School of Behavioral and Brain Sciences

Neuroscience (BS)

Neuroscience is the multidisciplinary study of brain function that draws on recent advances in cell and molecular biology, biochemistry, biophysics, and computer and behavioral and cognitive sciences. It examines the brain's global and nanoscale biochemistry, its complex and extensively networked anatomical structure, and its remarkably adaptive physiology. The field considers neuronal development from early embryology through advanced senescence, and examines the brain's plasticity from the level of single proteins, of individual neurons, up through the level of networks or systems of cells, on up to complete behaving organisms. It studies the regulation and expression of behavior, the impact of that behavior on the brain, and the complex interactions of multiple neuronal systems that underlie the emergence of cognitive function. The Neuroscience program at UT Dallas provides students with the opportunity to focus on the brain from a systems-level perspective, drawing on behavioral and cognitive expertise combined with cellular and molecular analyses. It allows undergraduates extensive interactions with working neuroscientists who use the latest experimental techniques.

The Neuroscience program is designed to prepare students for admission to graduate, medical, or dental school, or for careers in related biomedical research, industry, and allied health science fields. Required courses and guided electives can include the approved pre-medical curriculum and offer an alternative to other traditional pre-health majors. Students who wish to continue their education in the fields of medicine, dentistry or allied professional areas should register with the Health Professions Advising Center during their first semester. Students are encouraged to design a personalized degree plan of guided electives with their advisor that combines courses from the neurosciences and related disciplines of mathematics, physics, chemistry, biology, engineering, computer science, psychology, and speech pathology and audiology in a way that will suit their individual interests and goals. Students are also strongly encouraged to gain research experience as part of their undergraduate training in Neuroscience.

Students can complete Core Curriculum and Neuroscience major requirements in a minimum of 85 semester credit hours, leaving 35 elective semester credit hours. Students can complete Core Curriculum, Neuroscience major, and pre-health Professions requirements in a minimum of 111 semester credit hours, leaving 9 remaining elective semester credit hours.

Bachelor of Science in Neuroscience

Degree Requirements (120 semester credit hours)

View an Example of Degree Requirements by Semester

Faculty

Professors: Hervé Abdi, Peter F. Assmann, Sandra B. Chapman, W. Jay Dowling, Julia Evans,
Francesca Filbey, Richard M. Golden, John Hart Jr., Michael P. Kilgard, Daniel Krawczyk, Aage R. Møller, Theodore Price, Robert L. Rennaker II, Michael D. Rugg, Bart Rypma, Steven Small, Sven Vanneste

**Associate Professors:** Chandramallika Basak, Gregory Dussor, Kristen Kennedy, Sven Kroener, Mandy J. Maguire, Christa McIntyre Rodriguez, Amy Pinkham, Jonathan E. Ploski, Karen Rodrigue, Lucien (Tres) Thompson, Gagan Wig

**Assistant Professors:** Michael Burton, Catherine Thorn

**Senior Lecturers:** Steven McWilliams, Siham Raboune, Rukhsana Sultana, Anna Taylor

### I. Core Curriculum Requirements: 42 semester credit hours

#### Communication: 6 semester credit hours

- **COMM 1311** Survey of Oral and Technology-based Communication
- **RHET 1302** Rhetoric

#### Mathematics: 3 semester credit hours

Choose one course from the following:

- **MATH 2414** Integral Calculus
- **MATH 2417** Calculus

#### Life and Physical Sciences: 6 semester credit hours

- **CHEM 1311** General Chemistry
- **BIOL 2311** Introduction to Modern Biology

#### Language, Philosophy and Culture: 3 semester credit hours

Choose one course from the following:

- **HUMA 1301** Exploration of the Humanities
- **LIT 2331** Introduction to World Literature
- **PHIL 1301** Introduction to Philosophy
- **PHIL 2316** History of Philosophy I
- **PHIL 2317** History of Philosophy II

#### Creative Arts: 3 semester credit hours

Choose one course from the following:

- **AHST 1303** Survey of Western Art History: Ancient to Medieval
- **AHST 1304** Survey of Western Art History: Renaissance to Modern
AHST 2331 Understanding Art
ARTS 1301 Exploration of the Arts
DANC 1310 Understanding Dance
THEA 1310 Understanding Theatre
FILM 2332 Understanding Film
MUSI 1306 Understanding Music

American History: 6 semester credit hours

Choose two courses from the following:

HIST 1301 U.S. History Survey to Civil War
HIST 1302 U.S. History Survey from Civil War
HIST 2301 History of Texas
HIST 2330 Themes and Ideas in American History

Government / Political Science: 6 semester credit hours

GOVT 2305 American National Government
GOVT 2306 State and Local Government

Social and Behavioral Sciences: 3 semester credit hours

PSY 2301 Introduction to Psychology

Component Area Option: 6 semester credit hours

PSY 2317 Statistics for Psychology

or STAT 1342 Statistical Decision Making

or STAT 2332 Introductory Statistics for Life Sciences

And CHEM 1312 General Chemistry II

II. Major Requirements: 45 semester credit hours

Major Preparatory Courses: 24 semester credit hours - 6 semester credit hours beyond Core Curriculum

