



PCC Proposal to Establish a Bachelor of Science in Neuroscience (Senate Document #18-19-13)

TO Wallace D. Loh | President

FROM Christopher Walsh | Chair, University Senate

I am pleased to forward the accompanying legislation for your consideration and approval. Betsy Beise, a member of the Programs, Curricula, & Courses (PCC) Committee, presented the PCC Proposal to Establish a Bachelor of Science in Neuroscience (Senate Document #18-19-13), which the University Senate approved at its meeting on November 14, 2018. Please inform the Senate of your decision and any administrative action related to your conclusion.

Approved:

Date:

11-27-2018

Wallace D. Loh
President

Copies of this approval and the accompanying legislation will be forwarded to:

- Mary Ann Rankin**, Senior Vice President and Provost
- Reka Montfort**, Executive Secretary and Director, University Senate
- Michael Poterala**, Vice President and General Counsel
- Cynthia Hale**, Associate Vice President for Finance and Personnel
- John Bertot**, Associate Provost for Faculty Affairs
- Elizabeth Beise**, Associate Provost for Academic Planning & Programs
- Sylvia B. Andrews**, Academic Affairs
- Gregory Ball**, Dean, College of Behavioral and Social Sciences
- Katherine Russell**, Associate Dean, College of Behavioral and Social Sciences
- Amitabh Varshney**, Dean, College of Computer, Mathematical, and Natural Sciences
- Reid Compton**, Director of Undergraduate Studies, Department of Biology
- Janna Bianchini**, Chair, Senate PCC Committee



PCC Proposal to Establish a Bachelor of Science in Neuroscience (PCC 18022)

PRESENTED BY Janna Bianchini, Chair, Senate Programs, Curricula, and Courses Committee

REVIEW DATES SEC – October 29, 2018 | SENATE – November 7, 2018

VOTING METHOD In a single vote

RELEVANT POLICY/DOCUMENT NA

NECESSARY APPROVALS Senate, President, University System of Maryland Board of Regents, and Maryland Higher Education Commission

ISSUE

The Departments of Psychology and Biology, within the Colleges of Behavioral and Social Sciences (BSOS) and Computer, Mathematics, and Natural Sciences (CMNS), respectfully, propose to establish a Bachelor of Science degree program in Neuroscience. This new major will provide better academic opportunities for students in this well-defined but broad discipline than the university currently offers. Currently, neuroscience-related courses are primarily taught in the Biological Sciences (BSCI) and Psychology (PSYC) programs, both of which are already at or above capacity. Many major research universities already have neuroscience undergraduate majors. The goal is to create a sustainable, attractive, and intellectually cohesive STEM major that crosses the boundaries of existing academic units.

The Neuroscience major will offer rigorous training in the interdisciplinary study of brain and behavior. Neuroscience has been recognized as a cohesive academic discipline in the United States since the 1960's. Understanding the brain and nervous system requires integrative studies from many disciplines, such as anatomy, physiology, molecular biology and biochemistry, behavioral and cognitive sciences as well as computational methods.

The curriculum will consist of 76-80 credits organized into the following categories:

- 13 credits of neuroscience core courses (under a new course prefix NEUR)
- 47 credits of supporting courses in mathematics, statistics, biological sciences, chemistry, physics, psychology, along with UNIV100.
- 16-20 credits in one of two concentrations: (1) Molecular, Cellular, and Physiological or (2) Behavioral and Cognitive

Currently, students wishing to focus on neuroscience either major in PSYC or BSCI, which has a Physiology and Neurobiology specialization. The sponsoring units predict that 70% of students who select this new program would have previously selected BSCI or PSYC, and 30% will be new students who may not otherwise have enrolled at the University of Maryland.

The administrative structure for this program is designed to secure the departments and colleges involved as equally invested partners. An undergraduate director will be selected by a committee co-chaired by the BSOS and CMNS Associate Deans. The undergraduate director will report to the

CMNS Associate Dean for administrative purposes, but the academic, administrative, and financial decision-making will be collaborative between CMNS and BSOS. The BSCI undergraduate advising office will advise students initially, and when students enter their concentrations they will be advised by BSCI for the Molecular, Cellular, and Physiological concentration and PSYC for the Behavioral and Cognitive concentration.

The program aligns well with the existing multidisciplinary research and graduate training program in Neuroscience and Cognitive Science (NACS), which was established in 1996. In addition to academic department affiliations, instructional faculty in the NEUR program will have direct connection to the NACS program, the Maryland Neuroimaging Center, the Language Science Center, and the scientific components of the new Cole Field House project as well as a newly developing initiative in Brain & Behavior.

This proposal was approved by the Senate Programs, Curricula, and Courses committee on October 5, 2018.

RECOMMENDATION(S)

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

COMMITTEE WORK

The committee considered this proposal at its meeting on October 5, 2018. Katherine Russell, Associate Dean of BSOS, and Reid Compton, BSCI undergraduate director, presented the proposal. The proposal was unanimously approved by the committee.

ALTERNATIVES

The Senate could decline to approve this new degree program.

RISKS

If the Senate declines to approve this degree program, the university will lose an opportunity to offer prospective students a degree program that focuses on neuroscience coursework, much of which is already offered, and connects with the university's varied neuroscience research activities.

FINANCIAL IMPLICATIONS

Resources for the new program will be drawn from those currently used by the sponsoring colleges on neuroscience undergraduate education, reallocated funds from campus, and new resources to the university provided through state legislation, for which neuroscience is an identified priority area.

University of Maryland PCC
Program/Curriculum/Unit Proposal

PCC Log No: 18022

Program: BS in Neuroscience

Department/Unit: PSYC & BIOL

College/School: College of Behavioral and Social Sciences; College of Computer, Mathematical, and Natural Sciences

Proposal Contact Person (with email): Katherine Russell (krussell@ummd.edu); Robert Infantino (infantino@ummd.edu)

Type of Action (check one):

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

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

Approval Signatures - Please print name, sign, and date. For proposals requiring multiple unit approvals, please use additional cover sheet(s). 1/12/18

1. Department Committee Chair KOPSON
9/12/18
2. Department Chair KAROL
3. College/School PCC Chair Michael Dougherty
KAROL 9/19/18
4. Dean Robert Russell 9/18/18
5. Dean of the Graduate School (if required) _____
6. Chair, Senate PCC Jane Bianchini 10-5-18
7. University Senate Chair (if required) _____
8. Senior Vice President and Provost _____

BSOS

Instructions:

When approved by the dean of the college or school, please send the proposal and signed form to the Office of the Associate Provost for Academic Planning and Programs, 1119 Main Administration Building, Campus 3001, and email the proposal document as an MSWord attachment to pcc-submissions@ummd.edu.

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

The Psychology Department (PSYC) in the College of Behavioral and Social Sciences (BSOS) and the Biology Department (BIOL) in the College of Computer Mathematical and Natural Sciences (CMNS) are jointly proposing a new undergraduate major (BS) in Neuroscience (NEUR).

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

University of Maryland PCC
Program/Curriculum/Unit Proposal

PCC Log No: 18022

Program: BS in Neuroscience

Department/Unit: PSYC & BIOL

College/School: College of Behavioral and Social Sciences; College of Computer, Mathematical, and Natural Sciences

Proposal Contact Person (with email): Katherine Russell (krussell@umd.edu); Robert Infantino (infantino@umd.edu)

Type of Action (check one):

- Curriculum change (includes modifying minors, concentrations/specializations and creating informal specializations)
- Curriculum change is for an LEP Program
- Rename a program or formal Area of Concentration
- Establish/Discontinue a formal Area of Concentration
- Other:
- Establish a new academic degree/certificate program
- Create an online version of an existing program
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Italics indicate that the proposal must be presented to the full University Senate for consideration.

