

MAJOR DESCRIPTION & FLOWCHART

AS OF DECEMBER, 2022

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INTEGRATED SCIENCES

Description

The Integrated Sciences major is a single, comprehensive program comprising a variety of fields, including Biology, Chemistry, and Environmental Science. Today's most urgent scientific problems – from climate change to public health – require an integrated approach. Introducing multiple pathways in the natural science and emphasizing real-world experience, the Integrated Sciences major prepares students for careers as responsible and innovative scientific leaders and to seek interconnected solutions informed by several scientific disciplines. Students in the Integrated Sciences major will practice interdisciplinary and research-based approaches to scientific discovery, while also pursuing a specific concentration within the natural sciences: (1) Environmental Science and Sustainability, or (2) Biology and Health Science. The Integrated Sciences major provides a strong foundation for a career in industry as well as future graduate study.

Learning Outcomes

Students in the Integrated Science Major will be able to:

1. critically analyze and review primary and secondary scientific research sources;
2. apply critical thinking to question established perspectives and constructively address scientific problems;
3. apply appropriate qualitative and quantitative scientific methodologies in a specific field of the natural sciences to test hypotheses, analyze, and interpret data to make evidence based and scientific conclusions;
4. demonstrate foundational knowledge in the natural sciences and specialized knowledge in a focused area through effective written and oral communication;
5. apply ethical and multi-disciplinary approaches to understand and enrich the quality of life in the local and global communities;
6. effectively collaborate with others in teams to conduct scientific research.

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Mapping of Learning Outcomes

Course types	LO1	LO2	LO3	LO4	LO5	LO6
Foundation	I	I	I	I	I	I
Intermediate	R	R	I	I	R	R
Advanced	M	R	R	M	R	M
Computing	I	I	R	I	R	I
Seminar	R	R	M	M	R	M
Capstone	M	M	M	M	M	M

I=Introductory; R=Reinforced; M=Master

Degree Requirements

A Bachelor of Science in Integrated Sciences is awarded following the successful completion of:

- 5 Core courses (20 credits)
- 8 Exploratory courses (32 credits), of which up to two Exploratory courses (8 credits) can be counted towards the major.
- 2 Required foundation courses: Matter, and Introductory Biology (8 credits).
- 1 Required seminar course: Integrated Sciences Advanced Seminar (4 credits).
- 2 Math and Computer Science courses (8 credits).
- 5 Applied Integrated Sciences courses (20 credits) including at least three 300-level courses.
- Capstone I and Capstone II (8 credits) for Honors program OR
2 applied Integrated Sciences courses (8 credits), including at least one 300-level course.
- Electives courses (16 – 24 credits)
- Experiential Learning (4 – 12 credits).

for a total of 128 credits

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Sample Student Journey

Year 1	Year 2	Year 3	Year 4
Core Courses	Core Courses	Introductory Programing	Applied IS courses
Exploratory Courses	Exploratory Courses	IS advanced seminar	Elective courses
	Introductory Biology	Applied IS courses	Capstone I
	Matter	Elective courses	Capstone II
	Introductory Statistics	Experiential Learning	

Concentrations

Integrated Sciences major consists of 2 main concentrations:

- Environmental Science and Sustainability
- Biology and Health Science

These concentrations share the same degree requirements as outlined above, only applied courses are different.

Major Outlines

The following list of courses is subject to change as Fulbright continues to expand and develop.

Required foundation IS courses: These courses provide the fundamental knowledge of the 3 disciplines: Physics, Chemistry, and Biology. They serve as foundation for more advanced courses in Integrated Sciences major.

There are 2 required 100-level IS courses:

- Matter
- Introductory Biology

Statistics and Computing courses: Mathematical and computational foundations are integral in learning and doing sciences in this era. Therefore, Integrated Sciences students are required to complete one course in

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Statistics and one course in Programming. Any 100-level and 200-level course related to Statistics and Programming can be taken to fulfil this requirement.

Sample courses for Introductory Statistics requirement

- Introduction to Data Analysis
- Probability and Statistics

Sample courses for Introductory Programming requirement

- Computer Science I: Introduction to Programming
- Computer Science 2: Data Structures
- Algorithm Design and Analysis

Applied IS courses : these courses form the core of the IS major. They develop the knowledge and skills relevant to the two concentrations in increasing levels of depth: foundational (100-level), intermediate (200-level) and advanced (300-level). If students do Capstone, they will need 5 applied courses, including at least 3 300-level courses. If students do not do Capstone, they will need 7 applied courses, including at least 4 300-level courses.

Sample applied courses for the two concentrations:

Concentration	Environmental Science and Sustainability	Biology and Health Science
100-level	<ul style="list-style-type: none">• Environmental Sciences• Sustainable Development: Science and Industries• Energy in Daily Life	<ul style="list-style-type: none">• Introductory Biology• Research method and statistics
200-level	<ul style="list-style-type: none">• Materials that shape our world• Environmental Chemistry• Ecology• Organic Chemistry	<ul style="list-style-type: none">• Cell Biology• Introduction to Bioinformatics• Biology of Infectious Diseases• Algae
300-level	<ul style="list-style-type: none">• Advanced Analytical Techniques• Environmental Biology• Environmental Physics• Advanced Organic Chemistry	<ul style="list-style-type: none">• Human Physiology• Biochemistry• Drug synthesis• Microbiology

Note: certain courses can be applied to both concentrations

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Research seminar: The course “Integrated Sciences Advanced Seminars” is a requirement of IS major. It provides an advanced treatment of Integrated Science through lectures, seminars, and peer learning, with talks from not only FUV faculty but also invited speakers. Students learn and practice skills such as literature review, writing proposal, and presentation, which are essential to scientists and helpful in preparation for the Capstone.