All of the following:

BIOL 2111 Introduction to Modern Biology Workshop I
BIOL 2281 Introductory Biology Laboratory
BIOL 2311  Introduction to Modern Biology 3
CHEM 1111  General Chemistry Laboratory I
CHEM 1311  General Chemistry I 3
CHEM 1112  General Chemistry Laboratory II
CHEM 1312  General Chemistry II 3
MATH 2414  Integral Calculus 3
  or MATH 2417  Calculus I 3
PSY 2301  Introduction to Psychology 3
PSY 2317  Statistics for Psychology 3
  or STAT 1342  Statistical Decision Making 3
  or STAT 2332  Introductory Statistics for Life Sciences 3

Major Core Courses: 24 semester credit hours

All of the following:

NSC 3361  Introduction to Neuroscience
NSC 4352  Cellular Neuroscience
NSC 4353  Neuroscience Laboratory Methods
NSC 4354  Integrative Neuroscience
NSC 4356  Neurophysiology
NSC 4363  Neuropharmacology
NSC 4366  Neuroanatomy

And one emphasis course from the following six:

NSC 4357  Neurobiology of Learning and Memory
  or NSC 4367  Developmental Neurobiology
  or NSC 4371  Neural Plasticity
  or NSC 4373  Sensory Neuroscience
  or NSC 4362  Molecular Neuroscience
  or NSC 4385  Neuropsychology

Major Related Courses: 15 semester credit hours

Guided Electives: 15 semester credit hours from the following list

BIOL 3101  Classical and Molecular Genetics Workshop
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>BIOL 3301</td>
<td>Classical and Molecular Genetics</td>
</tr>
<tr>
<td>BIOL 3102</td>
<td>Eukaryotic Molecular and Cell Biology Workshop</td>
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<tr>
<td>BIOL 3302</td>
<td>Eukaryotic Molecular and Cell Biology</td>
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<tr>
<td>BIOL 3161</td>
<td>Biochemistry Workshop I</td>
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<tr>
<td>BIOL 3361</td>
<td>Biochemistry I</td>
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<tr>
<td>BIOL 3162</td>
<td>Biochemistry Workshop II</td>
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<tr>
<td>BIOL 3362</td>
<td>Biochemistry II</td>
</tr>
<tr>
<td>BIOL 3455</td>
<td>Human Anatomy and Physiology with Lab I</td>
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<tr>
<td>BIOL 3456</td>
<td>Human Anatomy and Physiology with Lab II</td>
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<tr>
<td>NSC 3344</td>
<td>Anatomy and Physiology of Speech and Hearing</td>
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<tr>
<td>NSC 3345</td>
<td>Neural Basis of Communication</td>
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<tr>
<td>NSC 4350</td>
<td>Medical Neuropathology</td>
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<td>NSC 4351</td>
<td>Medical Neuroscience</td>
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<tr>
<td>NSC 4355</td>
<td>Advanced Neuroscience Laboratory</td>
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<tr>
<td>NSC 4357</td>
<td>Neurobiology of Learning and Memory</td>
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<td>NSC 4358</td>
<td>Neuroscience of Pain</td>
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<td>NSC 4359</td>
<td>Cognitive Neuroscience</td>
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<td>NSC 4362</td>
<td>Molecular Neuroscience</td>
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<td>NSC 4364</td>
<td>Journey into Medicine</td>
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<td>NSC 4367</td>
<td>Developmental Neurobiology</td>
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<tr>
<td>NSC 4370</td>
<td>Neuroendocrinology</td>
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<tr>
<td>NSC 4371</td>
<td>Neural Plasticity</td>
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<td>NSC 4372</td>
<td>Neuroimmunology</td>
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<tr>
<td>NSC 4373</td>
<td>Sensory Neuroscience</td>
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<tr>
<td>NSC 4374</td>
<td>Neuroplasticity in Disorders of the Nervous System</td>
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<td>NSC 4376</td>
<td>Neurobiology of Stress</td>
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<td>NSC 4378</td>
<td>Neurotoxicology</td>
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<tr>
<td>NSC 4385</td>
<td>Neuropsychology</td>
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<tr>
<td>NSC 4387</td>
<td>Neuropathology</td>
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<tr>
<td>NSC 4388</td>
<td>Medical Physiology</td>
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<tr>
<td>NSC 4390</td>
<td>Directed Research and Writing</td>
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III. Elective Requirements: 33 semester credit hours

Free Electives: 33 semester credit hours

At least 33 semester credit hours of lower- or upper-division courses of the student's choice. Students are encouraged to explore areas of concentration in Neuroscience as well as explore interests outside the field. Be aware that at least 51 semester credit hours of upper-division courses are required for graduation.

