NEUROBIOLOGY, B.S.

Neuroscience is the scientific study of the central (brain and spinal cord) and peripheral (nerves in body) nervous system. The neurobiology major at UW–Madison will provide a rigorous education in neuroscience principles that will prepare students for health-related careers (physician, physician assistant, veterinarian, dentist, neuroimaging technician, speech-language pathologist, neuropsychologist, drug rehabilitation counselor, physical therapists), academic careers (college and university faculty, research scientists, lab technician, K-12 teachers), and careers in pharmaceutical and biotech industries, venture capital and scientific consulting firms, medical and scientific journals, intellectual property law, neuroscience-related nonprofit organizations and foundations, and government agencies. UW–Madison is one of the leading universities in the world with more than 90 faculty engaged in neuroscience research and undergraduates will have access to this research faculty in formal classroom environments and through undergraduate research opportunities. Please see the Neurobiology Major (http://www.neuromajor.wisc.edu) website for more information.

ABOUT THE CURRICULUM

The curriculum is designed to give students a solid foundation in basic biology, chemistry, physics, and mathematics before going on to study neuroscience at the molecular, cellular, systems, and cognitive levels. Students with interests in non-neuroscience majors are welcome and encouraged to enroll in neuroscience courses. For example, students may be attracted to the diversity and flexibility of courses offered within the biology major in the College of Agricultural and Life Sciences and still take several neuroscience courses that satisfy requirements in the biology major. Students can also perform independent research in neuroscience laboratories on campus. Students in other majors, such as biochemistry, psychology, genetics, animal sciences, communication sciences and disorders, engineering, and computer science, can enroll in neuroscience courses that uniquely complement courses within their major. The Neurobiology Major Program Committee is committed to increasing opportunities for all students with interests in neuroscience and helping students accomplish their academic goals at UW–Madison. This new major is tailored to attract students from a diverse array of backgrounds. Please see the Neurobiology Major website (http://www.neuromajor.wisc.edu) for more information.

HOW TO GET IN

Undergraduate advising in the major: The student services coordinators Catherine Auger and Virginia Jackson, located in Birge Hall, are the primary advisors for the neurobiology major. Students should declare the major no later than the beginning of the junior year. Students can make appointments for general advising and major declarations through the student services coordinators. Advisors are assigned based on student’s last name.

Last names beginning with A through F—see Catherine Auger, Schedule an Appointment (https://calendar.wisc.edu/scheduling-assistant/public/profiles/GvjvmzDO.html)

Last names beginning with G through Z—see Virginia Jackson, Schedule an Appointment (https://calendar.wisc.edu/scheduling-assistant/public/profiles/GvjvmzDO.html)

REQUIREMENTS

UNIVERSITY GENERAL EDUCATION REQUIREMENTS

All undergraduate students at the University of Wisconsin–Madison are required to fulfill a minimum set of common university general education requirements to ensure that every graduate acquires the essential core of an undergraduate education. This core establishes a foundation for living a productive life, being a citizen of the world, appreciating aesthetic values, and engaging in lifelong learning in a continually changing world. Various schools and colleges will have requirements in addition to the requirements listed below. Consult your advisor for assistance, as needed. For additional information, see the university Undergraduate General Education Requirements (http://guide.wisc.edu/undergraduate/#requirementsforundergraduatetestudytext) section of the Guide.

General Education

- Breadth—Humanities/Literature/Arts: 6 credits
- Breadth—Natural Science: 4 to 6 credits, consisting of one 4- or 5-credit course with a laboratory component; or two courses providing a total of 6 credits
- Breadth—Social Studies: 3 credits
- Communication Part A & Part B *
- Ethnic Studies *
- Quantitative Reasoning Part A & Part B *

* The mortarboard symbol appears before the title of any course that fulfills one of the Communication Part A or Part B, Ethnic Studies, or Quantitative Reasoning Part A or Part B requirements.

COLLEGE OF LETTERS & SCIENCE BREADTH AND DEGREE REQUIREMENTS: BACHELOR OF SCIENCE (B.S.)

