

# MOLECULAR/CELLULAR SPECIALIZATION

UPDATED AU21

## What is Molecular/Cellular Neuroscience?

Molecular/Cellular Neuroscience is a subfield of neuroscience that examines the mechanisms related to the basic biological processes of neurons and support cells of the nervous system. Molecular/Cellular neuroscientists tend to study how neurons communicate, how parts of neurons (e.g. axons and dendrites) function, and explore the anatomy/physiology of neurons.

## DECLARATION REQUIREMENTS

In order to declare the major, students must meet with a Neuroscience Advisor to discuss the requirements. To set up an appointment:

1. Stop by room 10 of Townshend Hall
2. Give us a call at (614) 292-8512
3. E-mail us at [NeuroAdvising@osu.edu](mailto:NeuroAdvising@osu.edu)
4. Attend an Info Session  
[NeuroscienceMajor.osu.edu/declare](http://NeuroscienceMajor.osu.edu/declare)

### Contact Us

Neuroscience Undergraduate Program  
College of Arts & Sciences and College of  
Medicine  
10 Townshend Hall  
1885 Neil Avenue Mall  
Columbus, OH 43210  
Phone: (614) 292-8512

<http://NeuroscienceMajor.osu.edu>

The requirements for the 36 semester hour (12 classes) neuroscience major are distributed across four categories: Core, Data Analysis, Specialization, and Breadth.

### I. PROFESSIONAL SURVEY

- **Neuro 1100H Neuroscience Honors Survey**  
1hr | Au, Sp | (Pre-reqs: Full or Pre-Majors Only)

### II. CORE REQUIREMENTS

Take all 4 of the courses below

*Pre-major students must complete Neuro 1100H, Psych 3313 and Neuro 3000 with grades of 'B' or higher in both classes and earn a minimum 3.0 cumulative GPA*

- **Psych 3313 Introduction to Behavioral Neuroscience**  
3hrs | Au, Sp, Su | (Pre-reqs: Psych 1100)
- **Neuro 3000 Introduction to Molecular/Cellular Neuroscience**  
3hrs | Au, Sp | (Pre-reqs: Bio 1113 and Pre-Major)
- **Psych 3513 Introduction to Cognitive Neuroscience**  
3hrs | Au, Sp | (Pre-reqs: Psych 1100)
- **Neuro 3050 Structure & Function of the Nervous System**  
3hrs | Au, Sp | (Pre-reqs: Bio 1113 & Neuro 3000)

### III. DATA ANALYSIS REQUIREMENT

Take 1 of the 4 courses below

- **Psych 2220 Introduction to Data Analysis in Psychology**  
3hrs | Au, Sp, Su | (Pre-reqs: Psych 1100 & Math 1148)
- **Stats 2480 Statistics for Life Sciences**  
3hrs | Sp | (Pre-reqs: Math 1151)
- **Stats 2450 Introduction to Statistical Analysis**  
3hrs | Au, Sp | (Pre-reqs: Math 1151)
- **MolGen 5650 Analysis & Interpretation of Biological Data I**  
3hrs | Au | (Pre-reqs: Math 1150 & 10hrs of Bio)

