BACHELOR OF SCIENCE WITH A MAJOR IN NEUROSCIENCE

GW’s Neuroscience program teaches the core concepts and methods involved in modern neuroscience. The program provides students with a rigorous, interdisciplinary education in molecular, cellular, and cognitive neuroscience, resulting in a comprehensive understanding of the mechanisms and circuitry in the brain that drive behavioral outputs. Critically evaluating and applying the core experimental methods used in molecular neuroscience and neurobiology results in students being fluent in the core concepts, methods, and current literature involved with modern neuroscience. This preparation puts students in a position to pursue advanced graduate studies, including for medicine and other pre-health careers. Program graduates also may go on to conduct research, teach, support government agencies, and work in global or public health fields.

Visit the program website (https://biology.columbian.gwu.edu/bs-neuroscience/) for additional information.

ADMISSIONS

For information about the admission process, including deadlines, visit the Office of Undergraduate Admissions website (https://undergraduate.admissions.gwu.edu/). Applications can be submitted via the Common Application (https://go.gwu.edu/commonapp/).

Supporting documents not submitted online should be mailed to:

Office of Undergraduate Admissions
The George Washington University
800 21st St NW Suite 100
Washington, DC 20052

For questions visit undergraduate.admissions.gwu.edu/contact-us (http://undergraduate.admissions.gwu.edu/contact-us/).

REQUIREMENTS

The following requirements must be fulfilled:

The general requirements stated under Columbian College of Arts and Sciences, Undergraduate Programs (https://bulletin.gwu.edu/arts-sciences/#degreeregulationtext).

Program-specific curriculum:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Required</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>38 or 41 credits (10 or 11 courses) in basic science</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BISC 1111</td>
<td>Introductory Biology: Cells and Molecules</td>
<td></td>
</tr>
<tr>
<td>BISC 1112</td>
<td>Introductory Biology: The Biology of Organisms</td>
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</tr>
</tbody>
</table>

BISC 2207 or BISC 2202
Genetics

CHEM 1111
General Chemistry I

CHEM 1112
General Chemistry II

CHEM 2151 & CHEM 2153
Organic Chemistry I and Organic Chemistry Laboratory I

CHEM 2152 & CHEM 2154
Organic Chemistry II and Organic Chemistry Laboratory II

PHYS 1025
University Physics I with Biological Applications

PHYS 1011
General Physics I

PHYS 1021
University Physics I

PHYS 1026
University Physics II with Biological Applications

PHYS 1012
General Physics II

PHYS 1022
University Physics II

MATH 1220 & MATH 1221
Calculus with Precalculus I and Calculus with Precalculus II

MATH 1231
Single-Variable Calculus I

6 credits (two courses) in quantitative methods, selected from the following:

BISC 2585
Biometry

CSCI 1012
Introduction to Programming with Python

DATS 1001
Data Science for All

DATS 2102
Data Visualization for Data Science

DATS 2103
Data Mining for Data Science

DATS 2104
Data Warehousing for Data Science

PUBH 3201
Introduction to Bioinformatics

STAT 1127
Statistics for the Biological Sciences

9 credits in three gateway courses that introduce core neuroscience concepts, selected from the following:

ANAT 2160
Human Functional Neuroanatomy

or SLHS 2106
Neural Substrates of Speech, Language, and Hearing

BISC 2320
Neural Circuits and Behavior

BISC 3320
Human Neurobiology
PSYC 2015  Biological Psychology

15 credits (five courses), taken in the following three categories:

Cellular/molecular/systems neuroscience: 6 credits (two courses), selected from the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANTH 3413</td>
<td>Evolution of the Human Brain</td>
</tr>
<tr>
<td>BISC 2220</td>
<td>Developmental Neurobiology</td>
</tr>
<tr>
<td>BISC 3214</td>
<td>Developmental Biology</td>
</tr>
<tr>
<td>BISC 3320</td>
<td>Human Neurobiology</td>
</tr>
<tr>
<td>PSYC 3199</td>
<td>Current Topics in Psychology</td>
</tr>
</tbody>
</table>

Cognitive neuroscience: 6 credits (two courses), selected from the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSYC 3118</td>
<td>Neuropsychology</td>
</tr>
<tr>
<td>PSYC 3121</td>
<td>Memory and Cognition</td>
</tr>
<tr>
<td>PSYC 3122</td>
<td>The Cognitive Neuroscience</td>
</tr>
<tr>
<td>PSYC 3124</td>
<td>Visual Perception</td>
</tr>
<tr>
<td>PSYC 3127</td>
<td>Social and Affective Neuroscience</td>
</tr>
<tr>
<td>SLHS 2133</td>
<td>Autism</td>
</tr>
<tr>
<td>SLHS 3116</td>
<td>Brain and Language</td>
</tr>
</tbody>
</table>