Students pursuing a bachelor of science degree in the College of Letters & Science must complete all of the requirements below. The College of Letters & Science allows this major to be paired with either a bachelor of arts or a bachelor of science curriculum. View a comparison of the degree requirements here. (https://pubs.wisc.edu/home/archives/ug15/images/babs2009.pdf)

BACHELOR OF SCIENCE DEGREE REQUIREMENTS

Mathematics

Two (2) 3+ credits of intermediate/advanced level MATH, COMP SCI, STAT

Limit one each: COMP SCI, STAT

Foreign Language

Complete the third unit of a foreign language

Note: A unit is one year of high school work or one semester/term of college work.
L&S Breadth

- Humanities, 12 credits: 6 of the 12 credits must be in literature
- Social Sciences, 12 credits
- Natural Sciences, 12 credits: must include 6 credits in biological science; and must include 6 credits in physical science

Liberal Arts and Science Coursework

- 108 credits
- Depth of Intermediate/Advanced work: 60 intermediate or advanced credits

Major

- Declare and complete at least one (1) major

Total Credits 120 credits

UW-Madison Experience

- 30 credits in residence, overall
- 30 credits in residence after the 90th credit

Minimum GPAs

- 2.000 in all coursework at UW–Madison
- 2.000 in intermediate/advanced coursework at UW–Madison

NON–L&S STUDENTS PURSUING AN L&S MAJOR

Non–L&S students who have permission from their school/college to pursue an additional major within L&S only need to fulfill the major requirements and do not need to complete the L&S breadth and degree requirements above. Please note that the following special degree programs are not considered majors so are not available to non-L&S-degree-seeking candidates:

- Applied Mathematics, Engineering and Physics (Bachelor of Science–Applied Mathematics, Engineering and Physics)
- Journalism (Bachelor of Arts–Journalism; Bachelor of Science–Journalism)
- Music (Bachelor of Music)
- Social Work (Bachelor of Social Work)

REQUIREMENTS FOR THE MAJOR

MATH, STATISTICS, CHEMISTRY & PHYSICS

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics—one course:</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>MATH 211</td>
<td>Calculus</td>
<td></td>
</tr>
<tr>
<td>MATH 217</td>
<td>Calculus with Algebra and Trigonometry II</td>
<td></td>
</tr>
<tr>
<td>MATH 221</td>
<td>Calculus and Analytic Geometry 1</td>
<td></td>
</tr>
<tr>
<td>MATH 275</td>
<td>Topics in Calculus I</td>
<td></td>
</tr>
<tr>
<td>Statistics—one course:</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>STAT 371</td>
<td>Introductory Applied Statistics for the Life Sciences</td>
<td></td>
</tr>
<tr>
<td>STAT/B M I 541</td>
<td>Introduction to Biostatistics</td>
<td></td>
</tr>
<tr>
<td>BOTANY 575</td>
<td>Special Topics</td>
<td></td>
</tr>
<tr>
<td>General Chemistry—one course:</td>
<td></td>
<td>5-9</td>
</tr>
<tr>
<td>CHEM 103</td>
<td>General Chemistry I</td>
<td></td>
</tr>
<tr>
<td>&amp; CHEM 104 &amp; General Chemistry II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 109</td>
<td>Advanced General Chemistry</td>
<td></td>
</tr>
</tbody>
</table>

CHEM 115 & CHEM 116

- Chemical Principles I
- and Chemical Principles II

Organic Chemistry—one course:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 314</td>
<td>Elementary Organic Chemistry</td>
<td></td>
</tr>
<tr>
<td>CHEM 343   &amp; CHEM 345</td>
<td>Introductory Organic Chemistry and Intermediate Organic Chemistry</td>
<td></td>
</tr>
</tbody>
</table>

General Physics 1—one course:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICS 103</td>
<td>General Physics</td>
<td></td>
</tr>
<tr>
<td>PHYSICS 201</td>
<td>General Physics</td>
<td></td>
</tr>
<tr>
<td>PHYSICS 207</td>
<td>General Physics</td>
<td></td>
</tr>
<tr>
<td>PHYSICS 247</td>
<td>A Modern Introduction to Physics</td>
<td></td>
</tr>
<tr>
<td>E M A 201 &amp; E M A 202</td>
<td>Statics and Dynamics</td>
<td>1</td>
</tr>
</tbody>
</table>

General Physics 2

Select one of the following:

- PHYSICS 104 General Physics
- PHYSICS 202 General Physics
- PHYSICS 208 General Physics
- PHYSICS 248 A Modern Introduction to Physics

Total Credits 24-28

1 M E 240 may be taken instead of E M A 202

30 CREDITS OF BIOLOGY AND NEUROBIOLOGY

Credits will be applied from General Biology, Neurobiology, Lab, and Electives. Courses apply only once.

