NEUROSCIENCE, BS

Banner Code: SC-BS-NEUR

Academic Advising

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The Bachelor of Science in Neuroscience is an interdisciplinary program emphasizing the relationship between the biology and chemistry of the nervous system and the behavior of an organism. The BS prepares students for graduate-level study in both medical school and doctoral and master's-level programs in neuroscience and other health-related fields, and work in the neuroscience field.

Admissions & Policies

Admissions

University-wide admissions policies can be found in the Undergraduate Admissions Policies (http://catalog.gmu.edu/admissions/undergraduate-policies/) section of this catalog.

To apply for this program, please complete the George Mason University Admissions Application (https://www2.gmu.edu/admissions-aid/apply-now/).

Policies

Students must fulfill all Requirements for Bachelor's Degrees (http://catalog.gmu.edu/policies/academic/undergraduate-policies/#ap-5-3-2), including the Mason Core (http://catalog.gmu.edu/mason-core/).

NEUR 410 Current Topics in Neuroscience or NEUR 411 Seminar in Neuroscience fulfill the writing intensive requirement.

For policies governing all undergraduate programs, see AP.5 Undergraduate Policies (http://catalog.gmu.edu/policies/academic/undergraduate-policies/).

Requirements

Degree Requirements

Total credits: minimum 120

Students should refer to the Admissions & Policies tab for specific policies related to this program.

Foundation Courses

Code	Title	Credits
Biology		
BIOL 213	Cell Structure and Function (Mason Core) (http://catalog.gmu.edu/mason-core/)	4
Select one from the following: [1,2]		4
BIOL 311	General Genetics	
BIOL 322	Developmental Biology	
BIOL 326	Animal Physiology	
BIOL 425	Human Physiology	
BIOL 430	Advanced Human Anatomy and Physiology I	
Chemistry		
CHEM 211 & CHEM 213	General Chemistry I (Mason Core) (http://catalog.gmu.edu/mason-core/) and General Chemistry Laboratory I (Mason Core) (http://catalog.gmu.edu/mason-core/)	4
CHEM 212 & CHEM 214	General Chemistry II (Mason Core) (http://catalog.gmu.edu/mason-core/) and General Chemistry Laboratory II (Mason Core) (http://catalog.gmu.edu/mason-core/)	4
Mathematics		
Select one option (4 or 6 credits) from the following:		4-6
MATH 113	Analytic Geometry and Calculus I (Mason Core) (http://catalog.gmu.edu/mason-core/)	
MATH 123 & MATH 124	Calculus with Algebra/Trigonometry, Part A and Calculus with Algebra/Trigonometry, Part B (Mason Core) (http://catalog.gmu.edu/mason-core/)	
Statistics		
Select one course (3 or 4 credits) from the following:		3-4
BIOL 214	Biostatistics for Biology Majors	
STAT 250	Introductory Statistics I (Mason Core) (http://catalog.gmu.edu/mason-core/)	
PSYC 300	Statistics in Psychology	
MATH 352	Statistics	
Physics		
Select one of the following sequences:		8
PHYS 243 & PHYS 244 & PHYS 245 & PHYS 246	College Physics I (Mason Core) (http://catalog.gmu.edu/mason-core/) and College Physics I Lab (Mason Core) (http://catalog.gmu.edu/mason-core/) and College Physics II (Mason Core) (http://catalog.gmu.edu/mason-core/) and College Physics II Lab (Mason Core) (http://catalog.gmu.edu/mason-core/)	
PHYS 160 & PHYS 161 & PHYS 260 & PHYS 261	University Physics I (Mason Core) (http://catalog.gmu.edu/mason-core/) and University Physics I Laboratory (Mason Core) (http://catalog.gmu.edu/mason-core/) and University Physics II (Mason Core) (http://catalog.gmu.edu/mason-core/) and University Physics II Laboratory (Mason Core) (http://catalog.gmu.edu/mason-core/)	
Psychology [1,3]		

PSYC 100	Basic Concepts in Psychology (Mason Core) (http://catalog.gmu.edu/mason-core/)	3
PSYC 375	Brain and Sensory Processes	3
PSYC 376	Brain and Behavior	3
Computer Science		
CDS 130	Computing for Scientists	3
Core Courses in Neuroscience [1]		
NEUR 327	Cellular, Neurophysiological, and Pharmacological Neuroscience	3
NEUR 335	Molecular, Developmental, and Systems Neuroscience	3
Technical Writing [1,2,4]		
NEUR 410	Current Topics in Neuroscience	3
or NEUR 411	Seminar in Neuroscience	
Required Psychology Lab Course [1]		
PSYC 373	Biopsychology Laboratory	2
Total Credits		54-57

1. Students must earn a minimum grade of 1.67 (C-) in these courses.
2. The course chosen to fulfill this requirement cannot be applied to the 24 credits of approved neuroscience electives.
3. Transfer students who have earned transfer credit for PSYC 372 Biopsychology may substitute this course for PSYC 375 Brain and Sensory Processes.
4. Either course fulfills the writing intensive requirement.

