

Curricular Affairs Committee of the Faculty Senate

MEMO

To: The UVM Faculty Senate

From: Curricular Affairs Committee of the Faculty Senate, Colby Kervick, Co-Chair

Date: November 4, 2021

Re: Approval of a proposal from the College of Arts and Sciences for a new BA in Neuroscience

On November 4, 2021, the Curricular Affairs Committee unanimously approved the actions recommended in the following memo.

The Curricular Affairs Committee approved a proposal from the College of Arts and Sciences for a new Bachelor of Arts degree in Neuroscience. On September 8, 2021 the proposal received unanimous approval from the CAS curriculum committee and on September 14, 2021 the CAS faculty also voted to approve it. Zero public comment was received during the 30-day circulation of the proposal.

Program Description and Rationale

Neuroscience is the study of the nervous system and how it functions and regulates behavior. Often described as one of the “last frontiers”, neuroscience is an exciting and challenging interdisciplinary field in which scientists share a common interest in studying the anatomy, physiology, and function of the nervous system. Psychology and Biology have been the traditional disciplines that share this interest, but the interdisciplinary nature of neuroscience also requires understanding of a broad range of methods of inquiry from fields such as Communication Sciences, Physics, Computer Science and others. In 2010 a Bachelor of Science (B.S.) in Neuroscience was created that includes five departments (Biology and Psychological Sciences (Primary), Communication Sciences and Disorders, Neurological Sciences, and Pharmacology) in three academic units (CAS, COM, and CNHS). This program has grown to be one of the largest majors in CAS. In 2016 they began offering a minor in Neuroscience and now propose to offer a B.A. degree to meet the needs of students wanting a well-rounded liberal arts experience.

Justification and Evidence for Demand

Currently, a large portion of the students earning a B.S. in Neuroscience from UVM go on to jobs outside of academia or the medical field. As such, they do not require the immersion in Neuroscience that a B.S. degree entails. Students pursuing a Neuroscience degree for one of many alternate career paths would be better suited to have a more well-rounded curriculum in the humanities and social sciences as would be offered by the B.A. curriculum. We feel there will be a draw of students into the B.A. as they pursue alternative careers utilizing their neuroscience foundation.

Relationship to Existing Programs

The curriculum emphasizes the study of a broad base of neuroscience knowledge and an appreciation of the interconnectedness of related disciplinary fields. The B.A. will complement the current B.S. but will require fewer upper-level electives to allow/encourage students to explore the liberal arts with a minor or double major. It will not impact the on-going Ph.D. or Accelerated Master’s programs in Neuroscience.

Curriculum

The proposed B.A. curriculum encompasses the same fundamental and foundational courses as the B.S. so

decision between the B.S. and the B.A. does not need to happen within the first 3-4 semesters. The B.A. curriculum utilizes the same upper-level electives as the B.S. but requires that only three instead of six electives be taken. The B.A. also differs from the B.S. in requiring one instead of two semesters of calculus and not requiring the one-credit lab for Exploring Neuroscience (NSCI 112); independent research electives allowed in the B.S. (NSCI 198/298 and HON 281/282) are not included as electives for the B.A.

Fundamental Courses

Number	Name	Credits
PSYS 001	Introduction to Psychological Science	3
CHEM 031 & 032	General Chemistry I & II	8
CHEM 042	Introduction to Organic Chemistry	4
MATH 019 or 021	Fundamentals of Calculus I or Calculus I	
Select one of the following Biology Options:		4 – 8
<i>Option A (recommended)</i>		
BCOR 011	Exploring Biology	
BCOR 012	Exploring Biology	
<i>Option B</i>		
BCOR 021	Accelerated Biology	
<i>Option C</i>		
BIOL 001	Principles of Biology	
BIOL 002	Principles of Biology	

Foundations Courses

Number	Name	Credits
NSCI 111	Exploring Neuroscience	3
BCOR 101	Genetics	3
PSYS 053	Psychological Research Methods I	3
PSYS 054 or STAT 141	Psychological Research Methods II or Basic Statistical Methods	3 – 4
<i>Select one of the following:</i>		3
PSYS 111	Learning, Cognition & Behavior	
PSYS 115	Biopsychology	
CSD 281	Introduction to Cognitive Neuroscience	

Advanced Core Neuroscience Courses

Number	Name	Credits
NSCI 270	Diseases of the Nervous System	3
<i>Three courses of Neuroscience electives, with at least one from each of the following categories:</i>		
<i>Category A</i>		3 – 8
CSD 101	Speech and Hearing Science	
CSD 208	Cognition and Language	
PSYS 211	Learning	

PSYS 212	Cognition	
PSYS 213	Motivation	
PSYS 214	Advanced Cognitive Neuroscience	
PSYS 215	Physiological Psychology	
PSYS 218	Hormones and Behavior	
PSYS 220	Behavioral Genetics	
PSYS 252	Emotional Development & Temperament	
<i>Category B</i>		3 – 7
BIOL 108 or BCOR 103	Molecular and Cellular Biology	
BIOL 261	Neurobiology	
BIOL 266	Neurodevelopment	
NSCI 222	Cellular Neurophysiology	
NSCI 225	Human Neuroanatomy	
NSCI 255	Neuroregeneration	
NSCI 280	Glia: Not Just Neuron Glue!	
PHRM 201	Introduction to Pharmacology	
PHRM 290	Topics in Molecular and Cellular Pharmacology	
PSYS 216	Psychopharmacology	

- Additional courses may be accepted as Advanced Course Options with prior approval from the Neuroscience Director.
- NSCI 3XX courses may be accepted as Advance Course Options with prior approval from the Neuroscience Directors. These courses are often open to upper-level undergraduate students with instructor permission.

