



Academic Review Committee Request Form: New Program

ARC Use Only:
ARC #: _____
Program ID: _____
Status: _____
(A=Approved, I=Information Item, R=Returned)
Date rec'vd by ARC: _____

Please submit the ORIGINAL of this request form and supporting documents (along with an electronic version) to your unit ARC representative, who will deliver them to the Academic Review Committee.

SECTION A: Program Information

Program Title: Neuroscience (minor)

Originator(s) of the Proposal: Joseph Cataliotti, Naseem Choudhury, Chris Reich

Proposal Date: 10-5-14

School(s): SSHS Convening Group(s): Psychology

Please attach a description of the proposed program, and all supporting documentation including the Provost's pre-approval.

SECTION B: Approvals

Reviewed and Approved by:

Title	Print name	Sign	Date
Convener (if a convening group exists)			
Graduate Council Chair			
School Curriculum Committee chair			
Dean			

ARC Disposition:

- Information item only - no ARC approval necessary¹
- ARC recommends approval by the Faculty Assembly
- ARC does NOT recommend approval by the Faculty Assembly

ARC Chair: _____ Date: _____
print & sign

The ARC recommends the following:

Office of the Provost Use Only:

Approved Not Approved Provost Signature _____ Date: _____

¹ Only applies to non-credit-bearing certificate programs

Checklist: Proposals for New Programs

Submit the following items along with this checklist. If an item is subject to approval in *only* one phase (feasibility or curricular), that information is indicated in parentheses. If an item applies *only* to a particular type of program, that information is also indicated in parentheses. Certificates developed by or affiliated with CIPL use CIPL's forms and items, but if they are credit-bearing certificates they will also need an ARC form.

1. Feasibility Phase:

- Program proposal
 - Program summary, objectives, and cooperative arrangements (if any)
 - Program's impact on the College's other programs, including the undergraduate curriculum if the proposed program is a graduate program
 - Program's need
 - If the program is in the liberal arts/sciences, indicate student demand and opportunities for further education if appropriate; if the program is career-oriented/professional, indicate student demand and labor market need, provide employer surveys, and describe opportunities for employment and advanced/additional study.
 - Alignment with the Strategic Plan
 - Comparison with similar programs in the State and neighboring states
 - Program's anticipated enrollment from launch to optimal level
 - Additional resources needed for the first five years
- Program budget (graduate program only)

Feasibility approval: Provost's signature: _____ Date: _____

Upon approval by the Provost of the Feasibility Phase, include this signed form with the package for the Curricular Phase. Ensure all materials included in the Feasibility Phase are also included.

2. Curricular Phase

- Program proposal form with all signatures
- Program proposal –documents required in addition to those provided in the Feasibility Phase
 - Program assessment
 - learning goals/outcomes
 - direct and indirect measures
 - assessment process
 - alignment of program outcomes to all-college goals/outcomes (undergraduate programs only)
 - alignment of program outcomes to program courses
 - Program's relationship to:
 - College's mission (check those that apply)

<input type="checkbox"/> Interdisciplinary learning	<input type="checkbox"/> Diversity/Inclusiveness
<input type="checkbox"/> Experiential learning	<input type="checkbox"/> Sustainability
<input type="checkbox"/> International understanding	<input type="checkbox"/> Student engagement
<input type="checkbox"/> Intercultural understanding	<input type="checkbox"/> Community involvement
 - College's Strategic Plan
 - School's mission and/or goals
 - Degree requirements
 - Course titles, descriptions, and credits
 - Course sequencing
 - Distinction between required and elective courses
 - Number of credits for the entire program, including general education (undergraduate program only)
- Consultant's CV (for state review only) (majors and graduate programs only)

Curricular phase: Materials (checklist, ARC form, all proposal documents) received by ARC: _____ (date)

Date: Mon, 06 Oct 2014 13:46:59 -0400

From: Beth E Barnett <bbarnett@ramapo.edu>

Subject: Re: minor in neuroscience

To: jcatalio@ramapo.edu

Cc: trakotob@ramapo.edu, sjrosenb@ramapo.edu, jcapizzi@ramapo.edu

Joe

I am recommending that the proposal for the minor in neuroscience be moved forward for review by the unit curriculum committee, the dean, and ARC.