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

1. Department Committee Chair Reid Compton Reid Compton 9/13/2018
2. Department Chair [Signature] 9/14/18
3. College/School PCC Chair Robert Infantino 9/18/2018
4. Dean [Signature] 9/18/2018
5. Dean of the Graduate School (if required) _____
6. Chair, Senate PCC _____
7. University Senate Chair (if required) _____
8. Senior Vice President and Provost _____

CMNS

Instructions:

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

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

The Psychology Department (PSYC) in the College of Behavioral and Social Sciences (BSOS) and the Biology Department (BIOL) in the College of Computer Mathematical and Natural Sciences (CMNS) are jointly proposing a new undergraduate major (BS) in Neuroscience (NEUR).

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

Program: Bachelor of Science in Neuroscience

Date of Proposal: September 21, 2018 (rev 9/28/18)

Start Term for New Program: Fall 2019 or later

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

Mission and Purpose

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

The Colleges of Behavioral and Social Sciences (BSOS) and Computer Mathematics and Natural Sciences (CMNS) are jointly proposing a **new undergraduate major (BS) in Neuroscience (NEUR)**. This new major will address a critical need to manage current undergraduate enrollments in this well-defined but broad discipline. Currently, Neuroscience-related courses are primarily taught in BSCI and PSYC, with additional relevant courses and research in other units across campus. Most major research universities already have neuroscience undergraduate majors. The goal is to create a sustainable, attractive, and intellectually cohesive STEM major in neuroscience for the campus that crosses the boundaries of existing academic units. It will also serve as a model for other interdisciplinary majors at UMCP in the future.

The neuroscience major will: (1) recruit talented undergraduate students to the University of Maryland that are interested in pursuing a neuroscience major; (2) better serve students who are interested in the broad field of neuroscience and currently must choose either a Biological Sciences or Psychology major; (3) offer an additional undergraduate major for students interested in research careers, medicine, and allied health professions; (4) redistribute some students away from the very large Biological Sciences and Psychology majors, thereby increasing the quality of the student experience for all.

Program Characteristics

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

The Neuroscience major will offer rigorous training in the interdisciplinary study of brain and behavior. Students will complete a required set of NEUR courses as well as a supporting sequence of coursework in mathematics, biology, chemistry, physics, and psychology. Students will then choose an upper-level specialization and coursework in (1) cellular, molecular, and physiological neuroscience or (2) behavioral and cognitive neuroscience. The Neuroscience major prepares students for a broad range of career paths including: scientific research, medicine, clinical psychology, allied health professions, or science-related government, nonprofit, or private sector employment.

3. What are the educational objectives of the program?

Learning Outcomes for the Neuroscience major are listed below.

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

Neuroscience will be a Limited Enrollment Program (LEP) similar to the current LEP criteria for the BSCI major.* The Gateway/Benchmark courses will be:

- Completion of MATH 135 or 140 with a minimum grade of C-
- Completion of BSCI 170/171 (formerly BSCI 105) with a minimum grade of C-
- Completion of CHEM 131/132 and CHEM 231/232 with a minimum grade of C-
- A minimum grade point average of 2.0 in all courses is required at the 45-credit benchmark review for first-time freshmen.
- A minimum grade point average of 2.7 in all courses taken at the University of Maryland and all other institutions is required for internal and external transfer to the Neuroscience major.

**The majority of students who consider the neuroscience major will also be considering the BSCI major. Therefore the LEP proposal for the Neuroscience major will mirror the BSCI LEP per <http://lep.umd.edu/>.*

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

Also, please review the basic requirements of [degree programs](#) or [certificate programs](#) to ensure that they meet the minimum policy requirements.

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

Summary of Neuroscience Major Requirements

1. **NEUR Required Courses (13 credits)**
2. **Required Supporting Courses (47 credits)**
3. **Concentration Courses (16-20 credits)** - Concentration courses may be added as additional courses become available. There is particular interest in adding courses from a broad range of disciplines beyond just in CMNS and BSOS. Some possible future collaborators include EDUC, ENGR, PLCY, and SPHL.

NEUR Required Courses (13 credits)			
3	NEUR 200	Introduction to Neuroscience (General Education: NS)	New Course
3	NEUR 305	Neuroscience Fundamentals I	New Course
3	NEUR 306	Neuroscience Fundamentals II	New Course
4	NEUR 405	Neurobiology Lab	New Course

Required Supporting Courses (47 credits)			
4	MATH 135 or 140	Discrete Math or Calculus I	LEP Benchmark and Gateway Course
4	MATH 136 or 141	Calculus (136) or Calculus II	
3	STATISTICS	BIOM301, EPIB300, PSYC200, STAT400, or STAT464	
4	BSCI 170/171	Principles of Molecular and Cellular Biology with Lab	LEP Benchmark and Gateway Course
4	BSCI 160/161	Principles of Ecology and Evolution with Lab	
4	CHEM 131/132	Fundamentals of General Chemistry with Lab	LEP Benchmark and Gateway Course
4	CHEM 231/232	Organic Chemistry I with Lab	LEP Benchmark and Gateway Course
4	CHEM 241/242	Organic Chemistry II with Lab	
4	CHEM 271/272	General Chemistry and Energetics with General Bioanalytical Chemistry Lab	
4	PHYS 131/141	Fundamentals of Physics for Life Sciences I or Principles of Physics I with Lab	
4	PHYS 132/142	Fundamentals of Physics for Life Sciences II or Principles of Physics II with Lab	
3	PSYC100	Introduction to Psychology	

1	UNIV100 (or equivalent)	Introduction to the University	
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Concentration Courses (16-20 credits)		
<ul style="list-style-type: none"> Complete at least 5 courses , including at least 3 courses from within one concentration and at least 1 lab course. Up to 3 pre-approved Neuroscience Research credits can be applied to the major. 4 pre-approved NEUR479 credits in the same faculty research laboratory can satisfy the lab requirement 		
Molecular, Cellular, and Physiological Concentration*	Behavioral & Cognitive Concentration*	Prerequisites
NEUR379 (1-3 cr) - Neuroscience Research: Molecular and Cellular	NEUR379 (1-3 cr) - Neuroscience Research: Behavioral and Cognitive	NEUR306 and permission of dept.
NEUR479 (1-4 cr) - Neuroscience Research Lab BSCI399(H, L) may be substituted with permission	NEUR479 (1-4 cr) - Neuroscience Research Lab BSCI399(H, L) may be substituted with permission	NEUR306 and NEUR379 and permission of dept.
BCHM463 Biochemistry of Physiology		CHEM271/272 or CHEM276/277
BSCI222 Principles of Genetics NOTE: Students may not use both ANSC327 and BSCI222 toward filling Neuroscience concentration requirements	BSCI222 Principles of Genetics	CHEM131/132, BSCI170/171; and either BSCI160/161 or another CHEM
BSCI330 Cell Biology & Physiology with Lab	BSCI330 Cell Biology & Physiology with Lab	CHEM131/132 and BSCI170/171
BSCI339D Biology of Chemosensory Systems		NEUR306 or BSCI353
BSCI339F Neurophysiology of Cells and Circuits		NEUR306 or BSCI353
	BSCI360 Principles of Animal Behavior	BSCI160/161, BSCI170/171, and BSCI222
	BSCI401 Animal Communication	BSCI160/161, and PHYS (1 semester); Recomm:

		animal behavior or biopsychology
BSCI402 Genomics of Sensory Systems		BSCI222
BSCI403 Biology of Vision		BSCI207
BSCI410 Molecular Genetics		BSCI222 and CHEM231/232
BSCI415 Molecular Genetics Lab		BSCI410
BSCI430 Developmental Biology		BSCI222 and BSCI330
BSCI440 Mammalian Physiology and BSCI 441 Mammalian Physiology Lab		BSCI330 and CHEM231/232
BSCI446 Neural Systems	BSCI446 Neural Systems	NEUR306 or BSCI353
BSCI452 Diseases of the Nervous System		NEUR306 or (BSCI353 & BSCI330)
Special Topics Courses (BSCI338 or 339) when specifically approved for the major/specialization. Check with your advisor.		
KNES370 Motor Development		
	KNES385 Motor Control and Learning	
KNES462 Neural Basis of Human Movement		
	KNES498C Exercise and Brain Health	KNES350
	PHIL209N Know Thyself: Wisdom Through Cognitive Science	
	PHIL366 Introduction to Philosophy of Mind	
	PSYC302 Fundamentals of Learning and Behavior	PSYC100 and BSCI170/171
	PSYC341 Introduction to Memory and Cognition	PSYC200 and (PSYC300 or NEUR306)
	PSYC402 Neural Systems and Behavior	PSYC301 or NEUR305

	PSYC403 Animal Behavior	PSYC301 or NEUR305
PSYC404 Introduction to Psychopharmacology	PSYC404 Introduction to Psychopharmacology	pending
	PSYC406 Neuroethology	pending
	PSYC407 Behavioral Neurobiology Laboratory	NEUR405 or (PSYC300 and PSYC301)
	PSYC413 Developmental Cognitive/Social Neuroscience	PSYC301 or NEUR305
	PSYC414 Science of Sleep and Biological Rhythms	NEUR306 or (PSYC100 and PSYC301)
	PSYC442 Psychology of Language	pending
	PSYC455 Cognitive Development	PSYC355 & (PSYC300 or NEUR306)
	PSYC489G Hormones & Behavior	NEUR306 or NEUR301

*Courses may be occasionally added or removed from this list. Not all courses may be available each semester.

