

NEUROSCIENCE ADVISEMENT GUIDE

What is neuroscience?

Neuroscience is the scientific study of the nervous system and its involvement in mental processes and behavior. Neuroscience is an interdisciplinary field of study that employs the methods, perspectives, and knowledge base of biology, psychology, chemistry, physics, medicine, and other fields to gain a better understanding of how the nervous system functions and controls behavior.

Why major in neuroscience?

Majoring in neuroscience provides interested undergraduate students with the opportunity to explore a fascinating and challenging area of study while preparing for a variety of career options. In addition, many of our life experiences, from the need to wear corrective lenses in childhood to memory loss in old age, are explored as part of the neuroscience curriculum.

What career options exist for neuroscience majors?

Career options for neuroscience majors include biomedical research, health-care, teaching, administration, product development and distribution, government service, pharmaceutical sales, and other areas. Many neuroscience majors pursue graduate study in neuroscience, psychology, neurophysiology, neuropsychology, neuropharmacology, biotechnology, and related areas. Other neuroscience majors enter training programs for medicine, osteopathy, clinical psychology, physician's assistant, nursing, optometry, physical therapy, and healthcare administration. Some individuals with unique skills (such as artistic or writing ability) or interests (legal issues related to neuroscience and psychology) may pursue non-traditional career options such as medical illustration, scientific writing for the general public, law, or public policy. Yet others will enter positions where a strong liberal arts emphasis at the undergraduate level is more important than the specific major and where advanced education and training is not necessary (e.g. direct care provider for children with autism).

The types of career placements include academia (research, teaching, and/or administration in a college or university), health professions (psychology, medicine, osteopathy, physical therapy, etc), corporate institutions (research, administration, and product development or sales), and nonprofit institutions (research, administration, service, federal and state government, government-sponsored programs, public relations, and fund-raising).

What degree is necessary for the different types of careers?

Professor at a college or university: Ph.D. (doctor of philosophy)

Professional services: M.D. (doctor of medicine), D.O. (doctor of osteopathy), O.D. (doctor of optometry), Ph.D.

Research scientist: Ph.D. or professional degree

Research assistant or technician: B.A (bachelor of arts), B.S. (bachelor of science), M.A. (master of arts), or M.S. (master of science)

Administrator--bachelor's degree or above

Other positions--bachelor's degree or above

What are the requirements to graduate with an undergraduate degree in neuroscience?

Baylor University offers a B.S. degree in neuroscience and students must satisfy the general university requirements for the B. S. degree and the specific requirements for the neuroscience major. The full details are given later in this document, but basically a neuroscience major must complete substantial coursework in science and mathematics, including one course in calculus, two courses in statistics (one calculus-based), three courses in biology, three courses in chemistry, two courses in physics, and nine courses in neuroscience. Most of these courses have a lab component. Thirty-three hours are required in neuroscience and twenty-nine hours are required in math and biology, chemistry, and physics.

The non-neuroscience requirements for a B.S. in neuroscience are virtually identical to those required by the professional schools (medicine, osteopathy, optometry, etc), so the neuroscience major is an excellent choice of undergraduate major.

What are the procedures to admittance into a closed class?

You may request admittance into a closed class by completing a Closed Class Request form located in BSB B.309. Although the catalog says you may get consent of the instructor for prerequisite waivers those decisions are made only by the department chair.

What do researchers in neuroscience do?

As with other fields of scientific research, individual neuroscientists may focus on basic research or applied research, or both. Some neuroscientists focus on basic research leading to a better understanding of the nervous system. Others focus on applied research directed at solving problems (such as Alzheimer's disease) or evaluating the effectiveness of various treatments and procedures. Many researchers in neuroscience also teach, raise issues of public policy, and/or serve as consultants for government, foundations, and corporations.

What is the training to be a neuroscientist?

There are many paths to becoming a neuroscientist. Although many neuroscientists have been specifically trained in neuroscience programs, a significant number of individuals trained in other areas have utilized their training in fields such as medicine, chemistry, engineering, or mathematics to conduct basic or applied research on the nervous system. Thus, neuroscientists vary widely in the type of training they have received. They also differ substantially in the amount of training they have received, ranging from little or no formal training in neuroscience to 5-12 years of formal training. Doctoral programs in neuroscience arose because of the recognition that formal training in neuroscience is very valuable to those seeking to understand the nervous system.

