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

Institution Submitting Proposal	Goucher College
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Each action below requires a separate proposal and cover sheet.

- | | |
|---|---|
| <input checked="" type="radio"/> New Academic Program | <input type="radio"/> Substantial Change to a Degree Program |
| <input type="radio"/> New Area of Concentration | <input type="radio"/> Substantial Change to an Area of Concentration |
| <input type="radio"/> New Degree Level Approval | <input type="radio"/> Substantial Change to a Certificate Program |
| <input type="radio"/> New Stand-Alone Certificate | <input type="radio"/> Cooperative Degree Program |
| <input type="radio"/> Off Campus Program | <input type="radio"/> Offer Program at Regional Higher Education Center |

Payment <input checked="" type="radio"/> Yes	Payment <input type="radio"/> R*STARS # 600448	Payment	Date
Submitted: <input type="radio"/> No	Type: <input checked="" type="radio"/> Check # 600448	Amount: \$850	Submitted: 5/15/2024

Department Proposing Program	Biological Sciences and Psychology		
Degree Level and Degree Type	Bachelor of Arts		
Title of Proposed Program	Neuroscience		
Total Number of Credits	120		
Suggested Codes	HEGIS:	CIP: 26.1501	
Program Modality	<input checked="" type="radio"/> On-campus	<input type="radio"/> Distance Education (<i>fully online</i>)	
Program Resources	<input checked="" type="radio"/> Using Existing Resources	<input type="radio"/> Requiring New Resources	
Projected Implementation Date	<input checked="" type="radio"/> Fall	<input type="radio"/> Spring	<input type="radio"/> Summer Year: 2024
Provide Link to Most Recent Academic Catalog	URL: https://catalog.goucher.edu/		

Preferred Contact for this Proposal	Name:	Elaine Meyer-Lee
	Title:	Provost and Senior Vice President for Academic Affairs
	Phone:	(410) 337-6044
	Email:	Elaine.Meyer-Lee@goucher.edu

President/Chief Executive	Type Name:	Kent Devereaux
	Signature:	Date: 5/14/24
	Date of Approval/Endorsement by Governing Board:	

Revised 1/2021



May 15, 2024

Dr. Sanjay Rai, Ph.D.
Maryland Higher Education Commission
6 N. Liberty Street, 10th Floor
Baltimore, MD 21201

Dear Secretary Rai:

Goucher College is submitting a proposal seeking approval for the development of a new *Bachelor of Arts in Neuroscience* program, a request that has been endorsed by Goucher faculty. The proposed program builds on the strengths of our Biological Sciences and Psychology programs, and it closely aligns with our commitment to provide an innovative liberal arts that “prepares students with a broad, humane perspective for a life of inquiry, creativity, and critical and analytical thinking.”

A check for the review of this proposal is being sent via snail mail to the Commission, but please contact me at Elaine.Meyer-Lee@goucher.edu or at 410-337-6044 if you need additional information.

Sincerely,

A handwritten signature in black ink that reads "Elaine Meyer-Lee".

Dr. Elaine Meyer-Lee
Provost and Senior Vice President for Academic Affairs
Goucher College

Goucher College Proposal for a New Academic Program

Bachelor of Arts in Neuroscience

A. Centrality to Institutional Mission and Planning Priorities:

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

The Neuroscience program detailed in this proposal aims to provide an interdisciplinary path for students who wish to learn about the nervous system and its role in human cognition, behavior, and physiological processes. Students will obtain a strong foundation in biology and psychology, integrated with courses in research methods and hands-on research opportunities throughout the program. Through research experiences, internships, and engagement with real-world issues, students will apply their classroom learning to practical situations. This program is aligned with Goucher's liberal arts education, emphasizing experiential education and fostering an environment of individual and cultural diversity, social responsibility, and ethical development. For these reasons, the Goucher faculty approved a Neuroscience major, which will be jointly offered by the Departments of Psychology and Biological Sciences. This new major is designed not only to leverage the strengths of these two majors but also to integrate other programs (e.g., Chemistry, Computer Science, Philosophy) to provide students with a robust liberal arts education.

The curriculum for the proposed major consists of a set of core courses offered by the Departments of Psychology, Biological Sciences, and Chemistry. The core curriculum includes introductory courses in these three fields (20 credits), statistics and research methods (8 credits), intermediate neuroscience content courses (8 credits), a capstone research experience (4 credits), and 8 credits of electives (including at least one advanced seminar) selected from multi-disciplinary list of courses. This trajectory from a core set of disciplinary courses to integrative seminars and a research capstone provides a robust experience that shares the strengths of neuroscience majors offered at Goucher's peer institutions.

Besides developing synergies between existing programs in Psychology and Biological Sciences, the proposed program highlights Goucher's innovative pedagogies (such as Complex Problem Exploration courses and experiential learning through involvement in research). The active learning strategies and pedagogies involved in these experiences have been shown to decrease the achievement gap between students historically excluded from STEM fields and those who are historically overrepresented.¹ Furthermore, these pedagogies foster collaboration skills and

¹ Theobald, E. J., Hill, M. J., Tran, E., Agrawal, S., Arroyo, E. N., Behling, S., ... & Freeman, S. (2020). Active learning narrows achievement gaps for underrepresented students in undergraduate science, technology, engineering, and math. *Proceedings of the National Academy of Sciences*, 117(12), 6476-6483.

an appreciation for diverse perspectives that are critical to making advances in neuroscience.² The proposed program also lays groundwork for featuring unique existing interdisciplinary themes (such as public health, neuroethics, addiction) that intersect with Goucher’s commitment to social justice.³ By definition, neuroscience is an interdisciplinary field that investigates questions about human diversity, behavior, and mental and physical health, which shed light on many social justice issues. To summarize, the proposed Neuroscience major is well-aligned with the college’s mission of providing “an innovative liberal arts education that prepares students with a broad, humane perspective for a life of inquiry, creativity, and critical and analytical thinking.”⁴

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

The proposed Neuroscience program supports three core goals of Goucher’s Strategic Plan 2021-2025:⁵

- **Enhance student success:**

The major emphasizes hands-on, applied learning, and a curriculum that draws from several fields of study. Students can choose elective courses to match their interests and abilities given the wide variety of pre-approved electives. Moreover, Goucher is committed to delivering programs that prepare students with interdisciplinary knowledge and collaborative skills that lead to success in a globalized and fast-changing world. Support services include (but are not limited to): the Academic Center for Excellence; Center for Race, Equity, & Identity; Student Health Center; Student Counseling Center; Office of Residential Life; and Career Education Office. Starting in 2021, the College initiated a cohort-based, integrated, four-year program called LAUNCH Network, which is designed to collaborate with pre-existing offices and programs to offer integrated support for underrepresented students.

- **Develop innovative, future-oriented educational programs that respond to the needs of today’s students:**

Neuroscience is a fast-growing field, attracting many students due to its interdisciplinary nature, inherent innovation, and clear application to human experience. At colleges with multiple life science majors, neuroscience ranks high in student interest.⁶ More incoming college students will have had some exposure to neuroscience in their secondary and primary classes, as across the United States implementation of Next Generation Science Standards has led to an increase in classes aimed at enhancing

² Ramirez, J.J. (2020). Undergraduate neuroscience education: Meeting the challenges of the 21st century. *Neuroscience Letters*, 739(1), 135418.

³ Webb, E.K., Cardenas-Iniguez, C., & Douglas, R. (2022). Radically reframing studies on neurobiology and socioeconomic circumstances: A call for social justice-oriented neuroscience. *Frontiers of Integrated Neuroscience*, 16, 1-14.

⁴ “Goucher College Mission,” accessed May 7, 2024, <https://www.goucher.edu/explore/who-we-are/mission>.

⁵ “Goucher College Strategic Plan 2021-2025,” accessed May 3, 2024, <https://strategicplan.goucher.edu/>.