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

Neuroscience has been recognized as a cohesive academic discipline in the United States since the 1960's. The national Society for Neuroscience was formed in 1969 and had its first conference in 1971 with 1500 attendees and now regularly includes more than 30,000 colleagues from more than 80 countries. Understanding the brain and nervous system requires integrative studies from many disciplines such as anatomy, physiology, molecular biology and biochemistry, behavioral and cognitive science as well as computational methods. Advancements in the fields of molecular biology and biochemistry, behavioral and cognitive science as well as improved computational methods have led to the formation of new graduate programs and eventually new undergraduate programs. Many peer institutions, including all but two Big 10 Universities (Illinois and Maryland), developed thriving neuroscience undergraduate majors decades ago. Some examples of universities with vibrant undergraduate neuroscience programs include [Duke University](#), [Johns Hopkins University](#), [University of Michigan](#), and [The Ohio State University](#).

At the University of Maryland, the Neuroscience and Cognitive Sciences (NACS) [Ph.D. program](#) was established in 1996 followed by an [undergraduate minor in neurosciences](#) in 2006. In 2018, there is more undergraduate interest in neuroscience and stronger campus investment in neuroscience-related education and research than ever before. The Brain & Behavior Initiative, the Maryland Neuroimaging Center, the Language Science Center, and the scientific components of the Cole Field House Project are important evidence of neuroscience as a strong focus of campus research and educational strength.

Neuroscientist and BSOS Dean Gregory Ball assembled and chaired the committee that assembled the academic curriculum for this new major. The committee consisted primarily of neuroscience faculty at University of Maryland, along with knowledgeable academic administrators. This committee considered the course structure and content of a number of other neuroscience undergraduate programs. The curriculum that is assembled here is comparable in course scope, depth, course requirements to institutional peers.

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

Neuroscience Major Sample 4-Year Plan

<u>First Semester</u> MATH135 or 140 (FSAR/MA) BSCI160 & 161 (DSNL) CHEM131 & 132 (DSNL) ENGL101 (FSAW) UNIV100 Total	 4 4 4 3 1 16	<u>Second Semester</u> MATH136 or 141 BSCI170 & 171 CHEM231 & 232 PSYC100 (DSHS) Total	 4 4 4 3 15
<u>Third Semester</u> NEUR200 (DSNS) CHEM241 & 242 Gen Ed (FSOC) Gen Ed (DSHU) Total	 3 4 4 3 14	<u>Fourth Semester</u> NEUR305 CHEM271 & 272 Approved Statistics Gen Ed (DSHS) Gen Ed (DSHU) Total	 3 4 3 3 3 16
<u>Fifth Semester</u> NEUR306 PHYS131 NEUR Concentration Gen Ed (SCIS) Elective Total	 3 4 3 3 3 16	<u>Sixth Semester</u> NEUR Concentration ENGL39X (FSPW) PHYS132 Gen Ed (DVUP) Total	 3-4 3 4 3 13-14
<u>Seventh Semester</u> NEUR Concentration NEUR405 Gen Ed (DSSP) Gen Ed SCIS) Elective Total	 4 4 3 3-4 0-1 15	<u>Eighth Semester</u> NEUR Concentration NEUR Concentration Gen Ed (DVXX) Gen Ed DSSP) Elective Total	 3 3 3 3 3 15

NOTE: All students must complete an Oral Communication (OC) course as part of the Gen Ed requirements. If I-Series (IS), Understanding Plural Societies (UP) and Cultural Competence (CC) courses double count with Gen Ed Distributive Studies requirements, the number of Gen Ed courses can be reduced by 3-4 courses. Note that freshman with AP credit for calculus and biology can enroll in NEUR200 in freshman year with no major restriction.

8. Indicate whether the program will be offered in a non-standard delivery format, such as online delivery, off-campus, or through non-standard terms. Please note that MHEC requires a separate proposal for online or off-campus delivery. If the program will be offered in non-standard terms, describe the term structure and whether the Office of the Registrar and the Office of International Scholar and Student Services have been notified and support the proposal.

The Neuroscience major will be offered on the standard on-campus undergraduate schedule. Although there may be some blended and occasional online courses in the summer/winter terms, the major will be predominantly a full-time undergraduate brick and mortar major that can be completed on a regular fall/spring schedule.

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

NA

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

Intended Learning Outcomes for the Neuroscience major are listed below. An overview of which outcomes will be assessed in which major courses can be found **Appendix B**

1. Develop a **knowledge base** in the field of neuroscience and supporting disciplines
 - a. Understand the fundamental principles of neuroscience across all levels of analysis – molecular/cellular, circuits, systems, and behavior
 - b. Understand the principles of evolution, especially as they apply to the nervous system and behavior
 - c. Develop additional expertise and depth of knowledge in at least one area of neuroscience (molecular/cellular, circuits, systems, and behavior)
 - d. Be able to address a question in neuroscience by integrating information from multiple levels of analysis
2. Understand the current techniques and strategies in **neuroscience research**,
 - a. Understand the theory and practice of important current neuroscience research techniques, along with their strengths and limitations
 - b. Acquire laboratory experience through neuroscience courses or research
 - c. Develop skills in data analysis using relevant quantitative and programming methods
 - d. Obtain training to work comfortably and successfully within a research team or equivalent experience
3. Develop competence in **scientific reasoning and critical thinking**

- a. Be able to critically evaluate scientific literature, including assessment of the problems addressed, methodology used (including statistical analyses), and conclusions drawn
 - b. Demonstrate skill in innovative and integrative thinking and problem-solving
 - c. Demonstrate skill in experimental design and interpretation
4. Develop effective **professional communication** skills
- a. Demonstrate proficiency in clear, concise, and graceful writing
 - b. Demonstrate proficiency with oral communication in a range of professional situations
 - c. Demonstrate proficiency in graphical presentation of information integrated into both written and oral presentations
5. Understand the role of neuroscience in **social and cultural contexts** as well as the influences of social and cultural context on neuroscience
- a. Understand the influences, current and potential, of neuroscience on other fields such as medicine, education, the arts, and the social sciences
 - b. Recognize the relationships between scientific research and the culture(s) in which it is embedded
 - c. Understand and follow ethical practices in academic study, scientific research, and professional life
6. Develop an appreciation of possible **career paths** available to students proficient in neuroscience
- a. Understand the activities, opportunities, and responsibilities of the individual scientist within the scientific community
 - b. Recognize the range of career opportunities outside academia
 - c. Develop and, as far as possible, implement plans for career development

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

The Psychology Department and College of Behavioral and Social Sciences have ongoing strategies to recruit and retain underrepresented minority students, including the BSOS Advising Minority Retention Group, the BSOS College Summer Research Initiative, and the ongoing agenda of the Psychology Department Diversity Committee that focuses on undergraduate diversity and inclusion.

The utmost attention will be paid to ensure that both faculty and staff advisor hires for the NEUR major include individuals who represent, and have experience working with, students from diverse backgrounds.

