

Contact: Rachel Boon

**REQUEST FOR NEW PROGRAM AT UNIVERSITY OF IOWA:
BACHELOR OF SCIENCE IN SUSTAINABILITY SCIENCE**

Action Requested: Consider approval of the request by University of Iowa to establish a Bachelor of Science in Sustainability Science in the College of Liberal Arts and Sciences.

Recommendation: The Council of Provosts and Board office support approval of this program.

Background:

Description of proposed program. The proposed major focuses on the complex connections that link humans to biophysical systems. Highly interdisciplinary, the major is designed as a systems science in order to provide the framework needed to understand complex interactions among system components that result in many of today's most challenging problems.

As the program grows and evolves with the science and the profession of sustainability, the major will consistently meet the need for new experts able to address the complex problems emerging from growing populations and increasingly stressed resources. Similarly, this proposed major will build bridges between academia and on-the-ground systems management, an area of critical need, in order to implement sustainability in real-world settings.

Academic objectives. Upon completion of the Sustainability Science major, students will be able to work across the social, physical and mathematical disciplines, making this sustainability science program challenging but also important and rewarding. This program will offer students relevant real-world experiences (e.g., study abroad, community outreach) as well as an academically rigorous curriculum. The program is designed to provide a solid foundation for careers in fields related to sustainability while also giving students the needed preparation to continue their studies in professional or graduate programs.

After successfully completing the program, students will be able to,

- a. Understand the complex processes that connect humans to natural systems;
- b. Analyze the potential impact of decisions given competing information, perceptions and goals;
- c. Communicate the importance of sustainability science and management to leaders and the public.

Need for proposed program. Estimating demand is challenging since sustainability science is still emerging. Still, the rapid rise in the University of Iowa Certificate in Sustainability, now with over 200 students, suggests strong local interest in this related major. Likewise, the number of new sustainability programs at peer institutions nation-wide illustrates the attraction of such programs. The proposed major also will fulfill an important statewide need by educating students who will be capable of having a positive impact on society in areas related to sustainability.

Link to institutional strategic plan. Goal 2 of the Strategic Plan of the College of Liberal Arts and Sciences (CLAS) is to "provide a rich and challenging experience." This proposed major offers a rigorous curriculum with an important relation to contemporary issues, preparing students to tackle the "grand challenges of the 21st Century" (UI Strategic Plan, Goal 1).

Additionally, the major speaks more specifically to two key objectives within Goal 2 of the CLAS Strategic Plan: 1) To strengthen connections between interdisciplinary research initiatives and

student learning by expanding curricula and programs of study; and 2) To foster computational and data-informed thinking as a central component of student learning. The proposed major does the first of these by taking advantage of faculty cluster hires and research initiatives, such as the Water Sustainability Initiative, the Iowa Informatics Initiative, and the Iowa Initiative for Sustainable Communities. The proposed major speaks to the goal of Objective 2 by requiring coursework in statistics, computer science or mathematics, and geographic information science.

Relationship to existing programs at the institution. The proposed major goes directly to the core of sustainability through a STEM-based approach focused at the intersection of natural and human processes. It will be highly integrative, systems-based, forward-looking, and problem-driven. There are several other programs concerned with environmental topics at the University of Iowa. These include the Environmental Sciences bachelor's degree, focused on natural processes; the Environmental Policy and Planning (EPPL) bachelor's degree, focused on human processes; the Environmental Studies track in the Geography bachelor's degree, focused on human-environmental interaction; and the Sustainability Certificate, presenting a broad survey of related issues and concepts from a range of perspectives.

Looking closely at the courses that comprise these programs, a continuum exists from, for example, the Environmental Science-Chemistry track, which is highly focused on natural science, to the EPPL-Policy track, which is highly focused on social science. The Sustainability Science major lies squarely in the middle as a rigorous STEM-based degree that integrates the natural and social sciences. Of the degrees listed above, the new program will be most similar to Geography's Environmental Studies track, but it will have a greater focus on STEM, research experience and systems-based science.

Relationship to existing programs at other colleges and universities. Iowa State University offers the MS and PhD degrees in sustainable agriculture; a Master of Design degree in Sustainable Environments; and an interdisciplinary minor in Sustainability. The University of Northern Iowa offers a concentration in Environmental Systems and Sustainability within the Geography major as well as a Sustainability Certificate. However, no Regent university currently offers an undergraduate bachelor's degree in sustainability.

