

MAJOR: ENVIRONMENTAL SCIENCE, B.S.

The B.S. degree in environmental science provides students with a broad base of knowledge in science and mathematics, as well as the economic, political, and ethical considerations that may accompany environmental issues. Students completing this degree will have a firm background in physical and life sciences, and a basic understanding of: (1) existing environmental policies and regulations and the legislative process of their formation; (2) the major environmental issues including water, global climate, energy, pollution, and population; (3) techniques of environmental monitoring and prediction; and (4) economics and business organization.

TYPICAL PROGRAM OF STUDY			
FIRST YEAR			
FALL SEMESTER		SPRING SEMESTER	
GEOL 1110 Geology and Earth Systems	4 cr	BIOL 1012 General Biology II	5 cr
BIOL 1011 General Biology I	5 cr	CHEM 1152 General Chemistry II ¹	5 cr
CHEM 1151 General Chemistry I ¹	<u>5 cr</u>	MATH 1290 Calculus for the Natural Sciences or MATH 1296 Calculus I ²	5 cr
	Total: 14 cr	WRIT 1120 College Writing	<u>3 cr</u>
			Total: 18 cr
SECOND YEAR			
ESCI 2210 Science & Management of Environmental Systems	4 cr	ECON 1023 Principles of Economics: Micro	3 cr
BIOL 2801 General Ecology	3 cr	PHYS 2012 General Physics II	4 cr
BIOL 2802 General Ecology Laboratory	2 cr	GEOL 3100 Earth's Climate & Environment: Past & Future or GEOG 3401 Weather & Climate	3 cr
MATH 1297 Calculus II ²	5 cr	STAT 2411 Statistical Methods ³	3 cr
PHYS 2011 General Physics I	<u>4 cr</u>	Liberal education requirement	<u>3 cr</u>
	Total: 18 cr		Total: 16 cr
THIRD YEAR			
ESCI 3101 Non-renewable Resources	4 cr	ESCI 3102 Renewable Resources	4 cr
CHEM 2212 Environmental Chemistry	4 cr	ESCI concentration elective ⁴	2-4 cr
WRIT 3150 Advanced Writing: Science	3 cr	ESCI water science elective A or B ⁵	2-4 cr
ESCI concentration elective ⁴	<u>2-4 cr</u>	Liberal education requirement	<u>3-4 cr</u>
	Total: 13-15cr		Total: 12-16cr
FOURTH YEAR			
ESCI 4101 Pollution & Technology	4 cr	ESCI 4102 Environmental Assessment	4 cr
ESCI concentration elective ⁴	2-4 cr	ESCI concentration elective ⁴	2-4 cr
ESCI water science elective A or B ⁵	2-4 cr	ESCI water science elective A or B ⁵	2-4 cr
Liberal education requirements	<u>6 cr</u>	Liberal education requirement	<u>3-4 cr</u>
	Total: 15-18cr		Total: 12-16cr

[^]First math course is determined by math placement exam. This schedule presupposes placement into Calculus I

¹Students may take CHEM 1161 and 1162 Honors General Chemistry I and II in place of CHEM 1151 and 1152.

²Students may take MATH 1596 and 1597, Honors Calculus I and II, in place of MATH 1290 or 1296 and 1297.

³Students may take STAT 3411 Engineering Statistics or STAT 3611 Intro. to Probability & Statistics in place of STAT 2411.

⁴Students must take 10 credits from the list of concentration electives. Courses used to satisfy a concentration elective may not be used to satisfy a water science elective. See list on the back of this program-planning sheet

⁵Students must take 3 courses (8-11 credits) of water science electives. Take at least one course each from Groups A & B. Courses used to satisfy a concentration elective may not be used to satisfy a water science elective. See list on back of this program-planning sheet.

FOR ADDITIONAL INFORMATION:

Swenson College of Science and Engineering
140 Engineering Building
218-726-7585
csesa@d.umn.edu
<http://www.d.umn.edu/csesa>

ENVIRONMENTAL SCIENCE, B.S.