Relationship to Other Units or Institutions

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

BSCI and PSYC courses listed for the NEUR concentrations will be available to NEUR majors, in addition to BSCI and PSYC majors. It is predicted that 70% of NEUR majors would have previously selected BSCI or PSYC majors and 30% of the NEUR majors will be new students who may not otherwise have enrolled at University of Maryland. This will result in a net 30% increase in demand for these courses. Courses in any prefixes other than BSCI and PSYC that are listed as options in the curriculum will be pre-approved by the offering departments prior to being listed. The appendix contains letters of support from the courses outside of CMNS and BSOS listed in this proposal.

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

An undergraduate major in neuroscience will not require accreditation.

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

NEUR Administrative Structure

The Neuroscience major will only be successful if the partnering academic units have sustainable incentives to remain fully invested in the undergraduate program. Thus, an administrative structure is required that secures the Departments of Biology and Psychology as well as CMNS and BSOS Colleges as equally invested partners in the neuroscience major. It will also be important to ensure stable collaborations with NACS and BBI to establish stable faculty teaching and faculty-mentored undergraduate research.

NEUR Undergraduate Director

One faculty member (TTK or PTK) will be appointed as the NEUR Undergraduate Director. This position will be selected/hired by a committee co-chaired by the Associate Deans for Undergraduate Education in CMNS and BSOS. The NEUR Undergraduate Director will report to the Associate Dean for Undergraduate Education in CMNS for administrative purposes. However, academic, administrative, and financial decision-making will be collaborative between CMNS and BSOS.

Academic & Career Advising

The academic and career advising for NEUR majors will be structured to take advantage of the interdisciplinary expertise of faculty and staff across multiple units while still offering students easy access to advising resources. The NEUR undergraduate team will include: the NEUR Undergraduate Director (0.5 FTE), the NEUR Academic Advisor (1.0 FTE) in the CMNS Office of Student Services, and NEUR Academic Advisor in the PSYC Advising Office (1.0 FTE). The two NEUR advisors and the NEUR Undergraduate Director will work closely together to ensure consistency in offerings, policy, and communications for NEUR majors.

The initial college-level academic advising home for ALL new NEUR majors will be the [CMNS Office of Student Services](#) through the [Biological Sciences Undergraduate Program](#). LEP admission, Orientation, 1st semester onboarding, UNIV100, and Benchmark-I checks will be conducted by BSCI/CMNS. A separate LEP proposal will be submitted.

After successfully completing the introductory NEUR coursework, NEUR majors will select one of two concentrations. At that point, academic advising will broaden as follows.

NEUR - Molecular, Cellular, and Physiological Concentration - BIOL/CMNS will be the academic advising department/college for students who choose the Molecular, Cellular, and Physiological concentration in the NEUR major. Students in this concentration will graduate with a Neuroscience Major in the Biology Department in the CMNS College. Students will be cleared for graduation and considered alumni of BIOL/CMNS.

NEUR - Behavioral and Cognitive Concentration - PSYC/BSOS will be the academic advising department/college for students who choose the Behavioral and Cognitive concentration in the NEUR major. Students in this concentration will graduate with a Neuroscience Major in the Psychology Department in the College of BSOS. Students will be cleared for graduation and considered alumni of PSYC/BSOS.

The NEUR Undergraduate Director will ensure that the NEUR majors in both concentrations have a curriculum and academic/career advising that is helpful and consistent. The NEUR Undergraduate Director will work closely with the two NEUR advisors to ensure that all NEUR majors are able to connect with faculty mentors,

manage undergraduate research, ensure scheduling of seats/classes for upper-level coursework, move seamlessly between opportunities, research, and courses across multiple units, and clear students for graduation in their concentration.

NEUR Required Courses

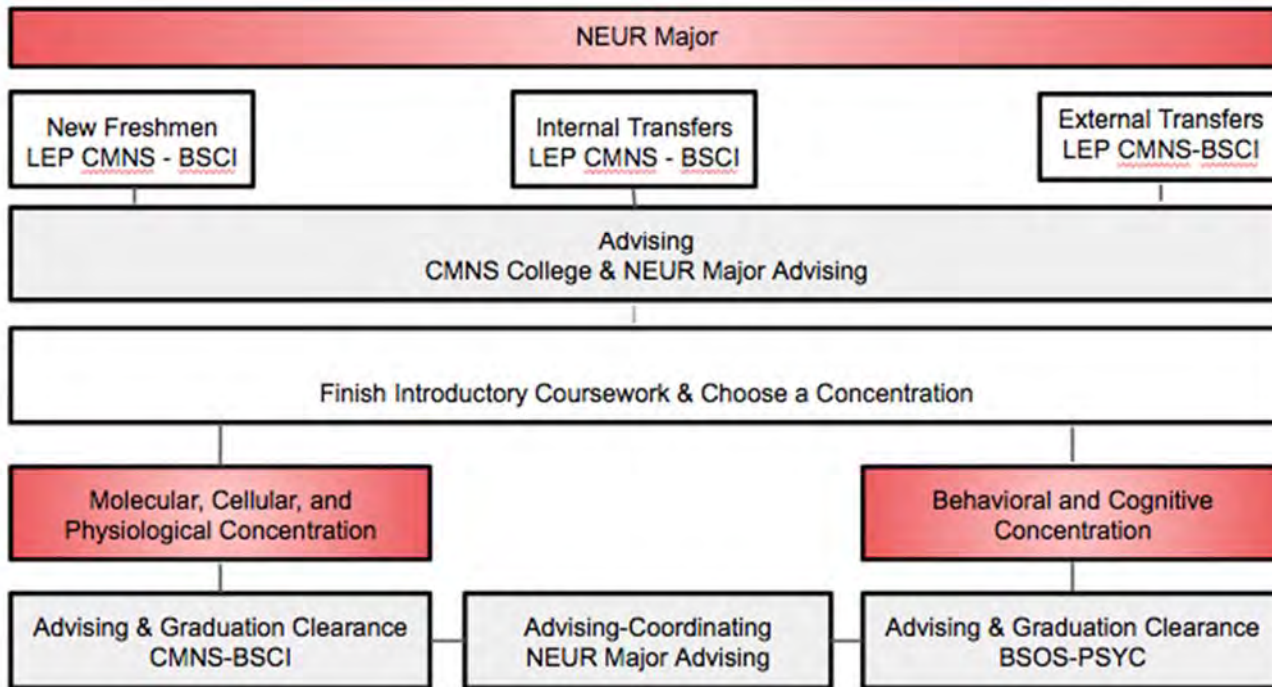
In the steady state, each of the required NEUR courses will be assigned on a long-term basis to BSCI/BIOL or PSYC. The course assignments have not yet been made. Since each NEUR course will be offered every semester and multiple sections of each course will be required, having one departmental home for each required course will ensure that the content, quality, and seats are continually reviewed and renewed.

NEUR Budget Administration

Since the NEUR major will be an interdisciplinary program, the CMNS/BSOS Deans will jointly oversee the budget administration for the NEUR major, ensuring that adequate courses/seats are available, that faculty resources are dedicated to the undergraduate teaching and research opportunities related to the NEUR major, and that adequate academic and career advising resources are maintained for the major. The day-to-day planning and budget oversight will be managed by the NEUR Undergraduate Director.

In the initial budget, resources required for renovation costs, faculty (TTK & PTK) hires, and staff hires in support of the NEUR major will be negotiated between the Provost and the Deans for CMNS and BSOS.

The budget for operating an undergraduate major is normally integrated into departmental and college operations as part of their core mission. Because the NEUR major will cross academic units, an annual operating budget for NEUR major will be established in a cost-share agreement between the Provost and the Deans in CMNS and BSOS. The initial agreement will last for a 5-year period and will be renewed at least every 5 years. The agreement will be reconsidered in year 4 for the next 5-year cycle. In this way, the NEUR major budget and staffing of PTK faculty will be stable for 5-year intervals, which is also the expected contract length for senior-level PTK faculty who will carry the heaviest teaching load in the NEUR major.



