

Developed by the Departments of Psychology, Science, and Mathematics/Computer Science

A. Centrality to Institutional Mission and Planning Priorities

Program Description

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

The program in Neuroscience is an interdisciplinary major that focuses on the study of the nervous system. This major is being proposed with the support of the School of Natural Science and Mathematics, and will be housed in the Department of Psychology. Additionally, the Science and Mathematics/Computer Science departments will contribute heavily to the program through coursework and mentoring of research projects.

The program is designed with a number of foundational courses in biology, chemistry, psychology, and computer science which will then be applied in neuroscience-specific courses and research that cover topics ranging from cell biology to human behavior and cognition. Considering the broad reach of neuroscience, the curriculum has been designed to give students the opportunity to tailor their coursework to focus on a specific branch of neuroscience (cognitive, behavioral, molecular/cellular, or computational). The core of the curriculum is designed to give students desirable skill sets for immediate job placement after graduation. Additionally, the flexibility in elective choices will allow students to satisfy requirements for a number of graduate programs.

The goal of the program is to train scientists who can apply a broad ranging skill set to address the problems that enhance the human condition. This goal aligns with multiple facets of Mount St. Mary's University's mission. The interdisciplinary nature of the major allows students to broaden their perspective on topics in neuroscience through the wide range of coursework as well as access to a larger number of students and faculty across departments. This exposure should will align with the MSMU mission of encouraging students' "free and rigorous inquiry"

and allow a more "reflective and creative understanding" of the human person, including, but not limited to human thinking, feeling and behaving. Neuroscientists can apply their training to a number of important problems, such as understanding substance abuse, mood disorders, and age-related neurodegenerative disorders, etc. Working in these fields, graduates of the program will have multiple opportunities to "resolve the problems facing humanity and commit themselves to live as responsible citizens."

The program has potential for profound intellectual and ethical development for students in the program, two core values of the MSMU mission. First, students will establish a strong foundation of ethical development through the Core Curriculum courses. From our Core, students acquire a strong ethical background, including extensive consideration of the nature of the good and development of moral reasoning, as well as a sophisticated intellectual foundation related to neuroscience that includes reflection on classic mind body questions such as human reason, free will, consciousness, understanding, and identity. Additionally, students will learn the foundations of biology, chemistry, psychology, and computer science from coursework. Their intellectual development will be furthered through application of these topics in higher level courses which will require empirical research, data analysis, and communication through papers and presentations. The ethical development of students will be addressed through a variety of courses as well. Ethical treatment of subjects and samples will be covered in a number of biology and psychology courses. Ethical treatment of data will be covered in the data science course. Additionally, the multidisciplinary approach to neuroscience will give students a rich understanding of human functioning. These students will be challenged to think about new solutions to problems that have long affected humanity, and will be encouraged to spread awareness to others.

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

The development of a major in Neuroscience will directly address four different goals of the university's strategic plan. Strategic Plan **objective 1.1 seeks to improve intellectual growth**. While neuroscience has existed as a discipline for over a century, much is yet to be discovered regarding the inner workings of the brain. The proposed curriculum will provide a basic understanding of well-established principles through courses offered in the first two years. Later courses will heavily emphasize intellectual growth through critical analysis of current research, and self-designed research.

The unique interdisciplinary design of the major gives it the opportunity to stand out as a **premier academic program, objective 1.2** of the Strategic Plan. It is becoming increasingly important in scientific research to produce work that is multidimensional and translational. Neuroscience publications in top journals often move from gene to protein to behavior. Individuals that can view a research question from all of these levels *and* have the computer science skills to analyze data appropriately, are both rare and vital in research laboratories.

MSMU is in a unique position based on its small size and the location of contributing departments that allow for ease of collaboration in an interdisciplinary neuroscience major. The proposed program would be much more difficult logistically for other schools to deliver. Additionally, a new program in neuroscience will support the Strategic Plan **objectives 3.2 and 3.3 to improve graduation and retention rates and grow enrollment**. As a wide-reaching discipline, neuroscience touches on topics that many students are interested in before attending college, including substance abuse, autism and artificial intelligence. The number of undergraduate neuroscience programs tripled between 2006 and 2016, indicating a strong growing interest in the field. A new major in neuroscience has the capability of attracting new students to MSMU and thus growing enrollment. Additionally, the emphasis of student-directed research in the proposed curriculum is a high impact practice for student engagement[1] and will likely result in high retention rates.

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

The proposed program in Neuroscience will be cost neutral at the beginning of program implementation. A version of the program currently exists as a self-designed interdisciplinary major in Biopsychology. The proposed program mostly utilizes existing courses, and the proposed courses can be absorbed into the course load of faculty that are contributing to the program. As the program grows in number, an additional faculty member should be added to help with the mentoring of capstone projects and adding additional relevant courses to the curriculum. Additional laboratory space will be beneficial to the program, however not necessary in the first five years. The funds for additional space will come from an existing project to expand the School of Natural Science and Mathematics.

3. *Provide a description of the institution's commitment to:*
    a. *ongoing administrative, financial, and technical support of the proposed program*
    b. *continuation of the program for a period of time sufficient to allow enrolled students to complete the program*

The program in Neuroscience is primarily composed of existing coursework that leverages the expertise of current faculty. Thus, the additional administrative and financial burden of the curriculum will be minimal. We have ample reason to believe that the program will be attractive to a large number of students. We are prepared to deliver the program using existing resources until the number of majors reaches capacity (approximately 10 students per year), at which point the increased tuition revenue should justify the hire of an additional faculty member who may teach and mentor Neuroscience students, and work to fill courses in their respective discipline (likely in the Psychology, Science, or Mathematics/Computer Science department). Technical needs will be factored in to an existing project to expand the space and equipment of the Coad Science Building. Dean Kraig Sheetz has already included a Neuroscience Research Laboratory into the planning of the building renovation and expansion.

The proposed Neuroscience major will be housed and primarily overseen by the Department of Psychology. Because the major is built on the foundation of existing courses, the current support structure will be expanded to support the proposed major. For students entering the Neuroscience degree, this means there is no reason for concern that the university might fail to support completion of the degree once started.

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

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

a. The need for the advancement and evolution of knowledge
b. Societal needs, including expanding educational opportunities and choices for minority and educationally disadvantaged students at institutions of higher education
c. The need to strengthen and expand the capacity of historically black institutions to provide high quality and unique educational programs

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

While neuroscience as a discipline has existed for over a century, and many advancements have been made, the majority of the human brain remains a mystery. Neuroscience is a discipline with applications in a number of important pressing public health concerns, including substance abuse and the aging population. Graduates of the proposed program in Neuroscience will be trained as highly skilled scientists with the ability work in a variety of occupations that can contribute to the understanding, prevention, and treatment of these issues.

The proposed major aligns with multiple strategies outlined in the Maryland State Plan for Postsecondary Education. **Strategy 7 aims to enhance career advising and planning services and integrate them explicitly into academic advising and planning**. Students in the major will be required to conduct empirical research as part of the curriculum, and will be heavily encouraged to partake in other research opportunities such as internships and summer lab work. This experience with independent research has become nearly a requirement for admission into most graduate programs in Neuroscience, and allows students to identify prior to admission whether research is an appropriate career path for them. The current faculty in the program will be able to provide a wide range of research opportunities, including genetics (Dr. Kallarackal), animal behavior (Dr. Slezak), and biochemistry (Dr. McCauslin). Through independent research projects, work study, and the capstone project, students will have multiple opportunities to explore and gain experience with a wide variety of neuroscience-related techniques, as well as gain an understanding of the everyday schedule of a working scientist. These research opportunities will be extremely valuable to students even if they do not pursue a career that revolves around bench work. In additional to direct research experience, career planning and advising will be integrated into coursework. The required Research Preparation/PSYCH 390

course currently includes a number of career-related material including, regular guest speakers in various fields of work, resume editing, and LinkedIn profile work.