General Biology

Complete one General Biology sequence:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introductory Biology</td>
<td></td>
<td>10-16</td>
</tr>
<tr>
<td>ZOOLOGY/ BIOLOGY/ BOTANY 151</td>
<td>Introductory Biology</td>
<td></td>
</tr>
<tr>
<td>ZOOLOGY/ BIOLOGY/ BOTANY 152</td>
<td>Introductory Biology</td>
<td></td>
</tr>
<tr>
<td>BIOCORE 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOCORE 381</td>
<td>Evolution, Ecology, and Genetics</td>
<td></td>
</tr>
<tr>
<td>BIOCORE 383</td>
<td>Cellular Biology</td>
<td></td>
</tr>
<tr>
<td>BIOCORE 485</td>
<td>Organismal Biology</td>
<td></td>
</tr>
<tr>
<td>BIOCORE 587</td>
<td>Biological Interactions</td>
<td></td>
</tr>
<tr>
<td>Plus two from:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOCORE 382</td>
<td>Evolution, Ecology, and Genetics Laboratory</td>
<td></td>
</tr>
<tr>
<td>BIOCORE 384</td>
<td>Cellular Biology Laboratory</td>
<td></td>
</tr>
<tr>
<td>BIOCORE 486</td>
<td>Organismal Biology Laboratory</td>
<td></td>
</tr>
<tr>
<td>Animal Biology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZOOLOGY/ BIOLOGY 101</td>
<td>Animal Biology</td>
<td></td>
</tr>
<tr>
<td>ZOOLOGY/ BIOLOGY 102</td>
<td>Animal Biology Laboratory</td>
<td></td>
</tr>
<tr>
<td>BOTANY/ BIOLOGY 130</td>
<td>General Botany</td>
<td></td>
</tr>
</tbody>
</table>

### Neurobiology, B.S.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZOOLOGY/</td>
<td>Neurobiology</td>
<td>3</td>
</tr>
<tr>
<td>PSYCH 523</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Behavioral Neuroscience:</strong></td>
<td></td>
</tr>
<tr>
<td>PSYCH 454</td>
<td>Behavioral Neuroscience</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Neuroscience Seminar:</strong></td>
<td></td>
</tr>
<tr>
<td>ZOOLOGY 500</td>
<td>Undergraduate Neurobiology Seminar</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td><strong>Distributed Neuroscience—three courses from:</strong></td>
<td>3</td>
</tr>
<tr>
<td>BIOCHEM 375</td>
<td>Special Topics (Molecular Control of Metabolism and Metabolic Disease)</td>
<td></td>
</tr>
<tr>
<td>BIOCHEM 501</td>
<td>Introduction to Biochemistry</td>
<td></td>
</tr>
<tr>
<td>BIOCHEM 508</td>
<td>General Biochemistry II</td>
<td></td>
</tr>
<tr>
<td>BIOCHEM/</td>
<td>Cellular Signal Transduction Mechanisms</td>
<td></td>
</tr>
<tr>
<td>PHMCOL-M/</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZOOLOGY 630</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS&amp;D 210</td>
<td>Neural Basis of Communication</td>
<td></td>
</tr>
<tr>
<td>CS&amp;D 503</td>
<td>Neural Mechanisms of Speech, Hearing and Language</td>
<td></td>
</tr>
<tr>
<td>ED PSYCH 326</td>
<td>Mind, Brain and Education</td>
<td></td>
</tr>
<tr>
<td>GENETICS 520</td>
<td>Neurogenetics</td>
<td></td>
</tr>
<tr>
<td>KINES 531</td>
<td>Neural Control of Movement</td>
<td></td>
</tr>
<tr>
<td>NTP/</td>
<td>Cellular and Molecular Neuroscience</td>
<td></td>
</tr>
<tr>
<td>NEURODPT 610</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NTP/ZOOLOGY 616</td>
<td>Lab Course in Neurobiology and Behavior</td>
<td></td>
</tr>
<tr>
<td>NTP/</td>
<td>Molecular and Cellular Mechanisms of Memory</td>
<td></td>
</tr>
<tr>
<td>NEURODPT 629</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NTP/</td>
<td>Neuronal Mechanisms for Sensation and Memory in Cerebral Cortex</td>
<td></td>
</tr>
<tr>
<td>NEURODPT 630</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NTP/</td>
<td>Methods for Neuroimaging Research</td>
<td></td>
</tr>
<tr>
<td>MED PHYS 651</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZOOLOGY 655</td>
<td>Modeling Neurodevelopmental Disease</td>
<td></td>
</tr>
<tr>
<td>NTP 670</td>
<td>Stem Cells and the Central Nervous System</td>
<td></td>
</tr>
<tr>
<td>NTP 675</td>
<td>Special Topics (Basic Sleep Mechanisms &amp; Sleep Disorders)</td>
<td></td>
</tr>
<tr>
<td>NTP 675</td>
<td>Special Topics (Functional Brain Imaging of Cognitive Disorders)</td>
<td></td>
</tr>
<tr>
<td>NTP 675</td>
<td>Special Topics (Molecular Mechanisms of Brain Damage)</td>
<td></td>
</tr>
<tr>
<td>NTP 675</td>
<td>Special Topics (Neuroendocrinology)</td>
<td></td>
</tr>
<tr>
<td>NTP 675</td>
<td>Special Topics (Reproductive Neuroendocrinology)</td>
<td></td>
</tr>
<tr>
<td>NTP 675</td>
<td>Special Topics (Brain Mapping in Health and Disease: Applications)</td>
<td></td>
</tr>
<tr>
<td>PHM SCI/</td>
<td>Pharmacology I</td>
<td></td>
</tr>
<tr>
<td>PHMCOL-M 521</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ANAT&amp;PHY 335</td>
<td>Physiology</td>
<td></td>
</tr>
</tbody>
</table>

