



Neuroscience Major Requirements FALL 2017 or Later

Undergraduate Program in Neuroscience

📍: 1140 Undergrad. Science Bldg. (USB)

🌐: <http://www.lsa.umich.edu/neurosci>

✉: lsa-biology-advising@umich.edu

☎: 734-763-7984 (front desk)

Why study Neuroscience?

Neuroscience is the study of the nervous system. Neuroscientists aim to understand how the nervous system develops and functions on a cellular level as well as the mechanisms that underlie behavior, mental disorders and disease. The faculty teaching courses in the major include cellular and molecular neuroscientists appointed in the Department of Molecular, Cellular and Developmental Biology (MCDB) and behavioral and cognitive neuroscientists appointed in the Department of Psychology. This interdisciplinary program gives students the best of both of these worlds.

Who should major in Neuroscience?

Any student who wishes to pursue a career studying the nervous system or behavior. This is an excellent major for anyone interested in pre-health careers, graduate studies, or careers in the biotech industry.

Exclusions:

Students who elect a major in Neuroscience may not elect the following majors: Biology; General Biology; Cell and Molecular Biology (CMB and CMB:BME); Molecular, Cellular, and Developmental Biology (MCDB); Biopsychology, Cognition and Neuroscience (BCN); Brain, Behavior, and Cognitive Sciences (BBCS); Biochemistry; Biomolecular Science (BMS); Plant Biology; or Microbiology; nor elect a minor in Biology, Plant Biology, Chemistry, or Biochemistry.

Students can double major in Psychology and Neuroscience or Cognitive Science and Neuroscience, but may only share a maximum of 3 courses toward their two programs.

How do I declare?

Students interested in neuroscience are encouraged to meet with an advisor to discuss their academic plans as soon as possible! Students need not have completed all of the prerequisites of the major to declare, but should usually have completed the biology introductory sequence with a 2.0 or better and be in good academic standing. Make an advising appointment online through the Neuroscience website: www.lsa.umich.edu/neurosci.

What courses should I take first?

Students with **AP Biology credit** (Biology 195) should take the Introductory Biology Lab (BIOLOGY 173) during their first year. **Transfer students** who receive credit for BIOLOGY 191 should take BIOLOGY 192 and BIOLOGY 173 to complete the introductory biology sequence. All other students should begin the introductory biology sequence during their first year and complete it no later than their second year. BIOLOGY 171 and 172/174 can be taken in either order. Students should take BIOLOGY 173 when they enroll in their second semester of introductory biology.

<p><u>BIOLOGY 171</u> ...focuses on ecology, biodiversity, and genetics and evolutionary processes. Students engage with biological hypotheses dealing with prominent current issues such as human evolutionary origins, emerging diseases, conservation biology, and global change.</p>	<p><u>BIOLOGY 172 or 174</u> (prerequisite: prior or concurrent credit for CHEM 130) ...focuses on how cells, organs, and organisms work. (174 covers the same material as 172 but is geared toward students who prefer a more problem-solving approach to understand biology, rather than a more traditional lecture-based course.)</p>
<p><u>BIOLOGY 173</u> (prerequisite = BIOLOGY 171, 172, 174, 191, or 195) ...is the accompanying lab component to the introductory sequence. The course provides an integrated introduction to experimental biology. Topics focus on biochemistry, molecular genetics, evolution, and ecology.</p>	

Can I transfer courses from another institution?

Yes, students will work with the applicable department for the transferring subject to have your course evaluated (i.e., the Psychology department for PSYCH classes) and with the transferring institution to issue your official transcript to UM. Check the Undergraduate Program in Neuroscience website for more detailed instructions.

http://www.lsa.umich.edu/neurosci/academics/advisingprogrampolicies/transfercredit_ci

What can I do with my Neuroscience undergraduate degree?

The undergraduate degree in neuroscience is a great starting point for graduate programs in neuroscience, psychology, or biology. The degree will also prepare students for medical, dental, veterinary or pharmacy school. Other possible jobs are in health services, industry, government, teaching, and sales. <http://www.lsa.umich.edu/neurosci/careers>

How do I get involved in research?

