

## General Science

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### Objectives

The general science program provides special opportunities to students interested in interdisciplinary fields, such as ecology, environmental science, earth science, and pre-medical, pre-dental, or preveterinary studies. The program provides a broad background in the basic sciences. A preprofessional specialization is offered to assist in preparation for health professions. Other curricula can be customized for each student in consultation with the advisor. The environmental science degree offers an interdisciplinary approach to environmental issues. The prime objective of these degrees is to enable students to gain a better understanding of the human ramifications of science and technology and to help them think realistically and creatively about intellectual, moral, and social issues related to science and technology.

### Degrees Offered

Bachelor of Science in General Science

Bachelor of Science in Environmental Science

### Majors Offered

General Science

Environmental Science

### Specialization Offered

Preprofessional

## Bachelor of Science in General Science

In order to earn the bachelor of science in general science degree with a major in general science, students must complete a minimum of 180 credits with a cumulative and major/department grade point average of 2.00, including the following:

### I. Core Curriculum Requirements

ENGL 110	College Writing: Inquiry and Argument .....	5
PHIL 110	Introduction to Philosophy and Critical Thinking .....	5
Choose one of the following two courses .....		5
HIST 120	Origins of Western Civilization	
HIST 121	Studies in Modern Civilization	
ENGL 120	Introduction to Literature .....	5
Fine Arts (one approved 5 credit course; see course descriptions).....		5
PHIL 220	Philosophy of the Human Person.....	5
Social Science I	.....	5
Social Science II (different discipline from Social Science I).....		5

Theology and Religious Studies Phase II (200-299) .....	5
Ethics (upper division) .....	5
Theology and Religious Studies Phase III (300-399) .....	5
Interdisciplinary satisfied within major	
Senior Synthesis (Fulfilled by ISSC 489 and 490) .....	3

## II. Major Requirements

95 credits in mathematics, science, engineering, and computer science including:

\*Primary concentration ..... 30

\*Secondary concentration..... 20

(May not include introductory mathematics and science courses)

Science Electives (see department)..... 0 to 15

Courses used to satisfy the following requirements may, in some cases, be applied toward the primary or secondary concentrations.

Ten credits in chemistry, including:

CHEM 121            General Chemistry I ..... 4

CHEM 131            General Chemistry Lab I ..... 1

CHEM 122            General Chemistry II ..... 4

CHEM 132            General Chemistry Lab II ..... 1

CSSE                Elective ..... 5

Interdisciplinary Science (300-400 level) ..... 3 to 5

Choose two of the following five options: ..... 10

a. BIOL 161            Biology I: Molecular and Cellular Biology

    BIOL 171            Biology I Lab

b. BIOL 162            Biology II: Evolution and Ecology

    BIOL 172            Biology II Lab

c. BIOL 163            Biology III: Physiology and Development

    BIOL 173            Biology III Lab

d. BIOL 200            Anatomy and Physiology I

e. BIOL 210            Anatomy and Physiology II

Choose option a, b, c, or d..... 10

a. MATH 120            Precalculus: Algebra

    MATH 131            Calculus for Life Sciences (note: MATH 121 is co-requisite)

b. MATH 118            College Algebra for Business

    MATH 130            Elements of Calculus for Business

c. MATH 134            Calculus I (note: MATH 121 is co-requisite)

    MATH 135            Calculus II

d. MATH 131            Calculus for Life Sciences (note: MATH 121 is co-requisite)

    PSYC 201            Statistics for Non-Majors

Choose option a or b..... 10

a. PHYS 105            Mechanics

    PHYS 106            Waves, Sound, Electricity and Magnetism

b. PHYS 121            Mechanics

    PHYS 122            Electricity and Magnetism

**NOTE:** 1. At least 20 credits of the 95 general science required credits must be from 300- or 400-level classes. An additional 10 credits must be from 300-level, 400-level, or approved 200-level courses. This may require prerequisites beyond the minimal degree requirements. PSYC 330 is allowed for upper-division science credit. The approved 200-level courses are BIOL 240, CEEGR 221/222, CHEM 231/241, CHEM 232/242, MATH 232, MATH 233, MATH 234, MEGR 210, MEGR 230, MEGR 281, PHYS 203, PHYS 204, and PHYS 205. ISSC 489/490 does not count toward major or upper-division science credits. 2. No more than 15 credits from this major will be counted toward any minors. 3. Students must earn at least a C- in 100 and 200-level science and mathematics courses that apply to the major.

