Neuroscience Undergraduate Certificate

The undergraduate Certificate Program in Neuroscience is an interdisciplinary program requiring 20 credits of training in Neuroscience. The Program provides a group of related courses capped by a research experience. The Program is likely to be of particular interest to students who want to pursue graduate or professional training, but it is intended to appeal to any student interested in Neuroscience.

Courses taken for the certificate in the lower division (1000 and 2000 level) may satisfy general education requirements (that is, breadth requirements), if they are approved general education courses. Courses in the upper division (3000 level and above) may satisfy requirements for the student's major, consistently with the major's requirements. All required courses must be completed with a "B-"average or higher. Pass/Fail grades to not count.

Most courses required by the Certificate Program in Neuroscience have prerequisites. Some students may satisfy prerequisites by virtue of their prior curriculum. When this is not the case, students are responsible for satisfying the prerequisites.

Requirements

The two entry level courses:

BIOL 1831	Introductory Biology: From Molecules to Organisms (MOTR BIOL 150L) [1]	5
or BIOL 1012	General Biology: The Science of Life (MOTR BIOL 100)	
or BIOL 1102	Human Biology (MOTR LIFS 150)	
PSYCH 2211	Introduction to Biological Psychology	3
Select one of the following statistics courses:		3
BIOL 4122	Biostatistics	
MATH 1320	Introduction to Probability and Statistics	
PSYCH 2201	Psychological Statistics	
SOC 3220	Quantitative Data Analysis in Social Science Research	

Electives

Select two of the following: [2]		6
BIOL 1131	Human Physiology and Anatomy I	
BIOL 1162	General Microbiology	
BIOL 2012	Genetics	
BIOL 2482	Microbiology	
BIOL 3102	Animal Behavior	
BIOL 3622	Cell Biology	
BIOL 4502	Evolution of Cognition	
BIOL 4822	Introduction to Neuroscience	
CHEM 1052	Chemistry for the Health Professions (MOTR CHEM 100)	
CHEM 4712	Biochemistry	
CMP SCI 4300	Introduction to Artificial Intelligence	
CMP SCI 4340	Introduction to Machine Learning	
HONORS 3030	Advanced Honors Seminar in the Social and Behavioral Sciences [3]	
HONORS 3160	Honors Writing in the Sciences [3]	
PHIL 2280	Minds, Brains, and Machines	
PHIL 3378	Philosophy of Mind	
PHIL 3380	Philosophy of Science	
PHIL 4478	Topics in Philosophy of Mind and Philosophy of Language	
PHIL 4479	Philosophy of Cognitive Science	
PHIL 4480	Topics in Philosophy of Science [3]	
PHYSICS 4347	Introduction to Biophysics	
PSYCH 4300	Introduction to Psychopharmacology: Drugs and Mental Illness	
PSYCH 4340	Introduction to Human Neuroanatomy	
PSYCH 4349	Human Learning and Memory	
PSYCH 4350	Emotions and the Brain	
PSYCH 4372	Introduction to Social Neuroscience	
PSYCH 4374	Introduction to Clinical Neuropsychology	
Select at least 3 credits from one or more semesters of research experience [4]		3
BIOL 4905	Research	
CHEM 3905	Chemical Research	
CMP SCI 4880	Individual Studies in Computer Science	
PHIL 4450	Special Readings in Philosophy	
PHYSICS 3390	Research	
PSYCH 3390	Directed Research in Psychology	
Total Hours		**20**

[1] BIOL 1831 is strongly recommended, especially for those considering taking BIOL 4822 Introduction to Neurosciences towards their Neuroscience Certificate (BIOL 1831 is a prerequisite for BIOL 4822)"

[2] At least one elective must be taken outside the student's major

[3] With permission of the program director

[4] This requires completion of a Directed Research Assistantship with a Neuroscience faculty member within any of the participating departments. The research project must be approved in advance by the undergraduate advisor with the assistance of a committee of Neuroscience faculty. It is expected that this research will lead to a presentation of the research (e.g., at the UM-St. Louis Neuroscience seminar or the Undergraduate Research Symposium).

Learning Outcomes

Upon completion of the program, certificate earners will be able to:

- Describe the molecular, cellular, and tissue-level organization of the central and peripheral nervous system.
- Understand the properties of cells that make up the nervous system including the propagation of electrical signals used for cellular communication.
- Relate the properties of individual cells to their function in organized neural circuits and systems.

- Explain how the interaction of cells and neural circuits leads to higher level activities such as cognition and behavior.
- Engage in research, generate testable scientific hypotheses, design experiments, and collect, analyze, and interpret data through collaborative research projects, lab work, internships, and coursework.
- Demonstrate critical thinking skills by analyzing and evaluating neuroscience primary literature.
- Effectively communicate scientific information in written and oral formats; prepare and formally present a scientific paper or poster about neuroscience research, including communication of quantitative data in statistics, graphs and tables.
- Create a career development plan that matches an accurate self-assessment of abilities, achievement, motivation and work habits with specific job opportunities in the neurosciences.