Although the only required research in the curriculum is the senior capstone project, as stated earlier, students will be heavily encouraged to partake in research opportunities earlier in their undergraduate career. As an undergraduate institution, our faculty members often rely on undergraduate students to help advance their own scholarly work. Promising students will have the chance to present novel work at conferences and in exceptional cases, have the chance to publish papers as undergraduates. These research experiences support the overall goal of innovation in the Maryland State Plan. Specifically, **faculty-led research projects will expand support for research (Strategy 10) and encourage a culture of risk-taking and experimentation (Strategy 11)**. While small liberal arts schools such as Mount St. Mary's suffer from lack of funding and time for research, the lessened pressure to write grants and publish papers, can be viewed as a blessing. Traditionally, the senior capstone project in the Psychology department has been student-designed with guidance from faculty. This has led to projects that lie outside of the faculty member's previous work, fostering new lines of research. These types of projects have been beneficial to both the students and faculty members involved and will hopefully continue to be a trend in the Neuroscience program.

An additional, and important, value to independent research projects is the level playing field they provide for students. Underrepresentation of a number of minority groups (Hispanics, African Americans, and Native Americans) in the sciences is a well-documented issue. While many underrepresented minority students begin STEM undergraduate programs, the majority of them do not complete the bachelors in a STEM field. Multiple studies have shown that undergraduate research experiences qualitatively and quantitatively enhance success in STEM fields, including self-reports of engagement, aspirations for STEM careers, and admission to graduate programs. Importantly, underrepresented minorities benefit from these research experiences as much, or in some cases, more than non-Hispanic white classmates [1–3].

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

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

Those who graduate from the proposed program in Neuroscience will have a number of employment opportunities. For most, the program will steer them towards careers in academia or the pharmaceutical industry. The primary goal of the program is to prepare students for graduate programs in neuroscience. Graduate training will open the door for high-level careers such as academic researchers, staff scientists, and program managers. Graduate programs in neuroscience vary greatly in focus between programs, including cognitive neuroscience, behavioral neuroscience, computational neuroscience, and cellular and molecular neuroscience. The specialization in neuroscience will give students an early advantage to graduate school admission, showcasing their focused interest. Additionally, the interdisciplinary nature of the proposed curriculum will allow students to thrive in a number of different types of programs.

While many of these professions may require further graduate work, many entry-level neuroscience positions exist, such as research technicians, clinical laboratory technologists, and medical/health service managers. A bachelor's degree in neuroscience also presents opportunities in less traditional applications, such as science writing, marketing jobs and policy work.

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

Market research conducted by EAB Global Inc., shows a high market demand bachelor's level neuroscience degrees. Between September 2016 and October 2018 there was a 42% increase in the demand for bachelor's-level neuroscience professionals. The professions for the highest demand regionally include both research and managerial roles. In October 2018 alone there were 449 job postings among regional employers for professionals with Bachelor's-level training in neuroscience. This was increased from 316 such postings a year prior.

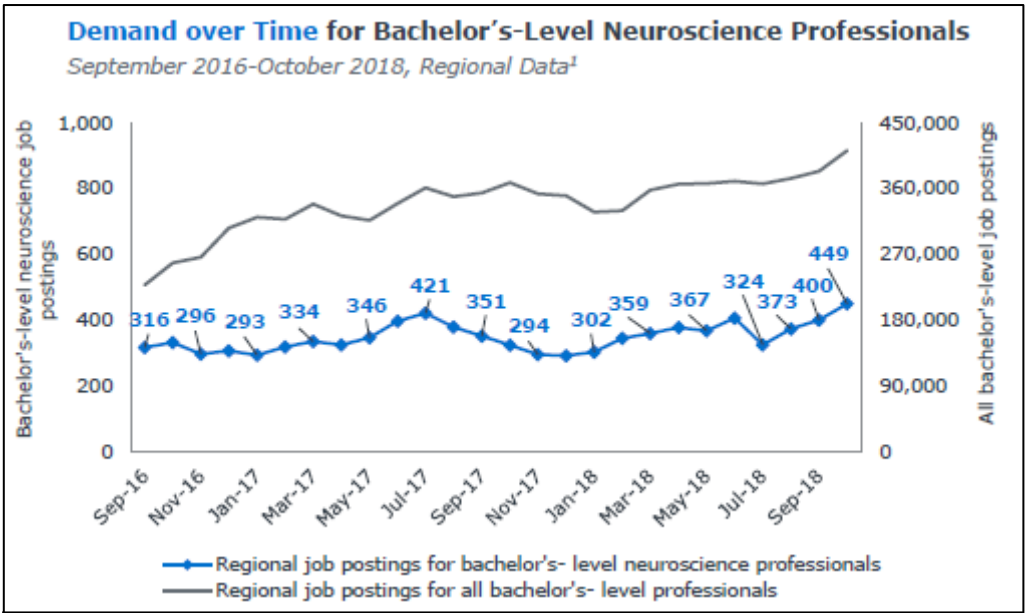

Figure 1. Demand for Bachelor's level Neuroscience Professionals, compiled by EAB Global Inc. Data from Emsi Analyst.

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

A 2018 study quantified the desired qualities, skills, and characteristics of top Neuroscience graduate programs across the country[4]. The proposed curriculum will provide students with all of the highest rated skills including: basic research experience, background knowledge in neuroscience, statistical knowledge and bench skills. Additionally, the program will foster highly desired characteristics including: critical thinking, ethical behavior, and ability to work with others. The proposed program in Neuroscience includes training a number of skills that are

valued among employers. Many of the job postings for bachelor's level neuroscience professionals are for manager roles such as "clinical manager," "program manager," and "research and development manager." In addition to leadership and presentation skills that will developed through lab projects and presentations in the coursework, students will also develop leadership skills through participation in Brain Awareness Week (an outreach program that is part of the Introduction to Neuroscience course) and membership in the Nu Rho Sci honor's society.

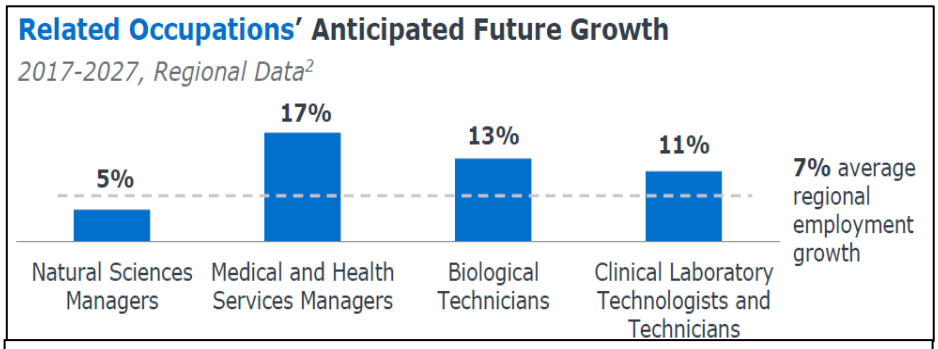

Figure 2. Anticipated future growth in occupations related to Neuroscience, compiled by EAB Global Inc. Data from Emsi Analyst.

The EAB Global Inc., market analysis projects a substantial increase in employment opportunities over the next 10 years for students who graduate with a Bachelor's in Neuroscience. They project a 17% increase in employment opportunities for "medical and health services managers" a 13% increase in vacancies for "biological technicians" and a 5% increase in "natural science managers" between 2017 and 2027.

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

School	Total population	Neuro majors	Biology majors	Psych majors
Franklin and Marshall College, PA	2283	**18**	30	26
Dickinson College, PA	2382	**9**	48	30
Swarthmore College, PA	1577	**16**	35	13
Ursinus College, PA	1507	**18**	59	31

It is somewhat difficult to project the number of prospective graduates for the Neuroscience program based on the wide range in program sizes among comparable schools. Based on the table compiled below, we project between 9-30 graduates each year once the program has been established.