⁶ Rochon, C., Otazu, G., Kurtzer, I. L., Stout Jr, R. F., & Ramos, R. L. (2019). Quantitative indicators of continued growth in undergraduate neuroscience education in the US. *Journal of Undergraduate Neuroscience Education*, 18(1), A51.

student appreciation and understanding of science, sometimes through the incorporation of neuroscience related topics.⁷ At Goucher, interest in neuroscience programs from prospective and current students has increased in recent years. In fall of 2023 there were 86 applicants, 67 admitted students, and 8 enrolled students who expressed interest in neuroscience as either a primary or secondary major,⁸ further emphasizing the need for this program.

A degree in neuroscience positions students for professional success as well as academic success. The Neuroscience major at Goucher College will address all of the NACE Career Readiness Competencies: career & self-development, communication, critical thinking, equity & inclusion, leadership, professionalism, teamwork, and technology.⁹ Students completing this major will be well-prepared for a wide range of post-graduate options, including research in academia, government, or industry, science journalism, science education, healthcare or public health, and graduate programs in neuroscience or medicine.

- **Enhance our reputation for delivering outstanding interdisciplinary education and experiential learning:**

Neuroscience is at its core an interdisciplinary field, drawing heavily on theory and methods from disciplines in the natural sciences and social sciences. The major curriculum reflects this interdisciplinarity by requiring courses that span four programs (Psychology, Biological Sciences, Chemistry, and Data Science). Elective options include courses from Philosophy and Computer Science. In addition to interdisciplinarity within the major, students will take two of Goucher's innovative Complex Problem Exploration (CPE) courses as part of the Goucher Commons Curriculum graduation requirements. These are interdisciplinary courses centered around contemporary issues and designed to "produce graduates capable of solving complex problems as part of diverse teams" collaborating on high-impact, creative projects or research projects.¹⁰

Experiential learning is extensively built into the Neuroscience major in the form of laboratory courses, research experiences, and the option to pursue internships that apply content and methods to global issues. In addition to these experiences, the major will emphasize applied skills throughout the curriculum, including: designing and conducting experiments, data analysis and visualization, and written and oral scientific communication about the real-world implications of research.

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

The Neuroscience program will be jointly housed in the Departments of Psychology (within the Center for Social Sciences) and Biological Sciences (within the Center for Natural, Computer,

⁷ Gage, G. J. (2019). The case for neuroscience research in the classroom. *Neuron*, 102(5), 914-917.

⁸ Personal correspondence with Christopher Wild, Director of Enrollment Systems & Operations, Goucher College

⁹ "What Is Career Readiness?," accessed May 7, 2024, <https://www.naceweb.org/career-readiness/competencies/career-readiness-defined/>.

¹⁰ "Program: Complex Problem Exploration Courses - Goucher College - Acalog ACMS™," accessed April 8, 2023, https://catalog.goucher.edu/preview_program.php?catoid=11&poid=1528.

and Data Sciences). Faculty and facilities for the Neuroscience major will be provided by these two departments, so there will be no significant additional costs to the college. Nonetheless, a new faculty member will be hired to develop and teach a few new courses for the major, as well as mentor students in neuroscience research. Funds for this purpose, as well as those for marketing and promotion, have been allocated from Goucher's Strategic Plan.

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

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

The proposed program will be housed jointly between the Center for Social Sciences and the Center for Natural, Data, and Computer Sciences, where administrative and technical support currently exists for the Departments of Psychology and Biological Sciences. These departments will be responsible for planning, organizing, implementing, and overseeing the Neuroscience program.

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

Goucher's Strategic Plan calls for the development of "innovative, future-oriented educational programs that respond to the needs of today's students;"¹¹ the Neuroscience program perfectly fits this description. As a result, the Neuroscience major evolved from the Strategic Plan, and the college has allocated funds for it. In addition, the College has a strong commitment to continuing academic programs to enable majors to finish their requirements, and it has allocated funds to hire a new faculty member who will teach specialized Neuroscience courses.

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

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

a) The need for the advancement and evolution of knowledge

The demand for neuroscience education is increasing globally due to its potential to improve mental health care, medicine, technology, education, and criminal justice, among other important applications. Training undergraduate students in content knowledge and research methods in neuroscience develops the next generation of scientists who will join these efforts. Students graduating with a degree in Neuroscience from Goucher College will have the additional background of having taken classes in Environmental Sustainability and Race, Power, and Perspective for the Goucher Commons Curriculum requirements.¹² These experiences enable students to contribute unique skills and social justice-oriented perspectives to their post-graduate work in neuroscience.

¹¹ "Goucher College Strategic Plan 2021-2025," accessed May 7, 2024, <https://strategicplan.goucher.edu/>.

¹² "The Goucher Commons Curriculum," accessed May 7, 2024, <https://www.goucher.edu/learn/curriculum/>.

Maryland is home to numerous academic institutions and federal agencies with ongoing neuroscience research, as well as relevant pharmaceutical and technological industries. At the same time, Maryland is experiencing a dire shortage of health professionals,¹³ including those working in mental health care services (e.g., behavioral therapy and addiction care¹⁴) and medicine¹⁵ (e.g., psychiatry, neurology). Undergraduates completing a neuroscience program would have a range of career options to choose from that would help meet this need.

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

Neuroscience has historically been male-dominated, and Black, Hispanic, and Indigenous populations are still underrepresented in the field. Recent data from the National Center for Education Statistics suggest that while the ratio of male to female undergraduate neuroscience majors is now largely proportional to the ratio of all male to all female undergraduates,¹⁶ racial disparities are still significant. Although the total number of undergraduates majoring in neuroscience has increased significantly in the last few years, a disproportionately low percentage of these students are racial-minority-identifying.¹⁷

The proposed Neuroscience major at Goucher has the potential to expand educational opportunities for minority and educational disadvantaged students in important ways. First, Goucher enrolls a greater proportion of students who identify as Black compared to the average across U.S. colleges.¹⁸ Second, the active learning strategies and pedagogies that will be implemented in the proposed Neuroscience major have been shown to decrease the achievement gap between historically underrepresented students and those who are historically overrepresented.¹⁹ Taken together, this suggests that the proposed major has the potential to welcome underrepresented students into the field of neuroscience, increasing diversity in the field and, consequently, enhancing the creativity and impact of neuroscience research.²⁰ Finally, the application of neuroscience research to education (i.e., educational neuroscience, an interdisciplinary subfield that investigates how the developing brain acquires academic skills,

¹³ Bureau of Health Workforce, Human Resources and Services Administration, U.S. Department of Health & Human Services. (2024). *Designated Health Professional Shortage Areas Statistics*. <https://data.hrsa.gov/topics/health-workforce/shortage-areas>.

¹⁴ “2023 Behavioral Health Crisis Prevention Platform,” accessed May 9, 2024, <https://www.equaltreatmentmd.org/platform>.

¹⁵ Cicero Institute. (2024). *Maryland Physician Shortage Facts*. <https://ciceroinstitute.org/research/maryland-physician-shortage-facts/>.

¹⁶ Ramos, R.L., Alviña, K., & Martinez, L.R. (2017). Diversity of Graduates from Bachelor’s, Master’s, and Doctoral Degree Neuroscience Programs in the United States. *Journal of Undergraduate Neuroscience Education*, 16(1), A6-A13.

¹⁷ Harrington, M.A. (2023). Diversity in Neuroscience Education: A Perspective from an Historically-Black Institution. *Journal of Neuroscience Research*, 100(8), 1538-1544.

¹⁸ “Goucher College,” accessed 8 May, 2024, <https://www.usnews.com/best-colleges/goucher-college-2073>.

¹⁹ Theobald, E. J., Hill, M. J., Tran, E., Agrawal, S., Arroyo, E. N., Behling, S., ... & Freeman, S. (2020). Active learning narrows achievement gaps for underrepresented students in undergraduate science, technology, engineering, and math. *Proceedings of the National Academy of Sciences*, 117(12), 6476-6483.