Before I receive a recommendation and the updated proposal from ARC, I would like to find student learning outcomes that can be achieved by all students within the minor, more concrete data supporting student interest in this minor, and potential impact on the psychology major included within the proposal.

Thank you

Beth

Beth E Barnett
Provost and Academic Vice President
Ramapo College of New Jersey
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Mahwah, NJ 04730
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bbarnett@ramapo.edu

Proposal for a Neuroscience Minor Program

Program summary, objectives, and cooperative arrangements (if any)

The Minor in Neuroscience will help our students understand how the wider neuroscience community investigates the nervous system and how it produces behavior, in the widest sense of that term. In a sense we will have our students explore the mystery of consciousness within the context of the liberal arts/interdisciplinary focus of our institution.

Students will gain an in depth understanding of the organization of the nervous system in terms of its anatomy and physiology. Topics include vertebrate anatomy and physiology, molecular structure of the neural system, primate developmental neurobiology and comparative neural anatomy and physiology. By exploring these areas of knowledge student will gain an appreciation of and fluency with multiple levels of analysis and study of the nervous system (e.g., molecular, cellular, systems, behavioral and cognitive neuroscience levels).

Students will gain a basic understanding of the interaction between neural structure and function by exploring the brain's relation to behaviors such as motor control, basic sensory processes (e.g., audition, proprioception, and vision), higher cognition (e.g., attention, memory, learning and language) and emotional processing. Major theories of brain-behavior relations will be studied. Several of these topics include behavioral neuroscience and learning, cognitive neuroscience, sensation and perception.

Students will develop fluency into multiple levels of empirical analysis and converging methodologies in the research and study of brain and behavior. The minor will allow student to gain a basic understanding of the methodology and current technology used to investigate phenomena from the molecular to complex behaviors. A critical analysis of the reliability, efficacy and validity of current methods will be employed to engage students in developing in depth knowledge of the state of primary neuroscience research on specialized and advanced neuroscience topics. Students will also have an opportunity to perform neuroscience research with faculty members.

Students will develop an understanding of the role of the brain in the behavior of atypical populations, in comparison to typical populations. In depth investigation of the assessment techniques and methods used in neuropsychological research will be presented so that students have an understanding of the typical assessment tools and procedures used for diagnosing and treating neurologically based disorders (such as dyslexia, ADD, ASD, cerebral palsy, Parkinson's disease, dementia, stroke).

Furthermore, students will also gain an appreciation of the interdisciplinary nature of neuroscience and the study of mind, brain, and behavior. Students will be encouraged to seek new insights by integrating across subject areas that have traditionally been studied separately (e.g. psychology, philosophy, public health, anthropology and art/literature). Students will explore the relation between brain, mind and behavior, and the boundaries between typical and atypical behaviors and the association between the mind, brain and conscious and unconscious behavior as presented in these areas. Students will be encouraged to use a broad ecological perspective to contextualize findings from current neuroscience research.

Program's impact on the College's other programs:

The Neuroscience minor is designed to augment majors and will not negatively impact other programs. The minor consists of courses already offered in Psychology, Biology and Chemistry, and we believe will not require additional resources. There are students who intend to take the required courses for the minor by the time they graduate even if the minor is not offered.

Program's need/Student demand:

Student Survey

A request to complete a brief online survey, which included a description of the proposed neuroscience curriculum was recently sent to most of the Psychology and Biology majors. One hundred thirty-four students completed the survey.

Students were asked several questions, including:

Q1. How would you best describe your area(s) of study? You can check or fill-in all that apply.

#	Answer	Response	%
1	Psychology Major	86	65%
2	Psychology Minor	9	7%
3	Biology Major	46	35%
4	Biology Minor	3	2%
5	Other Major	7	5%
6	Other Minor	23	17%

Q2. Which of the following courses do you think you will complete by the time you graduate, even if there is no official minor in neuroscience?

