

# Environmental Science

Atmospheric Science, Biology, Chemistry, Geoscience tracks

College of Arts and Sciences  
Saint Louis University

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Environmental science encompasses the study of Earth's geosphere, hydrosphere, atmosphere, and biosphere, and human's interactions with these spheres. These spheres do not operate independently; rather they are intimately related. Thus, any student who wants to gain a greater understanding of the environment must first gain an understanding and appreciation of each sphere individually and their interconnectedness. Our environmental science program is designed so that students first gain a thorough foundation of knowledge in all spheres and then focus more on one or more sub-disciplines (*tracks*). The breadth-plus-depth structure of the program prepare students for continued study in graduate schools and professional schools such as law or public health, or for immediate employment in industry or government.

## Characteristics of people in environmental science

Many environmental scientists and professionals are people who appreciate the environment, have a general interest in science, recognize the importance of maintaining a healthy planet, and desire to improve the living conditions of humanity. Given the diversity of professional opportunities in the environmental science field, it is possible to work almost entirely outdoors, indoors, in laboratories, in industrial settings, in academic settings, in legal offices, or in governmental agencies. Most students are able to find satisfying careers given the numerous career paths within environmental science.

## Faculty in the Program

Given the breadth of environmental science, our program integrates faculty who are biologists, chemists, atmospheric scientists, geoscientists, and statisticians by training. These scientists, who bring their educational and research experiences into the classroom, form a cohesive group who endeavor to provide a comprehensive and integrated curriculum for environmental science majors. They are individually committed to teaching, while maintaining active undergraduate and graduate research programs. Faculty in the Philosophy, English, and Communications departments have partnered with us to provide courses or sections of courses that are tailored to the needs of our students. These courses help students gain an appreciation for the ethical and legal issues encountered in environmental science and provide students with opportunities to develop their written and oral communication skills.

## Extracurricular Opportunities

Many opportunities are open to our students outside of the classroom including undergraduate research opportunities on campus, participation on numerous field trips, involvement in internships, and the chance to interact with faculty and other students outside of the classroom.

## Graduate School Opportunities

Students in the BS program will be well prepared to enter most graduate programs in environmental science and/or discipline-specific programs such as chemistry, biology, atmospheric sciences, and geoscience. In some graduate programs, students will have to take a few additional courses that are commonly taken in discipline-specific undergraduate majors, though this is not an obstacle to pursuing any graduate degrees. Students in the BA program will be well prepared for many graduate professional programs, law schools, and other graduate programs that are less oriented toward the sciences.

## Career Opportunities

Graduates with these degrees will work for environmental companies, industry, government, and non-profit organizations or continue their studies in graduate or professional schools. During their careers, graduates will have to address many important issues related to our environment including global warming, energy resource depletion, loss of biodiversity, extinctions, pollution, water resources, and environmental hazards such as tsunamis, hurricanes, and volcanic eruptions. Beginning salaries for students employed immediately after graduation are upwards of \$40K depending on the area of employment. Salaries typical of environmental scientists and professionals such as environmental lawyers with additional experience and/or education are oftentimes \$50K or more. Students who plan to work immediately after graduation should consider participating in one or more summer internship prior to graduation in preparation for employment.

## Contact Person:

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### Should I major in the BS or BA program?

Students majoring in the BS program are required to take 14 more credits of science and math than students in the BA program, resulting in the BS students graduating with a firmer grasp of the *science* in environmental science. Students interested in pursuing graduate school in environmental science or working as environmental scientists are encouraged to pursue the BS degree. The BA degree is potentially more appropriate for students interested in pursuing a professional degree (e.g., law, MBA) or more interested in the public *policy* associated with environmental science.

### General Course Schedule

The following two schedules demonstrate potential course sequences that a student in the BS program might follow if he/she starts immediately into the environmental science program his/her freshman year (*schedule on the left*) or defer the start of the science and math courses until his/her sophomore year (*schedule on the right*). These examples are meant to demonstrate the potential range in course schedules. Most students will probably develop their course schedule intermediate between these two illustrations. Obviously, it is better to start science and math courses as early as possible in order to reduce course loads each semester and create more internship and research opportunities during junior and senior years. A similar course of study would also be followed by a student in the BA program.