The major requires approximately 49 credits (depending on the options taken this would be as low as 46 or as high as 58), which leaves ample room for core liberal arts studies, dual degrees, and minors. The only restriction on students in this program is that they may not double major with a Psychological Sciences B.S. degree.

Admission Requirements and Process

There is no supplemental application process for the Neuroscience program (either the B.A. or B.S.) other than application to CAS. All CAS students must maintain a 2.0 GPA to graduate.

Anticipated Enrollment and Impact on Current Programs

The hope is that a B.A. degree in Neuroscience will bring new students into UVM; however, it is more likely that a proportion of the current B.S. majors will switch to the B.A. once offered since it may better align with their future directions. There are >60 declared majors in the B.S. program each year, and it is thought that half and up to two-thirds may elect the B.A. over the B.S. There could potentially be a draw of students from the Biology and Psychology B.A. programs as well. As these are large programs it is unlikely to be detrimental to their programs as this also happened when the B.S. was originally created.

Advising

Advising of Neuroscience B.S. majors is currently performed by a first-year advisor and seven faculty from Biology and Psychological Sciences. Since it is imagined that there will mostly be a redistribution of the same students the same advising structure will work. If the majors continue to grow, Dean Falls has agreed to work with the program to provide additional advising.

Assessment Plan

Program Outcomes:

Upon completion of the BS degree, students will be able to:

- Outcome 1: Understand core concepts, methodologies, empirical findings and their interpretations in neuroscience.
- Outcome 2: Neuroscience is an interdisciplinary field. Students should understand core concepts from related fields and their relevance to neuroscience and synthesize information and knowledge across disciplines.
- Outcome 3: Demonstrate an understanding of the scientific process in neuroscience, including methodologies, data analysis and interpretation and science communication, based on direct experience.

The B.A. will be incorporated into the Neuroscience Program's assessment plan which runs on a three-year cycle and includes both direct and indirect assessment components of the three outcomes above.

Direct:

- Evaluation of 5 – 10 papers from the capstone NSCI 270 course;
- Short quizzes designed to assess the accuracy and depth of understanding of the core concepts, methodologies, empirical findings and their interpretations, as well as the broader implications of these findings **or** designed to assess the accuracy and depth of understanding of the core concepts, methodologies, empirical findings and their interpretations, as well as the broader implications of these findings in the capstone NSCI 270 course;
- Evaluate 5 – 10 research project proposals and the associated completed papers from students enrolled in NSCI 198, Independent Research;
- Review a sample of the presentations given in the capstone NSCI 270 course;

Indirect:

- Survey graduating majors
- Survey alumni every 3 years
- Survey faculty in the program

Results will be shared with the Steering Committee as well as Chairs and Faculty in the associated Departments.

Staffing Plan, Resource Requirements, and Budget

The Program Director, Associate Director, the steering committee, and the Chairs of Biology, Communication Sciences, and Psychology will review the program yearly to determine if the program needs are being met and if the program is negatively impacting the resources of the supporting departments and to make adjustments as appropriate. Currently, secretarial support is provided by the department of Biology for 15% of one staff member. As the university shifts to a shared services plan, we anticipate additional assistance would be provided. This would be welcomed given the size of the program. The College of Arts and Sciences has provided the Neuroscience program with a first-year advisor. This support is anticipated to continue and will include the B.A. students.

New space will not be required above what is already being utilized for the Neuroscience B.S.

As nothing new is being proposed, it is anticipated that the current budget for the program is sufficient to support both the B.S. and the B.A.

Evidence of Support

Letters were received from:

- Jom Hammack (Assoc Director of the Neuroscience Program)
- Tony Morielli (Director of the Neuroscience Graduate Program)
- Alison Brody (BCOR Director)
- Don Stratton (BCOR Director)
- Matthias Brewer (Chemistry Chair)
- Jianke Yang (Mathematics Chair)
- Jeffrey Buzas (Statistics Program Director)
- Bryan Ballif (Biology Chair)
- John Green (Psychological Sciences Chair)
- Micahel Cannizzaro (Communication Sciences and Disorders Chair)
- Greg Holmes (Neurological Sciences Chair)
- Margaret Vizzard (Vice Chair for Education, Neurological Sciences)
- Mark Nelson (Pharmacology Chair)
- Bill Falls (CAS Dean)

Summary

The Bachelor of Arts in Neuroscience is proposed to complement the currently existing and popular Bachelor of Science degree. The specific goal is to provide a comprehensive introduction to neuroscience content and the skills needed for post-graduation career options including graduate study, health professions, laboratory technician positions, and science writing. Course requirements are divided into three major groups of courses: Fundamental Ancillary courses during the first year are similar to those typical of a life science major and include Biology, Chemistry, Calculus and Psychology. The Foundational Group of courses, including Exploring Neuroscience, Genetics, Research Methods and statistics, and a core course in Cognition introduce the field of neuroscience and important background knowledge that are prerequisites for more advanced courses. These courses are intended to facilitate the development of critical thinking, problem-solving and data analysis skills and to introduce the student to methods of inquiry that are key to basic and applied areas of neuroscience (e.g., experimental design and statistics). The student takes three courses of from the Advanced Core of the Neuroscience major with courses required in each of the cellular/molecular and behavioral/cognitive disciplines and the senior capstone course Diseases of the Nervous system. The major requires 49 credits, which leaves ample room for core liberal arts studies, minoring or even double majoring.

If approved by the Faculty Senate and the Board of Trustees, the new Bachelor of Arts degree in neuroscience would go into effect during the 2022-2023 catalog year.