The most prevalent model of training is for students to enter a 4-6 year doctoral program in neuroscience after receiving a bachelor's degree in one of the sciences (typically biology, psychology, or chemistry). As part of the doctoral program a student will take two years of coursework and complete and defend a major original research project called a dissertation). After earning a Ph.D. in neuroscience (or another closely related field), most individuals pursue 2-3 years of postdoctoral training in a different laboratory usually at a different institution to learn additional neuroscience techniques. Following this long period of training, the well-trained neuroscientist will seek a position in academia, industry, etc.

Are there research opportunities available for undergraduates?

Yes, there are a number of opportunities for neuroscience majors to participate in neuroscience research in the department or in summer training programs throughout the country. In general students selected for these opportunities are juniors or seniors who have demonstrated a high level of academic performance and a strong desire to be involved in research.

What is the neuroscience community like at Baylor University?

It is comprised of neuroscience faculty, undergraduate students majoring in neuroscience, graduate students majoring in neuroscience, research faculty in the community, and other interested individuals. We have two student organizations in neuroscience (Nu Rho Psi and the Baylor Neuroscience Society) and one in psychology (Psi Chi). Nu Rho Psi is an honor society in neuroscience and Psi Chi is an honor society in psychology. The Baylor Neuroscience Society is open to anyone who is interested in neuroscience, regardless of major. Each of these three groups has its own officers, meetings, and activities, but there is considerable shared interest among the three groups. The three groups have presentations by faculty and students, discussion of research opportunities in neuroscience and psychology, educational programs, social activities, and community service activities.

Who do I see for advisement in neuroscience?

Until a student has completed thirty semester hours, advisement is handled through the Office of Academic Advisement. Afterwards, you may obtain advisement from the Neuroscience Advisor, Dr. Achor (710-2235; email address L_Joseph_Achor@baylor.edu), the Chair of the Department of Psychology and Neuroscience, Dr. Diaz-Granados (710-2961), or the Office Manager, Mrs. Nancy Ulman (710-2961).

Requirements for the B. S. Degree in Neuroscience

General university requirements (see catalog for specifics)

- Chapel (two courses)
- English (four courses)
- Religion (two courses)
- Math and science (see required non-neuroscience courses)
- Language (four courses)
- History/social science (two courses)
- Human performance (four courses)

Neuroscience requirements (33 hours)

- NSC 1306 Introduction to Neuroscience (lecture)
- NSC 1106 Introduction to Neuroscience (lab)
- NSC 3311 Cognitive Psychology (lecture)
- NSC 3111 Cognitive Psychology (lab)
- NSC 3319 Clinical Neuroscience (lecture)
- NSC 3119 Clinical Neuroscience (lab)
- NSC 3320 Learning and Behavior (lecture)
- NSC 3120 Learning and Behavior (lab)
- NSC 3323 Sensation and Perception (lecture)
- NSC 3123 Sensation and Perception (lab)
- NSC 3355 Drugs and Behavior (lecture)
- NSC 4330 Behavioral Neuroscience (lecture)
- NSC 4130 Behavioral Neuroscience (lab)

Six hours from the following:

- NSC 4312 Behavioral Medicine
- NSC 4317 Literature of Behavioral Neuroscience
- NSC 4324 Research on Sensation and Perception
- NSC 4371 Advanced Research
- NSC 4V96 Special Topics (may be taken twice)

Required non-neuroscience courses (34 hours)

- BIO 1305 Modern Concepts of Bioscience (lecture)
- BIO 1105 Modern Concepts of Bioscience (lab)
- BIO 1306 Modern Concepts of Bioscience (lecture)
- BIO 1106 Modern Concepts of Bioscience (lab)
- BIO 2306 Genetics
- CHE 1301 Basic Principles of Modern Chemistry
- CHE 1302 Basic Principles of Modern Chemistry
- CHE 1316 Basic Principles of Modern Chemistry Lab
- MTH 1321 Calculus I
- STA 2381 Biomedical statistics (calculus based)
- PSY 4300 Advanced Statistics
- Either
- PHY 1408 General Physics for Natural and Behavioral Sciences
- PHY 1409 General Physics for Natural and Behavioral Sciences
- Or
- PHY 1425 General Physics I
- PHY 2435 General Physics II

Other requirements

A minimum grade of "C" must be earned in all PSY and NSC courses required for the major. 36 hours of 3000-4000 level credits (including courses in the major) must be earned.

(A minimum of 29 of these hours will be satisfied with required neuroscience courses. An additional three hours will be satisfied with Psychology 4300, leaving just four additional upper level credits needed).

