NEUROSCIENCE

Neuroscience is one of the fastest growing interdisciplinary fields of study, combining biology, chemistry, computer science, psychology, physics, mathematics and philosophy.

ABOUT THE PROGRAM

The neuroscience program at Hope College is founded on one of its greatest strengths – its research program – and promotes the process of discovery and inquiry-based learning. The program is designed to meet the following objectives:

• Students will obtain an understanding of the fundamental principles of neuroscience.
• Students will obtain an appreciation/understanding of the interdisciplinary aspect of neuroscience.
• Students will be able to develop hypotheses, design experiments, carry out these experiments and interpret data for a question related to a neuroscience issue.
• Students will discuss ethical issues related to scientific research.
• Students will be able to access, read and gain insight from the primary neuroscience literature.

MINORS

Neuroscience

The neuroscience minor is structured on the existing disciplinary course infrastructures, thus allowing students to tailor their own specialized program to match their interests. The minor consists of a total of 23 credit hours, combining three core neuroscience courses listed below with flagged courses from multiple disciplines.

The core courses will consist of:

• NSCI 211 – Introduction to Neuroscience, 4 credits
• NSCI 411 – Advanced Neuroscience Research I, 4 credits
• NSCI 412 – Advanced Neuroscience Research II, 3 credits

In addition to the core courses, students are required to take 12 credits of flagged courses, only 8 of which may be taken in the student’s major department and satisfy the requirements for the student’s major. These courses include:

BIOLOGY:

• BIO 221 – Human Physiology, 4 credits
- BIO 335 – Neurochemistry and Disease, 4 credits
- BIO 348 – Advanced Topics in Cell Biology, 4 credits
- BIO 355 – Embryology, 4 credits
- BIO 370 – Animal Behavior, 4 credits
- BIO 442 – Advanced Topics in Animal Physiology, 4 credits

CHEMISTRY:
- CHEM 335 – Neurochemistry and Disease, 4 credits

ENGINEERING:
- ENGS 140 – Introduction to Electrical Circuits, 2 credits
- ENGS 240 – Electrical Circuits, 2 credits
- ENGS 351 – Signal Analysis and Communications, 3 credits
- ENGS 496 – BioElectrical Signals, 4 credits

MATHEMATICS:
- MATH 395 – Mathematical Biology, 4 credits

PHILOSOPHY
- PHIL 325 – Philosophy of Mind, 4 credits
- PHIL 360 – Philosophy of Science, 4 credits

PSYCHOLOGY
- PSY 325 – Health Psychology, 4 credits
- PSY 340 – Cognitive Psychology, 4 credits
- PSY 370 – Behavior Disorders, 4 credits
- PSY 395 – Sleep Seminar, 2 credits
- PSY 395 – Learning and Learning Strategies, 4 credits

NURSING
- NURS 320 – Pathophysiology, 4 credits
- NURS 325 – Psychiatric Mental Health Theory and Practicum, 3 credits
Important Considerations:

1. Students with majors outside of psychology are strongly encouraged to take PSY 100 (Introduction to Psychology) to fulfill their Social Science I General Education Requirement. This class will prepare them for the upper-level flagged courses offered through the psychology department.

2. Students with 1) majors outside of biology and 2) who are interested in taking a flagged course in biology are strongly encouraged to take BIO 221 Human Physiology as their flagged course.

3. Students can receive credit for taking BIO 221 or BIO 442, but not for both classes.

4. Students must take NSCI 411 and NSCI 412 in the same academic year.

5. Students should attempt to take as many of their flagged courses as possible prior to enrolling in NSCI 411.
COURSES

NEUROSCIENCE

NSCI 211 - Introduction to Neuroscience
This interdisciplinary course covers basic information from biology, chemistry, psychology, and philosophy that is relevant for understanding the nervous system and its role in behavior. Topics include structure and function of neurons, brain anatomy, sensory and motor systems, and the neuroscience of motivation, emotion, sleep, memory, language, and consciousness. Laboratory projects expose students to research methods in neuroscience, including monitoring the activity of individual neurons and recording physiological responses from humans. Three hours of lecture plus one 3-hour lab session per week.

Credits Awarded: 4
Terms Offered: Fall, Spring
Attribute: Natural Science I with lab (NSL)

NSCI 295 - Studies in Neuroscience
A topical lecture, seminar, or laboratory course designed to supplement the regular course offerings in neuroscience. Course may be taken multiple times if topics are different.

Credits Awarded: 1-4
Terms Offered: As Needed

NSCI 411 - Advanced Neuroscience Research I
An interdisciplinary course in which students with different academic majors work together as a team to complete a self-designed neuroscience research project supervised by the instructor. This course is the first half of the capstone project for the Neuroscience minor program. Students will read and discuss primary research literature, write a formal research proposal, then design and conduct a study on a neuroscience topic. One 3-hour lab session plus 3 hours of discussion per week.

Credits Awarded: 4
Terms Offered: Fall
Prerequisites: NSCI 211
NSCI 412 - Advanced Neuroscience Research II
This is the second semester of the capstone project for the neuroscience minor program. In this course, students with different academic majors work together as a team to complete the self-designed neuroscience research project that was initiated in NSCI 411. Students will continue to examine and discuss the relevant neuroscience literature, finish any remaining data collection and data analysis, and prepare a formal scientific report and research presentation. Three hours of discussion per week.

Credits Awarded: 3  
Terms Offered: Spring  
Prerequisites: NSCI 411

FACULTY & STAFF

Chase-Wallar, Dr. Leah
Associate Professor of Biology & Chemistry (2000)  
Ph.D., Univ of Minnesota Twin Cities, 1999  
B.S., University of Michigan-Flint, 1993

Gall, Dr. Andrew
Assistant Professor of Psychology (2015)  
Ph.D., University of Iowa, 2011  
M.A., University of Iowa, 2006  
B.S., University of Iowa, 2003

Goris, Dr. Emilie
Assistant Professor of Nursing (2007)  
Ph.D., Michigan State University, 2013  
BSN, Hope College, 2008

Griffin, Dr. Gerald
Associate Professor of Psychology and Biology (2015)  
Ph.D., University of Pennsylvania, 2009  
B.A., Cornell University, 2003

Polasek, Dr. Katharine
Associate Professor of Engineering (2010)  
Ph.D., Case Western Reserve Univ, 2007  
B.S., University of Michigan, 2001

Root Luna, Dr. Lindsey
Associate Professor of Psychology (2012)  
Ph.D., University of Miami, 2009  
M.S., University of Miami, 2005  
B.A., Hope College, 2003

Vollbrecht, Dr. Pete
Visiting Assistant Professor of Biology (2005)  
Ph.D., Vanderbilt University, 2014  
B.S., Hope College, 2007