Faculty and Organization

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

NEUR Undergraduate Committee

A NEUR undergraduate committee will be comprised of at least 6 faculty members (TTK and PTK). The committee will provide academic oversight for the major, serve as the departmental PCC Committee for the NEUR major, and oversee the annual learning outcomes assessment for the major. The composition of the committee will include: Biology-2, Psychology-2, NACS Director-1, and will be chaired by the NEUR Undergraduate Director-1. The NEUR undergraduate committee will provide academic oversight for the major, serve as the departmental PCC Committee for the NEUR major, and oversee the annual learning outcomes assessment for the major. The NEUR advisors may regularly attend these meetings at the discretion of the Undergraduate Director.

Both the PSYC and BIOL Departments, then the CMNS and BSOS Colleges, will approve the initial NEUR major curriculum. Subsequent revisions to the NEUR curriculum will be approved by the NEUR Undergraduate Committee, the PSYC & BIOL Departments, and by the BSOS and CMNS College PCC Committees. Departmental members of the NEUR Undergraduate Committee are nominated for renewable 2-year terms by their Department Chairs and approved by the BSOS and CMNS Deans. TTK and PTK faculty with expertise in Neuroscience will have teaching and research mentoring in the NEUR undergraduate major included in their hiring agreements and in their performance evaluations.

NEUR Annual Report & Meeting

Given the interdisciplinary nature of the major and the multiple units engaged, the NEUR Undergraduate Director will be charged with preparing a brief annual report due to the BSOS & CMNS Associate Deans on June 30th. The report should include a review of learning outcomes results, enrollment trends, graduating student outcomes, updates on collaborations, opportunities, and challenges for the program. The NEUR Undergraduate Director will also initiate a meeting of the Undergraduate Committee with the BSOS & CMNS Deans (and/or Associate Deans) each September to present the annual report and discuss the current and future directions of the major.

The NEUR major should be hard funded and folded solidly into the core mission of the Biology and Psychology Departments as well as the CMNS and BSOS Colleges, just as the current BSCI and PSYC majors are now. The NEUR Undergraduate Director should not be in the position of defending the program's base budget to the two home departments on an annual basis to either the chairs or the deans.

Resource Needs and Sources

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

See Appendix C for Library Collections Assessment

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

There are two physical facilities needs for the NEUR major- the NEUR Undergraduate Advising Offices and renovations of two existing teaching labs (one in BIOL and one in PSYC) to prepare them for the new NEUR405 lab course.

- (1) **NEUR Advising Offices** will be integrated into BSCI and PSYC. Both units may need additional office space to accommodate NEUR majors advisors and an undergraduate director. A physical space for the NEUR major advising would be ideal, but the pros and cons of a separate space rather than expanding the advising resources in both BSCI-Student Services and PSYC-Student Services has not yet been resolved.

- (2) **NEUR Teaching Lab Renovations** - Two adjacent existing neuroscience teaching labs on the ground floor of the Biology-Psychology Building will need renovation in order to meet the teaching needs of the new major, specifically to teach the NEUR405 lab course for all majors. Currently, there are two courses (BSCI454 and PSYC401) that have overlapping content and are taught in two separate labs. Both labs are in need of renovation in order to harmonize the curriculum across the two courses and increase the capacity of the course. With the proposed enrollment of 500 in the NEUR major, plus continuing demand from BSCI and PSYC majors for the course, approximately 150 seats per semester will need to be offered, which is a 30% increase in the total number of seats currently offered in BSCI454 and PSYC401 combined. Some teaching sustainability will be introduced by consolidating into one course and one curriculum in that a common syllabus will increase the ability of the departments to assign faculty to teach the course. However, increased demand will require a net increase in investment for the course overall, even with the consolidation.

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

The new instructional resources required for the NEUR major are summarized below. Note that although some courses/seats, research mentoring, and advising will come from existing BSCI/BIOL and PSYC faculty/staff, both existing majors (BSCI and PSYC) are very large and already stretched very thin in both teaching and advising resources.

TTK Faculty Hires – A minimum of two new TTK faculty hires (one in Biology & one in Psychology) will provide sustainable faculty leadership for the NEUR courses & undergraduate research programs. Each TTK faculty member will teach at least one NEUR course each academic year and will mentor undergraduate NEUR researchers.

PTK Faculty hires – A minimum of two new full-time PTK faculty hires (one in Biology & one in Psychology) will teach 3-3 loads. One of the PTK faculty hires will serve as course director and lab supervisor of NEUR405. It is fully expected that TTK faculty will teach NEUR405 on a regular basis, but a PTK faculty member who can provide consistency and leadership for the course each semester will be important in ensuring that multiple sections across space and time are consistent, assessed, and renewed on a regular basis. The second PTK faculty member will serve as course director for NEUR200 and will have additional administrative duties, including procuring undergraduate research opportunities as well as matching, tracking, and recording student research participation for academic credit.

Note that it will be absolutely critical that research active TTK faculty (both the two hired as part of this initiative and others) take leadership roles in the NEUR Undergraduate Committee, course oversight, and mentored undergraduate research. However, in our recent experience, it is virtually impossible to expect a research active TTK faculty member to either run an undergraduate program or serve as course director for a larger undergraduate course that is offered each fall, spring, and summer.

Graduate Teaching Assistants - In the steady state, an additional 12 full (20 hour/week) GA positions will support teaching in the NEUR major. The teaching assignments will include serving as TA's in the required NEUR200 (2), NEUR305 (2), NEUR306 (2), and serving as lab section leaders in NEUR405 (3), and across the additional MATH/BSCI/CHEM/PHYS sections (3) needed to support increased enrollment for NEUR majors.

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

Academic Advisor (1.0 FTE) - A full-time Academic Advisor for the NEUR major will work with CMNS and manage onboarding of NEUR majors in close collaboration with the CMNS Student Services Office. This advisor will also support the students who choose the Molecular, Cellular, and Physiological Concentration.

Academic Advisor (1.0 FTE) - A full-time Academic Advisor for NEUR will work primarily with the students who choose the Behavioral and Cognitive Concentration.

Undergraduate Director - One faculty member (TTK or PTK) will receive a 12-month administrative supplement and summer salary.

20. Use the Maryland Higher Education Commission (MHEC) commission financial tables to describe the program's financial plan for the next five years:

<https://docs.google.com/spreadsheets/d/1V6iSZG05edMitWP6CAOXjCoGO58Gf6VXxPaacKfrhZ4/edit#gid=0>. Add these tables as attachments.

The proposed budget for the NEUR major is outlined in an attachment.

Implications for the State (Additional Information Required by MHEC and the Board of Regents)

If the proposed program is for a Post-Baccalaureate Certificate that is derived entirely from existing courses within an existing Master's degree program, then you **only** need to respond to prompts 21 (on market demand) and 24 (curriculum of current master's degree program).

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

See sections 1 and 2 above.

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

See sections 1 and 2 above.

Neuroscience offers a strong and broad scientific background for students interested in a wide variety of careers ranging from medicine, allied health sciences, scientific research, medical technology, technology-related business, health or technology policy, public service and non-profit sector, government service, health insurance, public health, social services, psychological services, and others. The closest degrees currently offered at the University of Maryland are BSCI and PSYC majors. According to the NACE graduation survey, PSYC majors at the University of Maryland are placed in employment or graduate school within 6 months of

graduation at a rate of 93% (2016). CMNS currently places 92% of students in a similar time frame. NEUR majors are predicted to be placed at a similar or higher rate than current PSYC and BSCI majors.

The projected size of the Neuroscience major in the steady state is approximately 500 students. This number is a conservative estimate based on the enrollments of established NEUR majors at peer institutions. For example, the University of Michigan’s neuroscience major has 500 majors. The Ohio State University has 1000 neuroscience majors. The current Physiology & Neurobiology track in Biological Sciences at the University of Maryland has 650 majors.

The new Neuroscience major is projected to grow over a 2 or 3-year period to a steady state of approximately 500 students. We predict that 50% (250) of NEUR students would have previously selected BSCI as a major, 20% (100) would have selected PSYC, and 30% (150) of the students would not have previously enrolled at Maryland.