#	Answer	Response	%
1	Introduction to Psychology (PSYC 101)	111	85%
2	Introduction to Biology (BIOL 101) or Fundamentals of Biology I (BIOL 110)	89	68%
3	Neuropsychology (PSYC 310)	37	28%
4	Cognitive Neuroscience (PSYC 353)	28	21%
5	Behavioral Neuroscience (PSYC 245)	36	27%
6	Perception (PSYC 209)	43	33%
7	Principles of Chemistry I (CHEM 115) or Bio-organic Chemistry Lec/lab (CHEM 205)	32	24%
8	Advanced Topics in Neuroscience and Philosophy (PSYC 430)	18	14%

Results: Many biology students report that they will complete Introduction to Psychology and many psychology students reported that they will complete an introductory level biology class. **Seventeen** students indicated that they will complete 5 of the required courses by the time they graduate even if the minor is not offered.

Q3. Based on the five course requirement for the minor in Neuroscience described above, would you minor in this program if it were available?

Results: Sixty-four students indicated that they would minor in the program if it were available.
(Note: A small number of people checked off more than one choice for example “maybe and “yes”)

#	Answer	Response	%
1	No	30	23%
2	Maybe	42	32%
3	Yes	64	48%

A cross-tabulation of the results from Q1 and Q3 shows more detail about those who indicated “YES.” Thirty-five of those who indicate they have a major in psychology and 29 of those who indicate they have a major in biology would minor in neuroscience if the program were available.

How would you best describe your area(s) of study? You can check or fill-in all that apply.							
	Psychology Major	Psychology Minor	Biology Major	Biology Minor	Other Major	Other Minor	Total
No	26 30.95%	2 22.22%	3 6.52%	1 33.33%	3 42.86%	6 28.57%	30 22.90%
Maybe	26 30.95%	3 33.33%	16 34.78%	0 0.00%	2 28.57%	7 33.33%	42 32.06%
Yes	35 41.67%	5 55.56%	29 63.04%	2 66.67%	3 42.86%	8 38.10%	63 48.09%
Total	84 100.00%	9 100.00%	46 100.00%	3 100.00%	7 100.00%	21 100.00%	131 100.00%

Several students have communicated their interest in the minor in unsolicited personal communications, for example after receiving the request to complete the survey the following emails were received:
(reprinted with permission)

Hi Professor Cataliotti,

I received the email asking about the proposal for a neuroscience minor. I'm currently a junior, and have already taken three of the classes that would count towards the new minor, and was planning to take one neuro class per semester while still at Ramapo. I was just wondering, if you do create the minor, do you know how soon it would be implemented? I'm excited about the possibility and would love to see a neuroscience minor here.

Thank you,
Alison Haight

Hello,

I just wanted to say I think the proposal of a Neuro minor would be absolutely amazing! I just transferred to Ramapo from Scranton University where I was a Neuro/Psych double major. There aren't a lot of schools that offer Neuro so it would be a great addition for the school! I really hope this request goes through! I know a bunch of people would be interested, and it would increase the amount of students who apply here! I was just wondering how soon it would be implemented if it passes?

Thank you,
Natali Taglic

Opportunities for further education

The Minor in Neuroscience will provide students with the capacity to bridge connections with advanced educational opportunities in several academic and professional areas. Academically these students will be trained as critically thinking empiricists capable of analyzing data generated from work in areas as diverse as psychology, biology, cognitive science, behavioral genetics, and neurophilosophy. This background will better enable students to apply to masters and doctoral level programs in all of these and related academic areas. The Neuroscience Minor will also better prepare students to apply to schools of medicine, dentistry, and veterinary medicine, as well as behavioral science and physical therapy.

Alignment with the Strategic Plan:

The minor in Neuroscience aligns with Goal 1 of the Strategic Plan, which states that minors offered at Ramapo will be one mechanism by which the College will seek to advance “*Academic Excellence and Engagement*.” The minor integrates coursework from two schools, TAS and SSHS, to provide students with an interdisciplinary study of the underlying processes motivating animal and human behavior in the realms of cognition and social-emotional behavior. This is examined in both typical and atypical populations as well as multiple contexts.

The minor also provides students with the opportunity to engage in a systematic evaluation of the role of neuroscience in influencing developments in the fields of medicine, psychology, criminology and education (amongst others). This critical examination, integration and synthesis is the hallmark of a liberal arts education.