Determine what you may be interested in through your introductory courses and search the faculty directory of both MCDB and Psychology. All faculty will have their research interest listed in the directory. When contacting faculty to sponsor you for an independent study course or undergraduate research assistant position, we recommend that you treat it as if it were a professional job interview. It is expected that you have done some background research on the faculty, their publications and current research projects. Explain how you will be an asset to the lab, and how this experience will help you as you develop your career path. Provide a resume with examples of leadership, self-motivation, and dedication to work tasks. Contact faculty early if you plan to register for course credit. Students interested in research should plan to spend at least two semesters working in a lab. Research is an asset to Psychology graduate admission applications (and often the most important component of the application). <http://www.lsa.umich.edu/neurosci/studentresearch>

Scholarships for research are also available. <http://www.lsa.umich.edu/neurosci/academics/awardsscholarships>

What are the requirements for Honors?

The Neuroscience B.S. degree is the basis for the Honors degree in Neuroscience. Students must elect two terms of independent research (under PSYCH 424 & 426 for those with Psychology mentors, MCDB 300/400 for those with MCDB mentors), maintain an overall and major GPA of 3.4, complete an Honors thesis, and give a research presentation based on their Honors work.

Undergraduate research for an honors concentration in neuroscience must be completed on a topic in neuroscience that is approved by the major steering committee. If students are uncertain if their research topic fits this requirement they may contact the chair of the neuroscience major steering committee for guidance.

Prior to applying to the Neuroscience Honors Program students must identify a research mentor in the Department of Psychology or MCDB. See the list of possible mentors in the Undergraduate Program in Neuroscience office. (Students may conduct Honors research with faculty in other units on the University of Michigan campus, but must have a formal co-sponsor relationship with an approved neuroscience faculty member in Psychology or MCDB.)

Students apply to the Honors Program in Neuroscience by submitting a Neuroscience Honors Application (<http://www.lsa.umich.edu/biology/academics/honorsprogram>) with a research proposal. Neuroscience honors applications are due no later than the end of the add/drop period one semester prior to graduation (i.e. approximately Sep 25 for students graduating at the end of Winter term, and approximately January 25 for students graduating at the end of the Fall term or Summer term). When special circumstances apply, the honors committee may accept an application beyond the normal due date. Upon approval by the chair of the Neuroscience Steering Committee students are declared into the Honors plan. Honors theses must be submitted by December 1, April 1, or August 1 of the term of graduation.

<http://www.lsa.umich.edu/neurosci/academics/honorsprogram>

How do I find out about internships, study abroad, or summer programs?

Information about study abroad, faculty-led intercultural internships, faculty-led courses and field experiences, and Spring/Summer language study is available through the Center for Global and Intercultural Study. Please refer to www.lsa.umich.edu/cgis for detailed information about options.

LSA also offers many programs. <https://www.lsa.umich.edu/summer/summerprograms>

Related Student Groups:

Neuroscience Students Association (NSA)

The NSA is a student organization for students interested in neuroscience. This organization provides networking opportunities, seminars, and exposure to the depth of neuroscience. The organization also aims to actively participate in service to its community and provide the public with information on neuroscience, health, and general science topics. They hope to broaden their horizons of members by exposing them to medicine, public health, research, and engineering. The organization hopes to expose students to the many facets of this broad, advancing field.

Email: NeuroscienceStudentAssociation@umich.edu.

Biology Student Alliance (BSA)

The BSA is a student organization intended for Neuroscience, CMB, MCDB, Biology, Plant Biology, Microbiology and Biochemistry concentrators. BSA provides opportunities for undergraduates to enhance their learning in the natural sciences and gain exposure to various careers in scientific research and health-related fields. BSA aims to foster scientific discussion and stimulate innovative thinking in biology, seeks to build and sustain meaningful relationships among like-minded peers, and offer informal tutoring, academic advising, community service events, and coordinate events with various faculty guest speakers to help introduce undergraduates to various research fields. In addition, the BSA provides a space for students to present their own research in a low-pressure environment and give participants constructive feedback to help acquire skills that will be applicable to their current and future academic/professional careers. Email: BSA-Board@umich.edu

Quantitative Prerequisite (Elect two courses)

MATH 115, 120, 185 (or equivalent) Calculus I
MATH 116, 121, 156, 176, and 186 (or equivalent) Calculus II
PHYSICS 125, 135, 139, 140, 160 General Physics I (or Honors)
PHYSICS 126, 235, 239, 240, 260 General Physics II (or Honors)
EECS 183 (4) Elementary Programming Concepts

With permission of a neuroscience advisor, other courses that help students develop quantitative skills can be substituted, or a sixth upper level elective can substitute for the 2nd quantitative prerequisite.

