Neuroscience

UNIVERSITY of WISCONSIN UWMILWAUKEE

Interested in This Major?

Current Students: Contact Professor Karyn Frick or Professor Ava Udvadia at neuroscience-major@uwm.edu

Not a UWM Student yet? Contact our Admissions Counselor at let-sci@uwm.edu

web: uwm.edu/neuroscience

What is Neuroscience?

Neuroscience is a multidisciplinary science dedicated to understanding how nervous systems are built and function at different scales, from molecules and cells to circuits and systems. Neuroscientists are involved in work to improve the human condition with new discoveries that could prevent or treat neurodevelopmental defects and disorders, psychiatric disorders, and neurodegenerative diseases.

The courses for the major come primarily from the Department of Biological Sciences and the Department of Psychology. Students will learn about the structure and function of nervous systems, from the cellular level to the systems level; the connections between the brain and behavior; experimental design and research methods; and data analysis, interpretation, and use. Within the major students can take coursework in neuroscience subdisciplines such as cognitive, cellular and molecular, or computational neuroscience.

Career Opportunities

A neuroscience major is an excellent starting point for a career in human or animal medicine, basic and clinical medical research, psychology, pharmaceutical industry, public health, or science writing. There are many exciting opportunities for students with a bachelor's degree in academic, governmental, pharmaceutical industry laboratories as technical laboratory assistants, as clinical assistants in the healthcare industry, or in pharmaceutical sales, marketing or business operations. There are also opportunities in government agencies and nonprofit groups related to grant writing and regulatory management. The major is also excellent preparation for students pursuing advanced degrees in medicine, medical research, or professional counseling.

The job outlook for careers in neuroscience is positive with faster than average growth predicted by the U.S. Bureau of Labor Statistics. An aging population, a greater acceptance of mental health as an important healthcare issue, and new scientific breakthroughs in medical treatments of neurological diseases will drive the need for more individuals to work in this field.

Research Opportunities

UWM has a deep bench of faculty researchers in neuroscience who offer many opportunities for students to become involved in research. Many of our undergraduates work in research laboratories where they collaborate with faculty and graduate students conducting experiments with both humans and animals. It is not unusual to find undergraduates as co-authors on published, nationally-recognized journal articles.

Some examples of current neuroscience research projects include:

- **Changes in memory with advanced age.** Specifically this research project looks at how age impacts the formation of new knowledge. Using a combination of behavioral tasks, computational modeling, and brain imaging techniques that include fMRI and multivariate pattern analyses, researchers will examine the cognitive and neural mechanisms of memory. One outcome may be recommendations for ways to support new learning and flexible decision-making across the lifespan.
- **A genetic look at autism.** A rare disease called Timothy syndrome affects brain development leading to neurodevelopmental disorders including autism and intellectual disability. To learn how these disorders alter neuron development, a worm called C. elegans with

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only 1,000 cells and 300 neurons is examined microscopically after introduction of the genetic variant that causes Timothy syndrome. Alterations in neuron development can be observed along with the bigger picture of how this particular genetic variant interacts with other genes.

- **Sex steroid hormones and the brain.** The Frick Lab studies the influence of sex steroid hormones (such as estrogen and progesterone) on the molecular and cellular mechanisms through which mammals consolidate memories. By pinpointing these interactions between hormones and cells, researchers hope to identify key receptors and genes that could be targets for the development of new treatments for memory dysfunction such as Alzheimer's disease.
- **Cellular programming and regeneration.** In humans, optic nerve damage can result in permanent visual loss due to a failure of the human central nervous system to regenerate nerve growth. In contrast, fish naturally respond to optic nerve injury by re-establishing retinal neurons and eventually recovering visual function. Researchers are examining transcription factor activity, chromatin accessibility and chromatin architecture to understand why this difference exists between fish models and human models and potentially discover new approaches to promote optic nerve regeneration in humans.

Courses in the Major

The major consists of 35 to 39 credits in core coursework plus an additional 24 credits in affiliated science and math coursework. General requirements and electives make up the remainder of the coursework needed to reach the 120 credits required for graduation. Specific required classes include:

Course #	Course Name
BioSci 150	Foundations of Biological Sciences I
BioSci 152	Foundations of Biological Sciences II
BioSci 315	Cell Biology
BioSci 455	Cellular, Molecular and Developmental Neurobiology
a statistics class chosen from MathStat 215, BioSci 465, or Psych 210	
Psych 101	Intro to Psychology
Psych 254	Physiological Psychology
Chem 102	General Chemistry
Chem 104	General Chemistry and Qualitative Analysis
Chem 343	Organic Chemistry
Chem 345	Organic Chemistry
Physics 120	General Physics I
Physics 122	General Physics II
a research experience chosen from an approved list	

The remaining credits in the major are chosen from a list of approved classes.

Events

The program regularly hosts guest lectures and colloquia featuring speakers from around the country.

Recent topics have included:

- Parkinson's Disease Genetics in Latinos: What do we know and how do we move forward? Presented by Dr. Ignacio Mata, The Cleveland Clinic.
- Microtubule Actin Crosslinking Factor 1 (MACF1), a novel target in glioblastomas. Presented by Dr. Quincy Quick, Tennessee State University.
- RNA binding protein function in eukaryotic mRNA processing and neurodegenerative diseases. Presented by Dr. Yuna Ayala, St. Louis University.

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