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]¹

View an Example of Degree Requirements by Semester

Faculty

**Professors:** Hervé Abdi, Peter F. Assmann, James C. Bartlett, 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, Sven Vanneste

**Associate Professors:** Chandramallika Basak, Gregory Dussor, Kristen Kennedy, Sven
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 I

Life and Physical Sciences: 6 semester credit hours

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

Language, Philosophy and Culture: 3 semester credit hours

Choose one course from the following:

- **HUMA 1301** Exploration of the Humanities
- **LIT 2331** Masterpieces of 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 Theater
- **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
HIST 2332 Civil War and Reconstruction

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
CHEM 1111 General Chemistry Laboratory I
CHEM 1311 General Chemistry I
CHEM 1112 General Chemistry Laboratory II
CHEM 1312 General Chemistry II
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\(^4\)

- 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

BIOL 3455 Human Anatomy and Physiology with Lab I
BIOL 3456 Human Anatomy and Physiology with Lab II
NSC 3344 Anatomy and Physiology of Speech and Hearing
NSC 3345 Neural Basis of Communication
NSC 4350 Medical Neuropathology
NSC 4351 Medical Neuroscience
NSC 4355 Advanced Neuroscience Laboratory
NSC 4357 Neurobiology of Learning and Memory
NSC 4358 Neuroscience of Pain
NSC 4359 Cognitive Neuroscience
NSC 4362 Molecular Neuroscience
NSC 4364 Journey into Medicine
NSC 4367 Developmental Neurobiology
NSC 4370 Neuroendocrinology
NSC 4371 Neural Plasticity
NSC 4372 Neuroimmunology
NSC 4373 Sensory Neuroscience
NSC 4374 Neuroplasticity in Disorders of the Nervous System
NSC 4376 Neurobiology of Stress
NSC 4378 Neurotoxicology
NSC 4385 Neuropsychology
NSC 4387 Neuropathology
NSC 4388 Medical Physiology
NSC 4394 Internship in Neuroscience
NSC 4397 Thesis Research
NSC 4V75 Honors Seminar
NSC 4V90 Special Topics in Neuroscience
NSC 4V95 Externship in Neuroscience
NSC 4V96 Teaching Internship
NSC 4V98 Directed Research
NSC 4V99 Independent Study
PSY 4362 Perception
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 II Workshop
- **BIOL 2312** Introduction to Modern Biology II
- **CHEM 2123** Introductory Organic Chemistry Laboratory I
- **CHEM 2125** Introductory Organic Chemistry Laboratory II

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

- **BIOL 3101** Classic and Molecular Genetics Workshop
- **BIOL 3331** Classic and Molecular Genetics
- **BIOL 3102** Eukaryotic Molecular and Cell Biology Workshop
- **BIOL 3332** 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
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 http://catalog.utdallas.edu/2018/undergraduate/programs/bbs/neuroscience. 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
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