Thirteen of the Iowa's 34 private universities or colleges have environmental studies or environmental science programs, while only Drake University has developed a major specifically in sustainability. Drake's Sustainability and Resilience major is described as an interdisciplinary, systems-based and problem-oriented approach. There are three elements that will set the UI program apart from Drake's:

1. An emphasis on a STEM-based, quantitative analysis of complex problems, with GIS, statistics, and computer modeling integral to the program;
2. A connection to ongoing sustainability-related research conducted by UI faculty;
3. A connection to the outstanding outreach being conducted by the Iowa Institute for Sustainable Communities (IISC), providing exciting opportunities for students to engage in applied research and to make valuable contributions to Iowa and its future.

Unique features. The University of Iowa is uniquely positioned as an institution to support an interdisciplinary major in sustainability for the following reasons:

1. The University of Iowa recently completed a cluster hire in the area of water sustainability. This program brought ten highly qualified early and mid-career faculty to campus in a variety of disciplines. This community of faculty, together with existing faculty in multiple departments, is very interested in sustainability issues, providing a solid foundation on which to build a number of sustainability programs.

2. The University of Iowa has a long history of expertise and innovative research in the area of geographic information science and spatial decision support. This expertise provides students with an opportunity to learn about and apply cutting edge computer technology directly to sustainability and environmental problem solving.
3. The University of Iowa houses the Water Sustainability Initiative, the Iowa Flood Center, the Iowa Informatics Initiative, and the Iowa Initiative for Sustainable Communities, all of which provide unique opportunities for students to participate in outreach and sustainability research.
4. The University of Iowa's Office of Sustainability and the Environment was recently moved into the College of Liberal Art and Sciences to provide a campus hub for sustainability education, research and outreach and to help establish UI as a national leader in sustainability science. The Office offers a unique opportunity to coordinate and grow related programs.
5. The University of Iowa has many faculty conducting basic research in areas of sustainability science. Participating faculty are engaged in externally funded projects related to urban systems, natural systems and coupled human and natural systems. This provides more opportunities for students to participate in basic and applied research.

Student demand. As noted above, there was a rapid rise in the UI Sustainability Certificate, as well as the number of new sustainability programs at peer institutions. This illustrates significant interest and growing awareness among young people that the challenging problems related to sustainability must be addressed.

Workforce need/demand. According to the Bureau of Labor Statistics, employment opportunities for individuals with training in the environmental area will grow by 11% between 2014 and 2024, faster than the national average. This degree will provide entry into these and related careers, such as urban and regional planning (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).

In Iowa, challenges associated with water quality, habitat diversity, air quality, a changing climate and struggling rural communities have been recognized for many years. There are significant opportunities to have a positive impact on social, economic and environmental goals through, for example, renewable energy, reconnection of the farm with the community and the development of more sustainable urban infrastructure. A knowledgeable workforce is needed to address such challenges as well as to capitalize on these related opportunities. This degree is designed to provide students with the knowledge and skills needed to help build this more sustainable future in Iowa, the U.S., and around the world.

The proposed program not only creates a firm foundation for a first career but also provides a solid base of theoretical knowledge, analytical ability, and problem-solving experience, preparing students for graduate or professional studies in sustainability science or a related area, such as geography, ecology, resource economics, and law.

Resources to establish a high-quality program. Current faculty are well equipped to offer this major, with instructors specializing in areas generally related to human/environment interactions. Ongoing research by faculty and students includes projects related to environmental health (disease spread and resistance); land use/land cover (decision modeling; applications of remote sensing; policy); natural hazards; urban ecosystems; environmental policy (energy; environmental conservation, economics, and justice); and spatiotemporal modeling (agents; network analytics; visualization; cyberinfrastructure).

However, a faculty hire in the area of ecosystem ecology is anticipated. This includes a salary (\$78,000), fringe benefits (\$24,180), and start-up costs (\$50,000). Please note that an individual with these related skills in ecosystem ecology is needed on the UI campus regardless of whether or not this particular major is implemented and that hiring request will be submitted to the College of Liberal Arts and Sciences by the Department of Geographical and Sustainability Sciences for the academic year 2020-2021.

The Department of Geographical and Sustainability Sciences maintains a geographic information systems (GIS) laboratory comprised of 25 seats. The ability to analyze and visualize geographic information related to, for example, land use/land cover, transportation networks, utilities, water resources and water quality, sociodemographics, business opportunities and health outcomes is central to a broad range of issues humans must manage, including sustainability. As a result, GIS technology has been incorporated into an increasingly wide array of courses and the existing laboratory is near or at capacity.