²⁰ Phillips, K.W. (2014, October 1). “How Diversity Makes Us Smarter.” *Scientific American*, 311(4), 42.

and how to improve teaching in meaningful and equitable ways) has the potential to decrease disparities in student academic outcomes for future generations.

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

Not applicable

2. Provide evidence that the perceived need is consistent with the [Maryland State Plan for Postsecondary Education](#).

Regarding the College's commitment to Access, Success, and Innovation – as articulated in the State Plan – all three are present in Goucher's Strategic Plan. Access is part of Goucher's history: "Goucher has expanded upon its tradition as a women's college and aspires to provide access to a high-quality education to those communities historically denied that opportunity."²¹ Success, as detailed above, is fostered by way of support mechanisms ranging from the innovative LAUNCH Network, student health facilities, and athletics, to community-based learning opportunities, academic support through peer tutoring, and professional support. Innovation is key to Goucher's history and its future. Innovative interdisciplinary majors account for one of the reasons *U.S. News & World Report* names Goucher one of the "Most Innovative Colleges."

In particular, Goucher's Neuroscience program will address several of the strategies for education articulated in the Maryland State Plan as explained below.

Priority 5: Maintain the commitment to high-quality postsecondary education in Maryland. Ensuring high-quality postsecondary education in Maryland is a key commitment of Goucher College. Our mission to prepare students for "a life of inquiry, creativity, and critical and analytical thinking" is upheld through the use of universal design principles, which allow all students to achieve the same learning objectives through a flexible pedagogical design that accommodates individual preferences and abilities. Our faculty members, who are scholars and skilled teachers, participate in regular workshops at the Center for the Advancement of Scholarship & Teaching (CAST) to enhance their teaching and scholarly work. This ultimately aims to improve academic success, particularly those from historically underrepresented backgrounds, through the incorporation of evidence-based approaches. CAST instructional designers also work closely with faculty to ensure universal design principles are implemented in syllabi, assignments, and modules at all levels. Faculty regularly evaluate the quality of their courses through formative and summative assessment tools.

Priority 6: Improve systems that prevent timely completion of an academic program. Goucher College is committed to improving systems that may hinder timely completion of an academic program. Each student is assigned an individualized student Success Team who supports them and guides their self-discovery. The team includes a Success Advisor, who works with each student before their arrival on campus and who coach them academically, while also helping them identify their passions, goals, and interests. Once a student declares the major, a Faculty

²¹ "Goucher College Strategic Plan 2021-2025," accessed May 7, 2024, <https://strategicplan.goucher.edu/>.

Advisor joins the team to provide discipline-specific guidance. Other Success Team members connect students to campus resources if faced with academic, financial, or personal challenges.

Priority 7: Enhance the ways postsecondary education is a platform for ongoing lifelong learning. Goucher College's focus on "a life of inquiry, creativity, and critical and analytical thinking" extends to the promotion of lifelong learning through our curriculum and class design. Our classes are intended to allow students to apply and reflect on the skills and knowledge gained, fostering the development of metacognitive skills and encouraging the pursuit of additional educational and professional goals.

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.

Given the broad span of interdisciplinary knowledge acquired through completing an undergraduate degree in neuroscience, and the wide range of applications of neuroscience, graduates of the proposed Neuroscience program will have a variety of employment opportunities. These include but are not limited to: academic institutions (as a research assistant or lab technician), pharmaceutical industry (as a lab technician, analyst, or sales representative), federal agencies like the Food and Drug Administration (as a scientist or policy analyst²²), health care (as a research assistant, clinical coordinator, lab technician, or medical scribe), science communication (in a museum, science center, nonprofit, or media), and technology (as a user experience/UX designer or researcher).^{23 24 25}

An undergraduate degree in neuroscience also paves the way for students to enter a wide variety of graduate programs (MA/MS, PsyD, DO, PhD in Neuroscience or a related field, or MD). Students who choose to pursue graduate degrees will have even more opportunities in health care and allied health professions (as a physician, psychologist, speech-language pathologist, occupational therapist, physical therapist), scientific research (in academic medicine or the pharmaceutical industry), and education (teaching at the high school or college level)

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

The U.S. Bureau of Labor Statistics predicts an increased demand for occupations related to neuroscience and medical scientists, with an above-average projected growth of 10% from 2022

²² "Scientific Careers at FDA," accessed May 9, 2024, <https://www.fda.gov/about-fda/jobs-and-training-fda/scientific-careers-fda>.

²³ "I am a Neuroscience Major. Now What? Graduate School and Career Paths to pursue in Neuroscience," accessed 8 May, 2024, <https://careercentral.pitt.edu/blog/2023/04/05/i-am-a-neuroscience-major-now-what-graduate-school-and-career-paths-to-pursue-in-neuroscience/>.

²⁴ "Careers in Neuroscience," accessed May 9, 2024, <https://www1.wellesley.edu/neuroscience/careers-in-neuroscience>.

²⁵ "What kinds of jobs can you get with a neuroscience degree?" accessed May 9, 2024, <https://www.scranton.edu/academics/cas/neuroscience/Careers.shtml>.

to 2032.²⁶ While many of the occupations included in this prediction require a graduate degree, there are others that only demand a bachelor's degree. Examples include clinical laboratory technologist & technician, pharmaceutical sale representative, science writer, health educator, forensic science technician, clinical research assistant, and regulatory affairs specialist, among others. In fact, a marketing study conducted for Goucher College in the mid-Atlantic area from July 2020 to June 2021 revealed that approximately half of the 3,529 job postings that had included a degree in neuroscience were targeting professionals with a bachelor's degree.

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.

Graduates with a neuroscience degree could pursue a wide variety of careers, and it is expected that some of the most common professional pathways will experience growth in Maryland this decade.²⁷ For example, both biological technicians and clinical laboratory technologists & technicians are expected to experience growth rates of 5.93% and 13.36%, respectively. Similarly, the fields of forensic science and health education are projected to grow by 24.19% and 9.56%, respectively.

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

Neuroscience is a fast-growing field, attracting many students due to its interdisciplinary nature, inherent innovation, and clear application to human experience. At colleges with multiple life science majors, neuroscience ranks high in student interest.²⁸ More incoming college students will have had some exposure to neuroscience in their secondary and primary classes, as across the United States implementation of Next Generation Science Standards has led to an increase in classes aimed at enhancing student appreciation and understanding of science, sometimes through the incorporation of neuroscience related topics.²⁹ At Goucher, interest in neuroscience programs from prospective and current students has increased in recent years. In fall of 2023 there were 86 applicants, 67 admitted students, and 8 enrolled students who expressed interest in neuroscience as either a primary or secondary major,³⁰ further emphasizing the need for this program.

Some former students who have been interested in neuroscience have opted to create an Individualized Interdisciplinary Major (IIM) that integrates three disciplines into one central theme. This option is utilized by students who want to bridge multiple fields of study rather than following the pathway of a single or even double major. Out of 39 students who have designed

²⁶ "Occupational Outlook Handbook: Medical Scientists," accessed May 13, 2024, <https://www.bls.gov/ooh/life-physical-and-social-science/medical-scientists.htm>.

²⁷ Maryland Department of Labor (n.d.). Maryland Occupational Projections – 2020-2030, accessed May 13, 2024, <https://www.labor.maryland.gov/lmi/iandoproj/maryland.shtml>.

²⁸ Rochon, C., Otazu, G., Kurtzer, I. L., Stout Jr, R. F., & Ramos, R. L. (2019). Quantitative indicators of continued growth in undergraduate neuroscience education in the US. *Journal of Undergraduate Neuroscience Education*, 18(1), A51.

²⁹ Gage, G. J. (2019). The case for neuroscience research in the classroom. *Neuron*, 102(5), 914-917.

³⁰ Personal correspondence with Christopher Wild, Director of Enrollment Systems & Operations, Goucher College.

and completed an IIM over the past several years, 5 were IIMs in Neuroscience, and at least one additional student is currently pursuing an IIM in Neuroscience.

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.

