# Neuroscience Undergraduate Certificate 

## Certificate in Neuroscience

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 3102 | Animal Behavior |  |
| BIOL 4822 | Introduction to Neuroscience |  |
| CHEM 4712 | Biochemistry |  |
| CMP SCI 4300 | Introduction to Artificial Intelligence |  |
| CMP SCI 4340 | Introduction to Machine Learning |  |
| PHIL 2280 | Minds, Brains, and Machines |  |
| PHIL 3378 | Philosophy of Mind |  |
| PHIL 4478 | Topics in Philosophy of Mind and Philosophy of Language |  |
| PHIL 4479 | Philosophy of Cognitive Science |  |
| PHYSICS 4347 | Introduction to Biophysics |  |


| PSYCH 4300 | Introduction to <br> Psychopharmacology: Drugs and <br> Mental Illness |
| :--- | :--- |
| PSYCH 4314 | Behavioral Neuroscience |
| PSYCH 4330 |  |
| PSYCH 4349 | Human Learning and Memory |
| PSYCH 4356 | Cognitive Processes |
| PSYCH 4372 | Introduction to Social Neuroscience |
| Select at least 3 credits from one or more semesters of research |  |
| experience ${ }^{3}$ |  |
| BIOL 4905 | Research |
| CHEM 3905 | Chemical Research |
| CMP SCI 4880 | Individual Studies in Computer |
| PHIL 4450 | Science |
| PHYSICS 3390 | Special Readings in Philosophy |
| PSYCH 3390 | Research |

Total Hours
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
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 selfassessment of abilities, achievement, motivation and work habits with specific job opportunities in the neurosciences.

