SCIENCE

The core science requirement aims to develop critical awareness of the methods and limits of scientific inquiry, while fostering observational and analytical skills, particularly in reference to the natural and physical world. When choosing a science course, students should make sure they have reviewed and met the specified prerequisites for the course prior to enrollment.

Students who are considering careers in science-related fields, including health-related professions, are urged to begin their study of science within the first two semesters after matriculation at GS.

Science Requirement
To fulfill the science requirement, students must successfully complete three courses selected from two of the following Columbia departments or from the list of approved courses below, no more than two of which should be from the same department:

- Astronomy
- Biological Sciences
- Chemistry
- Earth and Environmental Sciences
- Ecology, Evolution, and Environmental Biology
- Physics
- Psychology (Columbia department only, excluding courses numbered at the 2600, 3600, or 4600 level)

Students may also use international high school leaving exams for which they received at least three transfer credits on the Entrance Credit Report (ECR) in one of the disciplines listed above to fulfill one of the three science requirement courses.

List of Approved Science Courses
The list of approved courses that fulfill the science requirement includes recommended sequences, science courses for non-science majors, and approved courses from departments not listed above and Barnard.

The following two courses may satisfy both the QR requirement and one science requirement when passed with a letter-grade of C or above. The P/D/F-grading options is not available for either of these two courses.

- Foundations of Science (SCNC UN1212)
  Using modern, student-centered, active and collaborative learning techniques, students will engage — through field observations, in-class experiments, computer simulations, and selected readings — with a range of ideas and techniques designed to integrate and anchor scientific habits of mind. Topics covered will include statistics, basic probability, a variety of calculations skills, graph reading and estimation, all aimed at elucidating such concepts as energy, matter, cells, and genes in the context of astronomy, biology, chemistry, earth sciences, neuroscience, and physics.

- Frontiers of Science (SCNC CC1000)
The principal objectives of Frontiers of Science are to engage students in the process of discovery by exploring topics at the forefront of science and to inculcate or reinforce the specific habits of mind that inform a scientific perspective on the world. Sample topics include the evolution of human language, brain dynamics, global climate change, the nanoworld, and biodiversity, among others.

GS students interested in taking this course should have earned a minimum score of 16 on the GS Quantitative Reasoning Exam and/or meet the specific criteria listed for this course in the Quantitative Requirements Core section of the website. Prior to enrolling in the course, students should also read the first chapter of the electronic textbook Scientific Habits of Mind and take the self-exam.

Courses Designed For Nonscience Majors

### Astronomy
- ASTR UN1234: The Universal Timekeeper
- ASTR UN1403: Earth, Moon and Planets (Lecture)
- ASTR UN1404: Stars, Galaxies and Cosmology (Lecture)
- ASTR UN1420: Galaxies and Cosmology
- ASTR UN1453: Another Earth
- ASTR UN1610: Theories of the Universe: From Babylon to the Big Bang

### Earth and Environmental Sciences
- ASTR BC1753: Life in the Universe
- ASTR BC1754: Stars, Galaxies, and Cosmology

### Recommended Sequences:
- ASTR UN1403 and ASTR UN1404: Earth, Moon and Planets (Lecture) and Stars, Galaxies and Cosmology (Lecture)
- ASTR UN1403 and ASTR UN1420: Earth, Moon and Planets (Lecture) and Stars, Galaxies and Cosmology
- ASTR UN1403 and ASTR UN1836: Earth, Moon and Planets (Lecture) and Stars and Atoms
- ASTR UN1403 and ASTR BC1754: Earth, Moon and Planets (Lecture) and Stars, Galaxies, and Cosmology
- ASTR BC1753 and ASTR UN1404: Life in the Universe and Stars, Galaxies and Cosmology (Lecture)

### Biology
- BIOL UN1002: Theory and Practice of Science: Biology
- BIOL UN1130: Genes and Development

### Computer Science
- COMS W1001: Introduction to Information Science
- COMS W1002: Computing in Context

### Earth and Environmental Engineering
- ECEE E2100: A better planet by design

### Earth and Environmental Sciences
- EESC UN1001: Dinosaurs and the History of Life: Lectures and Lab
- EESC UN1003: Climate and Society: Case Studies
- EESC UN1111: Earth: Origin, Evolution, Processes, Future
- EESC UN1030: Oceanography
- EESC UN1053: Planet Earth
- EESC UN1201: Environmental Risks and Disasters
- EESC UN1401: Dinosaurs and the History of Life: Lectures
- EESC UN1411: Earth: Origin, Evolution, Processes, Future: Lectures
- EESC UN2330: Science for Sustainable Development

### Ecology, Evolution, and Environmental Biology
- EEB W1001: Biodiversity
EEEB UN1010  Human Origins and Evolution  
EEEB UN1011  Behavioral Biology of the Living Primates  
EEEB S1115S  The Life Aquatic  

Recommended Sequences:
- EEEB UN1001  Biodiversity and Conservation Biology  
- EEEB UN1010  Human Origins and Evolution  
- EEEB UN1011  Behavioral Biology of the Living Primates  

**Note:** Students electing to take Human Origins and Evolution (EEEB UN1010) and Behavioral Biology of the Living Primates (EEEB UN1011) as a sequence are recommended, but not required, to take EEEB UN1010 before EEEB UN1011.