D. Reasonableness of program duplication:

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

2. Provide justification for the proposed program.

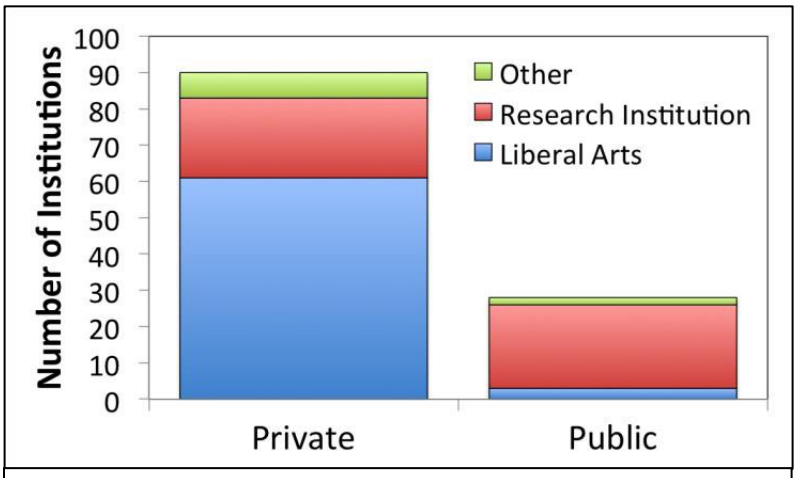

Figure 3. Neuroscience major distribution by institution type. "Other" is defined as any institutions not identifying themselves as research or liberal arts institutions. (From Pinard-Welyczko et al., 2017)

The National Center for Education Statistics lists a total of 199 nationwide bachelor degree programs including the word "neuro." Among these, there are 35 schools within a 200 mile radius of Mount St. Mary's University that offer such a major. Many of these schools are large non-competitor institutions like Georgetown University and Princeton University. Many however, follow the national trend (see Figure 3) of existing at small private liberal arts schools, including Swarthmore College, Ursinus College, Muhlenberg College, and Westminster College. Notably, the only two schools in Maryland offering a Bachelor's degree in Neuroscience are Johns Hopkins University, and the University of Maryland, College Park (which was just introduced this past year).

Table 1. Number of neuroscience graduates from 2017-2018 school year from all schools of 3,000 students or less with a Bachelor's program in Neuroscience within a 100 mile radius of Mount St. Mary's University. Data was obtained from the College Navigator Database from the National Center for Education Statistics.

A study conducted in 2017 examining different undergraduate neuroscience programs across the country found that the "average" program included a selection of biology, chemistry, and psychology courses [5]. Our proposed required curriculum includes three Neuroscience courses, two Biology courses, three Chemistry courses and four Psychology courses. Six of these courses are lab courses. It is important to note that three of the Psychology courses are focused primarily on research methods and statistics (PSYCH 200, PSYCH 390, and PSYCH 498), serving the role that most math classes play in curricula at other schools. These courses are also serve as the scaffold for a mentored empirically-based research project that will be required of all majors. The study by Pinard-Welyczko and colleagues noted that while 98% of programs offer research opportunities, only 31% require majors to perform research. This experience is particularly important for students interested in attending graduate school. Our analysis of graduate programs in Neuroscience found that most did not require specific coursework for admission, however previous research experience was often listed as highly recommended or required.

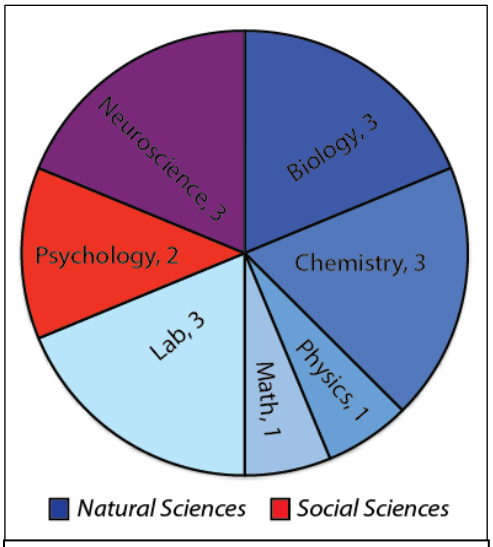

Figure 4. Visual comparison of number of required courses by category in the average neuroscience major (From Pinard-Welyczko et al., 2017).

An important difference in our proposed curriculum that makes it unique compared to other neuroscience programs is the computer science requirements (CMSCI 120 and DATA 200). Of the 118 schools surveyed in the Pinard-Welycszko et al., study only six schools had a computer science requirement. The computer science experience should increase the value of the neuroscience degree considering that 65% of employers plan to hire individuals with computer science degrees in 2018 according to the National Association of Colleges and Employers. Neither Johns Hopkins University, nor University of Maryland require computer science courses as part of their Neuroscience major.

Additionally, the MSMU Neuroscience major gives students to expand neuroscience beyond traditional scientific disciplines, and into the humanities through electives in Philosophy and Political Science. MSMU's foundation in the Catholic intellectual tradition encourages the study of both faith and reason. Neuroscience is a discipline that allows students and faculty to explore human functioning across many levels. The combination of the Neuroscience major with the University's Core curriculum will give students a unique perspective on neuroscience that may lead to novel avenues of research and study.

MSMU's major in Neuroscience will fulfill a need in Maryland, by offering the only program of its kind in the state. This major will be particularly beneficial for students who have an interest in neuroscience but do not desire to attend a large school. It will also draw students who have an interest in understanding the role of neuroscience in a larger context, ranging from the fullness of individual capacity to applications across society.

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

1. Discuss the program's potential impact on the implementation or maintenance of high-demand programs at HBI's.

We do not anticipate any impact on programs at HBI's.

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

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

We do not anticipate any impact on HBI's.

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

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

The undergraduate major in Neuroscience stems from a long-standing interdisciplinary self-designed major in Biopsychology. Historically, MSMU has graduated 1-3 students with a self-designed major every year for the past 30 years. There was a consensus among faculty advising Biopsychology students that the major should be formalized. During this process, the existing curriculum for the major was reviewed, and the need for unique neuroscience-specific courses was agreed upon. Chairs of all involved departments discussed pertinent coursework and the proposed curriculum was developed based on existing courses as well as framework of Neuroscience programs at other schools.

The program will be overseen by Dr. Angy Kallarackal, Dr. Caitlin Faas, Dr. Jon Slezak, Dr. Christine McCauslin, and Dr. Frederick Portier. Dr. Angy Kallarackal minored in Neuroscience as an undergraduate student and has a Ph.D in Neuroscience from the University of Maryland, Baltimore. She is a professional member of The Society for Neuroscience, Faculty for Undergraduate Neuroscience, and Nu Rho Sci, the neuroscience honor's society.
The Neuroscience program will be housed administratively within the Psychology Department. The faculty who will teach courses in the program will come from several departments. The majority of the faculty listed below have terminal degrees in their field and many are experienced Associate and Full Professors. The curriculum draws upon regular course offerings from Psychology, Biology, Chemistry, and Computer Science, and includes new course offerings in Neuroscience. Students who complete the Neuroscience major will be required to take fourteen courses (48 credits) across the subjects listed above. An additional 9-12 credits of electives complete the major. The below table lists requirements and electives. Courses marked with * are new courses. Full course descriptions follow the table.

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

Educational Objectives

The Neuroscience degree gives students training in a variety of scientific disciplines to help them better understand the human mind, its capabilities and underlying mechanisms. Students will learn to understand current literature and treatments for brain-based disorders, communicate research to both scientists and non-scientists alike and think critically and inventively. The program strives to graduate students who will gain meaningful entry-level employment as research assistants, science writers, and program coordinators and more.

The proposed Bachelor of Science in Neuroscience meets the American Psychological Association's (APA) standards for psychology majors. In the APA Guidelines for the Undergraduate Psychology Major: Version 2,0 (APA, 2013), five broad goal categories are established:

Goal 1. Knowledge Base in Psychology
Goal 2. Scientific Inquiry and Critical thinking
Goal 3. Ethical and Social Responsibility in a Diverse World
Goal 4. Communication.
Goal 5. Professional Development

Educational objectives of the Major in Neuroscience are:

1. Provide students with relevant interdisciplinary training covering the wide breadth of subject matter that relates to neuroscience, including, but not limited to, psychology, biology, chemistry, and computer science. (Goal 1 of the APA standards offering a broad and interdisciplinary knowledge base.)

