

BACHELOR OF SCIENCE WITH A MAJOR IN ASTRONOMY AND ASTROPHYSICS (STEM)

In the bachelor of science in astronomy and astrophysics program, students become well versed in different aspects of modern astronomy and astrophysics. Coursework includes quantum physics, mechanics, and astrophysics, as well as a range of electives in computer science and physics topics. Classes incorporate hands-on experience with state-of-the-art telescopes, satellites, and data analysis.

All students in the astronomy and astrophysics major complete a capstone project as well as a symposium course in which they learn to present their research findings and review their peers' projects. Students leave the program ready to begin graduate-level education in astronomy, astrophysics, physics or a related field, and they are able to apply their scientific and problem-solving skills in a variety of workplaces.

This is a STEM designated program.

Visit the program website (<https://physics.columbian.gwu.edu/undergraduate/>) 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/#degreeregulationstext>).

Program-specific curriculum:

Code	Title	Credits
Required		
Introductory courses (26 credits)		

PHYS 1021	University Physics I
PHYS 1022	University Physics II
PHYS 2023	Modern Physics
MATH 1231	Single-Variable Calculus I
MATH 1232	Single-Variable Calculus II
MATH 2233	Multivariable Calculus
MATH 2184	Linear Algebra I
MAE 1117 or CSCI 1012	Introduction to Engineering Computations Introduction to Programming with Python
Advanced courses (49 credits)	
MATH 3342	Ordinary Differential Equations
PHYS 3100	Math Methods for Physics
PHYS 2151W	Intermediate Laboratory I: Techniques and Methods
PHYS 2152	Intermediate Laboratory II: Instrumentation
ASTR 2121	Introduction to Modern Astrophysics
PHYS 3161	Mechanics
PHYS 3164	Thermal and Statistical Physics
PHYS 3165	Electromagnetic Theory I
PHYS 3166	Electromagnetic Theory II
PHYS 3167	Principles of Quantum Physics
PHYS 3181	Computational Physics
PHYS 4195W	Physics Capstone
ASTR 4195	Undergraduate Research in Astrophysics
PHYS 4200	Physics Symposium
Electives	
Two elective courses (6 credits) selected from the following:	
ASTR 2131	Astrophysics Seminar
ASTR 3141	Data Analysis in Astrophysics
ASTR 3161	Space Astrophysics
One elective course (3 credits) selected from the following:	
PHYS 3127	Biophysics: Macroscopic Physics in the Life Sciences

PHYS 3128 Biophysics: Microscopic Physics in the Life Sciences

PHYS 3163 Physical and Quantum Optics

PHYS 4170 Solid-State Physics

PHYS 4175 Nuclear Physics

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.