### IV. SPECIALIZATION REQUIREMENTS

Choose at least 5 specialization courses from the options below

- **Neuro 4550 Autism Spectrum Disorder & Neurodev Disorders**  
3hrs | Au | (Pre-reqs: Neuro 3000)
- **Neuro 3010 Neurophysiology**  
3hrs | Au | (Pre-reqs: Neuro 3000 & Neuro 3050)
- **Neuro 3305 Neuropharmacology**  
3hrs | Sp | (Pre-reqs: Psych 3313 & Neuro 3000)
- **Neuro 4050H Neurogenetics**  
3hrs | Au | (Pre-reqs: Neuro 3000)
- **Neuro 4100 Basic & Clinical Foundations of Neuro Disease**  
3hrs | Au | (Pre-reqs: Neuro 3000)
- **Neuro 4640 Neuronal Signal Transduction**  
3hrs | Sp | (Pre-reqs: Neuro 3000)
- **Neuro 5790H Developmental Neuroscience**  
3hrs | Sp | (Pre-reqs: Neuro 3000 & 3050 & Jr. or Sr.)
- **Psych 4644 Hormones & Behavior**  
3hrs | Au, Sp | (Pre-reqs: Psych 3313 & Neuro 3000)  
*Not Open to Students with Credit For Neuro 5644*
- **Psych 5603 Stem Cells and the Brain**  
3hrs | Au | (Pre-reqs: Psych 3313 & Neuro 3000)
- **Psych 4305 Introduction to Psychopharmacology**  
3hrs | Sp | (Pre-reqs: Permission of Instructor)  
*Not Open to Students With Credit For PHR 4440 or Biophrm 5824*
- **Biophrm 5824 Pharmacology of the Nervous System**  
3hrs | Au, Sp | (Pre-reqs: Permission of Instructor)  
*Not Open to Students with Credit For PHR 4440 or Psych 4305*
- **Chem 5230 Neurotransmitter Chemistry**  
3hrs | Sp | (Pre-reqs: Chem 2540, & 2520)
- **Neuro 4623 Biological Clocks & Rhythms**  
3hrs | Sp | Spring '16 '18 (Pre-reqs: Neuro 3000)
- **Biochem 4511 Intro to Biological Chemistry**  
4hrs | Au, Sp, Su | (Pre-reqs: Chem 2510 & Bio 1113)
- **MolGen 4500 General Genetics**  
3hrs | Au, Sp, Su | (Pre-reqs: Bio 1113 & 3+ hrs Bio)

## V. BREADTH REQUIREMENT

Choose at least 2 additional courses from the list below

- **Neuro 3025**      **History of Neuroscience**  
3hrs |    Sp       | (Pre-reqs: Psych 3313 & Neuro 3000)
- **Neuro 4850**      **Contemporary Topics in Neuroscience**  
3hrs |    Sp       | (Pre-reqs: Psych 3313 & Neuro 3000)
- **Psych 4501**      **Advanced Behavioral Neuroscience**  
3hrs | Au, Sp     | (Pre-reqs: 3313 & Neuro 3000)
- **Psych 5089**      **Cognitive Aging, Neurodegen, & Neuroplasticity**  
3hrs |    Sp       | (Pre-reqs: Psych 3313 & Neuro 3000)
- **Psych 5613(H)**    **Biological Psychiatry**  
3hrs |    Sp       | (Pre-reqs: Psych 3313 & Neuro 3000)
- **Psych 5602**      **Behavioral Genetics**  
3hrs |    Sp       | (Pre-reqs: Psych 3313 & Neuro 3000)
- **Psych 5604**      **Sex Differences in the Brain and Behavior**  
3hrs | Au         | (Pre-reqs: Psych 3313 & Neuro 3000)
- **Psych 5622**      **The Development of Brain and Behavior**  
3hrs | Au         | (Pre-reqs: Psych 3313 & Neuro 3000)
- **EEOB 4550**      **Neurobiology of Behavior**  
3hrs | Au         | (Pre-reqs: 2 courses in Bio)
- **Ling 3701**        **Language and the Mind**  
3hrs | Au, Sp     | (Pre-reqs: Psych 1100)
- **Psych/CSE/Ling/Philos 5612** **Introduction to Cognitive Science**  
3hrs | Au         | (Pre-reqs: 12hr in Psych/CSE/Ling/Philos)
- **Psych 5614**      **Cognitive Neuroscience**  
3hrs |    Sp       | (Pre-reqs: Psych 3313 or 3000)
- **Psych 5618**      **Intro to Computational Cognitive Neuroscience**  
3hrs |    Sp       | (Pre-reqs: Psych 3313 & Neuro 3000)
- **Psych 5628**      **Developmental Cognitive Neuroscience**  
3hrs | Au         | (Pre-reqs: Psych 3313 or 3000)
- **SHS 5760**        **Neurology of Speech and Hearing Mechanisms**  
3hrs | Au, Sp     | (Pre-reqs: Psych 3313 & 3000)
- **Psych 3321**      **Quantitative and Statistical Methods in Psych**  
3hrs | Au, Sp     | (Pre-reqs: B or higher in 2220)
- **Math 4350**        **Quantitative Neuroscience**  
3hrs |    Sp       | (Pre-reqs: Math 1152)
- **Psych 5608**      **Intro to Mathematical Psychology**  
3hrs | Au         | (Pre-reqs: Psych 3321)
- **Psych 5898**      **Seminar in Behavioral Neuroscience**  
3hrs |    Sp       | (Pre-reqs: Psych 4501)
- **CSE 5052**        **Survey of Artificial Intelligence for Non-Majors**  
3hrs | Au         | (Pre-reqs: Programming & Neuro 3000)
- **CSE 5526**        **Introduction to Neural Networks**  
3hrs | Au         | (Pre-reqs: CSE 3521)
- **Econ 5870**        **Neuroeconomics and Decision Neuroscience**  
3hrs |    Sp       | (Pre-reqs: Psych 3313 & 3000)
- **ECE 5070**        **Neuroengineering and Neuroprosthetics**  
3hrs | Au         | (Pre-reqs: CSE Programming)  
*Not Open to Students With Credit For Neuro 5070*
- **Neuro 4998/3193** **Undergraduate Research & Individual Studies**  
*Pre-approval required.*  
Up to 3 credit hours of any combination of Undergraduate Research (4998) and Individual Studies (3193) can be applied to the breadth requirement.