Students are strongly advised to obtain a degree audit each semester to keep up-to-date on progress towards graduation. You should bring your degree audit with you each time for advisement.

Recommended Schedule of Neuroscience Courses and Important Information Regarding Course Availability

As many of our neuroscience majors are premed (or other healthcare areas), the following recommendations reflect special constraints on this population of students. Other students may accelerate the program and are encouraged to do so. Premeds usually apply to medical school at the end of the junior year and should have completed almost all of the premed requirements before taking the Medical College Admission Test near the end of the junior year. The need to complete the premed requirements by the end of the junior year results in premedical students deferring most of their courses in their major to late in the junior year or later. This creates potential problems as some of the required courses for the neuroscience major are only offered once per year and the few elective neuroscience courses have special restrictions or limited availability.

Special information regarding elective hours in neuroscience: Majors must take six elective hours from a group of five courses. Four of the five courses have restrictive enrollment and students must ask a professor for permission to enroll. Three of these four (NSC 4371 Advanced Research, NSC 4324 Research on Sensation and Perception, and NSC 4V96 Special Topics) provide academic credit for students working on a research project under a professor's supervision. The other course requiring permission to enroll is NSC 4317 Literature of Behavioral Neuroscience, in which a student reads the literature in a given area and writes a lengthy, well-conceptualized review. The only elective course not requiring permission to enroll is NSC 4312 Behavioral Medicine. Students desiring to work with a professor should be aware that each faculty member has his/her own criteria for admitting students into the laboratory and for awarding academic credit. You should anticipate that a given professor may require you to volunteer for one semester before being eligible to register for academic credit. Most of the neuroscience faculty will also require that you have successfully completed one or more 3000-4000 level neuroscience courses, preferably with a "B" or better. Most strongly prefer (or require) that you have had a 3000-4000 level course under his/her direction. As a general rule of thumb, you will be expected to be engaged in some aspect of the research process for approximately thirty to forty hours for each hour of course credit. NSC 4V96 Special Topics is a variable credit course for which students may receive 1-4 credit hours. It may be repeated once for additional credit hours. Some faculty will grant credit for NSC 4371 Advanced Research only after the successful completion of one or two semesters of NSC 4V96 Special Topics. One important consequence of the restrictive or limited availability of the elective courses is that you must anticipate the need to pursue these opportunities and begin early.

The suggested schedule below reflects a balance between the constraints on premedical students and the constraints imposed by requirements of the major. Whenever feasible, students should accelerate this schedule, as scheduling conflicts, full classes, illness, and other factors (such as a course not being offered or the need to repeat a course) may lead to a delay in graduation.

Freshman/Sophomore Year

Introduction to Neuroscience

Non-neuroscience prerequisites for upper level neuroscience courses:

Calculus I and Biomedical Statistics

Junior Year

Cognitive Psychology

Sensation and Perception

Learning and Behavior

Drugs and Behavior (**only offered spring semester**)

Special Topics or Research on Sensation and Perception

Behavioral Medicine (**only offered spring semester**)
 Senior Year
 Clinical Neuroscience (**only offered fall semester**)
 Behavioral Neuroscience (**only offered spring semester**)
 Special Topics or Research on Sensation and Perception or Advanced Research
 Literature of Behavioral Neuroscience
 Advanced Statistics

Regular Neuroscience Offerings
 (subject to change)

Course Number	Fall	Spring	Summer
1306-1106	X	X	X
3311-3111	X	X	X
3319-3119	X		
3320-3120	X	X	X
3323-3123	X	X	
4330-4130		X	
3355		X	
4312		X	
4317	X	X	
4324	X	X	X
4371	X	X	
4V96	X	X	X

Bachelor of Science in Neuroscience

A Suggested Sequence of Required Courses (2007-2008 Catalog)