Advanced biochemistry: 3 or 4 credits (one course), selected from the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BISC 3261</td>
<td>Introductory Medical Biochemistry</td>
</tr>
<tr>
<td>CHEM 3165</td>
<td>Biochemistry I</td>
</tr>
<tr>
<td>CHEM 3166</td>
<td>Biochemistry II</td>
</tr>
</tbody>
</table>

Research/laboratory experience

3 or 4 credits in a research/laboratory experience, which may be fulfilled by one semester of guided or independent research in ANTH, CHEM, PHIL, PSYC, or SLHS, or in one of the following courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BISC 2452</td>
<td>Animal Behavior</td>
</tr>
<tr>
<td>&amp; BISC 2453</td>
<td>and Animal Behavior Laboratory</td>
</tr>
<tr>
<td>BISC 4171</td>
<td>Undergraduate Research</td>
</tr>
<tr>
<td>or BISC 4171W</td>
<td>Undergraduate Research</td>
</tr>
<tr>
<td>BISC 4172</td>
<td>Independent Study</td>
</tr>
<tr>
<td>BISC 4180</td>
<td>Undergraduate Research Seminar</td>
</tr>
</tbody>
</table>

1. 38 credits (10 courses) if MATH 1231 is taken; 41 credits (11 courses) if MATH 1220 and MATH 1221 are taken

2. Recommended for premed students. In addition, premed students are advised to take BISC 2322, BISC 2337, and SOC 1001.

3. SLHS courses are available only to students with a minimum GPA of 3.5 in major courses and/or the permission of the instructor.

**GENERAL EDUCATION**

In addition to the University General Education Requirement (https://bulletin.gwu.edu/university-regulations/general-education/), undergraduate students in Columbian College must complete a further, College-specific general education curriculum—Perspective, Analysis, Communication (G-PAC) (https://bulletin.gwu.edu/arts-sciences/gpac/) as well as the course CCAS 1001 First-Year Experience. Together with the University General Education Requirement, G-PAC engages students in active intellectual inquiry across the liberal arts. Students achieve a set of learning outcomes that enhance their analytical skills, develop their communication competencies, and invite them to participate as responsible citizens who are attentive to issues of culture, diversity, and privilege.

Coursework (https://bulletin.gwu.edu/university-regulations/general-education/#generaleducationtext) for the University General Education Requirement is distributed as follows:

- One course in critical thinking in the humanities.
- Two courses in critical thinking, quantitative reasoning, or scientific reasoning in the social sciences.
- One course that has an approved oral communication component.
- One course in quantitative reasoning (must be in mathematics or statistics).
- One course in scientific reasoning (must be in natural and/or physical laboratory sciences).
- UW 1020 (https://bulletin.gwu.edu/search/?p=UW%201020) University Writing (4 credits).
- After successful completion of UW 1020, 6 credits distributed over at least two writing in the discipline (WID) courses taken in separate semesters. WID courses are designated by a "W" appended to the course number.

Coursework for the CCAS G-PAC requirement is distributed as follows:

- Arts—one approved arts course that involves the study or creation of artwork based on an understanding or interpretation of artistic traditions or knowledge of art in a contemporary context.
• Global or cross-cultural perspective—one approved course that analyzes the ways in which institutions, practices, and problems transcend national and regional boundaries.

• Local or civic engagement—one approved course that develops the values, ethics, disciplines, and commitment to pursue responsible public action.

• Natural or physical science—one additional approved laboratory course that employs the process of scientific inquiry (in addition to the one course in this category required by the University General Education Requirement).

• Humanities—one additional approved humanities course that involves critical thinking skills (in addition to the one course in this category required by the University General Education Requirement).

• CCAS 1001 First-Year Experience

Certain courses are approved to fulfill GPAC requirements in more than one category.

Courses taken in fulfillment of G-PAC requirements may also be counted toward majors or minors. Transfer courses taken prior to, but not after, admission to George Washington University may count toward the University General Education Requirement and G-PAC, if those transfer courses are equivalent to GW courses that have been approved by the University and the College.

Lists of approved courses in the above categories are included on each undergraduate major’s (https://bulletin.gwu.edu/arts-sciences/#majorstext) page in this Bulletin.

SPECIAL HONORS

In addition to the general requirements stated under University Regulations, in order to be considered for graduation with Special Honors, students must maintain a cumulative 3.5 grade-point average in biological sciences courses and at least a 3.0 cumulative overall grade-point average. Students who meet these criteria and wish to pursue special honors must complete an approved research project under faculty direction.

COMBINED PROGRAM

Combined program

• Dual Bachelor of Science with a major in neuroscience and Master of Science in the field of biological sciences (https://bulletin.gwu.edu/arts-sciences/biological-sciences/dual-bs-neuroscience-ms-biological-sciences/)