**Note:** 2600-, 3600-, or 4600-level psychology courses may not be used to fulfill the science requirement.

**Note:** The Science of Psychology (PSYC UN1001) or Mind, Brain and Behavior (PSYC UN1010) must be taken as a prerequisite to any psychology course numbered 22xx or 24xx.

EEEB UN1403  General Chemistry I (Lecture)  
EEEB UN1404  General Chemistry II (Lecture)  
EEEB UN1500  General Chemistry Laboratory  
EEEB UN1604  Intensive General Chemistry (Lecture)  
EEEB UN2507  Intensive General Chemistry Laboratory  

**Note:** Students may not receive credit for both PSYC BC 1101 and PSYC UN1001. Psychology majors should consult the Psychology department for additional restrictions on overlapping courses.

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### Additional Courses Approved for the Science Requirement

Most of the following courses have required prerequisites and/or require instructor approval. Prerequisite and instructor approval requirements can be found in the course descriptions for each course or on the department website.

#### Astronomy

Any 3-point course numbered 2000 or higher

#### Biology

Any 3-point course numbered 2000 or higher

#### Chemistry

CHEM UN1403  General Chemistry I (Lecture)  
CHEM UN1404  General Chemistry II (Lecture)  
CHEM UN1500  General Chemistry Laboratory  
CHEM UN1604  Intensive General Chemistry (Lecture)  
CHEM UN2507  Intensive General Chemistry Laboratory  

Any 3-point course numbered 3000 or higher

#### Computer Science

COMS W1004  Introduction to Computer Science and Programming in Java  
COMS W1005  Introduction to Computer Science and Programming in MATLAB  
ENGI E1006  Introduction to Computing for Engineers and Applied Scientists  
COMS W1007  Honors Introduction to Computer Science  

Any 3-point course numbered 3000 or higher

#### Computing Science - Philosophy (CSPH)

CSPH G4801  Mathematical Logic I  
CSPH G4802  Math Logic II: Incompleteness

#### Earth and Environmental Sciences

EESC UN2100  Earth's Environmental Systems: The Climate System  
EESC UN2200  Earth's Environmental Systems: The Solid Earth System  
EESC UN2300  Earth's Environmental Systems: The Life System  

Any 3-point course numbered 3000 or higher

#### Ecology, Evolution, and Environmental Biology

EEEB UN2001  Environmental Biology I: Elements to Organisms  
EEEB UN2002  Environmental Biology II: Organisms to the Biosphere  
EEEB UN3087  Conservation Biology (Any 3-point course numbered 3000 or higher except EEEB GU4321 or EEEB GU4700)

#### History-Applied Math

HSAM UN2901  Data: Past, Present, and Future

#### Mathematics

Any 3-point course numbered 1100 or higher

#### Physics

PHYS UN1201  General Physics I  
PHYS UN1202  General Physics II  
PHYS UN1401  Introduction To Mechanics and Thermodynamics  
PHYS UN1402  Introduction To Electricity, Magnetism, and Optics
PHYS UN1403  Introduction to Classical and Quantum Waves
PHYS UN1601  Physics, I: Mechanics and Relativity
PHYS UN1602  Physics, II: Thermodynamics, Electricity, and Magnetism
Any 3-point course numbered 2000 or higher

Psychology*
Any 3-point course numbered 32xx, 34xx, 42xx, or 44xx **

Statistics
Any 3-point course except STAT W3997

*   **Note:** 2600-, 3600-, or 4600-level psychology courses may not be used to fulfill the science requirement.
**   **Note:** These courses may serve as a second term of a recommended sequence starting with Mind, Brain and Behavior (PSYC UN1010 (http://bulletin.columbia.edu/search/?P=PSYC%20UN1010/)) or The Science of Psychology (PSYC UN1001 (http://bulletin.columbia.edu/search/?P=PSYC%20UN1001/)).

Special Summer Program
The following special program fulfills two of the three terms of the science requirement.

Earth Institute Center for Environmental Sustainability [EICES]
- Summer Ecosystem Experience for Undergraduates (SEE-U) (http://eices.columbia.edu/education-training/see-u/): Locations change yearly. Check with the center in the spring semester for details.