2. Give students a strong foundation in research method design and interpretation, as well as hands on experience with relevant experimental techniques. (Goals 2, 4 and 5 or emphasizing research, communication and professional development.)

3. Encourage students to think critically and creatively about public health and other issues related to neuroscience. (Goals 2, 3 and 5 focusing on critical thinking, ethics and one's profession.)

Student Learning Outcomes:

LO1: demonstrate an understanding of the basic concepts of neuroscience, including the mechanisms of neural communication, functions of brain circuits, and roles in disease.
The first learning outcome reflects Goal 1 of the APA guidelines and the following subgoals (APA, 2013; p.15):

1.1 Describe key concepts principles, and overarching themes in psychology
1.2 Develop a working knowledge of psychology's content domains
1.3 Describe applications of psychology

LO2: develop strong research method skills including formulation of hypotheses, well-controlled experimental design, and appropriate statistical analysis of data.
This learning outcome is tied closely to Goal 2 and its 4 of its 5 subgoals (APA, 2013; p.15):

- 2.1 Use scientific reasoning to interpret psychological phenomena
- 2.2 Demonstrate psychology information literacy
- 2.3 Engage in innovative and integrative thinking and problem solving
- 2.4 Interpret, design, and conduct basic psychological research

LO3: understand ethical concerns of neuroscience research and consider the broad potential for addressing individual and societal needs.
This learning outcome directly reflects Goal 3 and its 3 subgoals as well as the last subgoal of Goal 2 (APA, 2013; pp.15-16):

- 3.1 Apply ethical standards to evaluate psychological science and practice
- 3.2 Build and enhance interpersonal relationships
- 3.3 Adopt values and build community at local, national, and global levels.
- 2.5 Incorporate sociocultural factors in scientific inquiry

LO4: exhibit the ability to critically read and evaluate neuroscience-related literature ranging from popular media articles to peer-reviewed journal articles.
Similar to LO2, this learning outcome also reflects Goal 2 and the first 4 of the 5 subgoals (APA, 2013; p.15):

- 2.1 Use scientific reasoning to interpret psychological phenomena
- 2.2 Demonstrate psychology information literacy
- 2.3 Engage in innovative and integrative thinking and problem solving
- 2.4 Interpret, design, and conduct basic psychological research

LO5: demonstrate the ability to communicate complex concepts in neuroscience to a variety of audiences from other scientists to the general public.
This learning outcome matches Goal 4 of the APA guidelines and its subgoals as well as the first subgoal of Goal 5 (APA, 2013; p.16):

- 4.1 Demonstrate effective writing for different purposes
- 4.2 Exhibit effective presentation skills for different purposes
- 4.3 Interact effectively with others
- 5.1 Apply psychological content and skills to career goals

Thus, the objectives and learning outcomes of the proposed undergraduate major in Neuroscience successfully align with the goals and standards for the undergraduate psychology major as outlined by the American Psychological Association (APA, 2013).

3. *Explain how the institution will:*

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

Learning Outcome	Assessment	Successful Outcome(s)
LO1: demonstrate an understanding of the basic concepts of neuroscience, including the mechanisms of neural communication, functions of brain circuits, and roles in disease.	-Exam and assignment performance in all core Neuroscience courses. -Pre- and post-tests delivered in Intro to Neuroscience.	-Eighty percent of students score 70% or above in the courses. -Ninety percent of students show improvement in post-test
LO2: develop strong research method skills including formulation of hypotheses, well-controlled experimental design, appropriate statistical analysis of data, and ethical conduct.	-Laboratory assignment grades in Biology, Chemistry, Biopsychology and other elective lab courses. -Research paper grades in Research Methods and Statistics, Biopsychology, Research Preparation, and Senior Capstone Project.	-Eighty percent of students earn paper grades of 70% or above as assessed by APA standardized rubric.
LO3: understand ethical concerns of neuroscience research and consider the broad potential for addressing individual and societal needs.	-Institutional Review Board assignment in Psych 390, completed in preparation for the Senior Capstone Project. -Delivery of societally relevant Brain Awareness projects in Introduction to Neuroscience. -Discussion participation in Advanced Seminar in Neuroscience.	-100% of the students will submit an IRB proposal that is successfully approved. -Participant surveys show interest and engagement in Brain Awareness projects.
LO4: exhibit the ability to critically read and evaluate neuroscience-related literature ranging from popular media articles to peer-reviewed journal articles.	-Journal article summary report grades in Introduction to Neuroscience. -Paper presentation grades in Introduction to Neuroscience and Advanced Seminar in Neuroscience.	-Eighty percent of students earn 70% or above on journal article summary reports. -Improvement in presentation grades compared between Intro and Advanced Neuroscience courses.
LO5: demonstrate the ability to communicate complex concepts in neuroscience to a variety of audiences from other scientists to the general public.	-Paper presentation grades in Introduction to Neuroscience and Advanced Seminar in Neuroscience. -Senior Capstone project poster presentation grades. -Surveys taken by participants after partaking in student-led Brain Awareness projects in Introduction to Neuroscience and Advanced Seminar in Neuroscience.	-Improvement in presentation grades compared between Intro and Advanced Neuroscience courses. -Ninety five percent of students participate in Senior Capstone poster session and earn 70% or above on poster grade. -Participant surveys show interest and engagement in Brain Awareness projects. -Brain Awareness partners show interest in continuing joint efforts in future years.

The majority of assessment of student achievement will come in the form of coursework and exams. The Psychology Department will use its existing platform through a shared network folder that will track student performance over multiple courses. Department members will also

work with the ASPIRE Office (Assessment, Strategic Planning and Institutional Research and Effectiveness) to use best practices in documenting and adjusting assessment strategies as needed.

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

Major Requirements (48 credits)

NEURO 209: Behavioral Neuroscience with Lab (Previously PSYCH 209)	4
NEURO 370: Methods in Neuroscience (Previously PSYCH/BIOL 370)	3
*NEURO 411: Advanced Seminar in Neuroscience	3
PSYCH 100 Foundations of Psychology	3
PSYCH 200: Research Methods and Statistics	3
PSYCH 390: Research Preparation	3
PSYCH 498: Senior Methods Seminar	3
BIOL 110: Intro to Biology I with Lab	4
BIOL 111: Intro to Biology II with Lab	4
CHEM 101: General Chemistry I with Lab	4
CHEM 102: General Chemistry II with Lab	4
CHEM 201: Organic Chemistry I with Lab OR	
CHEM 150: Bioorganic Chemistry	4
CMSCI 120: Introduction to Computer Science	3
DATA 200: Introduction to Data Science in a Big World	3

Electives (9-12 credits)
Pick three classes:

NEURO 240: Sensation and Perception (Previously PSYCH 240)	4
PSYCH 203: Abnormal Psychology	3
PSYCH 220: Experimental Learning	4
PSYCH 220: Experimental Cognition	4
PSYCH 365: Drugs and Addiction	3
PSYCH 351: Developmental Neurodiversity	3
PSYCH 399: Independent Research	3
PSYCH 480: Internship	3
BIOL 221: Genetics	4
BIOL 250: Animal Behavior	4
BIOL 298: Anatomy and Physiology I	4
+BIOL 311: Pharmacology	4
+BIOL 420: Molecular and Cellular Biology	4
PHYS 101: College Physics	4
CMSCI 125: Introduction to Computer Science II	3
+CMSCI 449: Introduction to Artificial Intelligence	3

DATA 220: Machine Learning Models	3
PHIL XXX: Body or Soul	3
PHIL XXX: Philosophy of Knowledge: Mind and Reality	3
PHYS 101/102: College Physics	4/4
PSCI 332: Politics of the Human Body	3

Total: 57-60 credits

* Indicates new course
+ Indicates necessity of additional pre-requisite(s)

Major Requirements (48 credits)