Several schools in Maryland offer a BA or BS in Neuroscience. However, Goucher's proposed Neuroscience major stands out from these others in that it offers a broader, more interdisciplinary range of electives, includes hands-on research experience in a lab with other undergraduates as the capstone requirement, is designed to facilitate a rich and diverse liberal arts experience, and is uniquely positioned within a school whose general education curriculum emphasizes environmental sustainability and race, power & perspective, two components of the Goucher Commons Curriculum that will enable graduates to contribute unique perspectives to their postgraduate work.

Other Maryland institutions offering Neuroscience majors include:

- *Johns Hopkins University:*³¹ The BA/BS program in Neuroscience at Johns Hopkins is strongly rooted in biology, with no psychology courses required. This major requires at least 79 credits, nearly 2/3 of the credits required for graduation. Rather than choosing freely from a list of pre-approved electives, students choose a focus area and take courses within that (e.g., Cellular and Molecular Neuroscience, Systems Neuroscience). Goucher's proposed program offers much more flexibility for taking courses outside of the major, and while Johns Hopkins does require students to participate in research experiences, the labs that students join also have more experienced staff (post-doctoral fellows, graduate students, and full-time research assistants). The role that students play in these labs differs greatly from Goucher, where labs are staffed only by undergraduates, giving students the opportunity to do more complex and technical work.
- *Notre Dame University of Maryland:*³² The Behavioral Neuroscience major at Notre Dame requires 77 credits (again nearly 2/3 of the credits required for graduation) across psychology, biology, chemistry, math, and physics. The pathway through the major culminates in a practicum experience in which students apply their knowledge through a supervised field placement. Students do have the option of participating in a neuroscience research lab, but this is not required. Goucher's proposed major requires at least 4 credits of "research team" for the capstone, giving students an opportunity to work directly with faculty mentors in a lab to learn crucial teamwork and communication skills and master techniques used in neuroscience research.

³¹ "Undergraduate Program in Neuroscience: BA Requirements," accessed May 7, 2024, <https://krieger.jhu.edu/neuroscience/bs-program/requirements/>.

³² "Behavioral Neuroscience," accessed May 7, 2024, <https://www.ndm.edu/undergraduate/academics/programs/behavioral-neuroscience>.

- *St. Mary's College of Maryland*:³³ The Neuroscience major at St. Mary's consists of at least 55 credits across biology, psychology, chemistry, and dedicated neuroscience courses. Although this is a similar range of courses to Goucher's proposed program, we only require 48 credits, leaving additional flexibility for students to explore topics outside their major in a true liberal arts fashion. Notably, there is no Research Methods course for the major at St. Mary's; in addition, the list of electives does not include as many options from psychology, and none in the area of cognitive neuroscience. Goucher's proposed program requires Research Methods in Neuroscience, and the list of electives contains several options in psychology that would allow students to pursue an interest in cognitive neuroscience.
- *University of Maryland*:³⁴ The neuroscience major at the University of Maryland has biology, chemistry, and neuroscience prerequisite courses before any required courses can be attempted. The required courses consist of an upper division neuroscience course with a seminar, and a set list of courses to select for the remaining credits. Only one psychology course is required (Introduction to Psychology), and after the set of required courses, students must choose a track (Molecular, Cellular, and Physiological or Behavioral & Cognitive). Experience in a research lab is also required for a total of at least 74 credits for the major, with at least two courses designated as lab courses. Goucher again offers more flexibility within and outside the major for a true liberal arts experience. Furthermore, Goucher's standalone "research team" capstone course requires students to gain important skills that are unique to the research process.
- *Washington College*:³⁵ The neuroscience major at Washington College requires a total of 62 credits, including introductory courses across biology, psychology, and chemistry, statistics, a core neuroscience course, several elective courses distributed across two theme areas ("Physical properties of the nervous system" and "emergent properties of the nervous system"). The culminating capstone course gives students the option of library research or laboratory research. Although Washington College is the most similar to Goucher College in terms of size and liberal arts college orientation, the neuroscience still requires far more credits and is not quite as interdisciplinary as Goucher's proposed program (for example, there are no elective options in computer science or philosophy). Students can choose from a biology-oriented or psychology-oriented "core" neuroscience course, whereas Goucher's proposed major will require both, encouraging breadth of understanding across a wider scope of neuroscience topics and theoretical perspectives. Finally, Washington College does not require laboratory research for the capstone, while Goucher's proposed program does.
- *Mount St. Mary's University*:³⁶ The Neuroscience major at Mount St. Mary's requires 60 credits (1/2 of the credits required for graduation) distributed across psychology, biology, chemistry, and dedicated neuroscience courses. The set of required foundational courses covers a broader range of disciplines, including computer science; Goucher has a more

³³ "Neuroscience, B.S.," accessed May 7, 2024, https://catalog.smcm.edu/preview_program.php?catoid=2&poid=116&returnto=46#content.

³⁴ "Neuroscience Major Requirements," accessed May 7, 2024, <https://neur.umd.edu/feature/neuroscience-major-requirements>.

³⁵ "Academic Requirements," accessed May 7, 2024, https://www.washcoll.edu/academic_departments/neuroscience/academic-requirements.php/.

³⁶ "Neuroscience, B.S." accessed May 14, 2024, https://catalog.msmary.edu/preview_program.php?catoid=14&poid=1301&returnto=590

focused set of foundational courses, allowing for a lower number of minimum credits and, therefore, more flexibility outside of the major. The Mount St. Mary's Neuroscience major culminates in two 3-credit capstone courses: one content-focused seminar, and one methods-focused seminar. Mentored lab research opportunities are offered via a research course through the Department of Psychology, but this is an elective; Goucher's proposed neuroscience program emphasizes the importance of the research experience by requiring it as the capstone for the major.

2. Provide justification for the proposed program.

Goucher's mission includes a commitment to the traditional liberal arts, an interdisciplinary approach to the curriculum, and experiential learning. Together, these commitments differentiate Goucher's proposed program from those described in the previous section. Goucher's commitment to experiential learning highlights the importance and value of laboratory research experiences, emphasized in the proposed major. For students looking to explore career paths in neuroscience, Goucher's proximity to Baltimore City provides rich opportunities for students to pursue career interests, build further skills, and network with professionals.

On a practical level, Goucher's proposed major is more approachable in terms of total credits, while still giving students ample foundational knowledge in theory and methodology, after which they can pursue more specific topics of interest through a broad set of elective courses. This gives students the ability to add a minor or potentially double-major, further highlighting Goucher's dedication to interdisciplinarity and studying relevant issues from diverse perspectives.

Goucher's position to launch a unique program with broad appeal and intrinsic interconnections with our existing curriculum and vision is also a strength. Social responsibility, valuing diverse perspectives, developing communication and collaboration, personal and professional ethics, and experiential learning are as crucial in advancement in neuroscience as they are to Goucher's vision of education, and are deeply imbued into the major. In addition, the Goucher Commons Curriculum and the proposed major emphasize high-impact teaching practices like problem-based learning, collaborative projects, and hands-on learning experiences with close mentorship from faculty.³⁷

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

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

No nearby HBIs offer undergraduate degrees in neuroscience, so the proposed program at Goucher will not be in direct competition. In fact, Morgan State University offers a Master of Science in Applied Neuroscience³⁸ that may be of interest to Goucher graduates. As the proposed

³⁷ "High-Impact Practices," accessed May 7, 2024, <https://www.aacu.org/trending-topics/high-impact>.

³⁸ "Applied Neuroscience (MS), Program Information," accessed May 7, 2024, https://catalog.morgan.edu/preview_program.php?catoid=25&poid=5957&hl=neuroscience&returnto=search&_gl=1*ieq8lh*_ga*NDY0NjY0MDUuMTcxMDc2NjM0Mg..*_ga_T3TCY7Q7D7*MTcxMDc2NjM0MS4xLjAuMTcxMDc2NjM0MS42MC4wLjA.

major develops over the next several years, there is the potential to form a partnership with that program (either informally, as a pipeline, or more formally as 4+1 program).