Comparison with similar programs in the State and neighboring states:

Institutions in New Jersey with a Neuroscience (or similar) Major/Minor

Drew University (BA, Neurosciences)

Rider University (BS, Biopsychology)

Rutgers University, New Brunswick (BA, Cell Biology and Neuroscience)

Northeast Liberal Arts Institutions with a Neuroscience Major/Minor

Lafayette College	Muhlenberg College
Drew University	Vassar College
Smith College	Bates College
Middlebury College	Gettysburg College
Franklin and Marshall College	Haverford College
Bryn Mawr College	Washington College
St. Mary's College (COPLAC)	Trinity College
Wesleyan University	Amherst College
College of Holy Cross	Hampshire College
Stonehill College	Wellesley College
Bowdoin College	Colby College
Skidmore College	Colgate College
Hamilton College	Bucknell College
Albright College	Eastern Connecticut State, Contract Major (COPLAC)

Program's anticipated enrollment from launch to optimal level:

Based on our survey results we anticipate approximately 15 students will enroll immediately and there may be 35-40 students at the optimal level.

Additional resources needed for the first five years:

None

Program proposal form with all signatures

(see paper copy)

Program proposal –documents required in addition to those provided in the Feasibility Phase

Program assessment

Neuroscience Minor Learning Goals and Assessment

1. Understand core concepts in psychology, biology and chemistry, providing the basis for scientific study of the nervous system and its relationship to behavior and mental processes.

Assessment: Exams and Quizzes: Psyc. 101, Psyc. 352, Biol.. 101 or Biol. 110, Chem 115
Laboratory Exercises: Biol. 101 or Biol. 110, Chem 115

2. Appreciate the role of a liberal arts education to critically integrate and synthesize neuroscience within a larger cultural, social, historical and ethical framework.

Assessment: CEC in Psyc 101, 209, 352, 353, 430
Exams: Psyc 209, Psyc 430

3. Development of proficient scientific literacy and analytical skill to critically evaluate the scientific merit of original research and scientific dissemination by popular and social media.

Assessment: Laboratory Exercises: Biol.. 101 or Biol. 110, Chem 115
Term Paper: Psyc 352, Psyc 353, Psyc 430

4. Demonstrate effective communication about neuroscience in both written and oral form.

Assessment: CEC Psyc 352, 353, 430
Laboratory Exercises: Biol.. 101 or Biol. 110
Term Papers Psyc 352, Psyc 353
Exams: Psyc 209, Psyc 352, Psyc 353, Psyc 430
Presentations: Psyc 352, Psyc 353
Class Discussions Psyc 430

These direct measures of assessment are currently in use for all noted courses and are inclusive in the routine program assessments of the Psychology, Biology and Chemistry. An Assessment Plan for each academic year will be submitted early in the Fall semester for review by the School Assessment Committee, College Wide Assessment Committee, the Deans of SSHS and TAS and Vice Provost for Curriculum and Assessment. The Assessment will be executed across the Fall and Spring semesters with the final report submitted to the above listed groups and individuals. Assessment reports are due late Spring.

Alignment Program Goals to College Goals

College Goals	Neuro. Goal 1	Neuro. Goal 2	Neuro. Goal 3	Neuro. Goal 4
Interdisciplinary Analysis	x	x	x	x
Experiential learning	x	x	x	
Intercultural/International		x		
Critical Inquiry		x	x	x
Communication		x	x	x
In-depth knowledge	x		x	x
Understanding the world		x	x	x
Awareness				
Engagement				

Program's relationship to the College's mission and Strategic Plan, and the School's mission and/or goals:

Program's Relationship to College's Mission:

Ramapo College's mission states that it is dedicated to providing students with a strong foundation for a lifetime of achievement and that the college is committed to academic excellence through interdisciplinary and experiential learning, and international and intercultural understanding. *Interdisciplinary* education is foundational to a minor in Neuroscience, as is a liberal education as defined by the AACU. The minor also reflects the value of *student engagement* by specifically offering course that are "characterized by critical examination, analysis, reflection, and problem solving".

Strategic Plan:

Goal 1 of the Strategic Plan seeks to “Advancing Academic Excellence and Engagement” through its General Education, major and free-standing minors programs. A minor in Neuroscience aligns with the strategic plan by integrating coursework from two schools, TAS and SSHS, to provide students with an interdisciplinary study of the human experience.

School of Social Science and Human Service’s Mission:

The minor addresses several of the goals embedded within SSHS’s mission, including *creating an interdisciplinary learning environment, using social science perspectives* to understand the study of mind, behavior and brain, and *engaging students in critical thinking about enduring and emerging issues* within the study of psychology, brain, and behavior.