MAJOR REQUIREMENTS	CREDITS	PREREQUISITES	SEMESTER TO BE COMPLETED	GRADE
YEAR 1				
WRIT 1120 College Writing	3			
BIOL 1011 General Biology I	5	1 yr of HS or 1 semester of college chemistry		
BIOL 1012 General Biology II	5	BIOL 1011		
CHEM 1151 General Chemistry I and CHEM 1152 General Chemistry II	5 5	1 yr HS chemistry and 1 yr HS algebra CHEM 1151		
OR				
CHEM 1161 Honors General Chemistry I and CHEM 1162 Honors General Chemistry II	5 5	1 yr HS chemistry and 1 yr HS algebra; placement CHEM 1161		
GEOL 1110 Geology & Earth Systems	4			
MATH 1290 Calculus for the Natural Sciences	5	Math placement or MATH 1250 with 'C-' or higher		
OR MATH 1296 Calculus I	5	Math placement or MATH 1250 with 'C-' or higher		
YEAR 2				
BIOL 2801 General Ecology	3	BIOL 1012		
BIOL 2802 General Ecology Laboratory	2	BIOL 2801(or concurrent with BIOL 2801)		
ECON 1023 Principles of Economics: Micro		Minimum 15 credits		
ESCI 2210 Science & Management of Env Sys	4	GEOL 1110		
GEOL 3100 Earth's Climate & Environment:	3	GEOL 1110 or 1130 or 1610		
OR GEOG 3401 Weather & Climate	3	GEOG 1414; 25 credits		
MATH 1297 Calculus II	5	MATH 1290 or 1296 or 1596 with grade of 'C-' or higher		
STAT 2411 Statistical Methods	3	MATH 1250		
OR STAT 3411 Engineering Statistics	4	MATH 1297 or 1597		
OR STAT 3611 Intro to Probability & Stat	4	MATH 1290 or 1296 or 1597 with grade of C- or higher		
PHYS 2011 General Physics I	4	MATH 1290 or 1296 or 1596		
PHYS 2012 General Physics II	4	PHYS 2011; MATH 1297 or 1597		
YEAR 3				
CHEM 2212 Environmental Chemistry	4	CHEM 1152 or 1162		
WRIT 3150 Advanced Writing: Science	4	WRIT 1120; 60 credits		
ESCI 3101 Non-renewable Resources	4	ESCI 2210, CHEM 1151 or 1161, and PHYS 2011		
ESCI 3102 Renewable Resources	4	ESCI 3101 and PHYS 2012		
ESCI concentration elective ⁴	2-4	See course description		
ESCI concentration elective ⁴	2-4	See course description		
ESCI water science elective ⁵	2-4	See course description		
YEAR 4				
ESCI 4101 Pollution & Technology	4	ESCI 2210, CHEM 1151 or 1161, PHYS 2011		
ESCI 4102 Environmental Assessment	4	ESCI 3102 and 4101		
ESCI concentration elective ⁴	2-4	See course description		
ESCI concentration elective ⁴	2-4	See course description		
ESCI water science elective ⁵	2-4	See course description		
ESCI water science elective ⁵	2-4	See course description		

NOTE: In addition to the above requirements, students must complete the liberal education program to earn the Environmental Science, B.S. degree. A minor is not required for Environmental Science majors.

⁴Students must take any 10 credits from the list of **CONCENTRATION ELECTIVES**:

CLIMATE PROCESSES: GEOG 3401*, GEOG 3422*, GEOG 5446*, GEOL 3210, GEOL 4210*, GEOL 5220, LIM 5103.

ENVIRONMENTAL CHEMISTRY: BIOL 5803*, BIOL 5868*, CHE 4612*, CHE 4613*, CHEM 2541/2543, CHEM 2542/2544, GEOL 3710, GEOL 5710, LIM 5102.

GLOBAL RESOURCES: ECON 4721, ECON 4777, GEOG 3461, GEOG 4451*, GEOL 4240, GEOL 4250, GEOL 4350*.

HABITATS: BIOL 4805, BIOL 5777, BIOL 5801*, BIOL 5802*, BIOL 5805, BIOL 5808, BIOL 5831, BIOL 5833, BIOL 5861, BIOL 5863, BIOL 5865, BIOL 5867*, BIOL 5870, BIOL 5839 or GEOL 5839.

QUANTITATIVE METHODS: BIOL 5807, CHE 2111, CHE 2121*, CHE 3111*, CHE 5021*, CHE 5022*, GEOG 4563*, GEOG 4564*, GEOG 4580*, GEOG 5541*, GEOL 5215, LIM 5004*, LIM 5101, MATH 3280, PHYS 5043, PHYS 5541*, STAT 5411.

⁵Students must take 3 courses (8-11 credits) of **WATER SCIENCE ELECTIVES**. Take at least one course each from Groups A & B.

Group A: Ground water: GEOL 4240, GEOL 4250, GEOL 5710.

Group B: Surface water: BIOL 5803*, BIOL 5805, BIOL 5833, BIOL 5861, BIOL 5867*, GEOG 5446, LIM 5004, LIM 5101, LIM 5102, LIM 5103, BIOL 5839 or GEOL 5839

Courses marked by "" have prerequisites that are not part of the Environmental Science major.