1. Students may apply only one of the following courses toward the major: BIOCHEM 375, BIOCHEM 501, BIOCHEM 508, ANAT&PHY 335, ANAT&PHY 435 B M E/CBE 520, ZOOLOGY 470.

### Lab/Research Experience

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZOOLOGY/</td>
<td>Lab Course in Neurobiology and Behavior</td>
<td></td>
</tr>
<tr>
<td>NTP 611</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZOOLOGY/</td>
<td>Laboratory in Developmental Biology</td>
<td></td>
</tr>
<tr>
<td>NTP 620</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZOOLOGY 603</td>
<td>Endocrinology</td>
<td></td>
</tr>
<tr>
<td>ZOOLOGY 604</td>
<td>Computer-based Gene and Disease/Disorder Research Lab</td>
<td></td>
</tr>
<tr>
<td>ZOOLOGY 611</td>
<td>Comparative and Evolutionary Physiology</td>
<td></td>
</tr>
<tr>
<td>ZOOLOGY/</td>
<td>Biology of Mind</td>
<td></td>
</tr>
<tr>
<td>ANTHRO/NTP/</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSYCH 619</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZOOLOGY/</td>
<td>Neuroethology Seminar</td>
<td></td>
</tr>
<tr>
<td>NTP 620</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZOOLOGY 625</td>
<td>Development of the Nervous System</td>
<td></td>
</tr>
<tr>
<td>ZOOLOGY/</td>
<td>Behavioral Neuroendocrinology Seminar</td>
<td></td>
</tr>
<tr>
<td>NEURODPT/</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSYCH 674</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Choose one option from:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOCORE 486</td>
<td>Organismal Biology Laboratory</td>
<td></td>
</tr>
<tr>
<td>ANAT&amp;PHY 435</td>
<td>Fundamentals of Human Physiology</td>
<td></td>
</tr>
<tr>
<td>PSYCH 621</td>
<td>Mentored Research and Seminar</td>
<td></td>
</tr>
<tr>
<td>ZOOLOGY 555</td>
<td>Laboratory in Developmental Biology</td>
<td></td>
</tr>
<tr>
<td>ZOOLOGY 604</td>
<td>Computer-based Gene and Disease/Disorder Research Lab</td>
<td></td>
</tr>
<tr>
<td>ZOOLOGY 612</td>
<td>Comparative Physiology Laboratory</td>
<td></td>
</tr>
<tr>
<td>ZOOLOGY/</td>
<td>Lab Course in Neurobiology and Behavior</td>
<td></td>
</tr>
<tr>
<td>NEURODPT/</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NTP 616</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Directed Study—3 credits from:

- ANATOMY 699 Independent Study
- ANESTHES 699 Independent Study
- BIOLOGY 699 Directed Studies
- BMOLCHEM 699 Special Research Problems
- CHEM 699 Directed Study
- COMP BIO 699 Directed Study
- CRB 699 Independent Study
- CS&D 699 Directed Study
- ED PSYCH 699 Independent Reading Undergrad
- FAM MED 699 Directed Study
- GENETICS 699 Special Problems
- H ONCOL 699 Independent Study in Human Cancer Biology
- KINES 699 Independent Study
- MED PHYS 699 Independent Reading or Research
- MEDICINE 699 Independent Study
- MED SC-V 669 Small Animal Cardiology Rotation
- M M & I 699 Directed Study
- MOL BIOL 699 Directed Studies in Molecular Biology
- NEURSURG 699 Neurosurgery: Directed in Study in Research
- NEUROL 699 Neurology: Directed Study in Neuroscience Research
- NEURODPT 699 Independent Work
- NUTR SCI 699 Special Problems
- OBS&GYN 699 Directed Study
- ONCOLOGY 699 Special Research Problems
- OPHTHALM 699 Directed Study
- PATH 699 Independent Study
- PATH-BIO 699 Directed Study
- PEDIAT 699 Independent Study
- PHM SCI 699 Advanced Independent Study
- PHYSIOL 699 Independent Work
- POP HLTH 699 Independent Reading
- PSYCH 699 Directed Study
- PSYCHIAT 699 Independent Study
- RADIOL 699
- SURGERY 699 Independent Study
- ZOOLOGY 699 Directed Studies in Zoology

Thesis—two semesters:

- PSYCH 681 Senior Honors Thesis & PSYCH 682 and Senior Honors Thesis
- ZOOLOGY 691 Senior Thesis & ZOOLOGY 692 and Senior Thesis

Note that Lab courses may also be those that apply in the Neurobiology category above.

Only Directed Study courses taken after—and not concurrent with or prior to—the completion of an Introductory Biology sequence are accepted in the major.