	<u>Fall</u>		<u>Spring</u>		<u>Fall</u>		<u>Spring</u>	
<b>Freshman</b>	BIOL 104	4	BIOL 106	4	Elective	3	Elective	3
	EAS 101/102	4	EAS 103/104	4	Elective	3	Elective	3
	Elective	3	EAS 260 (1)	1	Elective	3	Elective	3
	Elective	3	ENGL 190	3	Elective	3	Elective	3
	EDL101 (rec)	1	Elective	3	Elective	3	Elective	3
		<b>15</b>		<b>15</b>		<b>15</b>		<b>15</b>
<b>Sophomore</b>	EAS 310	3	BIOL 448	3	BIOL 104	4	BIOL 106	4
	CHEM 163/165	4	CHEM 164/166	4	EAS 101/102	4	EAS 103/104	4
	MATH 142	4	MATH 130	3	CHEM 163/165	4	CHEM 164/166	4
	EAS 260 (2)	1	CMM 120	3	MATH 142	4	MATH 130	3
	Elective	3	Elective	3	(Computer exam)	0	Elective	3
	(Computer exam)	0						
		<b>15</b>		<b>16</b>		<b>16</b>		<b>18</b>
<b>Junior</b>	Track course	4	Track course	3	EAS 310	3	BIOL 448	3
	Track course	3	Track course	3	Track course	3	Track course	3
	GIS	3	EAS 260 (3)	1	GIS	3	Track course	3
	Elective	3	PLS 350	3	PHYS 131/132	4	EAS 260 (1)	1
	Elective	3	Elective	3	ENGL 190	3	CMM 120	3
			Elective	3			Elective	3
		<b>16</b>		<b>16</b>		<b>16</b>		<b>16</b>
<b>Senior</b>	Track course	3	EAS 440	3	Track course	3	EAS 260 (3)	1
	PHYS 131/132	4	Track course	3	Track course	3	EAS 440	3
	PHIL of Science	3	Elective	3	PHIL of science	3	Track course	3
	Elective	3	Elective	3	EAS 260 (2)	1	PLS 350	3
	Elective	3	Elective	3	Elective	3	Elective	3
					Elective	3	Elective	3
		<b>16</b>		<b>15</b>		<b>16</b>		<b>16</b>

Courses required in the tracks of the BS program are listed below; fewer track-related courses are required in the BA program. It is permissible for students to fulfill the requirements of two tracks, and receive recognition of both tracks on their transcript. Students who *double track* in the program will have a wider range of employment opportunities and/or be better prepared for graduate school.

BS (Atmosphere track)	BS (Biology track)	BS (Chemistry track)	BS (Geoscience track)
EAS211 Map & Chart (3)	BIOL301 Evolution (3)	CHEM320/322 Analytical I (4)	EAS240 Field Techniques (2)
EAS253 Phys Climatology (3)	BIOL475 Gen Ecology (4)	CHEM342/343 Organic I (4)	EAS340 Soils (3)
EAS325 Global Change (3)	BIOL3XX/4XX (4)	CHEM420/422 Analytical II (4)	EAS410 Surface Processes (3)
EAS403 Air Pollution (3)	BIOL3XX/4XX (min 6 cr)	CHEM435 Environmental (3)	EAS435 Groundwater (3)
EAS3XX/4XX electives (6)	Course from another track (3)	CHEM3XX/4XX elective (3)	EAS3XX/4XX (min 6)
Course from another track (3)		Course from another track (3)	Course from another track (3)