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

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

The proposed Neuroscience major has no impact on the uniqueness and institutional identities and missions of any of the HBIs in the State.

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 three faculty members who worked together to develop the proposed Neuroscience major represent unique but related academic backgrounds and research expertise across Psychology and Biological Sciences programs. This program will be interdisciplinary at its core, housed between both departments and integrated with coursework from other disciplines. The primary faculty affiliated with the program are:

- Gillian Starkey (Psychology), *Associate Professor, tenured*. Dr. Starkey has expertise in cognitive neuroscience, specifically using EEG techniques to study the development of brain regions supporting language, math, and executive function in humans. She also has extensive experience with EEG, MRI, and fMRI methods.
- Jay Garaycochea (Biological Sciences), *Assistant Professor, tenure-track*. Dr. Garaycochea has training in psychology with a focus on cellular, molecular, and anatomical neuroscience. His research is with invertebrate model organisms (*C. elegans*) studying the neuromuscular junction using electrophysiology and cell culture, and also has experience working with rodents and salamanders. Prior to coming to Goucher, Dr. Garaycochea taught for two years in a neuroscience program at Wartburg College.
- Natalie van Breukelen (Biological Sciences), *Assistant Professor of Practice, non-tenure track*. Dr. van Breukelen studies behavior in vertebrates (freshwater cichlids). She has expertise and training in behavioral ecology and neuroendocrine systems, and has an active international field research program using novel techniques.

All three faculty currently teach courses that will be required for the major. Dr. Starkey will initially oversee the program, which involves tasks such as managing the budget, scheduling courses, coordinating assessment, providing student advising, and handling any interactions with Admissions. Major decisions will be made in collaboration with other Neuroscience-affiliated faculty members. In the first year or two of the program, we anticipate hiring a new faculty member to develop and teach dedicated Neuroscience courses (e.g., NEU 3XX Research Methods in Neuroscience) and mentor students in laboratory research. Once this new hire

becomes familiar with Goucher, they could assume the role of overseeing the Neuroscience program.

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

Major learning outcomes:

- *Comprehensive Grasp of Brain Anatomy and Physiology:* Students will develop a knowledge of the anatomical and physiological aspects of the brain, unraveling its complex mechanisms and functions. (Introduced in core 200/300-level neuroscience courses, and reinforced in upper-level courses)
- *Synthesis of Brain Structures and Cognitive Processes:* Students will explore the interconnections between brain structures and cognition, emotion, and behavior, forging a bridge between neuroscience and human psychology. (Introduced in foundational courses and reinforced in core 200/300-level neuroscience courses and Research Methods in Neuroscience and capstone research experiences)
- *Applying Neuroscience to the Human Experience:* Through the lens of brain-mind-behavior relationships, students will explore questions about human nature, fostering insights into consciousness, perception, and interaction with the world. (Introduced in foundational courses, reinforced in core 200/300-level neuroscience courses and upper-level courses and capstone research experiences)
- *Responsible Conduct of Research and Scientific Thinking:* Students will collect, interpret and analyze quantitative information while practicing and thinking critically about research integrity and ethics. (Primarily taught through Research Methods in Neuroscience and capstone research experiences)

These learning outcomes are aligned with the Society for Neuroscience’s “Core Competencies for Neuroscience Undergraduates.”³⁹

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**

Goucher College has a comprehensive and sustained process for assessing student learning outcomes in all courses and programs. Each year academic programs submit annual assessment reports to the Assessment Committee for review. These reports include assessment of specific learning outcomes and a discussion of the findings and action steps, if appropriate. These assessment reports are revisited during the academic program review process that includes an internal review during the fourth year and an external review during the eighth year. Both reviews include an evaluation of the assessment plan, an analysis of student learning outcomes, and a discussion of program responses.

³⁹ “Core Competencies for Neuroscience Undergraduates,” accessed May 9, 2024, <https://www.sfn.org/careers/higher-education-and-training/core-competencies/core-competencies-for-neuroscience-undergraduates>.

For each of the four Neuroscience Learning Outcomes, faculty will evaluate student work using appropriate rubrics and artifacts including exams, papers, and research presentations. We anticipate that Learning Outcomes 1 and 2 will be assessed by way of exams, while Learning Outcome 4 will be assessed by way of a final research presentation in a research methods course or the research lab capstone experience. Rubrics will be re-visited each year as part of the College’s annual assessment cycle. The assessments made by Neuroscience faculty will then be evaluated by the Assessment Committee, which provides additional recommendations.

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

The proposed Neuroscience major consists of five foundational courses across three scientific fields (20 credits), two courses related to the research process (8 credits), two core neuroscience content courses (8 credits), a capstone research experience (4 credits), and 8 credits of electives within the realm of neuroscience. This curriculum is intended to give students a solid background of multidisciplinary knowledge, as well as more focused content across the sub-fields within neuroscience. This major consists of 48 credits, which is roughly equivalent to the total credits required for Neuroscience majors at many peer institutions.

Foundational courses:

PSY 105 Introduction to Psychology	4
BIO 111 Explorations in Biology I: Life in Context	4
BIO 112 Explorations in Biology II: The Research Process	4
CHE 111 Principles of Chemistry I with Lab	4
CHE 151 Principles of Chemistry II with Lab	4
	20 credits

Courses on the research process (both required):

DMC 106 Introduction to Statistical Methods	4
NEU 3XX Research Methods in Neuroscience	4
	8 credits

Core courses in topics within neuroscience (both required):

PSY 337 Cognitive and Behavioral Neuroscience	4
NEU 2XX Cellular and Molecular Neuroscience	4
	8 credits

Capstone research experience (one 4-credit sequence required):

NEU 3XX – Mentored Research Team <i>followed by</i>	2
NEU 4XX – Advanced Mentored Research Team	2

NEU 4XX – Independent Research in Neuroscience for two semesters (2 credits/semester)	4
	4 credits

Elective courses (minimum of 8 credits required, including at least 4 credits at the 300 level or above and 2 credits at 400 level; Additional prerequisites that are not met by required courses for the major are listed in parentheses):

100/200-level electives:

BIO 220 Principles of Genetics (1-credit BIO 224 lab optional, but required to take BIO 278, BIO 360, or BIO 420 as an elective)

BIO 278 Developmental Biology (BIO 224 Genetics Lab)

CS 116 Introduction to Computer Science

PHL 106 Ethics and Cognition

PSY 222 Human Learning and Memory

PSY 233 Sensation and Perception

300/400-level electives:

BIO 338 Integrative Animal Behavior (C- or higher in any 200-level BIO or NEU)

BIO 360 Principles of Physiology (BIO 220 Genetics, one other 200-level BIO or NEU)

BIO 420 Seminar in Neurobiology (BIO 220 Genetics) - 2 credits

BIO 458 Seminar in Behavioral Neuroendocrinology (BIO 220 Genetics or NEU 2XX) - 2 credits

DMC 345 Introduction to Machine Learning (CS 116 Introduction to Computer Science)

NEU 3XX Neuroscience course in area of expertise of new faculty hire

NEU 4XX Seminar in area of expertise of new faculty hire - 2 or 4 credits

PSY 322 Cognitive Psychology

PSY 437 Seminar in Neuroscience (Topic: Neuroplasticity)

Total credits: 48

Course descriptions for required classes:

PSY 105: Introduction to Psychology (4 credits)

This course provides an overview of the contemporary discipline of psychology, integrated with experiential learning activities designed to develop scientific thinking and research skills. Topics include fundamental issues in psychology, brain and behavior, perception, learning and cognition, personality theories, psychological disorders, and humanistic, developmental, and social psychologies. Students will learn the philosophical and methodological foundations of psychology as a scientific study of mind, brain, behavior, and human experience.

BIO 111: Explorations in Biology I: Life in Context (4 credits)

Life in Context explores the diversity of living organisms, the evolutionary relatedness of all organisms, and interconnected associations between organisms. Particular emphasis is placed on the importance of biological diversity to ecosystem health and on issues of

human relevance. The fundamental concepts and principles of biology are emphasized throughout the course. Three hours classroom and three hours laboratory.