Electives

Students should consult with an advisor to choose appropriate elective courses, which must be approved by the director of the program. A sample of possible electives is given below. Only courses not already taken in the degree will apply as electives, with the exception of seminar and topics courses; a different topic must be addressed in the second instance of a seminar or topics course. Students may apply no more than 6 credits of courses with a grade of 'D' to this requirement.

Students intending to pursue a doctorate in neuroscience or a medical degree are advised to take CHEM 313 Organic Chemistry I and CHEM 315 Organic Chemistry Lab I.

Code	Title	Credits
Select 24 credits from the following:		24
BENG 101	Introduction to Bioengineering	
BENG 313	Physiology for Engineers	
BENG 434	Computational Modelling of Neurons and Networks	
BIOL 305	Biology of Microorganisms	
BIOL 306	Biology of Microorganisms Laboratory	
BIOL 311	General Genetics	
BIOL 322	Developmental Biology	
BIOL 323	Lab for Developmental Biology	
BIOL 326	Animal Physiology	
BIOL 417	Selected Topics in Molecular and Cellular Biology (when topic is Foundations of the Mammalian Brain)	
BIOL 420	Vaccines	
BIOL 425	Human Physiology	
BIOL 426	Mechanisms of Aging	
BIOL 430	Advanced Human Anatomy and Physiology I	
BIOL 431	Advanced Human Anatomy and Physiology II	
BIOL 432	Clinical Applications in Human Physiology	
BIOL 452	Immunology	
BIOL 453	Immunology Laboratory	
BIOL 471	Evolution	
BIOL 482	Introduction to Molecular Genetics	
BIOL 483	General Biochemistry	
BIOL 484	Cell Signaling and Disease	
BIOL 515	Developmental Neurobiology	
CDS 301	Scientific Information and Data Visualization	
CHEM 313	Organic Chemistry I	
CHEM 314	Organic Chemistry II	
CHEM 315	Organic Chemistry Lab I	
CHEM 318	Organic Chemistry Lab II	
CHEM 321	Quantitative Chemical Analysis	
CHEM 463	General Biochemistry I	
CHEM 464	General Biochemistry II	
CHEM 465	Biochemistry Lab	
MATH 114	Analytic Geometry and Calculus II	
or MATH 116	Analytic Geometry and Calculus II (Honors)	
MATH 203	Linear Algebra	
MATH 213	Analytic Geometry and Calculus III	
MATH 214	Elementary Differential Equations	
NEUR 405	RS: Laboratory Methods in Behavioral Neuroscience	
NEUR 406	Zebrafish Neurodevelopment Laboratory	
NEUR 407	Lab Investigations Using Voltage Clamp Electrophysiology	
NEUR 410	Current Topics in Neuroscience (when not used to fulfill the technical writing requirement) [1]	
NEUR 411	Seminar in Neuroscience [1]	
NEUR 422	Glutamatergic Systems	
NEUR 440	Independent Study in Neuroscience	
NEUR 450	Honors Thesis Proposal	
NEUR 451	Honors Thesis	
NEUR 461	Special Topics in Neuroscience	
NEUR 480	Biological Bases of Alzheimer's Disease	
PHYS 262	University Physics III (Mason Core) (http://catalog.gmu.edu/mason-core/)	
PHYS 263	University Physics III Laboratory (Mason Core) (http://catalog.gmu.edu/mason-core/)	
PSYC 304	Principles of Learning	
PSYC 309	Sensation, Perception, and Information Processing	
PSYC 317	Cognitive Psychology	

PSYC 441	Criminal Behavior: Psychological and Neurological Aspects	
PSYC 472	Current Topics in Brain and Behavior	
Total Credits		24

[1] Fulfills the writing intensive requirement.

Mason Core and Elective Credits

In order to meet a minimum of 120 credits, this degree requires an additional 39-42 credits which may be applied toward any remaining Mason Core (http://catalog.gmu.edu/mason-core/) requirements (outlined below), Requirements for Bachelor's Degrees (http://catalog.gmu.edu/policies/academic/undergraduate-policies/#ap-5-3-2), and elective courses. Students are strongly encouraged to consult with their advisors to ensure that they fulfill all requirements.

Mason Core

Some Mason Core (http://catalog.gmu.edu/mason-core/) requirements may already be fulfilled by the major requirements listed above. Students are strongly encouraged to consult their advisors to ensure they fulfill all remaining Mason Core (http://catalog.gmu.edu/mason-core/) requirements.