	Course #	BS	BA
<b>Required Core for Environmental Science</b>			
Principles of Biology I	BIOL 104	4	-
Principles of Biology II	BIOL 106	4	4 <sup>1</sup>
Conservation Biology	BIOL 448	3	3
Earth Dynamic Environment I	EAS 101 / 102	4	4
Earth Dynamic Environment II	EAS 103 / 104	4	4
General Chemistry I	CHEM 163/165	4	4
General Chemistry II	CHEM 164/166	4	4
Physics I	PHYS 131/132 or 161/162	4	4
Calculus I	MATH 142	4	-
Elementary Statistics with Computers	MATH 130 or BST 500	3	3
Environmental Science Seminar <sup>2</sup>	EAS 260	3	3
Environmental Issues	EAS 310	3	3
Intro to GIS (several are offered on campus)		3	3
Capstone Project	EAS 440	3	3
Competency exam in computer use <sup>3</sup>		0	0
Strategies of Rhetoric (preferably science sect)	ENGL 190	3	3
Public Speaking (preferably science section)	CMM 120	3	3
Introduction to Environmental Law	PLS 350	3	3
Philosophy of science course (from list <sup>4</sup> )	PHIL 3XX / 4XX	3	3
	<b>Subtotal =</b>	<b>62</b>	<b>54</b>
<b>Required Core for College<sup>5</sup></b>			
Foreign Language		6	9
Cultural Diversity (satisfied by other courses)		(3)	(3)
Fine and Performing Arts		3	3
Literature		3	6
World History (HIST-111 and HIST-112)		6	6
Philosophy (PH 105/205 for BA; PH 205 BS)		3	6
Theology (THEO-100 and a THEO-2xx-level) <sup>6</sup>		6	9
Social Science		6	6
	<b>Subtotal =</b>	<b>33</b>	<b>45</b>

<sup>1</sup> Students have permission to enroll in BIOL 106 without having taken BIOL 104.

<sup>2</sup> Students enroll for this 1-credit seminar three times, preferably during consecutive semesters during their sophomore and junior years.

<sup>3</sup> A short exam, which will be administered once each year, should preferably be completed during a student's freshman or sophomore years.

<sup>4</sup> PHIL 342 Environmental and Ecological Ethics; PHIL 407 Reasoning: Probability and Uncertainty; PHIL 409 Topics in Advanced Logic; PHIL 415 Survey of Philosophy of Science; PHIL 417-01 Philosophy of Physics; PHIL 417-02 Philosophy of Biology.

<sup>5</sup> See <http://www.stu.edu/colleges/AS/core.html> for list of courses that satisfy these requirements.

<sup>6</sup> Recommended: BS & BA students should consider THEO 260 Christian Moral Life; BA students should consider THEO 368 Green Discipleship: Theology & the Environment.

	Course #	BS	BA
<b>Choose one or more tracks<sup>7</sup></b>			
<b>Atmospheric Science Track</b>			
Survey of Calculus or Calculus I	MATH 132 or 142		3 or 4
Map & Chart	EAS 211	3	3
Phys Climatology	EAS 253	3	3
Global Change	EAS 325	3	3
Air Pollution	EAS 403	3	3
Atmospheric Science elective	EAS 3XX / 4XX	6	-
Course listed explicitly in another track		3	3
	<b>Subtotal =</b>	<b>21</b>	<b>18</b>
<b>Biology Track</b>			
Evolution	BIOL 301	3	3
Gen Ecology	BIOL 475	4	4
One taxon course (from list <sup>8</sup> )	BIOL 3XX / 4XX	4	4
BIOL electives	BIOL 3XX / 4XX	6	-
Course listed explicitly in another track		3	3
	<b>Subtotal =</b>	<b>20</b>	<b>14</b>
<b>Chemistry Track</b>			
Analytical I	CHEM 320 / 322	4	4
Organic I	CHEM 342 / 343	4	4
Analytical II	CHEM 420 / 422	4	-
Environmental	CHEM 435	3	3
Chemistry elective	CHEM 3XX / 4XX	3	-
Course listed explicitly in another track		3	3
	<b>Subtotal =</b>	<b>21</b>	<b>14</b>
<b>Geoscience Track</b>			
Field Techniques	EAS 240	2	2
Soils	EAS 340	3	-
Surface Processes	EAS 410 (+411)	3	-
Groundwater	EAS 435	3	-
EAS electives (from list <sup>9</sup> )	EAS 3XX / 4XX	6	9
Course listed explicitly in another track		3	3
	<b>Subtotal =</b>	<b>20</b>	<b>14</b>
<b>Free electives</b>			
		~4	~6
	<b>TOTAL CREDITS FOR GRADUATION</b>	<b>120</b>	<b>120</b>

<sup>7</sup> Can double track, but must take one course listed explicitly in a third track (excluding Calculus I).

<sup>8</sup> BIOL 322 Invertebrates; BIOL 326 Plants and Fungi; BIOL 410 Vertebrates; BIOL 421 Orchids; BIOL 424 Entomology; BIOL 426 Amphibians and Reptiles; BIOL 431 Birds; BIOL 438 Mammals; BIOL 428 Fishes.