BIO 112: Explorations Biology II: Research Process (4 credits)

Through an emphasis on scientific inquiry, students will investigate the foundations of cellular and molecular biology, including DNA, RNA, genes, and proteins. In the laboratory, students will actively develop hypotheses and design experiments to test them. Students will also read primary literature, develop quantitative skills to examine their data, and present their research findings. Three hours classroom, three hours laboratory.

CHE 111: Principles of Chemistry I with Lab (4 credits)

Introduction to chemistry including atomic structure, molecular structure, bonding, chemical reactions, and states of matter. Taught in studio format with integrated classroom and lab.

CHE 151: Principles of Chemistry II with Lab (4 credits)

Second semester of introduction to chemistry sequence including kinetics, thermodynamics, equilibrium, acid-base chemistry, redox reactions and electrochemistry. Taught in studio format with integrated classroom and lab. Prerequisite: CHE 111 with a grade of C- or better or permission of the instructor.

DMC 106: Introduction to Statistical Methods (4 credits)

This course provides an introduction to basic statistical principles, including basic probability, the normal and binomial distributions, hypothesis testing, and confidence intervals. This will culminate with the introduction of correlation and linear and logistic regression. The class focuses on conceptual learning and hands-on problem solving as well as computational tools for the statistical analysis of large data sets. Data cleaning and importing, model refinement, and visualization will be emphasized.

NEU 3XX: Research Methods in Neuroscience (4 credits)

This course will address the overall process of neuroscience research from the development of a research question to the presentation of research results. Topics to be covered include the role of theory in the scientific method, research design, various collection techniques (including brain imaging) and analytic strategies, and ethical considerations. Students will develop skills in scientific writing and critically reading and reviewing the literature. Prerequisites: PSY 105 and DMC 106.

PSY 337: Cognitive and Behavioral Neuroscience (4 credits)

This course is an introduction to the relationships between the brain, cognition, and behavior. Topics include the development of the human nervous system, neuropharmacology, the neural bases of sensory and motor systems, learning, stress, atypical development, psychological disorders, and neurodegenerative diseases.

NEU 3XX: Cellular and Molecular Neuroscience course (4 credits)

This course will establish the fundamental understanding of how individual neurons and glial cells function together to form a functional nervous system. The course will cover a variety of topics including cellular functioning, action potentials, cellular communication, and neuronal organization. This course will include significant writing components to begin the process of students developing the ability to conduct independent research.

NEU 3XX: Mentored Research Team (2 credits)

This course is designed for students to gain valuable research experience and skills by working on a faculty-mentored research team at a basic level in the planning and/or execution of an empirical research project.

NEU 4XX: Advanced Mentored Research Team (2 credits)

Planning and executing an empirical research project on a faculty-mentored research team at an advanced level. In addition to the course topic and relevant skill development, students will focus on broader integration of and reflection on their educational experiences.

NEU 4XX: Directed Research in Neuroscience (2 credits)

Under the direction of a program faculty member, students conduct laboratory or field research. Students initially write a brief research plan, outlining major goals of the research project. Upon completion of the research, students submit a report written in the form of a journal article to the faculty sponsor. Students choosing this course for their capstone requirement in the Neuroscience program must take this course for two semesters, at 2 credits per semester.

Course descriptions for electives (minimum of 8 credits required, including at least 4 credits at the 300 level or above and 2 credits at 400 level):

100/200-level electives:

BIO 220: Principles of Genetics (4 credits)

Concepts of heredity and their application in a wide variety of organisms from bacteria to humans. Includes classical transmission genetics, chromosomal structure, DNA structure and replication, protein synthesis, gene regulation in prokaryotes and eukaryotes, extra-nuclear heredity, and introduction to molecular analysis of genes and chromosomes. Prerequisites: BIO 112, CHE 151 (C- or better).

BIO 224: Techniques in Genetics & Molecular Biology (1 credit)

Laboratory experience with techniques used in genetics and molecular biology research. These include the use of mutant strains to carry out genetic analyses such as genotypic and phenotypic characterizations, segregation analysis, and genetic mapping. Molecular techniques used to manipulate and analyze DNA are integrated with the genetics analysis and include the polymerase chain reaction (PCR) and restriction endonuclease digestion-site mapping. Prerequisites: BIO 210, BIO 220 or concurrent enrollment.

* This 1-credit class is required to take BIO 278, BIO 360, or BIO 420 as an elective.

BIO 278: Developmental Biology (4 credits)

The cellular and organism-level processes that occur during typical development of plants and animals will be explored in this course. The central dogma, cell signaling, mitosis, and evolutionary change will be considered in addition to how typical development may be disrupted by the environment. Connections between developmental biology and social issues will be discussed. Prerequisites: BIO 111, BIO 224 (C- or better).

CS 116: Intro to Computer Science (4 credits)

Introduction to the discipline of computer science and algorithmic thinking through the study of a programming language. Students will master writing small computer programs to solve computational problems. Object oriented programming is introduced.

PHL 106: Ethics and Cognition (4 credits)

This course is an introduction to ethical thought with particular attention given to conflicts that arise between individual interests and communal goods. How should we act in our relationships with others? How should we expect others to act with respect to ourselves? What exactly does it mean to say that an action is wrong? Our attempt to answer these questions will be guided not only by solutions found in classical philosophical texts, but also by advances in contemporary neuroscience which have transformed our understanding of ethically relevant matters such as free will, self-perception, and rational decision-making. What happens when the assumptions about human nature that underlie traditional morality are shown to be incorrect? And might our reconsideration of these assumptions be aided by non-western sources, especially those drawn from the Buddhist tradition.

PSY 222 - Human Learning and Memory

This class explores fundamental concepts and current issues in human learning and memory, with a focus on how and why behavior changes with experience, and how this information is stored in the mind. In addition to classic research and theories, there is emphasis on real-world applications, such as in the domains of education, mental health, and the legal system. Prerequisite: PSY 105.

PSY 233 - Sensation and Perception

This course is a survey of current theory and research in perception. The primary goal is for students to gain an understanding of how people obtain reliable and useful information about the environment around them through their senses. Exploring several perceptual systems, including vision, audition, touch and pain, and smell and taste, we will cover topics such as the physiological structure of sensory systems, psychophysics, attention, sensory integration, and comparative perception. Prerequisite: PSY 105.

300/400-level electives:

BIO 338: Integrative Animal Behavior (4 credits)

This course will explore various animal behavior topics and may include reproduction,

territoriality, communication. For each topic students will examine how the behavior arises, through proximate causes such as neuroendocrinological and physiological mechanisms as well as why the behavior arises, through ultimate causes including the ecological and evolutionary changes. This course will provide students with opportunities for discussion and laboratory experiences related to the investigation and exploration of these topics in animal behavior. Prerequisites: C- or better in any 200-level biology course.

BIO 360: Principles of Physiology (4 credits)

Systems approach to the physiological processes of the body, emphasizing humans, including nerve, muscle, circulation, respiration, immune system, endocrine, renal function, and metabolism. Laboratory work introduces standard methods used in physiological investigations and emphasizes data interpretation with regard to known physiological mechanisms. Three hours classroom, three hours laboratory. Prerequisites: BIO 220, BIO 224, one additional 200-level or higher BIO or NEU course.

BIO 420: Seminar in Neurobiology (2 credits)

This seminar will focus on how nervous systems develop and function. Topics will include developmental neurobiology, function of the central nervous system, regeneration, and diseases of the central nervous system. Through critical analysis of primary scientific literature, students will become familiar with study systems, experimental methods used, and current knowledge in the field of neurobiology. Lectures, discussions, and student presentations. Prerequisites: BIO 220 (C- or better), and junior standing.