NEUROSCIENCE UPPER LEVEL ELECTIVES – 4 Classes (1-2 from Group A; 2-3 from Group B; 0-1 from Group C)

Group A: Molecular and Cellular Neuroscience (Elect at least one course)

MCDB 402 (3) Molecular Biology of Pain and Sensation	MCDB 453 (3) Ion Channels & their Channelopathies
MCDB 403 (3) Molecular and Cell Biology of the Synapse	MCDB 455 (3) Cell Biology of Neurodegeneration
MCDB 418 (3) Endocrinology	MCDB 456 (3) Genes, Circuits, and Behavior
MCDB 421 (3) Topics in Cellular & Molecular Neurobiology	MCDB 458 (3) Neuroepigenetics
MCDB 422 (3) Brain Development, Plasticity and Circuits	MCDB 459 (3) Brain States and Behavior
MCDB 426 (3) Molecular Endocrinology	MCDB 463 (3) Sensory Circuits & Diseases
MCDB 450 (3) Genetics and Molec. Bio. of Complex Behavior	HUMGEN 480 (3) Neurodevel Disorders
MCDB 452 (3) The Visual System	

Group B: Behavioral & Cognitive Neuroscience (Elect at least two courses)

PSYCH 240 (4) Introduction to Cognitive Psychology	PSYCH 431 (2-4) Advanced Topics in Behavioral Neurosci.
PSYCH 330 (2-4) Topics in Biopsychology	PSYCH 433 (2-4) Advanced Topics in Neurosci.
PSYCH 333 (3) Affective Neuroscience	PSYCH 434 (3) Neurosci of Fear & Anxiety
PSYCH 334 (3) Neuroscience of Learning & Memory	PSYCH 435 (3) Neuro. of Attention and Attentional Disorders
PSYCH 336 (3) Drugs of Abuse, Brain, and Behavior	PSYCH 440 (2-4) Advanced Topics in Cognitive Neurosci.
PSYCH 337 (3) Hormones and Behavior	PSYCH 454 (3) Developmental Cognitive Neuroscience
PSYCH 339 (3) Biopsychology of Cooperation	PSYCH 442 (3) Cog Neurosci of Expertise
PSYCH 340 (2-4) Topics in Cognition & Cog. Neurosci.	PSYCH 531 (3) Advanced Topics in Biopsychology
PSYCH 343 (3) Cog. Neurosci. Of Learning & Memory	NEUROL 455 (3) Neurobiology of Parkinson Disease
PSYCH 345 (4) Introduction to Human Neuropsychology	NEUROSCI 470 (4) Neuroanatomy
PSYCH 430 (3) Advanced Topics in Biopsychology	

Group C: Additional Courses on topics highly relevant to some types of Neuroscience (Elect no more than 1 course.)

BIO 205 (3) Developmental Biology	PSYCH 338/ANTHRBIO 368 (4) Primate Social Behavior I (ULWR)
BIO 207 (4) Microbiology	PSYCH 346 (3) Learning and Memory
EEB 492 (4) Behavioral Ecology (BIOSTATION: 5 credits)	PSYCH 349/LING 347 (3) Talking Minds
MCDB 397/EEB 397 (3) Writing in Biology (ULWR)	PSYCH 414/WOMENSTD 452 (3) Sexuality and Science
MCDB 401 (3) Advanced Topics in Biology	PSYCH 420 (must be taken for 3 credits to count) Faculty-Directed Advanced Tutorial Reading for Psych as a Nat Sci
MCDB 405 (3) Molecular Basis of Development	PSYCH 439/ANTHRBIO 468 (3) Evolutionary Endocrinology
MCDB 411 (3) Protein Structure and Function	PSYCH 441 (3) Neuroscience & Society
MCDB 416 (3) Introduction to Bioinformatics	PSYCH 447 (3) Curr Topics in Cognition and Cog. Neurosci.
MCDB 417 (3) Chromosome Structure and Function	PSYCH 448 (3) Mathematical Psychology
MCDB 427 (4) Molecular Biology	PSYCH 532/ANATOMY 541/ PHYSIOL 541 (4) Mammalian Reproductive Physiology
MCDB 428 (4) Cell Biology	BIOLCHEM 640 (2) Regulatory RNA & Control of Gene Expression
MCDB 435 (3) Intracellular Trafficking	PHRMACOL 310 (4) Pharmacology and Therapeutics
MCDB 436 (3) Human Immunology	
MCDB 440 (3) Cell Cycle Control and Cancer	Other courses may be approved by a concentration advisor as suitable for group C. Most frequently these are upper level courses in statistics, mathematics or from a basic science department of the medical school.
MCDB 441 (3) Cell Biology and Disease	
MCDB 454 (3) Cytoskeletal Dynamics	
MCDB 462 (3) Epigenetics	
PSYCH 335 (4) Intro to Animal Behavior	

Group D: Laboratory Requirement (Elect at least two courses, with at least one being from D1, for a min. of 4 cred. total)

Group D1: Method-based laboratory courses (Elect at least one course.)