\*Fields allowed: biology, chemistry, diagnostic ultrasound, engineering (all engineering courses are one field), mathematics, physics, computer science and interdisciplinary science. See department for approved science electives.

## Bachelor of Science in General Science Preprofessional Specialization

This track is for students interested in preparing for post-baccalaureate programs in professions such as medicine, dentistry, pharmacy, osteopathic medicine, and veterinary medicine. In order to earn the bachelor of science in general science degree in the pre-professional track, students must complete a minimum of 180 credits with a cumulative and major/department grade point average of 2.00, including the following:

### I. Core Curriculum Requirements

ENGL 110	College Writing: Inquiry and Argument .....	5
PHIL 110	Introduction to Philosophy and Critical Thinking .....	5
Choose one of the following two courses: .....		5
HIST 120	Origins of Western Civilization	
HIST 121	Studies in Modern Civilization	
ENGL 120	Introduction to Literature .....	5
Fine Arts (one approved 5 credit course; see course descriptions).....		5
PHIL 220	Philosophy of the Human Person.....	5
Social Science I	.....	5
Social Science II (different discipline from Social Science I).....		5
Theology and Religious Studies Phase II (200-299) .....		5
Ethics (PHIL 352 recommended) .....		5
Theology and Religious Studies Phase III (300-399) .....		5
Interdisciplinary satisfied within major		
Senior Synthesis (fulfilled by ISSC 489 and 490).....		3

### II. Major Requirements

96 credits in mathematics, science, and computer science, including:

BIOL 161	Biology I: Molecular and Cellular Biology .....	4
BIOL 171	Biology I Lab .....	1
BIOL 162	Biology II: Evolution and Ecology .....	4
BIOL 172	Biology II Lab .....	1

BIOL 163	Biology III: Physiology and Development .....	4
BIOL 173	Biology III Lab .....	1
Choose any three among the following six biology courses:..... 15		
BIOL 240	Genetics	
BIOL 300	Microbiology	
BIOL 310	Comparative Vertebrate Embryology	
BIOL 325	Comparative Anatomy of the Vertebrates	
BIOL 388	Animal Physiology	
BIOL 485	Cell Biology	
CHEM 121	General Chemistry I .....	4
CHEM 131	General Chemistry Lab I .....	1
CHEM 122	General Chemistry II .....	4
CHEM 132	General Chemistry Lab II .....	1
CHEM 123	General Chemistry III .....	4
CHEM 133	General Chemistry Lab III .....	1
CHEM 335	Organic Chemistry I .....	3
CHEM 345	Organic Chemistry Lab I.....	2
CHEM 336	Organic Chemistry II .....	3
CHEM 346	Organic Chemistry Lab II.....	2
CHEM 337	Organic Chemistry III .....	4
CHEM 347	Organic Chemistry Lab III .....	2
CSSE	Elective .....	5
Interdisciplinary Science (300-400 level) .....		3 to 5
Choose series a or b..... 15		
a. PHYS 105	Mechanics	
PHYS 106	Waves, Sound, Electricity and Magnetism	
PHYS 107	Thermodynamics, Optics, and Modern Physics	
b. PHYS 121	Mechanics	
PHYS 122	Electricity and Magnetism	
PHYS 123	Waves and Optics	
Choose option a, b, c, or d..... 10		
a. MATH 118	College Algebra for Business	
MATH 130	Elements of Calculus for Business	
b. MATH 120	Precalculus: Algebra	
MATH 131	Calculus for Life Sciences (MATH 121 is co-requisite)	
c. MATH 131	Calculus for Life Sciences (MATH 121 is co-requisite)	
PSYC 201	Statistics for Non-Majors	
d. MATH 134	Calculus I (MATH 121 is co-requisite)	
MATH 135	Calculus II	

**NOTE:** 1. CHEM 454, CHEM 455, and CHEM 456 are strongly recommended as electives. 2. Students interested in preparing for professions such as chiropractic medicine, podiatry, and physical therapy should consult with an advisor to determine appropriate courses. 3. No more than 15 credits from this major will be counted toward any minors. 4. Students must earn at least a C- in 100 and 200-level science and mathematics courses that apply to the major.