BIO 458: Seminar in Neuroendocrinology (2 credits)

This seminar will focus on reciprocal interaction between hormones and behavior by exploring vertebrate endocrine function, behavioral response and modulation, and physiological regulation. Using a comparative approach and analysis of primary scientific literature, students will become familiar with how experimental methods and model systems inform current knowledge in the field of behavioral endocrinology. Lectures, discussions, and student presentations. Prerequisites: BIO 220 (C- or better), and junior standing.

DMC 345: Introduction to Machine Learning (4 credits)

The basic theory and practice of machine learning techniques. Topics will vary, but will broadly cover the concepts of regression, classification, learning theory, supervised and unsupervised techniques, deep learning, and reinforcement learning. The course will include programming projects using a standard open source library (e.g. Torch or TensorFlow). Prerequisite: C- or above in CS 116.

NEU 3XX: TBD (content course in area of expertise of new faculty member; 4 credits)

NEU 4XX: TBD (seminar course in area of expertise of new faculty member; 2-4 credits)

PSY 322: Cognitive Psychology (4 credits)

The science of Cognitive Psychology involves exploring how the human mind processes information. This includes studying how and why the human mind evolved, how it develops through the lifespan, how it accomplishes the extraordinary achievements necessary for day-to-day living, and what happens when something goes wrong. Major topics include: perception, attention, memory, imagery, language, problem solving, and decision-making. Prerequisites: PSY 105.

PSY 437: Seminar in Neuroscience (4 credits)

This seminar focuses on one or more specific topics relevant to neuroscience and physiological psychology, such as brain imaging, educational neuroscience, psychopharmacology, neuropsychological case studies, or other aspects of brain/behavior relationships. May be repeated for credit with different topics. Prerequisites: PSY 337, and PSY 302/305 or NEU 3XX.

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

All students in the program will be required and able to complete Goucher's general education requirements (Goucher Commons) in order to satisfy Goucher's graduation requirements for a Bachelor of Arts degree (120 credits).⁴⁰ A comprehensive advising program before they declare a major ensures that students enroll in appropriate general education requirement courses (roughly 44 credits) and that they are on pace to complete such requirements. Advising is taken over by program faculty after the major has been declared, and students continue to be tracked for progress in their overall graduation requirements.

The Goucher Commons are innovative and flexible. Students take two Complex Problem Exploration (CPE) courses in two different areas. Students at Goucher must also demonstrate proficiency in Writing, Data Analytics, and Foreign Language & Culture, and complete requirements in two Common Inquiry Areas: Race, Power, & Perspective and Environmental Sustainability. Further education in cultural and social diversity is a goal of the study abroad requirement, in which all students participate in either a semester program or a 3-week Intensive Course Abroad.

Attention has also been paid to the Goucher Commons Curriculum where it intersects with the Neuroscience major. Students will be able to complete some Goucher Commons requirements through courses required for the major:

- DMC 106 Introduction to Statistical Methods (Data Analytics – Foundations requirement)
- NEU 2XX Cellular and Molecular Neuroscience (Writing Enriched Curriculum requirement)
- NEU 3XX Research Methods in Neuroscience (Data Analytics – Across the Curriculum requirement, Writing in the Discipline requirement)

⁴⁰ "The Goucher Commons Curriculum," Goucher College, accessed May 7, 2024, <https://www.goucher.edu/learn/curriculum/index.html>.

Because the major is a total of 48 credits, students have plenty of credits left over for other Goucher Commons requirements, including studying abroad for a full semester.

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

Not applicable

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.

Students receive relevant guidance materials before arriving at Goucher, during orientation, and in the online Catalog. After acceptance, students may register and pay for courses, access their registration and financial aid information, access their faculty and key staff, seek advice and answers to academic and administrative questions, and access technology support online or in person. All course materials and information can be obtained online through the Canvas learning management system. Catalogs and college policy and requirements are all accessible online through the Goucher College website.

Full-time program faculty serve as advisors to undergraduate students when they declare the major and are available to minors and other students, as well. Advisors help students navigate all of the systems at Goucher, both curricular and co-curricular. Goucher has also launched an innovative advising support service aimed at ensuring student success. The Success Team begins with a Success Advisor in the first year.⁴¹

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.

Faculty in the proposed program will work with the Admissions and Communications offices of the college to ensure all advertising, recruiting, and admissions materials that have been specifically designed for this program will clearly and accurately represent it. Furthermore, faculty in the program will keep program webpages up to date. Faculty often meet with prospective students on campus, during individual visits and group events, to discuss the curriculum and campus resources.

⁴¹ “Student Success Teams,” Goucher College, accessed May 7, 2024, <https://www.goucher.edu/learn/academic-support-and-resources/student-success-teams/index.html>.

H. Adequacy of Articulation (as outlined in [COMAR 13B.02.03.19](#))

1. If applicable, discuss how the program supports articulation with programs at partner institutions. Provide all relevant articulation agreements. More information for Articulation Agreements may be found [here](#).

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 faculty member will teach in the proposed program.

Below are listed all faculty who primarily teach, or contribute to, courses that are required for the Neuroscience major. The list of elective courses spans a wide range of departments, so we have not included faculty who solely teach electives. Core neuroscience faculty are in gray rows.

Name	Appointment Type	Terminal Degree Title and Field	Academic Title/Rank	Status	Courses Taught
Dr. Gillian Starkey	Tenure Track	PhD in Cognitive Neuroscience	Associate Professor	Full-time	PSY 105, PSY 337, NEU 3XX/4XX Mentored/ Advanced Mentored Research Team, 1 elective
Dr. Jay Garaycochea	Tenure Track	PhD in Neuroscience	Assistant Professor	Full-time	BIO 111, NEU 2XX Cellular and Molecular Neuroscience, NEU 3XX/4XX Mentored/ Advanced Mentored Research Team, 1 elective
Dr. Natalie van Breukelen	Non-Tenure Track	PhD in Integrative Biology	Assistant Professor of Practice	Full-time	BIO 112, NEU 3XX/4XX Mentored/ Advanced

					Mentored Research Team, 2 electives
New Hire	Tenure Track	PhD in Neuroscience or Related Field	Assistant Professor	Full-time	NEU 2XX (elective course within area of expertise), NEU 3XX Research Methods in Neuroscience, NEU 3XX/4XX Mentored/Advanced Mentored Research Team, 1 elective
Dr. Jenny Lenkowski	Tenure Track	PhD in Biology	Associate Professor	Full-time	BIO 111, BIO 112, 2 electives
Dr. Akana Noto	Tenure Track	PhD in Biology	Assistant Professor	Full-time	BIO 111
Dr. Verónica Segarra	Tenure Track	PhD in Biophysics and Biochemistry	Associate Professor	Full-time	BIO 112, CHE 111
Dr. Lisa Gulian	Non-Tenure Track	PhD in Physical Chemistry	Lab Coordinator and Stockroom Manager	Full-time	CHE 111
Dr. Rebekah Gray	Tenure Track	PhD in Analytical Chemistry	Assistant Professor	Full-time	CHE 111, CHE 151
Dr. Kevin Schultz	Tenure Track	PhD in Organic Chemistry	Associate Professor	Full-time	CHE 151
Dr. George Greco	Tenure Track	PhD in Chemistry	Full Professor	Full-time	CHE 151
Dr. Jaired Tate	Tenure Track	PhD in Physical Chemistry	Assistant Professor	Full-time	CHE 111, CHE 151
Dr. Thomas Narock	Tenure Track	PhD in Information Systems	Associate Professor	Full-time	DMC 106

Dr. Laura DeWyngaert	Non-Tenure Track	PhD in Applied Developmental Psychology	Assistant Professor of Practice	Full-time	PSY 105
Dr. Jennifer McCabe	Tenure Track	PhD in Cognitive Psychology	Full Professor	Full-time	PSY 105, 1 elective
Dr. Katherine Choe	Tenure Track	PhD in Developmental Psychology	Associate Professor	Full-time	PSY 105

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

Goucher’s Center for the Advancement of Scholarship and Teaching (CAST) regularly hosts faculty development workshops, trainings, and symposia.⁴² Each semester, CAST hosts speakers and workshops as part of pre-semester faculty development days. During the semester, it offers shorter workshops on topics ranging from inclusive syllabus construction to technology in the classroom. CAST prioritizes teaching faculty evidence-based approaches that improve the performance and engagement of all students. These approaches include: active learning; problem-based learning; retrieving, predicting, and interleaving; inclusive teaching; and metacognition. High-Impact practices (HIPs) learning assignments are modelled and reviewed.⁴³ Faculty are free to share ideas and strategies before implementing them or reflect together on successes and failures.

b) The learning management system

Goucher uses Canvas LMS by Instructure. New faculty receive training as part of their introduction to the College, and regular updates and trainings are offered. All faculty post syllabi on Canvas while many also utilize other features such as rubrics, modules, quizzes, and analytics.