Code	Title	Credits
Foundation Requirements		
Written Communication (ENGH 101) (http://catalog.gmu.edu/mason-core/#written)		3
Oral Communication (http://catalog.gmu.edu/mason-core/#oral)		3
Quantitative Reasoning (http://catalog.gmu.edu/mason-core/#quantitative)		3
Information Technology and Computing (http://catalog.gmu.edu/mason-core/#information-technology)		3
Exploration Requirements		
Arts (http://catalog.gmu.edu/mason-core/#arts)		3
Global Understanding (http://catalog.gmu.edu/mason-core/#global)		3
Literature (http://catalog.gmu.edu/mason-core/#literature)		3
Natural Science (http://catalog.gmu.edu/mason-core/#natural-science)		7
Social and Behavioral Sciences (http://catalog.gmu.edu/mason-core/#social-behavioral-science)		3
Western Civilization/World History (http://catalog.gmu.edu/mason-core/#western-civilization-world-history)		3
Integration Requirements		
Written Communications (ENGH 302) (http://catalog.gmu.edu/mason-core/#written)		3
Writing-Intensive (http://catalog.gmu.edu/mason-core/#wi) [1]		3
Synthesis/Capstone (http://catalog.gmu.edu/mason-core/#synthesis-capstone) [2]		3
Total Credits		40

[1] Most programs include the writing-intensive course designated for the major as part of the major requirements; this course is therefore not counted towards the total required for Mason Core.

[2] Minimum 3 credits required.

Honors

Honors in the Major

Highly-qualified students may apply to graduate with honors in the major.

Eligibility

To be eligible for admission, neuroscience majors must have completed at least 60 credits and have a minimum cumulative GPA of 3.25 and a minimum GPA of 3.25 in neuroscience courses.

Honors Requirements

If accepted, students must take a sequence of three courses, which culminates in the successful completion and presentation of an independent honors thesis.

Code	Title	Credits
NEUR 410	Current Topics in Neuroscience	3
or NEUR 411	Seminar in Neuroscience	
NEUR 450	Honors Thesis Proposal	2-3
NEUR 451	Honors Thesis	3-4
Total Credits		8-10

To graduate with honors, students must earn a minimum GPA of 3.50 in their honors courses, maintain a minimum cumulative GPA of 3.25, and complete an honors thesis.

Accelerated Master's

Neuroscience, BS/Biology, Accelerated MS

Overview

Qualified undergraduates may be admitted into an accelerated master's program and obtain both a Neuroscience, BS and a Biology, MS (https://catalog.gmu.edu/colleges-schools/science/systems-biology/biology-ms/) within an accelerated time frame. Students admitted to this program may take graduate courses after completing 90 undergraduate credits, and up to 6 credits of graduate work may be used in partial satisfaction of the requirements for the undergraduate degree. If students earn at least a 3.00 GPA in these classes, they are granted advanced standing in the master's program and must then complete an additional 24 credits to receive the master's degree. All other master's degree requirements must be met, including a minimum of 18 credits taken for the master's after the bachelor's degree is complete.

Application Requirements

Applicants to all graduate programs at George Mason University must meet the admission standards and application requirements for graduate study as specified in the Graduate Admission Policies (https://catalog.gmu.edu/admissions/graduate-policies/) section of this catalog. Application information for this accelerated master's program can be found on the School of Systems Biology's website (https://cos.gmu.edu/ssb/).

Successful applicants will have an overall undergraduate GPA of at least 3.10. Three letters of recommendation, including one from a prospective thesis or project advisor, are required. Additionally, they will have completed the following courses with a GPA of 3.00 or higher:

Code	Title	Credits
BIOL 213	Cell Structure and Function (Mason Core) (http://catalog.gmu.edu/mason-core/)	4
One Course in Statistics:		3-4
BIOL 214	Biostatistics for Biology Majors	
or STAT 250	Introductory Statistics I (Mason Core) (http://catalog.gmu.edu/mason-core/)	
or PSYC 300	Statistics in Psychology	
or MATH 352	Statistics	
BIOL 308	Foundations of Ecology and Evolution	5
or NEUR 327	Cellular, Neurophysiological, and Pharmacological Neuroscience	
NEUR 335	Molecular, Developmental, and Systems Neuroscience	3
BIOL 311	General Genetics	4
CHEM 313	Organic Chemistry I	3
CHEM 315	Organic Chemistry Lab I	2

Accelerated Option Requirements

At the beginning of the student's final undergraduate semester, students must submit a bachelor's/accelerated master's transition form (available from the Office of the University Registrar (http://registrar.gmu.edu/)) to the College of Science's Office of Academic and Student Affairs (https://cos.gmu.edu/about/contact-us/). Students must begin their master's program in the semester immediately following conferral of the bachelor's degree.