## Bachelor of Science in Environmental Science

In order to earn the bachelor of science in environmental science degree, students must complete a minimum of 180 credits with a cumulative and major/department grade point average of 2.00, including:

### I. Core Curriculum Requirements

ENGL 110	College Writing: Inquiry and Argument .....	5
PHIL 110	Introduction to Philosophy and Critical Thinking .....	5
Choose one of the following two courses: .....		5
HIST 120	Origins of Western Civilization .....	
HIST 121	Studies in Modern Civilization .....	
ENGL 120	Introduction to Literature .....	5
Fine Arts (one approved 5 credit course; see course descriptions).....		5
PHIL 220	Philosophy of the Human Person.....	5
Social Science I .....		5
Social Science II (ECON 272 recommended).....		5
Theology and Religious Studies Phase II (200-299) .....		5
Ethics (upper division).....		5
Theology and Religious Studies Phase III (300-399).....		5
Interdisciplinary .....		3 to 5
Senior Synthesis (Fulfilled by ISSC 489 and 490) .....		3

### II. Major Requirements

96 credits in science, engineering and mathematics including:

MATH 134	Calculus I.....	5
MATH 135	Calculus II.....	5
MATH 244	Probability and Statistics.....	5
BIOL 161	Biology I: Molecular and Cellular Biology .....	4
BIOL 171	Biology I Lab .....	1
BIOL 162	Biology II: Evolution and Ecology .....	4
BIOL 172	Biology II Lab .....	1
BIOL 163	Biology III: Physiology and Development.....	4
BIOL 173	Biology III Lab .....	1
BIOL 470	General Ecology.....	5
CHEM 121	General Chemistry I .....	4
CHEM 131	General Chemistry I Lab .....	1
CHEM 122	General Chemistry II .....	4
CHEM 132	General Chemistry II Lab .....	1
CHEM 123	General Chemistry III .....	4
CHEM 133	General Chemistry III Lab .....	1
CHEM 231	Fundamental Organic Chemistry I .....	4
CHEM 241	Fundamental Organic Chemistry I Lab.....	2
CHEM 232	Fundamental Organic Chemistry II .....	4

CHEM 242	Fundamental Organic Chemistry II Lab.....	2
PHYS 105	Mechanics and Sound .....	5
PHYS 106	Electricity, Magnetism, and Thermodynamics .....	5
CEEGR 341	Biological Principles for Environmental Engineers.....	4
CEEGR 342	Environmental Engineering Chemistry .....	4
CEEGR 343	Air Pollution Engineering.....	4
CEEGR 351	Engineering Geology .....	4
CEEGR 473	Principles of Environmental Engineering .....	5
CEEGR 476	Environmental Law and Impact Studies .....	3

### III. Other Major Department Requirements

20 credits in science, environmental, and engineering electives from the following:  
(Additional prerequisites may be necessary for some courses.) .....

CHEM 454	Biochemistry I (3)	
CHEM 319	Quantitative Analysis (5)	
CEEGR 105	Civil Engineering Graphics and Communication (3)	
CEEGR 311	Engineering Measurements (4)	
CEEGR 402	Engineering Economy (3)	
CEEGR 474	Water Supply and Wastewater Engineering (5)	
CEEGR 475	Hazardous Waste Engineering (5)	
MEGR 105	Engineering Graphics and Design (3)	
BIOL 235	Invertebrate Zoology (5)	
BIOL 240	Genetics (5)	
BIOL 252	Taxonomy of Flowering Plants (5)	
BIOL 275	Marine Biology (5)	
BIOL 300	Microbiology (5)	
BIOL 385	Plant Physiology (5)	

**NOTE:** Credit for CEEGR 105 and MEGR 105 cannot both be applied to the major.

No more than 5 credits of elective from the following environmental classes:

PLSC 300	Environmental Politics
ECON 468	Natural Resources and Environmental Economics
HIST 351	Environmental History
PHIL 378	Environmental Philosophy
THRS 324	Religion and Ecology
ISSC 482	Global Climate Change

**Note about minors:** A minimum of 30 credits in biology or environmental engineering will constitute a minor in that area, 35 credits for chemistry. Only one minor can be earned for each degree. A biology minor would require 10 credits of biology from the elective list. A minor in chemistry would require CHEM 319 and additional chemistry credits to total 35. A minor in environmental engineering would require 6 civil engineering credits from the elective list.

