Neuroscience Major Requirements

WIN 2014 or Later

Undergraduate Program in Neuroscience

ː 1140 Undergrad. Science Bldg. (USB) ː http://www.lsa.umich.edu/neurosci
ː lsa-biology-advising@umich.edu ː 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); 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 should complete the introductory biology prerequisite as early as possible. Students with Biology AP credit (Biology 195) should take the Introductory Biology Lab (BIOLOGY 173) during their first year. 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 intro. biology.

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<tr>
<th>BIOLOGY 171</th>
<th>BIOLOGY 172 or 174</th>
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<td>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.</td>
<td>(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.)</td>
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| BIOLOGY 173 |
| (prerequisite = BIOLOGY 171, 172, 174, 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. |

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](http://www.lsa.umich.edu/neurosci/studentresearch)

Scholarships for research are also available. [http://www.lsa.umich.edu/neurosci/academics/awardsscholarships](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](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](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](http://www.lsa.umich.edu/cgis) for detailed information about options.

LSA also offers many programs. [https://www.lsa.umich.edu/summer/summerprograms](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: nsaleadteam@umich.edu

**Biology Student Alliance (BSA)**
The BSA is a student organization intended for Neuroscience, CMB, 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)

NEUROSCIENCE UPPER LEVEL ELECTIVES – 5 Classes (2-3 from Group A; 2-3 from Group B; 0-1 from Group C)

Group A: Molecular and Cellular Neuroscience (Elect at least two courses. At least one must be from Group A-1.)

Group A-1: 300-level MCDB Electives
MCDB 351 (4) Synapses
MCDB 352 (4) Neurobiology of Sensory and Motor Systems
Taking MCDB 351 and MCDB 352 completes both the A-1 and A-2 requirements

Group A-2: Additional Area A Electives
MCDB 402 (3) Molecular Biology of Pain and Sensation
MCDB 403 (3) Molecular and Cell Biology of the Synapse
MCDB 418 (3) Endocrinology
MCDB 421 (3) Topics in Cellular & Molecular Neurobiology
MCDB 422 (3) Brain Development, Plasticity and Circuits
MCDB 426 (3) Molecular Endocrinology
MCDB 450 (3) Genetics and Molec. Bio. of Complex Behavior

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

PSYCH 240 (4) Introduction to Cognitive Psychology
PSYCH 330 (2-4) Topics in Biopsychology
PSYCH 332 (3) Biopsychology of Rhythms & Behavior
PSYCH 333 (3) Affective Neuroscience
PSYCH 334 (3) Neuroscience of Learning & Memory
PSYCH 336 (3) Drugs of Abuse, Brain, and Behavior
PSYCH 337 (3) Hormones and Behavior
PSYCH 343 (3) Cog. Neurosci. Learning
PSYCH 345 (4) Introduction to Human Neuropsychology
PSYCH 430 (3) Special Topics in Biopsych.

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

BIO 205 (3) Developmental Biology
BIO 207 (4) Microbiology
EEB 492 (4) Behavioral Ecology (BIOSTATION: 5 credits)
MCDB 397/EEB 397 (3) Writing in Biology (ULWR)
MCDB 401 (3) Advanced Topics
MCDB 405 (3) Molecular Basis of Development
MCDB 408 (3) Genomic Biology
MCDB 411 (3) Protein Structure and Function
MCDB 417 (3) Chromosome Structure and Function
MCDB 427 (4) Molecular Biology
MCDB 428 (4) Cell Biology
MCDB 435 (3) Intracellular Trafficking
MCDB 436 (3) Immunology
MCDB 440 (3) Cell Cycle Control
MCDB 441 (3) Cell Biology and Disease
MCDB 454 (3) Cytoskeletal Dynamics

MCDB 462 (3) Epigenetics
PSYCH 335 (4) Intro to Animal Behavior
PSYCH 338/ANTHRBIO 368 (4) Primate Social Behavior I (ULWR)
PSYCH 346 (3) Learning and Memory
PSYCH 414/WOMENSTD 452 (3) Sexuality and Science
PSYCH 420 (must be taken for 3 credits to count) Faculty-Directed Advanced Tutorial Reading for Psych as a Nat Sci
PSYCH 441 (3) Neuroscience & Society
PSYCH 448 (3) Mathematical Psychology
BiolChem 640 (2) Regulatory RNA & Control of Gene Expression

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 419 (3) Endocrinology 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) Labs in Biopsychology (ULWR)

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. Science**
PSYCH 428 (2-4) Senior Thesis

*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
# NEUROSCIENCE MAJOR REQUIREMENTS

## NEUROSCIENCE PREREQUISITES:

### Introductory Biology Sequence:

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<tr>
<th>TERM</th>
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<tr>
<td>☐ Complete Sequence A or B:</td>
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<tr>
<td>☐ A: BIO 171, 172 or 174, &amp; 173</td>
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<td>☐ B: BIO 195 (AP) &amp; 173</td>
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### Chemistry Sequence:

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<tr>
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<tbody>
<tr>
<td>☐ CHEM 210</td>
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<td>☐ CHEM 211</td>
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<td>☐ CHEM 215</td>
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<td>☐ CHEM 216</td>
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### Quantitative Prerequisites (2 courses)

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<td>☐ 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).</td>
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## NEUROSCIENCE MAJOR:

### Core Courses

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<tr>
<td>☐ Animal Physiology &amp; Neurobiology: BIO 225</td>
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<tr>
<td>☐ Introduction to Behavioral Neuroscience: PSYCH 230</td>
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<td>☐ Biochemistry: Choose from: MCDB 310, BIOLCHEM 415, or CHEM 351</td>
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<td>☐ Genetics: BIO 305</td>
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<td>☐ Statistics: STATS 250</td>
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### Upper Level Electives (5 courses)

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<tr>
<td>☐ Molecular &amp; Cellular Neuroscience - Group A (minimum of 2 courses, at least one from A-1)</td>
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<td>☐ 300-level – Group A1</td>
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<tr>
<td>☐ Additional Elective – Group A1 or A2</td>
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<td>☐ Behavioral Neuroscience - Group B (minimum of 2 courses)</td>
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<td>☐ Additional Courses - Group C (maximum of 1 course)</td>
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### Lab Courses – Group D (2 courses, 4 credits minimum, at least one from D-1)

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<tr>
<td>☐ Method-based laboratory courses – Group D1</td>
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<tr>
<td>☐ Second lab course – Group D1 or D2</td>
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### Total Units and GPA Requirement for Neuroscience

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<tr>
<td>☐ Minimum 37 cr. in Major (200-level &amp; above)</td>
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<td>☐ Core Courses (17-18 cr.) + A, B, C (min. 16 cr.) + D1, D2 (min. 4 cr.)</td>
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<tr>
<td>☐ Minimum 2.0 GPA in Concentration</td>
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<tr>
<td>☐ (GPA is calculated from all courses used for major requirements, and all courses in BIOLOGY, MCDB, and Natural Science PSYCHOLOGY courses)</td>
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### HONORS STUDENTS ONLY:

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<tr>
<td>☐ Minimum 3.4 Major GPA</td>
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<td>☐ Minimum 3.4 Cum. GPA</td>
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<td>☐ Independent Research (2 terms required, more recommended)</td>
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<tr>
<td>☐ PSYCHOLOGY focus area: PSYCH 424 &amp; 426</td>
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<tr>
<td>☐ MCDB focus area: MCDB 300 and/or MCDB 400</td>
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