<sup>9</sup> EAS 220/221 Mineralogy w/ lab; EAS 340 Soils; EAS 410 Surface Processes; EAS 426 Environmental Geophysics; EAS 428 Environmental Geochemistry; EAS 435 Groundwater.

### ***Why is the program structured with one “core” and multiple “tracks”?***

Environmental science covers a broad range of topics that are integrally related to each other. To better understand the Earth’s environment and to solve important environmental issues, an environmental scientist needs to have a solid foundation of knowledge in many intellectual disciplines, and appreciate their interrelationships. Our curriculum is designed so that an environmental science major gains knowledge and appreciation of the Earth’s geosphere, hydrosphere, biosphere, and atmosphere during the freshman and sophomore years. Once this primary scientific foundation has been established, students pursue a more specialized sequence of classes—a ‘track’—in their junior and senior years, for a more in-depth study of a specific discipline. This ‘breadth-depth’ approach helps prepare students for the wide range of intellectual challenges they will face as they advance to graduate school or pursue employment in government, industry, and non-profit agencies

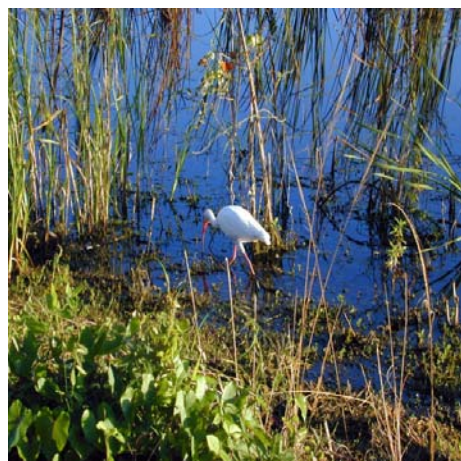


### ***Why should I major in Environmental Science rather than in a traditional science discipline?***

The answer to this question depends entirely on the interests and long-term goals of the student. If you are interested in many aspects of the Earth and its environment, then majoring in Environmental Science or Environmental Studies is a very good option for you. You will gain a greater appreciation for, and understanding of, the complexity of our natural world through the environmental science/studies programs than through more traditional disciplines of studies. If you are primarily interested in just biology or geology, for instance, then it might be more suitable for you to major in the appropriate discipline.

### ***What are the potential career opportunities?***

Environmental science has been, and will continue to be, an increasingly important focus of our society. Students majoring in environmental science will have numerous career opportunities depending on their interests and abilities. Environmental scientists work for a diverse array of employers, ranging from government agencies such as the EPA, to non-profit special-interest groups like the Sierra Club and the Natural Resources Defense Council. Many major industrial and energy resource companies hire environmental scientists as part of their corporate strategy, and many local environmental consulting firms and private businesses have environmental scientists on staff. The Environmental Science degrees also provide a solid foundation for students who choose careers in secondary education.



### ***What do employers value in environmental science graduates?***

There have been numerous studies that surveyed environmental professionals in industry, government agencies, and non-profit organizations. Some of the most important skills valued by employers include the ability to communicate well, both in oral and written form, the ability to work effectively and efficiently with others, and the ability to analyze and solve problems. Technical ability, computer skills, laboratory skills, and field skills are also valued by employers.

Our curriculum is designed to provide students the opportunities to gain mastery of these skills. There are special sections of writing and oral communication courses that are dedicated to our environmental science majors. There are also new courses that help students to develop analytical skills and gain experience in working with others in a team environment. Students who accept the challenge of a broad and diverse intellectual environment will be well prepared to succeed in their future careers.

### ***Can I be an Environmental Science major and still go to medical school?***

In a word, YES. Most medical schools place little value on the specific discipline an undergraduate majors in when applying for medical school. What matters more to them is that the student has completed the “required” courses, has a high GPA and MCAT scores, and is a well-rounded individual. If you are a premed / preprofessional health student and are interested in majoring in Environmental Science, we recommend you speak with the advisors in Preprofessional Health Studies (977-2840).

At Saint Louis University, the core of our mission is to help students find and reach their goals. It is important that you find a major that best fits your interests and needs, whether they be oriented towards employment prospects or intellectual curiosity. It is also important to realize that approximately 75% of the freshman pre-medical students at SLU never go to medical school. Our Environmental Science major provides a diverse range of potential career opportunities for students who change their goals.