

# NEUROSCIENCE

## Neuroscience Interdepartmental Graduate Program

Work is offered for the master of science and doctor of philosophy degrees with a major in neuroscience. Cooperating departments include Animal Science; Biochemistry, Biophysics and Molecular Biology; Biomedical Sciences; Chemical and Biological Engineering; Chemistry; Ecology, Evolution and Organismal Biology; Food Science and Human Nutrition; Genetics, Development and Cell Biology; Kinesiology; Psychology; Veterinary Clinical Sciences; and Veterinary Diagnostic and Production Animal Medicine.

The diversity of faculty in the Interdepartmental Neuroscience major provides students with a variety of research opportunities and reflects the structure of contemporary neuroscience which has become a diverse and inter-disciplinary field. Facilities and faculty are committed to research in the following areas: neuronal membrane functions, signal transduction, neuroanatomy, neurodegenerative diseases, neuroendocrinology, neurotoxicology, neuropathology, developmental neurobiology, neurogenetics, computational neuroscience, neural networks, behavioral neuroscience, tissue engineering, neuroregeneration and brain repair.

Additional information about program faculty members is available at: [www.neuroscience.iastate.edu](http://www.neuroscience.iastate.edu) (<http://www.neuroscience.iastate.edu>).

An undergraduate or advanced degree in one of the basic or applied sciences is ordinarily a prerequisite for admission to the program. Typical program disciplines include majors in biochemistry, biology, biomedical sciences, human medicine, immunology, neurobiology, physiology, pharmacology, psychology, veterinary medicine, or zoology. Appropriate undergraduate coursework includes mathematics, chemistry, physics, and biological sciences. Prior research experience is highly encouraged. The submission of GRE General Test scores is required for admission.

Prospective students are admitted by the Neuroscience program following an internal application process and after review by the Neuroscience Admissions Committee. Students are admitted either to participate in research rotations with several faculty before deciding on a major professor and laboratory, or by direct admission into a specific lab and department. Ph.D. students typically enter via rotation and M.S. students typically enter via a direct admit. Those students entering through a rotation admit are required to complete a minimum of three research lab rotations with faculty of interest. At the end of their second semester students on rotation must select a major professor from the faculty participating in the program.

## Curriculum Requirements for Neuroscience Graduate Students

Ph.D. candidates majoring in Neuroscience must take at least 72 graduate credits. These 72 credits includes the below core course

requirements and applicable research credits earned. Credits taken during a student's M.S. program in Neuroscience at Iowa State University will count towards their Ph.D. in Neuroscience.

Students seeking an M.S. degree must take a total of 30 credits, with not less than 22 credits earned at ISU. M.S. students have the same core requirements as Ph.D. students.

Additional coursework for both Ph.D. and M.S. degrees is selected by the student in consultation with his/her POS Committee to meet departmental requirements and to satisfactorily prepare the student for their research project.

Graduate credits of B or better earned at another institution may be transferred at the discretion of the POS Committee and with the approval of the Neuroscience Program and the ISU Graduate College.

Additional information relating to credits required for graduate degrees can be found in the ISU Graduate College Handbook (<http://www.grad-college.iastate.edu/common/handbook>).

### All students majoring in Neuroscience are required to complete a core curriculum consisting of:

NEURO 556	Cellular, Molecular and Developmental Neuroscience	3
NEURO 557	Advanced Neuroscience Techniques	3
NEURO 661	Current Topics in Neuroscience <sup>Repeatable</sup>	2-3
NEURO 690	Journal Club in Neuroscience <sup>Taken every fall &amp; spring</sup>	1
NEURO 696	Neuroscience Seminar <sup>Taken every fall &amp; spring</sup>	1
NEURO 699	Research	arr †
BBMB 404	Biochemistry I	3
B M S 537	Neuroanatomy	3
STAT 587	Statistical Methods for Research Workers	4
MANDATORY ETHICS TRAINING: All Neuroscience students are also required to complete 1 credit hour of ethics training.		1

† Arranged with instructor.

**In addition to the above coursework, all Neuroscience majors are expected to take a minimum of six credits of approved elective neuroscience courses. Pre-approved courses include:**

A ECL 551	Behavioral Ecology	3
AN S 670	Molecular Biology of Muscle	3
BIOL 354	Animal Behavior	3
BIOL 436	Neurobiology	3
B M S 354	General Pharmacology	3
KIN 572	Neural Basis of Human Movement	3
PSYCH 410	Behavioral Neurology	3

PSYCH 519	Cognitive Neuropsychology	3
PSYCH 598C	Seminar in Cognitive Psychology: Cognitive Neuroscience	arr †

† Arranged with instructor.

## Curriculum Requirements for Graduate Students Seeking a Neuroscience Minor

Graduate students interested in completing a Neuroscience minor are required to select 12 credits, with a minimum of 9 credits being from the list of approved courses (see below) and up to 3 credits of thesis/dissertation research (NEURO 699).

Students must be approved for the minor by the Neuroscience Program and must follow Graduate College guidelines for POS Committee membership.

Graduate students wishing to seek a minor in Neuroscience are encouraged to contact the Neuroscience Interdepartmental Graduate Program Coordinator for further information. Inquiries can be submitted to [idgp@iastate.edu](mailto:idgp@iastate.edu).

### Approved Neuroscience Minor Courses

NEURO 556	Cellular, Molecular and Developmental Neuroscience	3
NEURO 557	Advanced Neuroscience Techniques	3
NEURO 661	Current Topics in Neuroscience	2-3
B M S 537	Neuroanatomy	3
COM S 474	Introduction to Machine Learning	3
KIN 572	Neural Basis of Human Movement	3
PSYCH 410	Behavioral Neurology	3
PSYCH 519	Cognitive Neuropsychology	3
NEURO 699	Research (Up to 3 credits)	arr †

† Arranged with instructor.

### Courses primarily for graduate students, open to qualified undergraduates:

#### NEURO 556: Cellular, Molecular and Developmental Neuroscience

(Cross-listed with B M S, GDCB). (3-0) Cr. 3. Alt. F., offered odd-numbered years.

*Prereq: BIOL 335 or BIOL 436; physics recommended*

Fundamental principles of neuroscience including cellular and molecular neuroscience, nervous system development, sensory, motor and regulatory systems.

#### NEURO 557: Advanced Neuroscience Techniques

(Cross-listed with GDCB). (3-0) Cr. 3. Alt. S., offered odd-numbered years.

*Prereq: Neuro 556 or equivalent course*

Research methods and techniques; lectures, laboratory exercises and/or demonstrations representing individual faculty specialties.

### Courses for graduate students:

#### NEURO 661: Current Topics in Neuroscience

(Cross-listed with BBMB, GDCB). (2-0) Cr. 2-3. Repeatable. Alt. S., offered even-numbered years.

*Prereq: NEURO 556 (or comparable course) or permission of instructor*

Topics may include molecular and cellular neuroscience, neurodevelopment, neuroplasticity, neurodegenerative diseases, cognitive neuroscience, sensory biology, neural integration, membrane biophysics, neuroethology, techniques in neurobiology and behavior.

#### NEURO 690: Journal Club in Neuroscience

(1-0) Cr. 1. Repeatable. F.S.

*Prereq: NEURO 556*

Students are required to attend and make at least one presentation at a weekly journal club focusing on current topics.

#### NEURO 696: Neuroscience Seminar

(1-0) Cr. 1. Repeatable. F.S.

*Prereq: NEURO 556*

Presentations and discussion of research by students, faculty, and visiting scholars.

#### NEURO 699: Research

Cr. arr. Repeatable.