Sustainability Science, BS

The National Academy of Science defines sustainability sciences as "an emerging field...dealing with the interactions between natural and social systems, and with how those interactions affect the challenge of sustainability: meeting the needs of present and future generations while substantially reducing poverty and conserving the planet's life support systems." The sustainability science major at the University of Iowa is built on an integrative curriculum, with coursework in the social, natural, and analytical disciplines, thereby providing students with the knowledge and skills needed to help build a more sustainable future in Iowa, the United States, and around the world. The program offers students relevant real-world experiences such as study abroad and community outreach, as well as an academically rigorous curriculum.

Learning Outcomes

Sustainability science graduates will be able to:

- understand the complex processes that connect humans to natural systems;
- analyze the potential impact of decisions given competing information, perceptions, and goals; and
- communicate the importance of sustainability science and management to leaders and the public.

Requirements

The Bachelor of Science with a major in sustainability science requires a minimum of 120 s.h., including at least 68–71 s.h. of work for the major. Students must maintain a grade-point average of at least 2.00 for the major and in all UI courses for the major. They also must complete the College of Liberal Arts and Sciences GE CLAS Core. Transfer students must earn a minimum of 40 s.h. for the major in residence at the University of Iowa.

Sustainability science majors may earn a second major or minor in geography, environmental policy and planning, and environmental sciences, as well as other majors, minors, or certificates at the University of Iowa (except for the Certificate in Sustainability). Students may count a maximum of 6 s.h. completed for another major toward the sustainability science major, and may count a maximum of 3 s.h. toward a minor.

The BS with a major in sustainability science requires the following work.

Requirements	Hours
Core Courses	28-30
Analytical Tools Courses	14
Communication Course	2-3
Equity/Ethics/Equality Course	3
Electives	18
Research/Internship Experience	3

Core Courses

Core courses introduce students to key elements of sustainability science.

Sustainability Science

Course #	Title	Hours
Both of these:		
GEOG:2013/ BUS:2013/ SUST:2013/ URP:2013	Introduction to Sustainability	3
GEOG:3340	Ecosystem Services	3
One of these:		
GEOG:4200/ SUST:4200	Sustainability as a System Science	3
CBE:4410/CEE:4107	Sustainable Systems	3

Natural Systems

Course #	Title	Hours
One of these:		
CHEM:1070	General Chemistry I	3
CHEM:1110	Principles of Chemistry I	4
One of these:		
EES:1085/ ENVS:1085	Fundamentals of Environmental Science	4
GEOG:1020	The Global Environment	3
One of these:		
GEOG:4470	Ecological Climatology	3
BIOL:2673/ ENVS:2673	Ecology	3

Human Systems

Course #	Title	Hours
Both of these:		
GEOG:2110/ GHS:2110	Eight Billion and Counting: Introduction to Population Dynamics	3
GEOG:3800	Environmental Economics and Policy	3
One of these:		
GEOG:4770/ AFAM:4770/ GHS:4770	Environmental Justice	3
POLI:2417	Comparative Environmental Policy	3

Sustainability Sciences Seminar

Course #	Title	Hours
This course:		
A sustainability science seminar course (consult advisor)		1

Analytical Tools Courses

These courses address the solid analytical skills needed to address sustainability problems.

Course #	Title	Hours
All of these:		
GEOG:2050	Foundations of GIS	4
STAT:2010	Statistical Methods and Computing	3
STAT:3200/ DATA:3200/ IGPI:3200/ISE:3760	Applied Linear Regression	3

One of these:		
CS:1210	Computer Science I: Fundamentals	4
CS:2110	Programming for Informatics	4
MATH:1380	Calculus and Matrix Algebra for Business	4
MATH:1460	Calculus for the Biological Sciences	4

Communication Course

Course #	Title	Hours
At least one of these:		
CNW:2730	The Art and Craft of Science Writing	3
CNW:2740	The Art and Craft of Writing about the Environment	3
CNW:3664	Writing About Science	3
JMC:1800	Twenty-first-Century Science: Environmental Communication in the Digital Age	3
JMC:3185	Topics in Understanding Media	3
POLI:3107	Writing in Political Science: Writing for "Science" and for "Politics"	3

Equity/Ethics/Equality Course

Course #	Title	Hours
At least one of these:		
GEOG:4770/ AFAM:4770/ GHS:4770	Environmental Justice	3
PHIL:2402	Introduction to Ethics	3
SOC:1022/ SSW:1022	Social Justice and Social Welfare in the United States	3

Electives

Elective coursework provides flexibility so that students can gain depth in an area of interest or continue to build a broad platform on which to build subsequent academic or professional careers.

Students cannot use an elective course to satisfy more than one requirement.

Students must select a minimum of 18 s.h. from the following, with at least 9 s.h. numbered above 3000. Students who seek to develop depth in an area may take up to 12 s.h. in a single focal area.