NEURO 209 Behavioral Neuroscience with Lab (4)
Provides an introduction to the relationship of brain and hormones to psychological functioning. Examines basic neuroanatomy and neurophysiology important to behavior. Presents the biological bases of motor movement, sleep, reproduction, memory, language and psychopathology. Prerequisite: PSYCH 200. Three lecture and one laboratory session per week. (Spring)

NEURO 370 Methods in Neuroscience (3)
Covers the fundamentals of neuronal communication, including the physiology of neuronal responses, the actions of neurotransmitters, and the genetic and cell biological components of neuronal development and plasticity. Applies the understanding of neuronal communication to both human and non-human behaviors and processes. Pre-requisites: NEURO 209 OR BIOL 111. (Fall)

NEURO 411 Advanced Seminar in Neuroscience (3)
Focuses on reading and presenting neuroscience research. Lecture will focus on a variety of methods used in neuroscience research including behavioral, molecular, biochemical and computational techniques. Course will include weekly roundtable discussions on a primary research article. Additionally, students will complete a community outreach project during Brain Awareness Week. Prerequisites: NEURO 209 and NEURO 370. (Spring)

BIOL 110 Introduction to Biology I (4)
Designed to provide a broad background as preparation for further studies in the discipline. Familiarizes the student with the major levels and unifying principles of biological organization. Topics covered include evolution, biodiversity and ecology. Lecture and lab. (Fall)

BIOL 111 Introduction to Biology II (4)
A continuation of Introduction to Biology I. Topics covered include cellular and subcellular structure and function, metabolic processes, and genetics. Lecture and lab. Prerequisite: Grade of C- of better in BIOL 110. (Spring). Prerequisites: BIOL 110 (C- or higher)

CMSCI 120 Introduction to Computer Science I (3)
This is an entry-level course in computer science that covers problem-solving methods and the development of algorithms. Students are taught how to design, write, edit, test, debug and document simple computer programs. Principles of modularity and information hiding, good programming style and elementary data representation are covered. (Fall and Spring)

PSYCH 390 Research Preparation (3)
Involves the detailed formulation of an individually chosen research hypothesis for investigation in Senior Methods Seminar, including literature search, ethical analysis and feasibility assessment. Prerequisites: PSYCH 200 and junior status. (Spring)

PSYCH 498 Senior Methods Seminar (3)
Extends and synthesizes students' understanding of the empirical science of psychology. Covers advanced topics in philosophy of science, research design and statistical analysis (using SPSS). Students will demonstrate competence through completion of a data-based research project of their choosing. Prerequisites: PSYCH 390 and senior status. (Fall)

CHEM 101 General Chemistry I (4)
An introductory course aimed at familiarizing the student with many of the topics that form the basis of modern chemistry. Among these are atomic and molecular structure, stoichiometry, gases, and thermochemistry. Lecture and lab. (Fall)

CHEM 102 General Chemistry II (4)
A continuation of General Chemistry I. Topics covered include liquids and solids, solutions, kinetics, equilibrium, thermodynamics, electrochemistry, and the properties of metals and nonmetals. Lecture and lab. Prerequisite: grade of C- or better in CHEM 101. (Spring)

CHEM 150 Bioorganic Chemistry (4)
This course provides a foundation in structural organic chemistry and introductory biochemistry. Subjects include a survey of organic molecules (e.g. alkanes, alkenes, alkynes) Lewis structures, stereochemistry, inter- and intramolecular forces of attraction, functional groups, plus an introduction to the structure and reactivity of biological molecules, particularly those relevant to human health. The basics of biochemical principles and fundamental metabolic pathways will be presented. Lecture and lab. Prerequisite: CHEM 101 (C-grade or higher) (Spring)

OR

CHEM 201 Organic Chemistry (4)
An introduction to the chemistry of the compounds of carbon-containing molecules, with emphasis on functional groups. Study of the structure, reactivity and synthesis of organic molecules; the mechanism of specific reactions; introductory instrumental techniques; and introductory biochemistry. Laboratory technique to synthesize, isolate and characterize organic compounds. CHEM 201 also introduces biochemical molecules' structure and simple reactivity as well. Lecture and lab. Prerequisites: CHEM 101-102. (Fall)

DATA 200 Introduction to Data Science in a Big Data World (3)
This course presents an overview of the discipline of data science: its goals, methods, tools, and scope. The R statistical computing environment is used for data manipulation, statistical analysis, and visualization. Ethical issues surrounding data collection and use will be discussed. Prerequisite: None. (Fall)

Electives (9-12 credits)
Pick any three of the classes below

CMSCI 125 Introduction to Computer Science II (3)
A continuation of programming techniques from CMSCI 120, this course emphasizes the object-oriented paradigm. Students learn about class design, inheritance, input and output to files, and arrays. Prerequisite: CMSCI 120. (Fall and Spring)

DATA 220 Machine Learning Models (3)
The course is an overview of data science models and their application. These include statistical inference, regression, classification, machine learning, and neural networks. The course seeks to examine the assumptions, capabilities, limitations, and advantages of these models within the context of application areas. Prerequisite(s): DATA 210 Exploratory Data Analysis or permission of the instructor. (Fall)

NEURO 240 Sensation and Perception (4)
Studies the anatomy and physiology of sensory systems, including how energy from stimuli in the outside world is conveyed to the brain and how sensory information is interpreted to form perceptions. Prerequisite: PSYCH 200. Three lectures and one laboratory session per week. (Fall)

PSYCH 203 Abnormal Psychology (3)
Describes clinical disorders, personality disorders and developmental disorders that characterize abnormal behaviors. Prerequisite(s): PSYCH 100. (Fall)

PSYCH 220 Experimental Learning (4)
Provides an introduction to the experimental analysis of behavior, with an emphasis on classical and operant conditioning. Investigates recent basic and applied research in lecture and laboratory. Prerequisite: PSYCH 200. Three lecture and one laboratory session per week. (Fall)

PSYCH 230 Experimental Cognition (4)
Introduces the methods and theories of cognitive psychology, including perception, attention, memory, problem solving and language. Prerequisite: PSYCH 200. Three lecture and one laboratory periods per week. (Fall)

PSYCH 351: Developmental Neurodiversity (3)
Involves intensive readings and discussion about developmental disabilities that typically begin before birth or develop during childhood. The focus will include the neurobiological, genetic,

and environmental influences and emphasize a strengths-based approach to helping families. (Spring, odd years)

PSYCH 365 Drugs and Addiction (3)
Examines the major psychotropic drug categories from multiple psychological perspectives ranging from brain function to social psychology. Investigates basics of drug action as well as implications for society and policy. Student presentations on select topics are encouraged. Prerequisite: PSYCH 100. (Spring, even years)

PSYCH 399 Research (3-6)
Involves individual development of or participation in a psychological research project, usually involving data collection. Can be taken more than once. Prerequisites: PSYCH 200 and permission of instructor. (Fall and Spring)

PSYCH 480 Internship (3-6)
Provides opportunities to do psychological work in community agencies off campus. Can be taken more than once. Prerequisites: PSYCH 203 and/or PSYCH 200 (depending on placement) and department approval. (Fall and Spring)

BIOL 221 Genetics (4)
An introduction to the principles and mechanisms of heredity with an emphasis on classical Mendelian genetics. Other topics include molecular genetics and functional genomics. Elementary statistical methods will be employed with the laboratory component of the course focusing on experimental design using yeast as a model organism. Prerequisites: BIOL 110-111 (C-grade or higher). (Fall and Spring)

BIOL 250 Animal Behavior (4)
An exploration of the interactions of animals with their environment and with other animals, within the framework of evolution and natural selection. Topics such as foraging behavior, learning and memory, anti-predator behavior, reproductive behavior, social behavior, and communication will be studied in a wide range of animal taxa. Methodological approaches to observational and experimental studies of behavior both in the lab and in the field will be emphasized. Prerequisite(s): BIOL 221 (C-grade or higher) or instructor permission. (Spring, even years)