Incoming freshmen must enroll and complete requirements of **BBSU 1100**.

Pre-medical and/or other pre-health students should take the following required courses as part of their concentration:

**Required pre-medical courses (12 semester credit hours)**

- **BIOL 2112** Introduction to Modern Biology Workshop II
- **BIOL 2312** Introduction to Modern Biology II
- **CHEM 2123** Introductory Organic Chemistry Laboratory I
- **CHEM 2125** Introductory Organic Chemistry Laboratory II
- **CHEM 2323** Introductory Organic Chemistry I
- **CHEM 2325** Introductory Organic Chemistry II

**Pre-med Advanced Biology requirement (8 semester credit hours, select 2 courses and corresponding workshop courses)**

- **BIOL 3101** Classical and Molecular Genetics Workshop
BIOL 3301  Classical and Molecular Genetics
BIOL 3102  Eukaryotic Molecular and Cell Biology Workshop
BIOL 3302  Eukaryotic Molecular and Cell Biology
BIOL 3161  Biochemistry Workshop I
BIOL 3361  Biochemistry I
BIOL 3162  Biochemistry Workshop II
BIOL 3362  Biochemistry II

Pre-med Physics requirement (8 semester credit hours, select 2 courses and corresponding lab courses)

PHYS 1101  College Physics Laboratory I
PHYS 1102  College Physics Laboratory II
PHYS 1301  College Physics I
PHYS 1302  College Physics II
PHYS 2125  Physics Laboratory I
PHYS 2126  Physics Laboratory II
PHYS 2325  Mechanics
PHYS 2326  Electromagnetism and Waves

Pre-med electives (5 semester credit hours)

Fast Track Baccalaureate/Master's Degrees

UT Dallas undergraduate students with strong academic records who intend to pursue a master's degree in Applied Cognition and Neuroscience at UT Dallas may consider an accelerated undergraduate-graduate plan of study. If accepted into the program, students may take up to 15 semester credit hours of graduate courses that may be used to complete the baccalaureate degree and also satisfy requirements for the master's degree. Students must maintain a 3.000 grade point average and earn grades of B or better in graduate courses taken.

Students should apply for Fast Track admission in the semester they reach 90 semester credit hours. To qualify for application, undergraduate students must have completed at least 18 semester credit hours in major core courses at UT Dallas. To be eligible for Fast Track admission, students must have completed at least 90 semester credit hours toward a baccalaureate degree, and meet program admission requirements. Apply to the Fast Track program through the Applied Cognition and Neuroscience Program Office. Students should consult with a graduate advisor regarding admissions criteria and plans of study.
Minor in Neuroscience: 18 semester credit hours

Students who are not majoring in Neuroscience may minor in Neuroscience by taking 18 semester credit hours selected from the lists of major core courses, major related courses, and major preparatory courses. See Neuroscience (BS). Students who take a minor will be expected to meet the normal prerequisites in courses making up the minor, and should maintain a minimum GPA of 2.000 on a 4.00 scale (C average). At least 12 semester credit hours must be upper-division Neuroscience core courses. No semester credit hours may be used to satisfy both major and minor requirements; however, free elective semester credit hours or major preparatory courses may be used to satisfy the minor. At least one-third of the semester credit hours for a minor must be taken at UT Dallas.

At least 12 semester credit hours must be upper-division Neuroscience core courses.

Neuroscience Major Core Courses: 12 semester credit hours:

- **NSC 3361** Introduction to Neuroscience
- **NSC 4352** Cellular Neuroscience
- **NSC 4353** Neuroscience Laboratory Methods
- **NSC 4354** Integrative Neuroscience
- **NSC 4356** Neurophysiology
- **NSC 4363** Neuropharmacology
- **NSC 4366** Neuroanatomy
- **NSC 4357** Neurobiology of Learning and Memory
- **NSC 4362** Molecular Neuroscience
- **NSC 4367** Developmental Neurobiology
- **NSC 4371** Neural Plasticity
- **NSC 4373** Sensory Neuroscience
- **NSC 4385** Neuropsychology

1. Incoming freshmen must enroll and complete requirements of UNIV 1010 and the corresponding school-related freshman seminar course. Students, including transfer students, who complete their core curriculum at UT Dallas must take UNIV 2020.

2. Curriculum Requirements can be fulfilled by other approved courses from accredited institutions of higher education. The courses listed are recommended as the most efficient way to satisfy both Core Curriculum and Major Requirements at UT Dallas.

3. A required preparatory course that also fulfills a Core Curriculum requirement. Eighteen (18) semester credit hours are counted in Core Curriculum.
4. The Emphasis Course selected above will not count twice as a Guided Elective. Consultation with an advisor is required.

5. May be repeated for credit, up to 9 semester credit hours.

6. May be repeated for credit, up to 6 semester credit hours.

7. Algebra-based Physics courses

8. Calculus-based Physics courses

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