Students must maintain an overall GPA of 3.00 or higher in graduate coursework and should consult with their faculty advisor to coordinate their academic goals.

After completing 120 credits and all requirements for the bachelor's degree and filing the Graduation Intent Form, students are awarded a bachelor's degree.

Additional Requirements

- Satisfactory performance in undergraduate coursework must be maintained
- Satisfactory graduate-level performance in each approved graduate course taken while in undergraduate status (receiving a grade of B or better (3.0 or higher) in each course).
- Submission of documents to complete the master's application before the published deadline, including a goals statement and a resume. GRE scores are not required.
- Completion of undergraduate degree from George Mason University.
- Confirmation of a graduate faculty advisor.

Bachelor's Degree (selected), Bioinformatics Management, Accelerated PSM

Overview

This degree option allows highly qualified George Mason University bachelor's students to earn a Bioinformatics Management, PSM (https://catalog.gmu.edu/colleges-schools/science/systems-biology/bioinformatics-management-professional-science-masters/) degree in less time than if they had first graduated with a BS degree and then applied to the PSM program sequentially.

Admission and Processing Requirements

Students in the Biology, BS (https://catalog.gmu.edu/colleges-schools/science/biology/biology-bs/); Chemistry, BS (https://catalog.gmu.edu/colleges-schools/science/chemistry-biochemistry/chemistry-bs/); Computational and Data Sciences, BS (https://catalog.gmu.edu/colleges-schools/science/computational-data-sciences/computational-data-sciences-bs/); Neuroscience, BS (https://catalog.gmu.edu/colleges-schools/science/neuroscience-program/neuroscience-bs/); or Physics, BS (https://catalog.gmu.edu/colleges-schools/science/physics-astronomy/physics-bs/) with an overall GPA of at least 3.00 in their last 60 credits are welcome to apply to the Bioinformatics Management, PSM (http://catalog.gmu.edu/colleges-schools/science/systems-biology/bioinformatics-management-professional-science-masters/) accelerated master's program. Applicants to this accelerated master's should have previously taken courses in molecular biology, computer science, calculus, physical chemistry, and statistics. Students with deficiencies in one or more of these areas may be required to take additional courses from the undergraduate curriculum.

The GRE requirement is waived for students accepted into this accelerated program.

By the beginning of the undergraduate student's senior year, they should submit a Graduate Application for Accelerated Master's Program form (obtained from the College of Science's Office of Academic and Student Affairs (https://cos.gmu.edu/about/contact-us/)).

By at least the beginning of their senior year, students should seek out the Bioinformatics Management, PSM (https://catalog.gmu.edu/colleges-schools/science/systems-biology/bioinformatics-management-professional-science-masters/) Program Director who will aid the student in choosing the appropriate graduate courses to take and help to prepare the student for graduate studies.

In their senior year, accelerated master's students must complete the two graduate courses indicated on their Accelerated Master's Program Application with a minimum grade of 3.00 in each course. They must maintain a minimum GPA of 3.00 in all coursework and in coursework applied to their major. In the semester specified on the application (around the completion and conferral of the undergraduate degree), students must submit the Bachelor's/Accelerated Master's Transition form (found on the Office of the University Registrar website (http://registrar.gmu.edu/forms/)) and will subsequently be admitted into graduate status.

Reserve Graduate Credits

Students admitted to this program may take graduate courses after completing 90 undergraduate credits, and up to 6 credits of appropriate graduate coursework may be used in partial satisfaction of the requirements for the undergraduate degree. If students earn at least a 3.00 GPA in these classes, they are granted advanced standing in the master's program and must then complete an additional 25 credits to receive the master's degree.

To apply these credits to the master's degree, students must request that the credits be moved from the undergraduate degree to the graduate degree using the Bachelor's/Accelerated Master's Transition form found on the Office of the University Registrar website (http://registrar.gmu.edu/forms/) (as noted above).

Students may take up to 6 additional approved graduate credits as reserve graduate credit. These credits do not apply to the undergraduate degree but will reduce the subsequent master's degree credits

accordingly (e.g., with 6 credits counted towards undergraduate degree plus the maximum 6 reserve credits, the PSM could be completed with 19 post-bachelor's credits). The ability to take courses for reserve graduate credit is available to all high achieving undergraduates with the permission of the School of Systems Biology (https://catalog.gmu.edu/colleges-schools/science/systems-biology/).

Policies

For more detailed information on accelerated master's in general, see AP.6.7 Bachelor's/Accelerated Master's Degrees (https://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-7).

For policies governing all graduate programs, see AP.6 Graduate Policies (https://catalog.gmu.edu/policies/academic/graduate-policies/).