Natural Systems

Course #	Title	Hours
GEOG:2374/ BIOL:2374	Biogeography	3
GEOG:3315	Ecosystem Ecology	3
GEOG:3350	Urban Ecology	3
GEOG:4010	Field Methods in Physical Geography	3
BIOL:2673/ ENVS:2673	Ecology	3
ENVS:3095	Field Ecology	4
Iowa Lakeside Lab courses (prefix IALL); approved by advisor		

Human Systems

Course #	Title	Hours
GEOG:3300/ GHS:3300	Envisioning Future Worlds: Sustainable Development and Its Alternatives	3
GEOG:3780/ GHS:3780/ HIST:3240/ POLI:3431	U.S. Energy Policy in Global Context	3
GEOG:4750/ URP:4750	Environmental Impact Analysis	3
GEOG:4770/ AFAM:4770/ GHS:4770	Environmental Justice	3
ANTH:2100	Anthropology and Contemporary World Problems	3
ECON:3650	Policy Analysis	3
ENTR:3700	Sustainable Product Innovation and Management	3
POLI:2417	Comparative Environmental Policy	3
URP:3001/ GEOG:3920	Planning Livable Cities	3

Integrated Natural and Human Systems

Course #	Title	Hours
GEOG:2930	Water Resources	3
GEOG:2950	Environmental Conservation	4
GEOG:3331	Human Dimensions of Climate	3
GEOG:3760/ GHS:3760	Hazards and Society	3
GEOG:4310	Climate Change	3
ANTH:2261	Human Impacts on the Environment	3

Analytical Methods and Decision Support

Course #	Title	Hours
GEOG:3050/ IGPI:3050	Geospatial Programming	3
GEOG:3500/ IGPI:3500	Introduction to Environmental Remote Sensing	3
GEOG:3520/ IGPI:3520	GIS for Environmental Studies	3
GEOG:3540/ IGPI:3540	Geographic Visualization	3
GEOG:4150/ GHS:4150/ IGPI:4150	Health and Environment: GIS Applications	3
GEOG:4580/ IGPI:4581	Introduction to Geographic Databases	3
BAIS:3005	Information Systems	2
BAIS:3200	Database Management	3

BAIS:3800	Optimization and Simulation Modeling	3
CS:1110	Introduction to Computer Science	3
CS:1210	Computer Science I: Fundamentals	4
CS:2110	Programming for Informatics	4
CS:2230	Computer Science II: Data Structures	4
CS:3210	Programming Languages and Tools	3
CS:4720/ MATH:4820	Optimization Techniques	3

Research/Internship Experience

Students must complete a minimum of 3 s.h. for the research/internship experience requirement. They can fulfill this requirement through active participation in research with faculty, an internship at a public or private agency, or an honors thesis. Students can apply an additional 3 s.h. of research experience to their electives requirement.

Honors

Graduating with departmental honors and graduating with university honors are two opportunities available to high-achieving undergraduate students, each with specific and distinct requirements. Some students pursue both options while others pursue one or the other. Membership in the University of Iowa Honors Program is encouraged, though not required, to earn honors in the major.

Honors in the Major

Within the College of Liberal Arts and Sciences, each major develops its own requirements to achieve honors in the major. To graduate with honors, departmental honors students must maintain a cumulative University of Iowa grade-point average (GPA) of at least 3.33 and a GPA of at least 3.33 in all work for the major. They must be admitted to the department's honors program by the first semester of their senior year or earlier. Students also must complete 6 s.h. of research/internship credit, and successfully complete an honors thesis and presentation.

University of Iowa Honors Program

In addition to honors in the major, students have opportunities for honors study and activities through membership in the University of Iowa Honors Program. Visit Honors at Iowa to learn about the university's honors program.

Membership in the UI Honors Program is not required to earn honors in the sustainability science major.

Career Advancement

In Iowa, challenges associated with water quality, habitat diversity, air quality, a changing climate, and struggling rural communities have been recognized for many years. At the same time, there are significant opportunities to have a positive impact on social, economic, and environmental goals through renewable energy, reconnection of the farm with the community, and the development of more sustainable urban infrastructure, among other ways. A knowledgeable workforce is needed to address such challenges as well as to capitalize on these related opportunities.

Sustainability science provides a solid foundation for careers in fields related to sustainability while giving students the needed preparation to continue their studies in professional or graduate programs. According to the Bureau of Labor Statistics, employment opportunities for individuals with training in the environmental area are projected to grow by 11% between the years 2014 and 2024, faster than the national average. Sustainability science provides entry into these and related careers, such as planning and public affairs (projected growth of 6%, as fast as average); conservation (projected growth of 7%, as fast as average); and geospatial technologies (projected growth of 29%, much faster than the national average).

Academic Plans

Four-Year Graduation Plan

The following checkpoints list the minimum requirements students must complete by certain semesters in order to stay on the university's Four-Year Graduation Plan. Courses in the major are those required to complete the major; they may be offered by departments other than the major department.

Before the third semester begins: two core courses in the major.

Before the fifth semester begins: six courses in the major.

Before the seventh semester begins: 12 courses in the major and at least 90 s.h. earned toward the degree.

Before the eighth semester begins: 15 courses in the major.

During the eighth semester: enrollment in all remaining coursework in the major, all remaining GE CLAS Core courses, and a sufficient number of semester hours to graduate.

