

The Curriculum Committee introduces the following motion:

That Skidmore College create a Neuroscience Major to replace the current Biology-Psychology interdepartmental major, which will be deleted (effective 8/31/03) if this motion is passed.

Brief Rationale:

Neuroscience is an interdisciplinary area of study that represents a fertile intersection of interests between Biology and Psychology, as well as other disciplines. In a response to both student interest and increased interactions among researchers in Biology and Psychology, the two departments seek to create a new major that emphasizes these interdisciplinary interactions to a greater extent than is possible with the current Biology-Psychology interdepartmental major.

We anticipate a Faculty vote on this motion at the May meeting. For a more extensive rationale and other relevant information, please read the remaining pages of this document.

Proposal for an Interdisciplinary Neuroscience Major

Introduction

The Department of Psychology and the Department of Biology propose the evolution of our current Biology-Psychology joint major into an integrated, interdisciplinary Neuroscience major. Neuroscience is the scientific community's effort to understand the mechanisms that give rise to thoughts, motives, and behavior. Neuroscientists investigate the connections between events that occur at the subcellular level and the behavior of the whole organism. Addressing the fundamental questions of neuroscience requires the collaboration of specialists in diverse fields. Thus, although neuroscientists specialize in one particular discipline, they need to be cognizant of many related areas. Our neuroscience major will be cross-disciplinary and taught primarily by professors in the biology and psychology departments.

The curriculum that we propose draws upon existing faculty and facilities, along with long standing and recently developed courses, and comprises a suite of research-based experiences in which students will participate in scientific inquiry and actively integrate material across scientific disciplines. Such an approach is in keeping both with Skidmore's traditional and distinctive emphasis on interdisciplinary approaches and with the current trend toward dissolution of sharply defined boundaries among scientific disciplines. Creative interplay and truly exciting science often take place where previously distinct methodologies and ideas interact — it is here that new paradigms and syntheses are born. In our new interdisciplinary Neuroscience major, our students will participate in this excitement.

Mission Statement and Goals

1. Students will engage in broadly based study of the nervous system. This study will be multidisciplinary, integrating the perspectives of biology, psychology, and related sciences.
2. Students will develop a foundation in concepts, issues, discoveries and methodological approaches to the interdisciplinary endeavor of neuroscience.
3. Students will discover how approaches from different neuroscience subdisciplines complement one another and how the findings can be integrated to provide a more global understanding of the functioning of the nervous system.
4. Students will gather, analyze and interpret scientific data and summarize and communicate empirical results; this process will enhance their familiarity and facility with scientific methodology.
5. Students will develop their verbal, quantitative and writing skills.
6. Students will focus in a subfield of neuroscience, and may conduct research with faculty members.
7. Students will gain experience in integrating and synthesizing data, develop a broad background in the sciences and humanities, and acquire skills adaptable to a wide variety of areas and interests. The major will prepare students for career paths that include graduate school, the health professions, research and clinical work.

Curriculum

Requirements of the Major

To fulfill the major, students must complete the following:

a. Gateway course:

NS 101 (Neuroscience: Mind and Behavior)

b. Foundation courses:

CH 105 (Chemical Principles I)

BI 233 (Cell and Molecular Biology)

BI 236 (Comparative Vertebrate Physiology)

PS 217 (Statistical Methods in Psychology I)*

PS 306 (Experimental Psych)* or PS 304 (Physiological Psych)

c. Integrative course:

NS 277 (Integrative Seminar in Neuroscience Research) Taken upon completion of NS 101 and at least two foundation courses, but before initiation of research projects.

d. Elective courses:

Students must take four courses from the following list of electives. No more than three courses taken in one department will count toward the major.