F r e s h m a n Y e a r			
Fall _____ 0 Chapel (CHA 1088) _____ 3 ENG 1302 or FAS 1302 _____ 3 History/Social Science (PSY 1305 recommended) _____ 3-4 Foreign Language 1401/1412 (see reverse) _____ 4 BIO 1305/1105 Total: 13-14	Spring _____ 0 Chapel (CHA 1088) _____ 3 ENG 1304 (see below) _____ 3-4 Foreign Language 1402/2310 (see reverse) _____ 4 BIO 1306/1106 _____ 4 NSC 1306/1106 Total: 14-15		
S o p h o m o r e Y e a r			
Fall _____ 3 ENG 2301 _____ 3 Foreign Language 2310 (see reverse) _____ 1 Human Performance _____ 3 BIO 2306 _____ 3 CHE 1301 _____ 3 MTH 1321 (if eligible) Total: 16	Spring _____ 3 ENG 2304/2306 or GTX _____ 3 Foreign Language 2320 (see reverse) _____ 3 CHE 1302 _____ 3 STA 2381 _____ 4 NSC 3311/3111 or 3320/3120 Total: 16		
J u n i o r Y e a r			
Fall _____ 3 REL 1310 _____ 1 Human Performance _____ 4 PHY 1408 or 1420 _____ 4 NSC 3323/3123 _____ 4 NSC 3311/3111 or 3320/3120 Total: 16	Spring _____ 3 REL 1350 _____ 1 Human Performance _____ 3 CHE 1316 _____ 4 PHY 1409 or 1430 _____ 3 Elective (Variable depending on hours) _____ 3 NSC 3355 Total: 17		
S e n i o r Y e a r			
Fall _____ 3 NSC (4317 or 4371), 4312, 4324, 4V96 _____ 4 NSC 3319-3119 _____ 3 PSY 4300 (Advanced Statistics) _____ 3 History/Social Science (see reverse) _____ 1 Human Performance _____ 3 Advanced Elective Total: 17	Spring _____ 3 NSC (4317 or 4371), 4312, 4324, 4V96 _____ 4 NSC 4330/4130 _____ 3 PSC 2302 _____ 3 Advanced Elective _____ 3 Elective (Variable depending on hours) Total: 16		

All students must graduate with a minimum of 124 hours, 36 of which must be at the 3000/4000 level.

Notes about major requirements:

- Special information regarding elective hours in neuroscience: Students planning on graduate study or medical school are strongly encouraged to obtain research experience. Several of the elective courses are research-oriented, but the principal course is 4V96 Special Topics, a variable credit course usually taken for three semester hours of credit twice. Students desiring to work with a professor should be aware that each faculty member has his/her own criteria for admitting students into the laboratory and for awarding academic credit. Most of the faculty require that you agree to work in the laboratory for three semesters—once as a volunteer and then twice for academic credit. As opportunities to work in a given lab are limited, students should make arrangements with a professor at the beginning of the junior year. See the Neuroscience Advisor for details about 4V96 and other elective courses.
- English requirement: Students are allowed to take either ENG 1304 or FAS 1118, 1128, and 1138. Students majoring in the sciences may take ENG 3300 instead of ENG 1304.
- A grade of "C" or better in psychology and/or neuroscience courses used for the major.
- Check your degree audit often through Bearweb to ensure that you are making timely progress toward your degree.
- For more information, see page 103 in the undergraduate catalog.

Please see reverse side for important information on general requirements.

Notes about General Requirements:

- Course selection is subject to availability within each semester.
- Please keep in mind that this is only a suggested sequence. Actual sequence will vary according to possible second major, minor, other program of study (including pre-health) and individual circumstances (ex., transfer credit, dual credit, and credit by exam).
- In order to complete your degree, you must fulfill all requirements in your major and general requirements for the Bachelor of Science.
- To complete a double major, you may not count any courses toward both majors.
- For more specific information on general requirements, see undergraduate catalog pages 62-65.
- Check your degree audit often through Bearweb to ensure that you are making timely progress toward your degree.

History/Social Science (choose 2 courses from the following areas - 6 hours):

- Anthropology, Economics, History, Honors, Philosophy, Political Science, Psychology, Sociology, Geog 1300, FAS 1303, 1304 or 1305, or 3 courses from FAS 1115, 1125, 1135.
- Check your major to determine if special courses are needed.

Foreign Language:

- **Option A:** One modern language through 2320 level:
Arabic, Chinese, French, German, Italian, Japanese, Korean, Portuguese, Russian, Spanish, Swahili, Thai
- **Option B:** One classical language through 2320 level or two classical through 1302 level:
Latin, Greek, Hebrew (If available, Akkadian, Aramaic, Syriac, and/or Ugaritic may be used)
*Chemistry majors must take a modern foreign language; German or Russian are strongly recommended.

Math & Science: You must complete a minimum of 34 hours of math and science courses. See page 65 of the undergraduate catalog for a more detailed explanation.

Fine Arts: None required for this degree.