As the proposed major in sustainability grows, a second laboratory to support activities occurring outside of class (e.g., homework, research) and concurrent classes will be needed. This proposal for the sustainability major includes the cost of supporting such a facility at the anticipated cost of around \$100,000. Again, there is a need for such an additional laboratory in the relatively near future regardless of whether or not this major is created since working with these tools is essential to understand knowledge in the field and to future employment.

Cost.

	TOTAL COSTS	TOTAL NEW COSTS
Year 1	0	0
Year 2	\$152,180	\$152,180
Year 3	\$102,180	0
Year 4	\$202,180	\$100,000 (one-time)
Year 5	\$102,180	0
Year 6	\$102,180	0
Year 7	\$102,180	0

The estimates presented in the table above are based on the following assumptions:

- Year 2 Instructor salary (\$78,000), fringe benefits (\$24, 180) and start-up costs (\$50,000).
- Year 4 Lab to support out of class activities (\$100,000)

Projected enrollment.

Undergraduate	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7
Majors	15	25	50	75	100	100	125
Non-Majors	0	0	0	0	0	0	0

Articulation agreements. Articulation agreements beyond those already in place with the Regents institutions and other institutions within the State of Iowa are not planned at this time.

Accreditation. The program will not apply for program accreditation since additional accreditation is not appropriate or required in this particular field of study.

Date of implementation. August 2019

Letters of Support

Department of Geography



December 12, 2018

David Bennett
Professor and Department Chair
Department of Geographical and Sustainability Sciences
316 Jessup Hall
Iowa City, Iowa 52242

Professor Bennett,

Thank you for providing materials related to your proposed Bachelor of Science degree in Sustainability Science. Based on these materials, it is a thoughtful and well-structured program. As you note, it has some relationship to the Environmental Systems and Sustainability concentration within our Geography Bachelor of Arts major. Your proposed Sustainability Science program, however, has a unique and distinct focus that distinguishes it from our offerings. The specific focus of this Sustainability Science program on the three components of sustainability (environmental, social, and economic), and the integration of the natural sciences, communication studies, ethics, and analytical tools in its curriculum, make it well suited for students intending to pursue careers in this area.

We wish you success with your program.

Sincerely,

A handwritten signature in black ink, appearing to read "Tim Strauss".

Tim Strauss
Interim Head
Department of Geography
University of Northern Iowa

Cc:

Brenda Bass, Dean, College of Social and Behavioral Sciences, University of Northern Iowa
Helena Dettmer, Associate Dean for Undergraduate Programs and Curriculum and the
Humanities, University of Iowa

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

College of Liberal Arts and Sciences
Office of the Dean
202 Catt Hall
Ames, Iowa 50011-1301
515 294-3220
FAX 515 294-1303

January 15, 2019

Helena Dettmer
Associate Dean for Undergraduate Programs and Curriculum and the Humanities
College of Liberal Arts and Sciences
120 Schaeffer Hall
The University of Iowa
Iowa City, IA 52242-1409

Dear Dean Dettmer,

Thank you for your note requesting our input on the University Iowa's proposed major in Sustainability Science. I have shared your request with the program director for our interdisciplinary Environmental Sciences program and conferred with the College of Agriculture and Life Sciences. All agreed that preparing students to recognize and work with the dynamics of the interdependent systems of environmental, social and economic systems is vital. All parties also pointed to similarities and differences among the proposed program of study and ISU's undergraduate minor in Sustainability (sponsored by the colleges of Agriculture and Life Sciences, Design, Engineering, and Liberal Arts and Sciences), secondary major in Environmental Studies, and majors in Environmental Sciences and Global Resources Systems.

The proposed highly interdisciplinary program seems to be a logical outgrowth of the existing certificate program in sustainability. It also leverages particular strengths at the University of Iowa such as the Iowa Institute for Sustainable Communities and the Water Sustainability Initiative.

The College of Liberal Arts and Sciences appreciates the opportunity to review the proposal. Research and innovation in the broad area of environmental and sustainability sciences will be critical in the next few decades. We look forward to future faculty and student collaborations across our institutions as we develop and enhance our programs. If I can be of further assistance, please let me know.

Sincerely,



Amy R. Slagell
Associate Dean for Academic Programs
College of Liberal Arts and Sciences
202 Catt Hall
Iowa State University
Ames, IA 50011
(515) 294-7270