BIO 226 (2) Animal Physiology Laboratory
MCDB 306 (3) Introductory Genetics Laboratory
MCDB 423 (3) Cellular and Molecular Neurobiology Laboratory
MCDB 424 (2) Behavior Neurobiology Laboratory
MCDB 429 (3) Cellular and Molecular Biology Laboratory
PSYCH 302 (3) Research Methods in Cognitive Neuroscience (ULWR)
PSYCH 331 (4) Research Methods in Brain, Behavior, Cog Sci (ULWR)

*Max. of 3 cr. of ind. research may count toward the major. Must be taken for a min. of 2 cr. and be completed in a single term.

**Required for Neuroscience Honors with Psychology mentor

Group D2: Research-based laboratory courses

MCDB 300/400 (2 - 3) Undergraduate Research*
PSYCH 326 (2 - 4) Research for Psychology as a Natural Science
PSYCH 422 (3) Adv. Research for Psych. as a Natural Science
PSYCH 424 (3) Honors Research I for Psych. as a Nat. Science**
PSYCH 426 (3) Honors Research II for Psych. as a Nat. Sci.**
PSYCH 428 (2-4) Senior Thesis

NEUROSCIENCE MAJOR REQUIREMENTS

NEUROSCIENCE PREREQUISITES:

Introductory Biology Sequence:

	TERM:	COURSE:	GRADE:
<input type="checkbox"/> Complete Sequence A, B, or C: A: BIO 171, 172 or 174, & 173 B: BIO 195 (AP) & 173 C: BIO 191 (transfer credit), 192, & 173			

Chemistry Sequence:

<input type="checkbox"/> CHEM 210			
<input type="checkbox"/> CHEM 211			
<input type="checkbox"/> CHEM 215			
<input type="checkbox"/> CHEM 216			

Quantitative Prerequisites

<input type="checkbox"/> Statistics: STATS 250 or 280			
<input type="checkbox"/> 2 courses from list of MATH, PHYSICS, and STATS course options (or with advisor approval one course and a sixth course from the list of upper level electives).			

NEUROSCIENCE MAJOR:

Core Courses

<input type="checkbox"/> Principles of Cellular and Molecular Neuroscience: BIO 222			
<input type="checkbox"/> Principles of Human and Animal Physiology: BIO 225			
<input type="checkbox"/> Introduction to Behavioral Neuroscience: PSYCH 230			
<input type="checkbox"/> Biochemistry: Choose from: MCDB 310, BIOLCHEM 415, or CHEM 351			
<input type="checkbox"/> Genetics: BIO 305			

Upper Level Electives (4 courses)

<input type="checkbox"/> One Course from Molecular & Cellular Neuroscience - Group A			
<input type="checkbox"/> Two Courses from Behavioral & Cognitive Neuroscience - Group B			
<input type="checkbox"/> One Additional Course - Group A, B, or C			

Lab Courses – Group D (2 courses, 4 credits minimum, at least one from D-1)

<input type="checkbox"/> Method-based laboratory courses – Group D1			
<input type="checkbox"/> Second lab course – Group D1 or D2			

Total Units and GPA Requirement for Neuroscience

<input type="checkbox"/> Minimum 33 cr. in Major (200-level & above) = Core Courses (19 cr.) + 4 Electives + Labs (min. 4 cr.)			
<input type="checkbox"/> Minimum 2.0 GPA in Concentration (GPA is calculated from all courses used for major requirements, and all courses in BIOLOGY, MCDB, and Natural Science PSYCHOLOGY courses)			
HONORS STUDENTS ONLY:			
<input type="checkbox"/> Minimum 3.4 Major GPA			
<input type="checkbox"/> Minimum 3.4 Cum. GPA			
<input type="checkbox"/> Independent Research (2 terms required, more recommended) PSYCHOLOGY focus area: PSYCH 424 & 426 MCDB focus area: MCDB 300 and/or MCDB 400			