BS in Neuroscience

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 The University reserves the right to correct errors in records at any time.
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 AT LEAST ONE REQUIREMENT HAS NOT BEEN SATISFIED
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NO MINIMUM HOURS AND GPA

A minimum of 124 hours must be earned.
 (Elective hours may be required.)

- 124 hours must be completed with a minimum GPA of 2.0.
- 60 hours must be earned in residence.
- The last 30 hours must be earned in residence.

NEEDS: 30.0 HOURS
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NO MINIMUM ADVANCED HOURS

36 hours advanced credit (including courses in the major) must be earned.
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NO UNIVERSITY REQUIREMENTS

- 1) Complete 2 courses (semesters) of Chapel.

NEEDS: 2 COURSES

SELECT FROM: CHA 1088

- 2) SELECT FROM: PSC 2302
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NO ENGLISH REQUIREMENT

--> NEEDS: 4 SUB-GROUPS

- 1) NEEDS: 1 COURSE
 SELECT FROM: ENG 1302 FAS 1302
- 2) Complete ENG 1304, 3300, or 3 courses from FAS 1118, 1128, 1138.
- 3) SELECT FROM: ENG 2301
- 4) Select one course: ENG 2304, 2306, or 3 hours of GTX at the 2000 level or above.
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NO RELIGION REQUIREMENT

- 1) NEEDS: 2 COURSES

SELECT FROM: REL 1310, 1350(R)
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NO LABORATORY SCIENCE REQUIREMENT

--> NEEDS: 8.0 HOURS

Laboratory Science: Complete 8 hours of lab science (with appropriate lab)
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NO MATH AND SCIENCE REQUIREMENT

--> NEEDS: 3 SUB-GROUPS

- 1) SELECT FROM: MTH 1321
- 2) SELECT FROM: SELECT 1: MTH 1322 STA 2381
- 3) Additional Mathematics and Science: Complete 20 hours of courses from BIO, CHE, ENV, GEO, MTH, STA, NSC, PHY, and PSY.

NEEDS: 20.0 HOURS
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NO LANGUAGE REQUIREMENT

- 1) Complete one language through 2320 (or 2321 or 2322) level.

- OR Complete two Classical languages (Greek, Latin, Hebrew) through 1302 or 1402 level.

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NO HISTORY/SOCIAL SCIENCE

6 hours from Anthropology, Economics, History, Honors, Philosophy, Political Science, Psychology, Sociology, FAS 1303, 1304, 1305, or 3 courses from FAS 1115, 1125, 1135.

Check major to determine if special courses are needed.

- 1) NEEDS: 6.0 HOURS

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NO HUMAN PERFORMANCE ACTIVITY REQUIREMENT

- 4 courses of activity human performance required.

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NO NEUROSCIENCE REQUIREMENTS

--> NEEDS: 33.0 HOURS 3 SUB-GROUPS

- 1) NEEDS: 12 COURSES
SELECT FROM: NSC 1306,1106,3311,3111,3319,3119,3320,
NSC 3120,3323,3123,4330,4130
- 2) SELECT FROM: NSC 3355
- 3) Complete a minimum of 6 hours from the following:
NEEDS: 6.0 HOURS 2 COURSES
SELECT FROM: NSC 4317 OR 4371,4312,4324,4V96

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NO REQUIRED COURSES IN OTHER AREAS

--> NEEDS: 3 SUB-GROUPS

- 1) NEEDS: 10 COURSES
SELECT FROM: BIO 1305,1105,1306,1106,2306 CHE 1301,
CHE 1302,1316 MTH 1321 STA 2381
- 2) NEEDS: 1 SET
SELECT FROM: PHY 1408 & 14091420 (AND) 1430
- 3) SELECT FROM: PSY 4300

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NO MAJOR HRS/GPA/RESIDENCE REQUIREMENTS

- NEUROSCIENCE HRS/GPA: 33 hours and a minimum grade of "C" is required in all NSC and PSY courses used in the major.
NEEDS: 33.0 HOURS 2.00 GPA
- ADVANCED HOURS: 15 hours of 3000-4000 level courses must be completed in the major.
NEEDS: 15.0 HOURS
- ADVANCED HOURS IN RESIDENCE: 12 hours of advanced credit in the major must be earned in residence.
NEEDS: 12.0 HOURS

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ELECTIVES REQUIREMENT

Elective hours vary according to the program of study.

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WORK NOT APPLICABLE
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***** END OF ANALYSIS *****