Electives

Additional credits from the Neurobiology, Lab, or the following list, to attain 30 credits in the major:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANATPHY 435</td>
<td>Fundamentals of Human Physiology</td>
<td></td>
</tr>
<tr>
<td>AN SCI/ DY SCI 362</td>
<td>Veterinary Genetics</td>
<td></td>
</tr>
<tr>
<td>AN SCI/ DY SCI 434</td>
<td>Reproductive Physiology</td>
<td></td>
</tr>
<tr>
<td>AN SCI/ GENETICS 610</td>
<td>Ornithology</td>
<td></td>
</tr>
<tr>
<td>AN SCI/ GENETICS 610</td>
<td>Quantitative Genetics</td>
<td></td>
</tr>
<tr>
<td>ANATOMY 329</td>
<td>Human Anatomy-Kinesiology</td>
<td></td>
</tr>
<tr>
<td>BIOCHEM 507</td>
<td>General Biochemistry I</td>
<td></td>
</tr>
<tr>
<td>BIOCHEM 508</td>
<td>General Biochemistry II</td>
<td></td>
</tr>
<tr>
<td>BIOCHEM/ NUTR SCI 510</td>
<td>Biochemical Principles of Human and Animal Nutrition</td>
<td></td>
</tr>
<tr>
<td>BIOCHEM 601</td>
<td>Protein and Enzyme Structure and Function</td>
<td></td>
</tr>
<tr>
<td>BIOCHEM/ GENETICS/ MICROBIO 612</td>
<td>Eukaryotic Molecular Biology</td>
<td></td>
</tr>
<tr>
<td>BIOCHEM/ GENETICS/ MD GENET 620</td>
<td>Eukaryotic Molecular Biology</td>
<td></td>
</tr>
<tr>
<td>BIOCHEM 625</td>
<td>Mechanisms of Action of Vitamins and Minerals</td>
<td></td>
</tr>
<tr>
<td>BIOCHEM/ PHMCOL-M/ ZOOLOGY 630</td>
<td>Cellular Signal Transduction Mechanisms</td>
<td></td>
</tr>
<tr>
<td>BMOLCHEM 314</td>
<td>Introduction to Human Biochemistry</td>
<td></td>
</tr>
<tr>
<td>BMOLCHEM 503</td>
<td>Human Biochemistry</td>
<td></td>
</tr>
<tr>
<td>BMOLCHEM 504</td>
<td>Human Biochemistry Laboratory</td>
<td></td>
</tr>
<tr>
<td>F&amp;W ECOL 401</td>
<td>Physiological Animal Ecology</td>
<td></td>
</tr>
<tr>
<td>GENETICS 466</td>
<td>Principles of Genetics</td>
<td></td>
</tr>
<tr>
<td>GENETICS 545</td>
<td>Genetics Laboratory</td>
<td></td>
</tr>
<tr>
<td>GENETICS/ MD GENET/ ZOOLOGY 562</td>
<td>Human Cytogenetics</td>
<td></td>
</tr>
<tr>
<td>GENETICS/ MD GENET 565</td>
<td>Human Genetics</td>
<td></td>
</tr>
<tr>
<td>GENETICS/ MICROBIO 607</td>
<td>Advanced Microbial Genetics</td>
<td></td>
</tr>
<tr>
<td>GENETICS/ BIOCHEM/ MD GENET 620</td>
<td>Eukaryotic Molecular Biology</td>
<td></td>
</tr>
<tr>
<td>KINES 314</td>
<td>Physiology of Exercise</td>
<td></td>
</tr>
<tr>
<td>M M &amp; I 301</td>
<td>Pathogenic Bacteriology</td>
<td></td>
</tr>
<tr>
<td>M M &amp; I 302</td>
<td>Medical Microbiology Laboratory</td>
<td></td>
</tr>
<tr>
<td>M M &amp; I 341</td>
<td>Immunology</td>
<td></td>
</tr>
</tbody>
</table>
Neurobiology, B.S.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>M M &amp; I/ENTOM/</td>
<td>Parasitology</td>
</tr>
<tr>
<td>PATH-BIO/ ZOOLOGY 350</td>
<td></td>
</tr>
<tr>
<td>M M &amp; I/ PATH-BIO/</td>
<td>Parasitology Laboratory</td>
</tr>
<tr>
<td>ZOOLOGY 351</td>
<td></td>
</tr>
<tr>
<td>M M &amp; I 410</td>
<td>Medical Mycology</td>
</tr>
<tr>
<td>M M &amp; I 412</td>
<td>Medical Mycology Laboratory</td>
</tr>
<tr>
<td>M M &amp; I/PATH-BIO 529</td>
<td>Immunology Laboratory</td>
</tr>
<tr>
<td>M M &amp; I/ BIOCHEM 575</td>
<td>Biology of Viruses</td>
</tr>
<tr>
<td>MICROBIO 303</td>
<td>Biology of Microorganisms</td>
</tr>
<tr>
<td>MICROBIO 304</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>M M &amp; I/ PATH-BIO 528</td>
<td></td>
</tr>
<tr>
<td>MICROBIO 526</td>
<td>Physiology of Microorganisms</td>
</tr>
<tr>
<td>MICROBIO 527</td>
<td>Advanced Laboratory Techniques in Microbiology</td>
</tr>
<tr>
<td>MICROBIO/ M M &amp; I/PATH-BIO 528</td>
<td></td>
</tr>
<tr>
<td>MICROBIO 551</td>
<td>Capstone Research Project in Microbiology</td>
</tr>
<tr>
<td>MICROBIO/ ONCOLOGY/ PL PATH 640</td>
<td>General Virology-Multiplication of Viruses</td>
</tr>
<tr>
<td>MICROBIO/ BMOLCHEM 668</td>
<td>Microbiology at Atomic Resolution</td>
</tr>
<tr>
<td>NTP/NEURODPT/ PSYCH 611</td>
<td>Systems Neuroscience</td>
</tr>
<tr>
<td>NTP 660</td>
<td>Neuroscience &amp; Public Policy Seminar</td>
</tr>
<tr>
<td>NEURODPT 533</td>
<td>Molecular Physiology</td>
</tr>
<tr>
<td>NUTR SCI 431</td>
<td>Nutrition in the Life Span</td>
</tr>
<tr>
<td>NUTR SCI 631</td>
<td>Clinical Nutrition I</td>
</tr>
<tr>
<td>NUTR SCI/ PHM PRAC 672</td>
<td>Herbs, Homeopathy, and Dietary Supplements</td>
</tr>
<tr>
<td>ONCOLOGY 401</td>
<td>Introduction to Experimental Oncology</td>
</tr>
<tr>
<td>ONCOLOGY/ MICROBIO/ PL PATH 640</td>
<td>General Virology-Multiplication of Viruses</td>
</tr>
<tr>
<td>PHM SCI 558</td>
<td>Laboratory Techniques in Pharmacology and Toxicology</td>
</tr>
<tr>
<td>PSYCH 449</td>
<td>Animal Behavior</td>
</tr>
<tr>
<td>PSYCH 450</td>
<td>Primates and Us: Insights into Human Biology and Behavior</td>
</tr>
<tr>
<td>PSYCH/ ZOOLOGY 550</td>
<td>Animal Communication and the Origins of Language</td>
</tr>
<tr>
<td>ZOOLOGY/ ANTHRO/ BOTANY 410</td>
<td>Evolutionary Biology</td>
</tr>
<tr>
<td>ZOOLOGY 425</td>
<td>Behavioral Ecology</td>
</tr>
<tr>
<td>ZOOLOGY 430</td>
<td>Comparative Anatomy of Vertebrates</td>
</tr>
<tr>
<td>ZOOLOGY 470</td>
<td>Introduction to Animal Development</td>
</tr>
<tr>
<td>ZOOLOGY/ GEOSCI 541</td>
<td>Paleobiology</td>
</tr>
<tr>
<td>ZOOLOGY/ GEOSCI 542</td>
<td>Invertebrate Paleontology</td>
</tr>
<tr>
<td>ZOOLOGY 555</td>
<td>Laboratory in Developmental Biology</td>
</tr>
<tr>
<td>ZOOLOGY 570</td>
<td>Cell Biology</td>
</tr>
</tbody>
</table>