## Important information about the Neuroscience Major

1. **Students must meet the following requirements to declare the neuroscience major:**
  - First, meet with an advisor to officially be declared as a pre-neuroscience major
  - Complete 24 total semester credit hours
  - At least 12 of those semester credit hours must be from graded OSU coursework
  - An overall GPA greater than or equal to 3.0
  - Earn at least a “**B**” in Psych 3313, Neuro 3000, and Psych 1100H
2. **Honors students** must take at least one honors or graduate level course. Approved courses can be found here:  
<http://neurosciencemajor.osu.edu/honors>
3. Thirty-six (36) semester credits in approved Neuroscience coursework.
4. At least half of the major’s curriculum must be completed at Ohio State.
5. Majors will follow the Bachelor of Science curriculum for GE and other degree requirements.
6. Students are encouraged to focus on completion of core requirements before beginning their specialization coursework.
7. For courses to apply toward the major, you must earn at least a “**C**”.
8. To earn your degree you will need an overall GPA of at least a 2.0.
9. Research experience is also strongly encouraged for students considering graduate and professional training. You may enroll in a variety of 4998 opportunities.  
<http://neurosciencemajor.osu.edu/4998>
10. Up to 3 hours of experiential coursework can be applied to the breadth requirements of the major. This experiential coursework can be from any combination of the following classes: Undergraduate Research (4998) and Individual Studies).  
[Pre-approval from your neuroscience major advisor is required.](http://neurosciencemajor.osu.edu/4998)
11. Students planning to graduate "With Honors in Arts and Sciences" should visit our website for information on Honors Contract requirements for neuroscience majors.  
<http://neurosciencemajor.osu.edu/honors>
12. Courses cannot count for both a minor and a major.

## Honors Requirements

All Honors students must take at least one graduate-level course to fulfill their Honors requirement. Honors students must speak with their advisor to select a course. The chosen course to fulfill the requirement can count as EITHER one Breadth course or one Specialization course. The approved graduate-level courses can be found below:

### College of Arts and Sciences

- Psych 5603    Stem Cells and the Brain
- Psych 5606    High Level Vision
- Psych 5898    Seminar in Behavioral Neuroscience
- Psych 5618    Intro to Computational Cog Neuroscience
- Psych 6810    Statistical Methods in Psychology I
- Psych 6811    Statistical Methods in Psychology II

### College of Medicine

- Neurosc 4050H NeuroGenetics
- Neurosc 5790H Developmental Neuroscience
- Neuro 7050 Neurobiology of Disease
- Neuro 7500 NeuroImmunology
- Neuro 7001 Foundations of Neuroscience I

### College of Engineering

- CSE 5194.03    Neuroengineering & Neuroprosthetics
- CSE 5526        Introduction to Neural Networks