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

Not applicable.

⁴² “Center for the Advancement of Scholarship & Teaching (CAST),” Goucher College, accessed May 13, 2024, <https://www.goucher.edu/learn/academic-support-and-resources/cast/index.html>.

⁴³ “High-Impact Practices,” accessed May 7, 2024, <https://www.aacu.org/trending-topics/high-impact>.

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

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

The Goucher College Library's mission is to provide comprehensive resources and services in support of the research, teaching, and learning needs of the Goucher College community. The library is the anchor of the award-winning, LEED Gold-certified Goucher Athenaeum, which opened in 2009. The library's resources include 96,000 electronic journals; 59,000 media materials and streaming files; 140 research databases; 199,000 print titles; and 240,000 eBooks. Additional resources include the Digital Library and eScholarship@goucher, the college's institutional repository, which together have a combined total of over 10,000 digital items. Onsite holdings are supplemented by interlibrary loan and the college's membership in the Baltimore Area Library Consortium. Goucher College is prepared to support this new program with its existing library resources and partnerships.

Many neuroscience journals are open access, and the library already subscribes to databases that include fundamental resources such as: *Nature Neuroscience*, *Neuron*, *Brain*, *NeuroImage*, *Journal of Neuroscience*, *Nature Review Neuroscience*, *Cortex*, *Frontiers in Neuroscience*, *Trends in Neuroscience*, and *Journal of Cognitive Neuroscience*.

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.

Office space and a room that could serve as a laboratory are available in the Julia Rogers building. Suitable classrooms equipped with AV equipment are available in Julia Rogers, Van Meter, and Hoffberger Science buildings. In the next few years, Goucher anticipates renovating the current Hoffberger Science Center into the Science Innovation Center, which may have additional laboratory space or office space available for future new faculty.

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.

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.

Projected enrollments are based on market research, and tuition rate assumes a 70% discount rate. Other Sources include fees as well as room & board costs.

TABLE 1: PROGRAM RESOURCES					
Resource Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1. Reallocated Funds	0	0	0	0	0
2. Tuition/Fee Revenue (c + g below)	\$113,040	\$141,300	\$197,820	\$240,210	\$282,600
a. Number of F/T Students	8	10	14	17	20
b. Annual Tuition/Fee Rate	\$14,130	\$14,130	\$14,130	\$14,130	\$14,130
c. Total F/T Revenue (a x b)	\$113,040	\$141,300	\$197,820	\$240,210	\$282,600
d. Number of P/T Students	0	0	0	0	0
e. Credit Hour Rate	0	0	0	0	0
f. Annual Credit Hour Rate	0	0	0	0	0
g. Total P/T Revenue (d x e x f)	0	0	0	0	0
3. Grants, Contracts & Other External Sources	0	0	0	0	0
4. Other Sources	\$116,440	\$145,550	\$203,770	\$247,435	\$276,545
TOTAL (Add 1 – 4)	\$229,480	\$286,850	\$401,590	\$487,645	\$559,145

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.

Existing full-time faculty will offer courses for this proposed program, but a new full-time faculty member will be hired to teach exclusively in the proposed program. Their salary and benefits are included in 1.b and 1.c, respectively. Further, the proposed program does not require any new administrative or support staff, nor does it anticipate the need for additional

technical support or space for its operation. However, there are expenses associated with the operation costs of the program and its marketing and recruitment.

TABLE 2: PROGRAM EXPENDITURES					
Expenditure Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1. Faculty (b + c below)	\$101,536	\$104,582	\$109,811	\$115,302	\$121,067
a. Number of FTE	1	1	1	1	1
b. Total Salary	\$80,000	\$82,400	\$86,520	\$90,846	\$95,388
c. Total Benefits	\$21,536	\$22,182	\$23,291	\$24,456	\$25,679
2. Admin. Staff (b + c below)	0	0	0	0	0
a. Number of FTE	0	0	0	0	0
b. Total Salary	0	0	0	0	0
c. Total Benefits	0	0	0	0	0
3. Support Staff (b + c below)	0	0	0	0	0
a. Number of FTE	0	0	0	0	0
b. Total Salary	0	0	0	0	0
c. Total Benefits	0	0	0	0	0
4. Technical Support and Equipment	0	0	0	0	0
5. Library	0	0	0	0	0
6. New or Renovated Space	0	0	0	0	0
7. Other Expenses	\$45,856	\$82,927	\$112,670	\$136,911	\$152,504
TOTAL (Add 1 – 7)	\$147,392	\$187,509	\$222,481	\$252,213	\$273,571

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.

Goucher College has a systematic and sustainable system to assess teaching and learning at all levels and within all units of the institution, in compliance with MSCHE standards for assessment. Learning outcomes will be assessed in this program using evidence-based rubrics applied to individual and group projects, portfolios, and papers.

Students perform course evaluations for each course, and all faculty will be observed in class annually by department administrators and/or peers. Data collected through assessment and evaluations processes on an annual basis are used to identify opportunities for program improvements and areas where additional resources are needed. The program will conduct internal reviews and be reviewed on a prescribed schedule by outside evaluators.

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 make use of the statistics gathered by the college's Office of Institutional Effectiveness and the Provost's office to analyze results and trends in enrollment and student success.

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

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

The proposed program shares Goucher's commitment to promoting diversity in recruitment, admission, and retention efforts of students, as well as in faculty hiring. These efforts have been successful, with 41% of students identifying as non-white in 2021, from 27% in 2014. Among students who identify as Black or African-American, there were 247 full-time undergraduate students enrolled during the 2021-2022 academic year comprising 23% of the student body, with another 8% of undergraduate students identifying as Hispanic/Latinx, and 5% as Asian-American. Among the incoming class of 2023, 38% identify as persons of color, and 27% identify as first-generation college students.

The College established a Center for Race, Equity and Identity to support all traditionally underrepresented students with a special focus on providing ongoing programming for students of color, first-generation, socioeconomically disadvantaged, LGBTQ+, and other historically marginalized groups.

Goucher’s Strategic Plan includes a commitment to attracting and retaining a highly qualified, diverse faculty and staff and specifies the connection between staffing and minority student satisfaction with its commitment to: “Obtain baseline data and monitor diversity of applicant pools; employ best practices in hiring, retention, and employee satisfaction to achieve an employee population more representative of our student body.”⁴⁴ The College has made efforts in educating its faculty around racial issues through a variety of workshops and seminars. Faculty will be recruited and hired for the program with an emphasis on diverse candidates, a practice that will continue during implementation and program delivery, to attract and retain qualified faculty from diverse racial, socioeconomic, and geographical backgrounds.

In the classroom, the Common Core’s Race, Power, & Perspective requirement “integrates Goucher College’s values of diversity, social justice, and global citizenship by asking students not only to recognize difference but to explore the power structures behind those differences.”⁴⁵

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

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

Not applicable

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

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

Not applicable

- 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

⁴⁴ “Goucher College Strategic Plan 2021-2025,” accessed May 13, 2024 <https://strategicplan.goucher.edu/>.

⁴⁵ “Race, Power, and Perspective,” accessed May 13, 2024, <https://www.goucher.edu/learn/curriculum/race-power-perspective.html>.