Sample Plan of Study

Sample plans represent one way to complete a program of study. Actual course selection and sequence will vary and should be discussed with an academic advisor. For additional sample plans, see MyUI.

Sustainability Science, BS

Course	Title	Hours
Academic Career		
Any Semester		
GE CLAS Core: Sustainability [a]		
	Hours	**0**
First Year		
Fall		
CHEM:1110 or CHEM:1070	Principles of Chemistry I [b, c] or General Chemistry I	3 - 4
GEOG:2013	Introduction to Sustainability	3
ENGL:1200 or RHET:1030	The Interpretation of Literature or Rhetoric	3 - 4
GE CLAS Core: Historical Perspectives [d]		3
CSI:1600	Success at Iowa	2
	Hours	**14-16**
Spring		
GEOG:2050	Foundations of GIS	4

GEOG:2110	Eight Billion and Counting: Introduction to Population Dynamics [b]	3
ENGL:1200 or RHET:1030	The Interpretation of Literature or Rhetoric	3 - 4
GE CLAS Core: Values and Culture [d]		3
Elective course [e]		2
	Hours	**15-16**

Second Year

Fall

GEOG:1020 or EES:1085	The Global Environment [b] or Fundamentals of Environmental Science	3 - 4
STAT:2010	Statistical Methods and Computing [b]	3
GE CLAS Core: Diversity and Inclusion [d]		3
GE CLAS Core: World Languages First Level Proficiency or elective course [f]		4 - 5
Elective course [e]		2
	Hours	**15-17**

Spring

STAT:3200	Applied Linear Regression	3
Major: communication course [g]		2 - 3
Major: sustainability major elective [h]		3
GE CLAS Core: International and Global Issues [d]		3
GE CLAS Core: World Languages Second Level Proficiency or elective course [f]		4 - 5
	Hours	**15-17**

Third Year

Fall

GEOG:3340	Ecosystem Services	3
Major: equity/ethics/equality course [i]		3
Major: additional computer science or calculus course [j, k]		4
GE CLAS Core: Literary, Visual, and Performing Arts [d]		3
GE CLAS Core: World Languages Third Level Proficiency or elective course [f]		4 - 5
	Hours	**17-18**

Spring

GEOG:4200 or CBE:4410	Sustainability as a System Science or Sustainable Systems	3
GEOG:3800	Environmental Economics and Policy	3
Major: sustainability major elective [h]		3
Major: sustainability science seminar		1
GE CLAS Core: World Languages Fourth Level Proficiency or elective course [f]		4 - 5
	Hours	**14-15**

Fourth Year

Fall

POLI:2417 or GEOG:4770	Comparative Environmental Policy or Environmental Justice	3
Major: sustainability major elective [h]		3
Major: sustainability major elective numbered above 3000 [h]		3
Elective course [e]		3
Elective course [e]		3
Arrange research or internship placement		
	Hours	**15**

Spring

BIOL:2673 or GEOG:4470	Ecology or Ecological Climatology	3
Major: sustainability major elective numbered above 3000 [h]		3
Major: sustainability major elective numbered above 3000 [h]		3
Major: Research or internship		3
Elective course [e]		3
Degree Application: apply on MyUI before deadline (typically in February for spring, September for fall) [l]		
	Hours	**15**
	Total Hours	**120-129**

a Sustainability must be completed by choosing a course that has been approved for Sustainability AND for one of these General Education areas: Natural Sciences; Quantitative and Formal Reasoning; Social Sciences; Historical Perspectives; International and Global Issues; Literary, Visual, and Performing Arts; or Values and Culture.

b Fulfills a major requirement and may fulfill a GE requirement.

c Enrollment in chemistry courses requires completion of a placement exam.

d GE CLAS Core courses may be completed in any order unless used as a prerequisite for another course. Students should consult with an advisor about the best sequencing of courses.

e Students may use elective courses to earn credit towards the total s.h. required for graduation or to complete a double major, minors, or certificates.

f Students who have completed four years of a single language in high school have satisfied the GE CLAS Core World Languages requirement. Enrollment in world languages courses requires a placement exam, unless enrolling in a first-semester-level course.

g Choose from: CNW:2730, CNW:2740, CNW:3664, JMC:1800, JMC:3185, POLI:3107.

h Elective coursework provides the flexibility so that students can gain depth in an area of interest or continue to build a broad platform on which to build subsequent academic or professional careers. Students cannot use an elective course to satisfy more than one requirement. Students must select a minimum of 18 s.h. from the list found in the catalog, with at least 9 s.h. numbered above 3000. Students who seek to develop depth in an area may take up to 12 s.h. in a single focal area.

i Choose from: GEOG:4770, PHIL:2402, SOC:1022.

j Choose from: CS:1210, CS:2110, MATH:1380, MATH:1460

k Enrollment in math courses requires completion of a placement exam.

l Please see Academic Calendar, Office of the Registrar website for current degree application deadlines. Students should apply for a degree for the session in which all requirements will be met. For any questions on appropriate timing, contact your academic advisor or Graduation Services.