Curriculum for the Neuroscience Minor – 5 Courses Total*

Required Courses (these should be completed first and may be prerequisites for some of the electives):

1. Introduction to Psychology (PSYC 101)
2. Introduction to Biology (BIOL 101) or Fundamentals of Biology I (BIOL 110)

Select at least 3 additional courses from this list:

Neuropsychology (PSYC 310)

Cognitive Neuroscience (PSYC 353)

Behavioral Neuroscience (PSYC 352)

Perception (PSYC 209)

Principles of Chemistry I (CHEM 115) or Bio-organic Chemistry Lec/lab (CHEM 205)**

Advanced Topics in Neuroscience and Philosophy (PSYC 430)**

*At least 1/2 of the courses fulfilling the minor must be distinct from the student’s major. That is, three of the five courses required for a minor cannot be used towards fulfillment of major requirements. A school core does not need to be completed for a minor. Minors are open to students regardless of school affiliation.

**These courses may also be counted for the minor however they include additional prerequisites

Course Descriptions:

Intro To Psychology (PSYC 101): An introduction to psychology as a field of study and practice. The history, methods, and scope of psychology will be explored. Topics will include learning, perception, cognition, emotion, motivation, abnormal behavior, psychotherapy, social behavior, personality, development across the lifespan, and the biological bases of thought, feeling, and action.

Prerequisites: None

Introduction to Biology (BIOL 101): This course examines the development of biology as a science from the ancient world to the present. The course will examine unifying principles of biology such as genetic/evolutionary theory as central themes of modern biology. Representative organisms will be used to illustrate how organisms, using basic plans found widely in nature, are adapted to their environment. This course will emphasize biological science as a process for gaining information about the natural world using the techniques and understanding of 21st century science. Individual course sections may focus on aspects of biology such as biodiversity or human anatomy and physiology.

Course Attributes: GE-SCIENCE W EXPERIENTIAL

Prerequisites: None

Fundamentals of Biology I Lec & Lab (BIOL 110): An introduction to the principles of biological science. This first semester of a two-semester sequence will cover the cell from its chemical composition, structure, and function to the nature of information coding and transmission. This course also surveys the major phyla of animals, plants and fungi. Three hours of lecture and four hours of recitation/laboratory. Required for some science majors. NOTE: Dissection of plant or animal material is carried out in the laboratory portion of this course. Please refer to the Student Handbook for the College's dissection policy.

Course Attributes: GE-SCIENCE W EXPERIENTIAL, WRITING INTENSIVE

Prerequisites: Must have at least D in [CRWT 102 - CRITICAL READING & WRITING II](#) This course can be taken concurrently

Neuropsychology (PSYC 310): This course is designed to introduce the student to the field of clinical neuropsychology. This course will review the anatomy and basic function of the brain, particularly that of the cerebral cortex. Major neuropsychological dysfunctions related to brain damage, as well as what neurological disorders can reveal about normal brain functioning, will be presented. Students will also gain an understanding of the typical assessment tools and procedures used for diagnosing neuropsychological disorders. Fulfills Category 6. (Formerly Category 2)

Prerequisites: (Must have at least D in [CRWT 102 - CRITICAL READING & WRITING II](#) This course cannot be taken concurrently AND Must have at least D in [PSYC 101 - INTRO TO PSYCHOLOGY](#) This course cannot be taken concurrently)

Cognitive Neuroscience (PSYC 353): This course will be concerned with how brain activity and structure support cognitive processes. We will discuss the findings of researchers who have applied advances in neuroscience to the investigation of cognition, perception, memory, language and other high level cognitive processes. There will be a focus on understanding the methods used in cognitive neuroscience. Historical and cutting-edge research will be explored. Implications within the larger context of the field of psychology will also be considered. Fulfills Category 6 requirement. (Formerly Category 3)

Prerequisites: (Must have at least D in [CRWT 102 - CRITICAL READING & WRITING II](#) This course cannot be taken concurrently AND Must have at least D in [PSYC 101 - INTRO TO PSYCHOLOGY](#) This course cannot be taken concurrently)