BIOL 298 Anatomy and Physiology I (4)
This course is the first of a two part sequence that examines the structure and function of human tissues, organs, and organ systems. Topics include the integument, skeletal system, muscular system, and nervous system. The accompanying laboratory will explore these topics in a dissection based approach, coupled with physiological lab experiments. This course fulfills the Organismal area requirement in the Biology major. Lecture and lab. Prerequisites: BIOL 110-111, CHEM 101 (CHEM 101 can be taken concurrently). (Fall and Spring)

BIOL 311 Pharmacology (4)
Introductory course in Pharmacology, a scientific discipline that focuses on how drugs affect biological systems. The pharmacological basis of therapeutics will be discussed in the context of the principles of drug action and the mechanism of action of representative agents, with emphasis on the molecular and cellular aspects. Major concepts to be explored include: pharmacokinetics, drug metabolism, dose response relationships, and resistance. Other topics will discuss the chemistry, mechanism of action and pharmacologic action of drugs affecting the autonomic and central nervous systems, the cardiovascular, renal, and endocrine systems, pathogenic microbes, and cancer. Integrated lecture and 124 lab. This course fulfills the Molecular and Cellular Biology area requirement in the Biology major. Prerequisites: BIOL 110-111, CHEM 201 or CHEM 150 (C- grade or higher). (Fall, even years)

BIOL 420 Molecular and Cellular Biology (4)
Examines the molecular and cellular processes that enable cells to have certain structural and functional roles within an organism. Both microbial and animal cells will be studied with respect to chemical composition, function of organelles, cell division, gene expression and cellular interactions. The lab emphasizes techniques such as tissue culture, cellular transformation, DNA isolation and characterization, protein synthesis and recombinant DNA technology. This course fulfills the Molecular and Cellular area requirement in the Biology major. Integrated lecture and lab. Prerequisites: BIWI 221 and CHEM 201. (Fall, odd years)

PHYS 101/102 College Physics (4)
A two-semester algebra-based introduction to classical physics with emphasis on concepts and problem solving. Topics include mechanics, Newton's laws, conservation laws, waves and oscillations, fluid mechanics, electricity and magnetism, circuits and optics. (Fall and Spring)

PHIL XXX Body or Soul (3)
This class will investigate whether humans have a soul. While "soul" can be understood in different ways, this class seeks to understand whether a non-physical entity exists that many believe survives bodily death, accounts for consciousness, is essentially identical with personality, and contains the individual's memories, preferences and uniqueness.

PHIL XXX Philosophy of Knowledge: Mind and Reality (3)
The human mind is complex and does many things, but from a cognitive point of view, its primary function is usually thought to be to give us an accurate apprehension of objective reality. Since ancient times, however, philosophers have raised doubts about objectivity and the mind's capacity to know it, and these doubts are supported by recent work in the philosophy of mind and cognitive science. In this course, we will examine considerations on both sides of this fundamental question.

PSCI 332 Politics of the Human Body (3)
Explores approaches to policy decision making regarding issues involving the human body, generally referred to as biomedical policy. Focuses on political decision making rather than the

technical aspects of biomedical technologies. Areas of policy in biomedical technology include stem-cell and embryo research, human cloning, organ transplantation, assisted reproduction and genetic technology. Designed to further knowledge of different approaches to policy making and to increase understanding of the unique problems that rapidly developing technologies pose for policy makers.

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

General education requirements are met by Mount St. Mary's University Core curriculum. The Core curriculum is the academic embodiment of our Catholic mission. Rooted in the liberal arts, the program is a common and sequential curriculum that prepares students for success in the modern world, while giving them a solid grounding in the Catholic intellectual tradition.

More than just a set of requirements, the Core is integrated with every academic major, and includes leadership development and cultural components, giving every MSMU student a true liberal arts education in all of its dimensions—communication skills, cultural content and character formation.

Core requirements total 46-49 credits and have been aligned to general education requirements in the table below. Additionally, a sample 4 year plan for Neuroscience majors has been included that integrates the Core requirements along with major requirements.

General Education Requirement	Applicable Courses	Credit Hours
Arts and Humanities	PHIL 103 Foundations of Philosophy	3
	PHIL 203 Philosophy in the Modern Age	3
	THEO 220 Belief in Today's World	3
	THEO 320 Encountering Christ	3
	THEO/PHIL 300 Ethics and the Human Good	3
	World Languages I, II	3-6
	WCIV 102 Origins of the West	3
	WCIV 201 The Western Imagination	3
	AMER 202 America in the World	3
	MO 300 Modernity in Art/Lit	3
	Global Encounters	3
English Composition	SFYM 101 First-Year Symposium	3
Social and Behavioral Sciences	Foundations of Social Science (ECON 101 or 102, EDUC 100, PSYCH 100, SOC 100)	3
Mathematics	MATH 211 Mathematical Thinking	3
Biological and Physical Sciences	Lab Sciences (fulfilled by multiple required courses, e.g., BIO 110,111; CHEM 101,102,201/150)	4
TOTAL		46-49 credits

Sample Four-Year Plan (Major Requirements in Bold)

First Year			
Fall Semester		*Spring Semester*	
SFYM 101 First-Year Symposium	3	WCIV 102 Origins of the West	3
PSYCH 100 Foundations of Psych	**3**	PHIL 103 Classical Philosophy	3
World Languages I	3	World Languages II	3
BIOL 110 Intro to Biology I w/ Lab	**4**	**BIOL 111 Intro to Biology II w/ Lab**	**4**
General elective	3	General elective	3

Second Year			
Fall Semester		*Spring Semester*	
WCIV 201 The Western Imagination	3	AMER 202 American Experience	3
PHIL 203 Philosophy in the Modern Age	3	THEO 220 Belief in Today's World	3
PSYCH 200 Research Methods and Statistics	**3**	**NEURO 209 Behavioral Neuroscience w/ Lab**	**4**
CHEM 101 General Chemistry with Lab	**4**	**CHEM 102 General Chemistry II w/ Lab**	**4**
MATH 211 Mathematical Thinking	3	General elective	3

Third Year			
Fall Semester		*Spring Semester*	
THEO 320 Encountering Christ	3	THEO/PHIL 300 Ethics and the Human Good	3
__MO 300 Modernity in Art/Lit	3	**PSYCH 390 Research Preparation/Capstone**	**3**
NEURO 370 Methods in Neuroscience	**3**	**CMSCI 120: Introduction to Computer Science**	**3**
CHEM 201 Organic Chemistry I w/ Lab OR CHEM 150 Bioorganic Chemistry	**4**	XXGE 3XX Global Encounters	3
DATA 200: Introduction to Data Science	**3**	**Major elective 1**	**3/4**

Fourth Year			
Fall Semester		*Spring Semester*	
PSYCH 498 Senior Methods Seminar/Capstone	**3**	General elective	3
NEURO 400: Seminar in the Neurosciences	**3**	General elective	3
Major elective 2	**3/4**	General elective	3
Major elective 3	**3/4**	General elective	3
General elective	3	General elective	3

Total minimum required credits in the program (Core + Major): 103-109 credits
Total credits required to graduate: 120 credits

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

There are no specialized accreditation or graduate certificate requirements for this program.

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

Not applicable.

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

The proposed Neuroscience major will utilize many of the existing support mechanisms in place to ensure students are fully engaged and aware of their path to success. This includes a centrally accessible four-year plan sequence for majors that can be viewed by all students and faculty, as well as recommended hardware requirements, supporting departmental program question and answer sessions, and providing training on learning management systems, financial aid resources, and costs and payment policies at freshman/transfer student orientation. Students are assigned to an advisor in the first semester of freshman year. That advisor is also their freshman symposium instructor where reinforcement of keys to success, learning management systems, and other information is discussed. Students meet with their advisor at least twice each year prior to course registration for the coming semester. Advisors work with students at those advising sessions to map out and continually revise a plan to complete desired major with a four year timeline goal.

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

Similar to the Psychology, Biology, and Math majors the Mount St. Mary's University, the undergraduate course catalogue (online and hard copies), and brochures and handouts will be available and/or distributed to prospective students. These will include the educational objectives, student learning outcomes and Neuroscience Major requirements as outlined in this report.