## Interdisciplinary Science Courses

- ISSC 100 Introduction to Environmental Science ..... 2**  
Investigation of some significant topics in environmental science at an introductory level and research of current issues in the literature. Introduction to environmental science career opportunities through hands-on demonstrations, lectures, and site visits with professionals in the field. Open to all university students.
- ISSC 120 Introduction to Geology..... 5**  
Study of the principles of modern geology, with consideration of both the physical and historical aspects. Topics will include modern plate theory, tectonics, uniform processes, and the fossil record. Four hours of lecture and three hours of laboratory per week. Arranged field trips. (fall, winter, spring) Core lab science.
- ISSC 191-193 Special Topics ..... 1 to 5**
- ISSC 201 Digital Operations and Computation ..... 5**  
Digital processing of information and data, number-systems, Boolean algebra; design of hardware for registers, counting, and arithmetic operations; organization of computers, storage, and input/output. Introduction to simple logic circuits. Elementary concepts of programming, assembly language, and computer simulation. Open to all university students. Core lab science. Cross-listed with ECEGR 201. (fall, winter)
- ISSC 207 Air and Water..... 5**  
Dynamics of air and water systems. Consideration of the causes and control of air and water pollution. Monitoring and standards for clean air and water. The role of technology in the deterioration of air and water quality. Four hours of lecture and three hours of laboratory per week. Core lab science. Prerequisite: Core math. (winter or spring)
- ISSC 291-293 Special Topics ..... 1 to 5**
- ISSC 296 Directed Study..... 1 to 5**
- ISSC 480 The Human Response to Science and Technology..... 5**  
A comparative-historical approach to the scientization of culture and its contemporary and projected consequences; critical evaluation of competing claims about science and technology as enlightening allies of human progress; a personal search for appropriate intellectual and ethical perspectives on science as a way of knowing and on technology as a way of living. Seminar format; guest lectures; small-group paper conferences; student-led seminars. Interdisciplinary core option. Prerequisites: junior standing or higher, PHIL 220, HIST 120 or 121.
- ISSC 481 To Feed the World..... 5**  
An interdisciplinary approach to the history, production, and distribution of food from the perspectives of paleontology, anthropology, biology, chemistry, and the social sciences; modes of scientific examination and interpretation are explored; interrelationships of science, technology, and human needs are emphasized. Active participation by students; lectures, movies, and small group discussions. Prerequisite: Phase II of core. Interdisciplinary core option.

<b>ISSC 482</b>	<b>Global Climate Change</b> .....	<b>5</b>
	The science of global climate change and its effects on the environment, society and political decisions. Consideration of the main elements of the climate, measurement and consequences of change, evidence for past change and predictive tools for future change. Critical evaluation of current scientific literature, small group discussion and presentation. Prerequisites: Core lab science, junior standing. Interdisciplinary core option.	
<b>ISSC 483</b>	<b>Interdisciplinary Core Course</b> .....	<b>3 to 5</b>
<b>ISSC 489</b>	<b>Senior Synthesis</b> .....	<b>2</b>
	Initiation of an independent literature or laboratory research project. Searching, reading, and synthesizing scientific literature. Consideration of relationship between major, Core, and professional goals. Development of student portfolio. Oral presentation and written report. Along with ISSC 490, part of the senior synthesis requirement for general science and environmental science majors. Prerequisite: general science or environmental science major. (winter)	
<b>ISSC 490</b>	<b>Senior Synthesis Seminar</b> .....	<b>1</b>
	Continuation of the project developed in ISSC 489, including final oral and written presentations of the research. Along with ISSC 489, part of the senior synthesis requirement for general science and environmental science majors. Prerequisite: ISSC 489. (spring)	
<b>ISSC 491-493</b>	<b>Special Topics</b> .....	<b>1 to 5</b>
<b>ISSC 496</b>	<b>Independent Study</b> .....	<b>1 to 5</b>
<b>ISSC 497</b>	<b>Directed Reading</b> .....	<b>1 to 5</b>
<b>ISSC 498</b>	<b>Directed Research</b> .....	<b>1 to 5</b>