New NEUR Courses Required for All Majors - Projected Sections and Seats

	Fall	Spring	Similar Existing	Faculty Teaching
NEUR200	2 sections of 100 seats, lecture & discussion	2 sections of 100 seats, lecture & discussion	None	4 sections per year, 1 course director
NEUR305	2 sections of 200 (250 NEUR majors), lecture only	2 sections of 200 (250 NEUR majors), lecture only	BSCI353 (330 seats per year now); PSYC301 (300 seats per year)	4 sections per year
NEUR306	2 sections of 200 (250 NEUR majors), lecture only	2 sections of 200 (250 NEUR majors), lecture only	None	4 sections per year
NEUR405	1 lecture, 8 labs of 160	1 lecture, 8 labs of 160	BSCI454 (140 seats per year); PSYC401 (30 seats per year)	2 sections per year, 1 lab director

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

According to the MHEC website, the only two undergraduate degrees in neuroscience in the State of Maryland are at Johns Hopkins University and Notre Dame College of Maryland. Although the University of Maryland competes with Johns Hopkins University for a very small number of the most academically talented freshmen who are Maryland residents, the institutions and programs will not be duplicative or especially competitive. Notre Dame College of Maryland is a very small women’s college and not directly competitive with a large public flagship. Rather, the University of Maryland is more likely to compete with other Big 10 flagships and

large public universities for neuroscience majors, especially but not limited to the University of Michigan, Penn State, and The Ohio State University.

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

No HBCIs in Maryland currently offer bachelor's degrees in neuroscience.

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

NA

Appendices

Appendix A Neuroscience (NEUR) Courses

Appendix B Learning Outcomes Assessment Plan for NEUR Major

Appendix C Library Collections Assessment

Appendix D Proposed Expenses

Appendix E Letters of Support & Permission to List Courses

Appendix A
Neuroscience (NEUR) Courses

The following new courses will be proposed as part of the NEUR major.

NEUR200 (3 cr) Introduction to Neuroscience (DSNS)

Prerequisite: BSCI170/171 with C- or higher

Recommended: MATH135 or 140 with C or higher

Explores the anatomical and physiological systems that underlie animal behavior. Provides an introduction to the field of behavioral neuroscience.

NEUR 305 (3 cr) Neuroscience Fundamentals I

Prerequisite: MATH135 or 140 with C- or higher; NEUR200 with C- or higher

Principles of the nervous system and neural circuits.

NEUR306 (3 cr) Neuroscience Fundamentals II

Prerequisite: NEUR305 with a C- or higher

Principles of molecular and cellular neuroscience.

NEUR405 (4 cr) Neurobiology Lab

Prerequisite: NEUR306 with a C- or higher & permission of department

Laboratory course exploring the principles of nervous system function, ranging from molecular and cellular basis of neuron function through nervous system integration. Experiments use living invertebrates and cold-blooded vertebrates.

NEUR379 (1-4 cr) Introductory Neuroscience Undergraduate Research

Prerequisite: NEUR305 with a C- or higher & permission of department

NEUR479 (1-4 cr) Advanced Neuroscience Undergraduate Research

Prerequisite: NEUR306 with a C- or higher & permission of department

Appendix B
Learning Outcomes Assessment Plan for NEUR Major

The learning outcomes listed in Section 10 will be assessed on a 4 year cycle per current campus undergraduate assessment guidelines. Knowledge base and techniques will be the first two outcomes assessed. The assessment plan will focus on the required courses only during the first 4 year cycle.

Learning Outcomes In NEUR Major Required & Supporting Courses

Learning outcomes (black X indicates emphasis) (red X indicates major emphasis)		Required Courses				
		Supporting courses	NEUR 200	NEUR 305	NEUR 306	NEUR 405
		BIOL, CHEM, PHYS, MATH	Gateway	Neuro fundamentals cellular	Neuro fundamentals systems/cognitive	Neurobiology lab
Knowledge base						
	Neuroscience breadth		X	X	X	X
	Evolution	X				
	Neuroscience depth					
	Integrating knowledge		X	X	X	X
Techniques						
	Current techniques	X	X	X	X	X
	Lab experience	X				X
	Data analysis	X				X
Critical thinking						
	Evaluate literature			X	X	
	Problem solving	X				X
	Experimental design	X		X	X	X
Communication						
	Written	X				X
	Verbal	X				X
	Graphical	X				X
Cultural relationships						
	Neuroscience contributions		X	X	X	
	Cultural effects	X	X	X	X	
	Ethical practices					X
Professional development						
	Scientific community	X	X	X	X	X
	Career paths		X	X	X	X
	Personal plan					

Learning Outcomes In NEUR Major Concentration Courses Courses

Learning outcomes (Black X indicates emphasis) (Red X indicates clear emphasis)		Concentration Courses (representative courses)																				Learning outcomes (Black X indicates emphasis) (Red X indicates clear emphasis)				
		NEUR 378 NEUR 479	BSCI 288F	PSYC 302 PSYC 341	BSCI 375	BSCI 481	PSYC 402 BSCI 453	BSCI 402 BSCI 403 BSCI 336C	PSYC 403 BSCI 363	PSYC 404	BSCI 404	PSYC 406 BSCI 446	BSCI 410 BSCI 415	PSYC 411	PSYC 413 PSYC 405 BSCI 430	PSYC 414	BSCI 426	BSCI 440 BSCI 441	BSCI 442	PSYC 489G	PSYC 489P BIO 500			LING 440	PHIL 280 PHIL 362	
		Neuroscience research	Neural circuitry	Cognitive neuro	Evolution	Animal communication	Advanced neuro	Sensory neuro	Animal behavior	Neuro-pharmacology	Cellular biophysics	Neuroethology	Molecular genetics	Functional imaging	Neural development	Biological rhythms/circs	Membrane biophysics	Mammalian physiology	Psychology of Language	Homosoma	Ethics	Language and cognition	Philosophy of neuro			
Knowledge base	Neuroscience breadth			X		X			X			X			X			X					X	X	Neuroscience breadth	
	Evolution				X	X			X			X													X	Evolution
	Neuroscience depth	X	X				X	X	X	X	X	X	X		X	X	X			X	X		X		X	Neuroscience depth
	Integrating knowledge	X	X			X			X	X		X			X	X	X	X	X	X			X	X	X	Integrating knowledge
Techniques	Current techniques	X		X		X	X	X	X	X		X	X	X	X	X		X	X	X			X		X	Current techniques
	Lab experience	X																	X							Lab experience
	Data analysis	X												X					X							Data analysis
Critical thinking	Evaluate literature	X	X		X	X		X		X	X			X	X	X	X			X	X		X	X	Evaluate literature	
	Problem solving	X	X					X		X				X	X	X			X	X	X		X		X	Problem solving
	Experimental design	X	X	X				X	X	X					X	X			X		X					Experimental design
Communication	Written	X	X	X	X	X	X	X	X	X	X			X	X	X			X	X	X		X	X	Written	
	Verbal	X	X			X								X	X	X			X	X			X	X	Verbal	
	Graphical	X																	X	X						Graphical
Cultural relationships	Neuroscience contributions		X	X		X	X	X	X	X		X	X	X	X	X				X	X		X	X	Neuroscience contributions	
	Cultural effects																			X			X	X	Cultural effects	
	Ethical practices	X							X	X									X			X		X	Ethical practices	
Professional development	Scientific community	X	X	X		X	X	X	X			X			X	X							X		X	Scientific community
	Career paths	X												X						X						Career paths
	Personal plan	X																								Personal plan

Appendix C Library Collections Assessment

DATE: 01/18/2018

TO: Katherine Russell
Associate Dean, College of Behavioral and Social Sciences

FROM: On behalf of the University of Maryland Libraries:
Jordan Sly, Anthropology, Psychology, and Special Populations Librarian
Svetla Baykoucheva, Chemistry and Life Sciences Librarian
Maggie Saponaro, Head of Collection Development
Daniel Mack, Associate Dean, Collection Strategies & Services

RE: Library Collection Assessment

We are providing this assessment in response to a proposal by the colleges of Behavioral and Social Sciences as well as of Computer, Mathematical and Natural Sciences to create a new undergraduate major in Neuroscience. These colleges have requested that the University of Maryland Libraries assessed the available library resources in this area, to determine how well the Libraries could support the curriculum of this proposed program.