H. Adequacy of Articulation

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

Not applicable.

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

1. Provide a brief narrative demonstrating the quality of program faculty. Include a summary list of faculty with appointment type, terminal degree title and field, academic title/rank, status (full-time, part-time, adjunct) and the course(s) each faulty member will teach (in this program).

The program faculty are housed within the School of Natural Science and Mathematics. The program faculty are well published in their respective fields and contribute as journal editors and reviewers. The majority of faculty sponsor undergraduate student research and travel to national and international conferences. Some program faculty have received grant funding from various sources.

Biology Courses

- Dr. Rosina Bolen, Ph.D. in Biology; Assistant Professor of Biology; Full-time; Courses: Introductory Biology
- Dr. Kathryn Dye, Ph.D. in Molecular and Cellular Microbiology and Immunology; Associate Professor of Biology; Full-time; Courses: Introductory Biology, Genetics
- Dr. Christine McCauslin, Ph.D. in Genetics; Professor of Biochemistry; Full-time; Courses: Introductory Biology, Genetics
- Dr. Susan Mertins, PhD in Immunology; Assistant Professor of Biology; Full-time; Courses: Introductory Biology, Pharmacology; Bioorganic Chemistry
- Dr. Michael Turner, Ph.D. in Molecular, Cellular and Developmental Biology; Assistant Professor of Biochemistry; Full-time; Courses: Genetics
- Dr. Dana Ward, Ph.D. in Tumor Biology; Professor of Biology; Full-time; Courses: Introductory Biology, Genetics, Anatomy and Physiology I and II
- Annette Weintraub, D.M.D; Lecture in the Department of Science; Full-time; Courses: Anatomy and Physiology I and II

Chemistry Courses

- Dr. Patricia Kreke, Ph.D. in Chemistry; Professor of Chemistry; Full-time; Courses: Organic Chemistry I and II
- Dr. Patrick Lombardi, Ph.D. in Chemistry; Assistant Professor of Chemistry; Full-time; Courses: General Chemistry I and II
- Dr. Isaac Mills, Ph.D. in Chemistry; Assistant Professor of Chemistry; Full-time; Courses: General Chemistry I and II
- Dr. Garth Patterson, Ph.D. in Chemistry; Assistant Professor of Analytic Chemistry; Full-time; Courses: General Chemistry I and II

Computer Science and Mathematics Courses

- Dr. Brian Heinold, Ph.D. in Mathematics; Associate Professor of Mathematics and Computer Science; Full-time; Courses: Introduction to Computer Science I and II,
- Dr. Frederick J. Portier, Ph.D. in Mathematics; Professor of Mathematics and Computer Science; Full-time; Courses: Database Management Systems, Introduction to Computer Science I and II
- Rebecca Portier, M.S in Computational Mathematics; Assistant Professor of Mathematics and Computer Science; Full-time; Courses: Introduction to Data Science I
- Scott Weiss, M.S. in Computer Science; Assistant Professor of Computer Science; Full-time; Courses: Introduction to Computer Science I and II

Psychology Courses

- Dr. Caitlin Faas, Ph.D. in Human Development; Associate Professor of Psychology; Full-time; Courses: Foundations of Psychology, Research Preparation, Experimental Cognition, Developmental Neurodiversity
- Dr. Angy Kallarackal, Ph.D. in Neuroscience; Assistant Professor of Psychology; Full-time; Courses: Foundations of Psychology, Behavioral Neuroscience, Methods in Neuroscience, Sensation and Perception, Advanced Seminar in Neuroscience
- Dr. Robert Keefer, Ph.D. in Social Psychology; Associate Professor of Psychology; Full-time; Courses: Foundations of Psychology, Sensation and Perception, Senior Seminar
- Dr. Mindy Korol, Ph.D. in Clinical Psychology; Professor of Psychology; Full-time: Courses: Foundations of Psychology, Abnormal Psychology
- Dr. Jonathan Slezak, Ph.D. in Behavior Analysis; Associate Professor of Psychology; Full-time; Courses: Foundations of Psychology, Research Methods and Statistics, Experimental Learning, Drugs and Behavior

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

a) Pedagogy that meets the needs of the students

b) The learning management system

Course design and delivery in student-centered methods is encouraged by the University's Center for Instructional Design and Delivery (CIDD). Training on methods to enhance student-student and faculty-student interaction are provided.

CIDD offers faculty development throughout the year such as Canvas in the Classroom, Canvas Advanced Topics, Canvas Course Basics, Canvas Gradebook, Nearpod, and Screencasting. CIDD encourages student-centered instructional methods throughout these development opportunities.

The Canvas course management system enables faculty to actively contribute to the learning environment alongside their students. The CIDD encourages curriculum design that leverages Canvas tools to promote active engagement between faculty and students.

Examples from Canvas courses available upon request. Explanation of features available in Canvas linked to the CIDD website. Mount St. Mary's University has purchased premium level Canvas support providing 24/7 assistance to students and faculty. The CIDD has offered training sessions through the Center for Student Engagement and Success (CSES), transfer student orientation, Summer Orientation modules, and information sessions at University functions. A screencast has been developed to orient students to Canvas.

Additionally, library support is available and Learning Services complies with all documented support services regardless of course delivery format.

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

Not applicable. This is not a distance education program.

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

1. Describe the library resources available and/or the measures to be taken to ensure resources are adequate to support the proposed program. If the program is to be implemented within existing institutional resources, include a supportive statement by the President for library resources to meet the program's needs.

MSMU's Phillip's Library has adequate resources to support the B.S. in Neuroscience. However, additional subscriptions to Nature Neuroscience ($225/year) and Neuron ($322/year) would give access to journals that are considered premier in the field. The Phillip's library maintains a collection of 218,000 volumes with over 25,000 print and electronic journals.

MSMU is a founding member of the Maryland Interlibrary Consortium of academic libraries with over one million titles that are easily accessible to faculty and students of each member institution. The Consortium developed a policy to avoid duplicate orders and each partner school is responsible for specific title development. Paper materials are delivered to our users within 24 hours, as the Consortium members use a common library system, *WorldCat*, and a daily courier service. ILLiad is our Interlibrary Loan (ILL) management system.

Additionally, MSMU is a member of the Maryland Digital Library and Maryland Interlibrary Consortium which further expands resources to include a vast library of full text electronic journals and books. The library's Consortium partners recently purchased the EBSCOHost Discovery Service to provide simultaneous *Google*-like searching for all databases.

Through EBSCOHost MSMU subscribes to the *PsychINFO* database, "the American Psychological Association's (APA) renowned resource for abstracts of scholarly journal articles, book chapters, books, and dissertations, the largest resource devoted to peer-reviewed literature in behavioral science and mental health. It contains over 3 million records and summaries dating as far back as the 1600s with one of the highest DOI matching rates in the publishing industry.

Journal coverage, which spans from the 1800s to the present, includes international material selected from around 2,500 periodicals in dozens of languages." (EBSCOHost description). In addition, EBSCOHost inlcudes *PsycARTICLES,* also from the APA, which "is a definitive source of full-text, peer-reviewed scholarly and scientific articles in psychology. It contains more than 163,000 articles from more than 80 journals published by the American Psychological Association (APA), its imprint the Educational Publishing Foundation (EPF), and from allied organizations including the Canadian Psychological Association and the Hogrefe Publishing Group. It includes all journal articles, book reviews, letters to the editor, and errata from each journal. Coverage spans 1894 to present; nearly all APA journals go back to Volume 1, Issue 1" (EBSCOHost description).

Mount St. Mary's University also subscribes to the following library resources:

- Highwire, which provides access to over 4,500 PubMed journals
- JSTOR, which provides access to 3,400 bioscience journals
- AccessScience from McGraw-Hill (over 8,500 online encyclopedic bioscience entries)
- Science Direct from Elsevier, which includes access to the full text of over 200 journal titles in the areas of science, technology, business, and medicine. Additionally, abstract and bibliographic information is available for the entire database of 2500 journal titles, eBooks, reference works, handbooks, and book series.