Capstone: while optional, doing Capstone is highly recommended in IS major. This takes the form of a year-long research project in the last year of study. It is separated into Capstone I & II (4 credits each). Students need to apply and get faculty approval to do Capstone. The outcome is usually a scientific research report, with optional additional oral defense.

Requirements for Declaring the Integrated Sciences Major and Minor

To declare Major or Minor in Integrated Sciences, students need to complete:

- All Core and Exploratory Courses
- At least one of the two required foundational IS courses (Matter or Introductory Biology).

Graduation with Honors Requirements

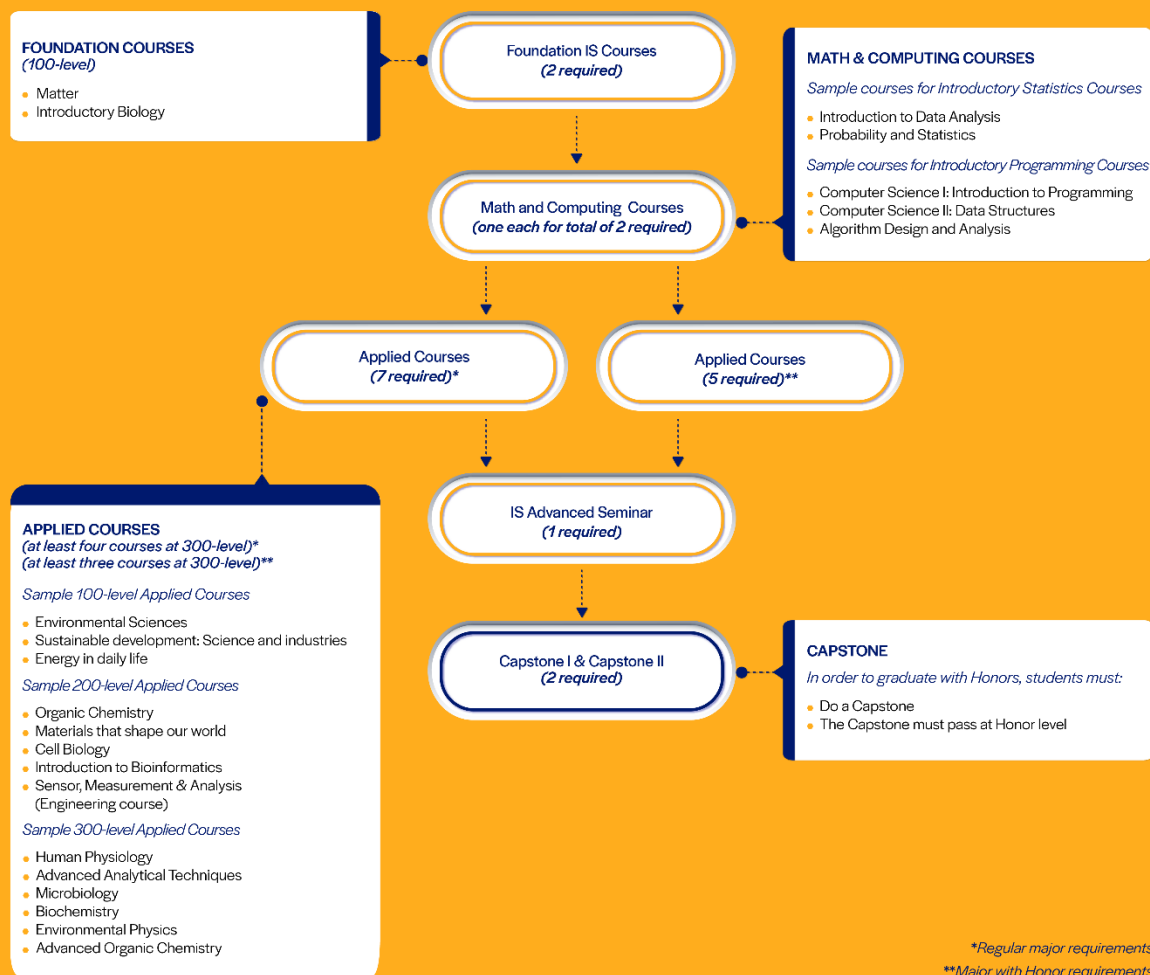
- Students must complete Capstone I and Capstone II
- The Capstone must be graded as Honors pass

Minor Requirements

A total of six courses are required, with some flexibility to allow students to design a minor that best supports their major or career goals. Students are required to take:

- Matter (4 credits)
- Introductory Biology (4 credits)
- Introductory Statistics OR Introductory Programming (4 credits)
- 3 Applied IS Courses (12 credits), with at least 300-level courses

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INTEGRATED SCIENCES MINOR (6 courses)

- Matter
- Introductory Biology
- Introductory Statistics OR Introductory Programming (1 required)
- Applied Courses - at least 2 courses at 300-level (total 3 required)