Serial Publications

The University of Maryland Libraries currently subscribe to a large number of scholarly journals—almost all in online format—that focus on neuroscience and closely related fields.

The Libraries subscribe to several of the top-ranked journals (by impact factor) that are listed in the neuroscience category of *Journal Citation Reports*¹ and using the SCJ ranking system². These journals include the top ten highest ranked journals, all of which are available online through the UMD Libraries:

- [Nature Reviews Neuroscience](#) (SCJ, *H index*=337 JCR, impact factor, 28.880)³
- [Nature Neuroscience](#) (SCJ, *H*=347 JCR, 17.839)
- [Annual Review of Neuroscience](#) (SCJ, *H*=209 JCR, 15.630)

¹ Top journals by impact factor: <https://jcr.incites.thomsonreuters.com/JCRJournalHomeAction.action?SID=A2-mx2BUGIHK70tCYKq911JFop4zmg69sBqxxd-18x2d5o7f0ECHKifXs0XqhOfBNgx3Dx3Dcnx2FdFfSjTS1s356x2Bx2FEmJrwx3Dx3D-YwBaX6hN5JZpnPCj2lZNMAs3Dx3D-jywgyyb6iMRLFJm7wHskHQx3Dx3D&SrcApp=IC2LS&Init=Yes> Journal Citation Reports (JCR) is a tool for evaluating scholarly journals. It computes these evaluations from the relative number of citations compiled in the Science Citation Index and Social Sciences Citation Index database tools, <https://jcr.incites.thomsonreuters.com/JCRJournalHomeAction.action?#>.

² SCIMAGO (SCJ) Listing of top journals for Neuroscience, <http://www.scimagojr.com/journalrank.php?area=2800>

³ Ranking and impact review information available through SJR, <http://www.scimagojr.com/>. Information about their ranking equations available here, <http://www.scimagojr.com/SCImagoJournalRank.pdf> and a key for understanding their icon and display system, http://www.scimagojr.com/help.php#rank_journals

- [Trends in Cognitive Science](#) (SCJ, H=247 JCR, 15.402)
- [Behavioral and Brain Sciences](#) (SCJ, H=137 JCR, 14.200)
- [Neuron](#) (SCJ, H=396 JCR, 14.024)
- [Progress in Neurobiology](#) (SCJ, H=199 JCR, 13.217)
- [Molecular Psychiatry](#) (SCJ, H=180 JCR, 13.204)
- [Acta Neuropathologica](#) (SCJ, H=129 JCR, 12.213)
- [Biological Psychiatry](#) (SCJ, H=273 JCR, 11.412)

Databases

Through our database subscription packages, we have access to much of the current research in this field. For articles in journals to which we do not have access researchers and students will likely have access to this material via our Interlibrary Loan and our Big Ten Academic Alliance partnerships at no cost to the researcher.

The Libraries' *Database Finder* (<http://www.lib.umd.edu/dbfinder>) resource offers online access to databases that provide indexing and access to scholarly journal articles and other information sources. Many of these databases cover subject areas that would be relevant to this proposed program. In particular, below is a listing of databases that would be useful in the field of neuroscience at the undergraduate level:

- Science Direct
- Neuroscience Information Framework
- Springer Link
- Web of Science
- EBSCO databases
- Nature Archives
- PubMed
- PubChem
- Reaxys
- American Chemical Society
- BIOSIS Preview
- BioMed Central
- Biological Sciences Database
- Medline Plus
- PsycINFO
- Psychology and Behavioral Sciences

- SciFinder
- ChemSpider

Additionally, multidisciplinary databases such as *Academic Search Complete* (accessible through EBSCO) and, occasionally, JSTOR (depending on the nature of the project) will have material relevant to neuroscience students.

In many cases, these indexes offer full text copies of the relevant journal articles. In those instances, in which the journal articles are available only in print format, the Libraries can make copies available to students through the Libraries' Scan & Deliver Program (<http://www.lib.umd.edu/access/scan-deliver>) or via Interlibrary Loan (Please see below for more information about these services).

Monographs

The Libraries regularly acquire scholarly monographs in neuroscience and related fields. Monographs that are not already part of the collection can be purchased upon request, if funds are available. Currently, the print holdings in the area of neuroscience are located in McKeldin Library.

Given the nature of the discipline and the courses planned for this new major, it is likely that most library research for this program will rely upon journals and up-to-date scholarly communications. However, monographs will continue to be purchased in both physical and electronic format to support the dynamic and multidisciplinary needs of this program.

A search of the University of Maryland Libraries' WorldCat UMD catalog was conducted, using a variety of relevant subject terms. This investigation yielded sizable lists of citations of books that we own. For example, a search for the term "Neural Plasticity" within our book holdings and access availabilities (physical and e-books as well as those available through Interlibrary Loan and U-Borrow) yields a high level (800+) of relevant and recent (published within the past five years) results. A search of the same material and parameters for the term "Neuroimmunology" brought nearly 90 targeted results. A search for "digital phenotyping AND genomics AND mood disorders"—a narrow search informed by a recent article by Harrison, Geddes, and Turnbridge (2017) yielded an appropriate number of results and included results in both genomic research and research into bi-polar disorder indicating our holdings in the wider fields covered in this brief search. Finally, the high number of general resources available through the libraries by searching terms like "neuroscience," "behavioral neuroscience," and "biopsychology" and other related general terms indicates that undergraduates will be supported by our current and future holdings.

Scan & Deliver and Interlibrary Loan

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

The Scan & Deliver service scans and delivers journal articles and book chapters within three business days of the request--provided that the items are available in print on the UM Libraries' shelves or in microform. In the

event that the requested article or chapter is not available on campus, Scan & Deliver will automatically refer the request to Interlibrary Loan (ILL). Interlibrary Loan is a service that enables borrowers to obtain online articles and book chapters from materials not held in the University System of Maryland.

Additional Materials and Resources

In addition to serials, monographs, and databases that are available through the University Libraries, students enrolled in the proposed program will have access to a wide range of media, datasets, software, and technology. Library Media Services (<http://www.lib.umd.edu/lms>) houses media in a variety of formats that can be utilized both on-site and via ELMS course media. Datasets and support materials are available through the Psychology Subject Guide (<http://lib.guides.umd.edu/Psychology>) and statistical consulting and additional research support is available through the Research Commons (<http://www.lib.umd.edu/rc>). Technology support and services are available through the Terrapin Learning Commons (<http://www.lib.umd.edu/tlc>).

The subject specialist librarian/s for the discipline listed below also serve as an important resource for the proposed programs.

Jordan S. Sly (Psychology Liaison Librarian)

<https://www.lib.umd.edu/directory/staff/jsly>

Svetla Baykoucheva, (Chemistry and Life Sciences Librarian)

<https://www.lib.umd.edu/directory/staff/sbaykouc>

Nedelina Tchangalova (Public health Librarian)

<https://www.lib.umd.edu/directory/staff/nedelina>

Other Research Collections

Because of the University's unique physical location near Washington D.C., Baltimore and Annapolis, University of Maryland students and faculty have access to some of the finest libraries, archives and research centers in the country that are vitally important for researchers in neuroscience. These include the resources provided by National Library of Medicine, Johns Hopkins University, Georgetown University and Medical Center, and the University of Maryland Baltimore. It should be mentioned that there is an increasing number of open-access journals and other free online resources that will provide valuable information to students and researchers in this field.

Conclusion

With our substantial journal electronic and print holdings and index databases, as well as additional support services and resources, the University of Maryland Libraries have the necessary resources to support teaching and learning in neuroscience. Additionally, the Scan & Deliver, U-Borrow, and Interlibrary Loan services make materials that are not available online available to remote users enrolled in online courses. In conclusion, this assessment demonstrates that the University of Maryland Libraries will be able to meet the curricular and research needs of the proposed BS major in neuroscience.

