NEUROSCIENCE AND BEHAVIOR

Overview and Contact Information
The program in neuroscience and behavior is intended for students with strong, integrative interests in both biological sciences and psychology and in the biological bases of behavior.

See Also
• Cognitive Neuroscience (http://catalog.mtholyoke.edu/areas-study/cognitive-neuroscience)

Contact Information
Renae Brodie, Chair
Dianne Baranowski, Academic Department Coordinator
105 Clapp Laboratory
413-538-2611
https://www.mtholyoke.edu/acad/neuroscience

Faculty
This area of study is administered by the Neuroscience and Behavior Committee:
Katherine Binder, William R. Kenan, Jr. Professor of Psychology
Renae Brodie, Professor of Biological Sciences
Gary Gillis, Professor of Biological Sciences; Associate Dean of Faculty; Director of the Science Center
Mara Breen, Associate Professor of Psychology and Education, Teaching Fall Only
Kathryn McMenimen, Associate Professor of Chemistry
Kenneth Colodner, Assistant Professor of Neuroscience and Behavior, Teaching Fall Only
Jared Schwartzer, Assistant Professor of Psychology and Education
André White, Assistant Professor of Biological Sciences, Teaching Fall Only
John Roche, Visiting Lecturer in Neuroscience and Behavior

Requirements for the Major
A minimum of 52 credits:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>NEURO-100</td>
<td>Introduction to Neuroscience and Behavior</td>
<td>4</td>
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<tr>
<td>CHEM-101</td>
<td>General Chemistry I</td>
<td>4</td>
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<tr>
<td>or CHEM-160</td>
<td>Integrated Introduction to Biology and Chemistry</td>
<td>4</td>
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<tr>
<td>CHEM-201</td>
<td>General Chemistry II</td>
<td>4</td>
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<tr>
<td>CHEM-202</td>
<td>Organic Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>MATH-101</td>
<td>Calculus I</td>
<td>4</td>
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<tr>
<td>PSYCH-204</td>
<td>Research Methods in Psychology</td>
<td>4</td>
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<tr>
<td>BIOL-200</td>
<td>Introductory Biology II: How Organisms Develop</td>
<td>4</td>
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<tbody>
<tr>
<td>NEURO-324</td>
<td>Cellular and Molecular Neuroscience</td>
<td></td>
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<tr>
<td>NEURO-395</td>
<td>Independent Study (4 credits)</td>
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<tr>
<td>BIOL-333</td>
<td>Neurobiology</td>
<td>4</td>
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<tr>
<td>BIOL-230</td>
<td>Molecular Genetics and Cell Biology</td>
<td>4</td>
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<td>A course in quantitative inference:</td>
<td>4</td>
<td></td>
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<tr>
<td>PSYCH-201</td>
<td>Statistics</td>
<td></td>
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<tr>
<td>or STAT-240</td>
<td>Elementary Data Analysis and Experimental Design</td>
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<tr>
<td>or STAT-242</td>
<td>Intermediate Statistics</td>
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Two of the following laboratory-based courses at the 300 level: 8

BIOL-307  Vertebrate Anatomy
BIOL-315  Behavioral Ecology
BIOL-321AD Conference Course: 'Addiction, Superior Memory, and Diseases of the Brain'
BIOL-328  Human Physiology
COMSC-334  Artificial Intelligence
COMSC-341NL Topics: 'Natural Language Processing'
NEURO-324  Cellular and Molecular Neuroscience
NEURO-395  Independent Study (4 credits)
PSYCH-340CL Laboratory in Perception and Cognition: 'Cognition and Literacy'
PSYCH-350  Lab in Biological Bases of Behavior:

A third 300-level course from the preceding list, or from the following: 4

BIOL-338  Evolution and Human Sexual Behavior
CHEM-312  Chemistry of Biomolecules
NEURO-331  Glial Cells in Health and Disease
PSYCH-349AM Seminar in Perception and Cognition: 'Art, Music, and the Brain'
PSYCH-349LT Seminar in Perception and Cognition: 'Language and Thought'
PSYCH-359CN Seminar: Biological Bases of Behavior: 'Clinical Neuroscience'

Total Credits 52

Additional Specifications
• Students planning postgraduate study in a related discipline or in medicine are urged to participate in independent laboratory research within either or both departments.
• Students who declare a neuroscience and behavior major automatically fulfill the College's "outside the major" requirement.

Course Offerings
NEURO-100 Introduction to Neuroscience and Behavior
Fall and Spring. Credits: 4
This comprehensive survey course explores the brain and the biological basis of behavior. We will examine the anatomy of the nervous system and the unique properties of the cells that make up the brain. We will discuss the mechanisms by which individual brain cells communicate with each other, and how small networks of cells underlie more complex processes such as perception, learning, and behavior. In labs, students will perform experiments that expand upon and reinforce these ideas through hands-on exercises.
Applies to requirement(s): Math Sciences
K. Colodner, J. Roche
Restrictions: This course is limited to first-year students.
Coreq: NEURO-100L.
NEURO-295 Independent Study
Fall and Spring. Credits: 1 - 4
The department
Instructor permission required.

NEURO-309 Topics in Neuroscience and Behavior
NEURO-309SP Topics in Neuroscience and Behavior: 'Synaptic Plasticity: Synaptic Mechanisms Underlying Learning and Memory'
Spring. Credits: 4
Much of what is currently known of memory is thought to involve synaptic modifications on both short and long time scales in a region of the brain called the hippocampus. This course will look at the experimental attempts to understand learning and memory. Students will utilize critical analysis of primary literature in order to gain a broad understanding of the historical underpinnings of the field as well as the most recent advances. Primary research papers will be analyzed and discussed, covering topics that include invertebrate memory models, long term potentiation in the mammalian hippocampus, synaptic tagging, and place cells of the hippocampus.
Applies to requirement(s): Math Sciences
Other Attribute(s): Speaking-Intensive
J. Roche
Prereq: NEURO-100 or BIOL-230.

NEURO-324 Cellular and Molecular Neuroscience
Not Scheduled for This Year. Credits: 4
This course will explore cellular and molecular mechanisms of nervous system development and function through lectures, laboratory exercises, and the critical analysis of primary literature. Topics include synapse formation and synaptic transmission, neuronal-glial interactions, the molecular basis of behavior, and applied genetic engineering techniques.
Applies to requirement(s): Math Sciences
K. Colodner
Prereq: NEURO-100 and BIOL-230 (or BIOL-220).
Notes: This course meets the 300-level laboratory-based course requirement for the Neuroscience and Behavior major.

NEURO-331 Glial Cells in Health and Disease
Fall. Credits: 4
This course will explore the "other" cells in your brain, the glial cells. While neuronal cells receive most of the attention, glial cells are now recognized as essential players in normal brain physiology. Through the critical analysis of primary literature, we will highlight recent advances in glial cell biology and discuss how the various glial cell subtypes (astrocytes, microglia, myelinating cells, etc.) contribute to the healthy and diseased brain. We will examine the glial contribution to a variety of disorders (e.g. multiple sclerosis, spinal cord injury, neurodegenerative diseases, etc.) as we cultivate a better understanding of these often overlooked brain cells.
Applies to requirement(s): Math Sciences
K. Colodner
Prereq: NEURO-100 and BIOL-230.

NEURO-395 Independent Study
Fall and Spring. Credits: 1 - 8
The department
Instructor permission required.