K. Adequacy of Physical Facilities, Infrastructure and Instructional Equipment *(as outlined in COMAR13B.02.03.13)*

1. Provide an assurance that physical facilities, infrastructure and instruction equipment are adequate to initiate the program, particularly as related to spaces for classrooms, staff and faculty offices, and laboratories for studies in the technologies and sciences. If the program is to be implemented within existing institutional resources, include a supportive statement by the President for adequate equipment and facilities to meet the program's needs.

The B.S. degree in Neuroscience will be implemented within existing institutional resources. As the degree primarily consists of existing courses, it will not significantly impact the use of existing facilities and equipment in the immediate future. Ongoing improvement of our research infrastructure will support all undergraduate programs. No immediate addition of facilities or facility modifications will be required for the proposed program.

2. Provide assurance and any appropriate evidence that the institution will ensure students enrolled in and faculty teaching in distance education will have adequate access to:

a) An institutional electronic mailing system, and
b) A learning management system that provides the necessary technological support for distance education

Not applicable as this program is not considered distance education.

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

1. Complete ***Table 1: Resources and Narrative Rationale****. Provide finance data for the first five years of program implementation. Enter figures into each cell and provide a total for each year. Also provide a narrative rationale for each resource category. If resources have been or will be reallocated to support the proposed program, briefly discuss the sources of those funds.*

The proposed Neuroscience major would be offered for students beginning in the fall of 2020 with no new faculty hired. In order to derive resource and expenditure information, it is important to evaluate the timing of new course offerings. A companion table has been created to reflect courses needed in a 1 year through 5 year timeline.

Course Rollout Timing					
New Courses	**Year 1 (2020-2021)**	**Year 2 (2021-2022)**	**Year 3 (2022-2023)**	**Year 4 (2023-2024)**	**Year 5 (2024-2025)**
Introduction to Neuroscience	x				
Advanced Seminar in Neuroscience		x			
Neuroscience elective				x	

TABLE 1: RESOURCES						
Resources Categories	**Year 0 (2019-20)**	**Year 1 (2020-21)**	**Year 2 (2021-22)**	**Year 3 (2022-23)**	**Year 4 (2023-24)**	**Year 5 (2024-25)**
1. Reallocated Funds	$0	$0	$0	$0	$0	$0
2. Tuition/Fee Revenue (c+g below)	$0	$205,850	$209,965	$428,330	$436,900	$668,460
a. # F.T. Students	0	5	5	10	10	15
b. Annual Tuition/ Fee Rate (discounted rate)	$41,170	$41,170	$41,993	$42,833	$43,690	$44,564
c. Annual Full Time Revenue (a x b)	$0	$205,850	$209,965	$428,330	$436,900	$668,460
d. # Part Time Students	0	0	0	0	0	0
e. Credit Hour Rate	$1340	$1340	$1367	$1394	$1422	$1450
f. Annual Credit Hours	15	15	15	15	15	15
g. Total Part Time Revenue (d x e x f)	0	0	0	0	0	0
3. Grants, Contracts, & Other External Sources	0	0	0	0	0	0
4. Other Sources	0	0	0	0	0	0
TOTAL (Add 1-4)	**$0**	**$205,850**	**$209,965**	**$428,330**	**$436,900**	**$668,460**

Credit Hour Rate: The rate for 2019-20 for undergraduates is $1340 per credit. We project an increment of 2% per year which is a typical amount of increase at MSMU.

Based on increases observed within the Psychology major, student enrollment increases are expected within Neuroscience.

*2. Complete **Table 2: Program Expenditures and Narrative Rationale**. Provide finance data for the first five years of program implementation. Enter figures into each cell and provide a total for each year. Also provide a narrative rationale for each expenditure category.*

	TABLE 2: EXPENDITURES					
Expenditure Categories	Year 0 (2019-20)	Year 1 (2020-21)	Year 2 (2021-22)	Year 3 (2022-23)	Year 4 (2023-24)	Year 5 (2024-25)
1. Faculty (b+c below)	0	$3,600	$3,600	$3,600	$3,600	$100,000
a. # FTE	0	0	0	0	0	1
b. Total Salary	0	0	0	0	0	$70,000
c. Total Benefits	0	0	0	0	0	$30,000
d. PT Adjunct Salary		$3,600	$3,600	$3,600	$3,600	0
2. Admin. Staff	0	0	0	0	0	0
a. # FTE	0	0	0	0	0	0
b. Total Salary	0	0	0	0	0	0
c. Total Benefits	0	0	0	0	0	0
3. Support Staff	0	0	0	0	0	0
a. # FTE	0	0	0	0	0	0
b. Total Salary	0	0	0	0	0	0
c. Total Benefits	0	0	0	0	0	0
4. Equipment	0	0	0	0	0	0
5. Library	0	547	547	547	547	547
6. New or Renovated Space	0	0	0	0	0	0
7. Other Expenses (software and materials)	0	0	0	0	0	0
8. TOTAL (Add 1 – 7)	0	$4,147	$4,147	$4,147	$4,147	$100,547

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

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

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

The program will be part of the Middle States Accreditation of the University. Course evaluations will be completed for each course as designated by the College/School in which the course resides and the university. Full-time faculty are reviewed at least every five years. Part-time faculty are reviewed on a course/semester basis. Each program is reviewed every seven years, using an optional outside consultant. The following table details the department assessment for the program, with each Learning Outcome being assessed at least once in a seven-year period.

Details regarding the evaluation of student learning outcomes are provided in a chart in Section G.

N. Consistency with the State's Minority Student Achievement Goals (as outlined in COMAR13B.02.03.05).

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

Nondiscrimination Statement

It is the policy of Mount St. Mary's University not to discriminate on the basis of race, color, national or ethnic origin, political or religious opinion or affiliation, age, sex or handicapping condition in the recruitment or admissions of students, or in the administration of the university's educational policies, admissions policies, scholarship and athletic programs, and other university-administered activities and programs.

Center for Student Diversity

The Center for Student Diversity was established to aid Mount St. Mary's University in its efforts of fostering inclusion, collaboration, and relationship building across campus. The Center provides academic, social, and transitional support in addition to programming, leadership training and inclusive workshops for ALL students and promotes exchange and dialogue between individuals of diverse backgrounds.

The Center for Student Diversity oversees the intercultural development, the Horning Fellowship, student support programs (including Third Century Scholars program and the American Indian program), and cultural programs. The office also supports cultural organizations, conducts diversity awareness programs, assesses the needs and climate of diverse groups and advocates on behalf of underrepresented students.

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

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

No low productivity programs have been identified by the Commission at Mount St. Mary's University. Therefore, this section is not applicable.

P. Adequacy of Distance Education Programs *(as outlined in COMAR 13B.02.03.22)*

1. Provide affirmation and any appropriate evidence that the institution is eligible to provide Distance Education.

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

Not applicable as this is not a distance education program.

References:

1. Russell SH, Hancock MP, McCullough J. Benefits of undergraduate research experiences. *Science (80)*. 2007;316(5824):548-549.
2. Carter FD, Mandell M, Maton KI. The Influence of On-Campus, Academic Year Undergraduate Research on STEM Ph.D. Outcomes: Evidence From the Meyerhoff Scholarship Program. *Educ Eval Policy Anal*. 2009;31(4):441-462.
3. Strayhorn TL. Undergraduate Research Participation and STEM Graduate Degree Aspirations Among Students of Color. *New Dir Institutional Res*. 2010;(148):85-94.
4. Boyette-Davis J. A Report on the Qualities , Skills , and Characteristics Desired by Top Neuroscience Graduate Programs. *J Undergrad Neurosci Educ*. 2018;17(1):54-58.
5. Pinard-Welyczko KM, Garrison ACS, Ramos RL, Carter BS. Characterizing the Undergraduate Neuroscience Major in the U . S .: An Examination of Course Requirements and Institution-Program Associations. *J Undergrad Neurosci Educ*. 2017;16(1):60-67.