**RESIDENCE AND QUALITY OF WORK**

2.000 GPA in all major courses

2.000 GPA on 15 upper-level major credits, taken in residence

15 credits in the major, taken on the UW–Madison campus

**HONORS IN THE MAJOR**

Students may declare Honors in the Neurobiology Major in consultation with the Neurobiology undergraduate advisor(s).

**HONORS IN THE NEUROBIOLOGY MAJOR REQUIREMENTS**

To earn Honors in the Major in Neurobiology, students must satisfy both the requirements for the major (above) and the following additional requirements:

- Earn a 3.300 overall university GPA
- Earn a 3.300 GPA for all major courses
- Complete 14 credits, taken for Honors, with individual grades of B or better, while in residence, to include:
  - Two courses from PSYCH 454 Behavioral Neuroscience, ZOOLOGY/PSYCH 523 Neurobiology and ZOOLOGY 500 Undergraduate Neurobiology Seminar
  - One course from the Required Neuroscience or Distributed Neuroscience course lists (above), taken for honors credit
  - A two-semester Senior Honors Thesis, typically 681 and 682, for a total of 6 credits.

The Senior Honors Thesis project must be approved by the Neurobiology Major Program Committee at least one month before beginning 681. The project must focus on a neuroscience-related topic.

1 The thesis can be taken in the following departments: See directed study list in Lab/Research Experience in the Major Requirements section. Other departments will be considered on a case-by-case basis by the Neurobiology Major Program Committee.
UNIVERSITY DEGREE REQUIREMENTS

Total Degree
To receive a bachelor's degree from UW–Madison, students must earn a minimum of 120 degree credits. The requirements for some programs may exceed 120 degree credits. Students should consult with their college or department advisor for information on specific credit requirements.