Behavioral Neuroscience (PSYC 352): (FORMERLY: PSYC 245) An introduction to the biological bases of behavior. Topics will include: evolution and animal behavior; the brain and central nervous system; visual and auditory perception; and brain behavior relationships (neural regulation of hunger, sleep, consciousness, aggression, sex, and drug action). Also discussed will be ethical issues in brain control. Fulfills Category 6 requirement. (Formerly Category 3)

Prerequisites: Must have at least D in [PSYC 101 - INTRO TO PSYCHOLOGY](#) This course cannot be taken concurrently

Psychology Of Perception (PSYC 209): The study of perception is one of the oldest areas of psychological speculation and research. It raises many interesting questions about mind, reality, truth and aesthetic experience. We will approach the study of perception historically by showing how it developed in parallel within philosophy, science and art, with each approach providing important insights for the

other. Our basic question will concern the relations that exist between descriptions of the physical world, our brain, and our experience. We will investigate what modern research has to say about the ways in which we experience color, object, space, motion and event perception. Aspects of the visual arts will be discussed in this context, both as employing perceptual principles and helping to reveal them. Fulfills Category 2 requirement. (Formerly Category 3)

Prerequisites: Must have at least D in [PSYC 101 - INTRO TO PSYCHOLOGY](#) This course cannot be taken concurrently.

Principles of Chemistry I Lec/lab (CHEM 115): Principles of Chemistry is a one semester course with lecture, recitation and laboratory experiences designed for students in the allied health fields. This course introduces the fundamental concepts of general chemistry integrated with the essential features of organic and biological chemistry. Topics covered include atomic structure, the periodic table, molecular and intermolecular bonding, chemical reactions, the structure, properties and behavior of simple organic molecules, molecular features of carbohydrates, proteins and lipids. The relationship between molecular structure and macroscopic properties are emphasized. Radioactivity, its effects and uses in biological systems are briefly examined. Principles of physics are embedded in the course where appropriate. Lab Fee.

Course Attributes: GE-SCIENCE W EXPERIENTIAL

Prerequisites: None

Bio-organic Chemistry Lec/lab (CHEM 205): This 4-credit Lecture and Laboratory course offers a comprehensive introduction to basic modern organic chemistry. It will predominantly be of interest to students majoring in biology or bioinformatics who do not require the traditional 2-semester organic chemistry sequence. Therefore students who do not plan on applying to med-school or grad-school can take this course instead of the CHEM 210/212 sequence. This course will introduce students to the principles of organic structure and nomenclature, functional group chemistry and stereochemistry, providing the language and theoretical foundations of organic chemistry. Emphasis will be placed on the synthesis of organic molecules, including the conversion of one class or organic compound to another. In addition, the properties of these organic compounds will be discussed. Organic chemistry is a multifaceted science that is central to other related sciences including biology, biochemistry and medicinal chemistry. The middle part of the course will build on the general principles and will include details on the synthesis and reactions of alcohols, aromatic compounds, aldehydes, ketones, carboxylic acids and their derivatives and amines. In addition, the course will include sections determining structures of organic compounds using analytical techniques such as Infra-Red (IR) and NMR spectroscopy. The course will conclude with sections on carbohydrates, amino acids, proteins, lipids and nucleic acids, subjects closely related to biology and biochemistry. The co-requisite Laboratory will provide students with the required experiential component, where students will perform experiments that put into practice the ideas discussed in the Lecture. Lab Fee.

Prerequisites: Must have at least D in [CHEM 112 - FUND CHEM II LEC/LAB](#) This course cannot be taken concurrently

Advanced Topics Psychology (PSYC 430): NEUROSCIENCE AND PHILOSOPHY: Psychology, born from the disciplines of Philosophy and Physiology, has long sought to provide insight into the nature of the mind. Some of the classic questions include: What is the relationship between the mind and the body? Is the mind the same thing as the brain or is it something else? How can mere thoughts cause things to happen in a physical universe? Is it merely a delusion on our part to believe that our thoughts matter in the grand scheme of the universe? Recent progress in Neuroscience is profoundly altering our conception of how we think, feel, decide, love and even reproduce. Therefore, Neurophilosophy is a recent sub-discipline arising from the intersections of neuroscience, philosophy and psychology.

Prerequisites: All sections of PSYC 430 require PSYC 303/PSYC 304 as prerequisites; students must also have junior/senior academic standing.