Appendix D Proposed Expenses

The Provost and CMNS/BSOS Deans will agree to a plan to reconcile available resources to projected expenses prior to finalizing a start date for the major.

EXPENDITURES FOR NEUROSCIENCE MAJOR IN YEARS 1-5					
Expenditure Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1. TTK Faculty (b+c below)	\$399,000	\$410,970	\$423,299	\$435,998	\$449,078
a. #FTE	2.0	2.0	2.0	2.0	2.0
b. Total Salary	\$300,000	\$309,000	\$318,270	\$327,818	\$337,653
c. Total Benefits	\$99,000	\$101,970	\$105,029	\$108,180	\$111,425
1. PTK Faculty (b+c below)	\$266,000	\$273,980	\$282,199	\$290,665	\$299,385
a. #FTE	2.0	2.0	2.0	2.0	2.0
b. Total Salary	\$200,000	\$206,000	\$212,180	\$218,545	\$225,102
c. Total Benefits	\$66,000	\$67,980	\$70,019	\$72,120	\$74,284
1. Graduate Teaching Assistants (b+c below)	\$95,760	\$98,633	\$203,184	\$313,919	\$323,336
a. #FTE	4.0	4.0	8.0	12.0	12.0
b. Total Salary	\$72,000	\$74,160	\$152,770	\$236,029	\$243,110
c. Total Benefits	\$23,760	\$24,473	\$50,414	\$77,890	\$80,226
2. Admin. Staff (b+c below)	\$232,750	\$239,733	\$246,924	\$254,332	\$261,962
a. #FTE	2.5	2.5	2.5	2.5	2.5
b. Total Salary	\$175,000	\$180,250	\$185,658	\$191,227	\$196,964
c. Total Benefits	\$57,750	\$59,483	\$61,267	\$63,105	\$64,998
3. Total Support Staff (b+c below)	\$33,250	\$34,248	\$35,275	\$36,333	\$37,423
a. #FTE	0.5	0.5	0.5	0.5	0.5
b. Total Salary	\$25,000	\$25,750	\$26,523	\$27,318	\$28,138
c. Total Benefits	\$8,250	\$8,498	\$8,752	\$9,015	\$9,285
4. Equipment	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000
5. Library	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
6. New or Renovated Space	\$0	\$500,000	\$0	\$0	\$0
7. Other Expenses: Operational Expenses	\$103,536	\$103,536	\$207,072	\$310,608	\$310,608
TOTAL (Add 1 - 7)	\$1,160,296	\$1,691,099	\$1,427,953	\$1,671,855	\$1,711,793
resources - expenditures					
These budget estimates are resources and expenditures to the University overall, and not to the program or unit. Do not include revenue-sharing agreements between units, between unit and college, or with the university (e.g., for entrepreneurial programs) as an expenditure.					
	benefits	0.33			
	inflation	1.03			
Other expenses might include Space rental (if offsite), advertising/recruitment, course development, travel. Please specify in a footnote.					
If new or renovated space is required beyond what is allocated to the College, this should be negotiated with the Office of the Provost prior to proposal submission.					
Required four NEUR major courses will need be offered every semester and in multiple large sections. Although existing Biology and Psychology faculty can teach a small number of the NEUR sections, the majority of the new required NEUR courses will be taught by new faculty hires.					
Two TTK faculty hires will teach at least one undergraduate NEUR course per year, will host undergraduate researchers in their labs, and will serve as members of the NEUR major undergraduate committee. This will be included in their offer letters and be part of their TTK teaching portfolios. If additional TTK faculty are hired as part of the BBI initiative, including NEUR undergraduate teaching and research mentoring as part of their hiring expectations will be negotiated.					
Two PTK faculty will teach 3-3 loads in the NEUR major, including taking leadership roles in specific NEUR courses and ensuring a common syllabus and regular assessment for each NEUR required course. The two PTK faculty will also serve on the NEUR major undergraduate committee. This will be included in their offer letters and be part of their PTK teaching portfolios. Administrative duties as part of the NEUR major will be included in the PTK contracts for both.					

Appendix E
Letters of Support & Permission to List Courses



Michael Dougherty, Chair
Department of Psychology
College Park, Maryland 20742-4411
301.405.5862 FAX 301.314.9566

April 4, 2018

RE: Neuroscience (NEUR) Major

Dear Dean Ball,

On behalf of the Department of Psychology, I am pleased to offer our enthusiastic support for the proposed undergraduate major in Neuroscience, and to confirm our commitment to the proposed curriculum described in the proposal. The neuroscience proposal was reviewed separately by the executive committee and the undergraduate studies committee, as well as by the entire faculty. Strong support for the proposed major was expressed in each of these contexts, with the department voting overwhelmingly (34 – 1) in support of the proposal.

In discussing the proposal with faculty two major considerations came up that I wish to share with you. First, the department feels that there is a need to ensure adequate advising to neuroscience students in the Behavioral and Cognitive Neuroscience track. As you know, Psychology is one of the largest majors on campus, and as such our departmental advising staff is already stretched to the limits. The addition of new advisees through the NEUR major would further strain these already limited resources. We therefore appreciate the inclusion of additional advising staff in the budget for the psychology department. This is a much needed resource for ensuring that NEUR majors receive strong advising and without there being a concomitant negative impact on PSYC majors.

Second, the department felt strongly that in order to create a truly exceptional educational program, adequate resources needed to be provided to support the increased teaching demands in Behavioral and Cognitive Neuroscience within Psychology. The proposed PTK and T/TT hires for Psychology included in the proposal are essential resources for Psychology to participate in this major. Without a sustained commitment to our hard budget, Psychology would be unable to participate.

In closing, I want to reiterate our enthusiastic support for this excellent proposal. I also want to thank you for your hard work in bringing this new major to fruition.

Sincerely,

A handwritten signature in black ink that reads "Michael Dougherty".

Michael Dougherty
Chair, Department of Psychology
University of Maryland

9/28/2018

Cc: Dr. Katherine Russell, Associate Dean for Undergraduate Studies, BSOS

Katherine Ford Russell <krussell@umd.edu>



Neuroscience Major & PHIL courses

Samuel J. Kerstein <kerstein@umd.edu> Wed, Aug 8, 2018 at 11:25 AM To: Katherine Ford Russell <krussell@umd.edu>

Hi Katherine,

I've heard back from my colleagues. PHIL 209N is an I-course, and it will be taught regularly (once an academic year). Neuroscience majors would, of course, be welcome to take it. But, as many I-courses do, it fills up quickly. PHIL 280 has not been taught in the past several years. It featured in a previous general education regime, and there are no immediate plans to revive it. But there is a course that is taught regularly that might fit in well with the Neuroscience major: Phil 366, "Introduction to Philosophy of Mind." I've attached the syllabus in case you'd like to take a look. Neuroscience majors would be welcome to take it.

Best, Sam

Samuel Kerstein, Professor and Chair, Dept. of Philosophy University of Maryland, 1125 Skinner Building
4300 Chapel Lane, College Park, MD 20742

kerstein@umd.edu; 301-405-3119
<http://faculty.philosophy.umd.edu/SKerstein/>

Neuroscience and KNES Courses

----- Forwarded message -----

From: **Colleen M. Farmer** <cfarmer@umd.edu>

Date: Wed, Aug 29, 2018 at 10:16 AM

Subject: NEUR PCC Proposal

To: Katherine Ford Russell <krussell@umd.edu>

Cc: Bradley D. Hatfield <bhatfiel@umd.edu>, Stephen M. Roth <sroth1@umd.edu>

Dear Katherine,

The KNES Department agrees to the NEUR PCC proposal listing the following KNES courses as possible electives for the new NEUR major.

Once the NEUR major gets underway KNES/SPHL can work with NEUR on available seats in these courses on a semester-by-semester basis. We cannot commit to seat availability in any given semester or course until closer to the time.

KNES370- Motor Development
KNES385- Motor Control and Learning
KNES462- Neural Basis of Human Movement
KNES498C - Exercise and Brain Health

We are pleased to be a part of the program and wish you the best.

Coke Farmer