Residency
Degree candidates are required to earn a minimum of 30 credits in residence at UW–Madison. "In residence" means on the UW–Madison campus with an undergraduate degree classification. "In residence" credit also includes UW–Madison courses offered in distance or online formats and credits earned in UW–Madison Study Abroad/Study Away programs.

Quality of Work
Undergraduate students must maintain the minimum grade point average specified by the school, college, or academic program to remain in good academic standing. Students whose academic performance drops below these minimum thresholds will be placed on academic probation.

LEARNING OUTCOMES

1. Demonstrate understanding of basic concepts in biology, chemistry, mathematics, statistics, and physics.

2. Demonstrate understanding of the ionic basis for the neuronal membrane potential and action potential, as well as the factors that determine neuronal excitability.

3. Demonstrate understanding of the basic mechanisms for synaptic transmission, neurotransmitter release, postsynaptic effects, and modulation of pre- and postsynaptic mechanisms. Predict how specific physiological and pathological conditions alter neuronal function at the cellular and synaptic levels.

4. Differentiate between examples of neuroplasticity at cellular, systems, and organismal levels.

5. Demonstrate understanding of central and peripheral neuroanatomy, basic functions of brain regions, and well-known neural pathways. Predict how localized disruptions of neuronal function alter behavior, motor function, or perception.

6. Demonstrate understanding of basic principles underlying motor function, sensory function (auditory, visual, touch, taste), emotion, autonomic regulation, and higher order cognitive functions (language, memory, attention, decision-making).

7. Demonstrate how experimental tools in neuroscience are used to address experimental questions, such as intra/extracellular recording, molecular biology techniques, immunohistochemical staining, fluorescent and electron microscopy, genetic manipulation, brain imaging, behavioral testing.

ADVISING AND CAREERS

NEUROBIOLOGY MAJOR ADVISING
The advisors for the neurobiology major are committed to providing students with first-rate guidance through the major and to graduation. Also, the neurobiology major advisors are dedicated to helping a student focus their future plans after undergraduate study. If you are interested in declaring the neurobiology major, make an appointment to discuss this.

CONTACT INFORMATION
Catherine Auger
Birge Hall, Room B156
430 Lincoln Drive
cauger@wisc.edu
Scheduling Assistant (https://calendar.wisc.edu/scheduling-assistant/public/profiles/GvjvmzDO.html)

Virginia Jackson
Birge Hall, Room 141
430 Lincoln Drive
vjackson4@wisc.edu
Scheduling Assistant (https://calendar.wisc.edu/scheduling-assistant/public/profiles/aBNotSX.html;jsessionid=5359D9578E6099BCF895E0A8487F3B94.primary)

L&S CAREER RESOURCES
SuccessWorks at the College of Letters & Science helps students leverage the academic skills learned in their major, certificates, and liberal arts degree to explore and try out different career paths; participate in internships; prepare for the job search and/or graduate school applications; and network with professionals in the field (alumni and employers).

SuccessWorks can also assist students in career advising, résumé and cover letter writing, networking opportunities, and interview skills, as well as course offerings for undergraduates to begin their career exploration early in their undergraduate career.

• SuccessWorks (https://careers.ls.wisc.edu)
• Set up a career advising appointment (https://careers.ls.wisc.edu/make-an-appointment)
• INTER-LS 210 L&S Career Development: Taking Initiative (1 credit, targeted to first- and second-year students)—for more information, see Inter-LS 210: Career Development, Taking Initiative (https://careers.ls.wisc.edu/inter-LS-210-career-development-taking-initiative)
• Learn how we're transforming career preparation: L&S Career Initiative (http://ls.wisc.edu/lsci)

PEOPLE

Professors Hardin (chair, jdhardin@wisc.edu), Bement, Blair, Carpenter, Gammie, Halloran, Ives, Lee, Newmark, Porter, Riters, Stanley, Stretton, Turner and Vander Zanden

Associate Professors Amann, Damschen, Grinblat, McIntyre and Orrock

Assistant Professors Sharma and Wolman
Adjunct Professor Peckarsky

**Neurobiology Major Programming Committee:** Professors Ciucci (Communication Sciences and Disorders; Surgery), Gammie (Integrative Biology), Johnson (Comparative Biosciences, chair of major), Lipton (Neuroscience), Postle (Psychology), Turkstra (Communication Sciences and Disorders)