BI 306 (Mammalian Physiology)

BI 311 (Biological Electron Microscopy)

BI 316 (Animal Behavior)

BI 323 (Developmental Biology)

BI 324 (Evolution)

BI 326 (Behavioral Genetics)

BI 344 (Biological Clocks)

BI 351 Neuroendocrinology (New course, Marc Tetel)

LS 202 (Psychoactive Drugs: Scientific & Social Context)

PS 213 (Hormones & Behavior)

PS 231 (Neuropsychology)*

PS 304 (Physiological Psychology)**

PS 306 (Experimental Psychology)**

PS 312a (Seminar in Cognitive Neuroscience)

PS 312b (Seminar in Neuropsychology of Perception & Attention)

*The pre-requisite of PS 101 (Introduction to General Psychology) is waived for Neuroscience majors taking these courses

**unless taken to fulfill the Foundations requirement, see B

e. Tutorial project

Students are encouraged to undertake a tutorial project (PS 375, 376: BI 375). Successful completion of a research tutorial is required for consideration for Honors.

Advice on Choosing Electives:

Students' choices of electives (within and beyond the requirements specified by the Neuroscience Major) will be influenced by individual interests and professional goals. For example, in the foundation course Chemical Principles I (CH 105), students are introduced to fundamental concepts necessary for understanding molecular mechanisms in the neurosciences; students wishing to deepen this understanding and pursue advanced biobehavioral studies will be advised to take additional courses in Chemistry. Similarly, students wishing to focus on Cognitive Science or Cognitive Neuroscience will be advised to pursue

interdisciplinary courses in cognitive processes, additional electives in Psychology, or electives in related disciplines including Philosophy and Anthropology. Students interested in Premed and other Health Professions should consult with the HP Advisory Committee for guidance in selecting options.

Rationale for Curriculum

The Neuroscience major is comprised of a gateway Neuroscience course (taught by staff from either the Psychology or Biology Department), a group of foundation courses, an integrative seminar course, and a selection of upper level electives and tutorial projects chosen in consultation with a student's advisors in Psychology and Biology and based upon a student's interests and professional goals.

As detailed in *Course Descriptions* of the full proposal, NS 101, the proposed gateway course for the major, fully integrates biological and psychological approaches to the study of the nervous system and behavior and constitutes a multidisciplinary introduction to Neuroscience.

In the foundation courses Cell and Molecular Biology (BI 233), Comparative Vertebrate Physiology (BI 236), Statistical Methods in Psychology 1 (PS 217) and either Experimental Psychology (PS 217) or Physiological Psychology (PS 304), students explore, at different organizational levels and from both psychological and biological perspectives, concepts, issues and discoveries necessary to understand the context for and substance of Neuroscience. In so doing, students also apply methods of critical inquiry within the discipline, and develop skills for upper level coursework and research tutorials. Based upon past successful experience with Biology-Psychology joint majors, Neuroscience majors will have the prerequisite of PS 101 waived by the Psychology department for the foundation courses PS 217 and PS 306. In the foundation course Chemical Principles I (CH 105), fundamental concepts of chemistry necessary for understanding molecular mechanisms in the neurosciences are introduced.

Integrative Seminar in Neuroscience Research (NS 277) will bring Neuroscience students and faculty together at the point when students are beginning directed studies in the form of coursework and research tutorials at the advanced level. Students will analyze and critique research papers, hear from Skidmore's neuroscience faculty first-hand accounts of investigations in Neuroscience, and develop their skills in identifying research questions and constructing experimental approaches. They will observe the complementary nature of different approaches to neuroscience, and discuss how the various methodologies and findings can be integrated to provide a fuller understanding of nervous system function. Finally, through a series of upper-level electives chosen based on each student's interests and aspirations, students will focus upon a sub-field of Neuroscience, and will have the option of conducting research in Neuroscience with faculty members in various departments.

This major is characterized by rigor, breadth, and integration as students develop a foundation in Neuroscience, and by the flexibility to pursue a variety of interests at the upper level. Throughout their studies in the major, students will gather, analyze and interpret scientific data and communicate empirical results. Through this process, they will develop analytical skills and gain experience in oral and written communication. In conjunction with their all-college studies, Neuroscience majors will develop a broad background in the sciences and humanities, acquire skills adaptable to a wide variety of areas and interests, and prepare themselves for a wide variety of career paths that include graduate school, the health professions, research and clinical work.