Contact: Rachel Boon

REQUEST FOR NEW PROGRAM AT THE UNIVERSITY OF IOWA: MASTER OF SCIENCE IN SUSTAINABLE DEVELOPMENT

Action Requested: Consider approval of the request by the University of Iowa for a Master of Science in Sustainable Development in the Graduate College.

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

Background:

Description of proposed program. First introduced in the Brundtland Report of 1987, the principle of "sustainable development" calls for meeting the needs of society today without compromising the ability of future generations to meet their own needs. Today, the United Nations Sustainable Development Goals (UN SDGs) provide a blueprint for sustainable development, addressing global challenges including climate change, access to clean water, healthy air, safe and reliable energy, long-term economic wellbeing, equity, responsibility to other species, and conflict over limited resources. Through training centered on the UN SDGs, the Master of Science degree in Sustainable Development (MS-SD) will prepare graduate students for technical and/or policy leadership roles in the private or public sector to advance the sustainable development of communities in Iowa, across the United States, and around the world. Leveraging existing strengths at UI in the areas of resource sustainability and engagement for sustainable communities, the new MS-SD will be built on course work, community-engaged projects, and professional development experiences**.** This program will be built upon evidenced-based best practices in graduate education and help train the next generation of sustainability professionals for career placement opportunities at state and federal agencies, national laboratories, policy think tanks, non-governmental organizations (NGOs) and in the private sector.

The MS-SD will include one-year of intensive coursework emphasizing fundamentals in sustainable development, professional development activities, and communication (including both technical communication within and across disciplines and communication with broader audiences, such as the general public and policy makers). During this year of coursework, students will either be self-supported or, in the case of mid-career professionals, receive support from their employers.

After completing 30 semester hours of coursework (10 courses typically taken over one year), students will either be able to receive an MS in Sustainable Development without a thesis or participate in a second-year thesis project with a program partner. The thesis project will culminate in a project portfolio required for graduation. During the second project year, the program envisions a flexible funding model where students will be supported by (i) their employer (if they are a mid-career professional), (ii) a program partner (e.g., industry, consulting), (iii) participating MS-SD faculty, (iv) a UI research center (e.g., Center for Health Effects of Environmental Contamination), or (v) a combination thereof. Students pursuing the thesis project portfolio option will be encouraged to engage established program partners early in their studies to identify opportunities best suited for their skill sets and interests.

The anticipated timeline for MS students is one year without thesis (coursework only) and two years with a portfolio thesis project. However, we note that the proposed one-year MS non-thesis degree and two-year MS with thesis degree timelines are flexible; they can be extended as

needed to accommodate working professionals that might seek a graduate training experience on a part-time basis.

Academic objectives. The MS-SD is designed to train the next generation of sustainability professionals to move society toward achieving the UN SDGs. After completing the training elements in the new MS degree program, MS-SD graduates will be able to do the following:

1. **Learning Objective 1:** Communicate science effectively and responsively with diverse audiences, from technical peers to potential employers, policymakers and the public. Graduates will be able to communicate across modern forms of media intended for public engagement and dissemination of advances towards sustainable development goals.
2. **Learning Objective 2:** Demonstrate qualities essential to thrive across a range of careers including people skills (e.g., collaboration, teamwork, and cultural competence), problem-solving abilities (e.g., inquiry, critical thinking, and creativity) and professional strengths (e.g., work ethic, responsible conduct, management and leadership).
3. **Learning Objective 3:** Analyze problems, conduct research and make policy recommendations on topics related UN SDGs, and anticipate the social, economic, political, technological, human health and environmental impacts of their proposed interventions.

Need for the program. No similar program exists in the state of Iowa, and students from Iowa seeking such an advanced degree will be forced to search for educational opportunities elsewhere. This includes graduates from the new undergraduate degree program in Sustainability Sciences (BS) at UI (approved by the Board of Regents and started in fall 2019) and UI graduates who have completed the Sustainability Certificate program. Based on the robust popularity and growth of these two undergraduate programs at UI alone, it is clear that there is an available pool of students in Iowa that will be seeking advanced graduate education in the area of sustainability. The new MS degree program proposed herein will directly meet that need. Built around interdisciplinary training and research to promote social good as articulated by the UN SDGs, it is anticipated that this program will resonate with a broad segment of undergraduates.

Relationship to existing programs at the institution. The proposed MS-SD will not duplicate any existing programs at UI, but rather attract a broader range of graduate students to UI through synergy in the complementary strengths of the programs involved with its creation. The primary academic programs (and coordinating faculty) initiating this venture include the Sustainable Water Development (SWD) graduate program within Civil and Environmental Engineering (Profs. David Cwiertny and Michelle Scherer), the School of Planning and Public Affairs (SPPA; Prof. Lucie Laurian), and the Department of Geographical and Sustainability Sciences (GSS; Prof. Dave Bennett). Building on their collective strengths and at the interface of these programs, there sits ideal space for training the next generation of experts in sustainable development of communities in Iowa, across the United States, and around the globe.

The SWD graduate program was developed through a $4M National Science Foundation National Research Traineeship (NRT) grant, which is set to expire in the next year. The SWD program, which is limited to Civil and Environmental Engineers, has demonstrated that a graduate program that provides the rigorous research experience of a traditional MS/PhD program, focuses on sustainability challenges in resource-constrained communities, and prepares students for diverse career paths will attract outstanding (e.g., 5 NSF Graduate Research Fellowship recipients) and diverse (e.g., the 30-member student cohort is ~70% female and ~30% URM) graduate students to UI. SWD also has developed and assessed several training activities intended for professional development and cultural awareness. These activities provide a solid foundation for expanding such efforts across Colleges in a truly interdisciplinary manner, capturing a wider pool of

applicants that is currently possible through the limitations of this program in Civil and Environmental Engineering.

SPPA has recently been designated as a STEM related field of study, and the SPPA program at UI has been a leader in community engaged training through the Iowa Initiatives for Sustainable Communities. SPPA at UI is among the top-ranked programs in the Midwest and among comparable programs based upon size. Importantly, and aligned with the mission of the proposed MS-SD, alumni from the SPPA program at UI have made important contributions to planning - in "traditional" government positions, in private sector development and consulting firms, and in the nonprofit sector.

Building on the success of the undergraduate Sustainability Certificate program, GSS recently established an undergraduate Sustainability Sciences major, which will serve as a recruitment pipeline. Enrollment in the major is exceeding expectations. GSS faculty also help oversee the newly constituted UI Office of Sustainability and the Environment (OSE) in CLAS, which can assist with community engagement and co-produced research activities that will be foundational to this MS degree program. GSS also has a significant track record of externally funded research and education grants in sustainability science.

While each of these programs at UI has established strengths in sustainability education, research and outreach, none currently offer an MS degree equal to that which will be established through the MS-SD. With its foundation in the UN Sustainable Development Goals, engaged and co-produced thesis projects, and interdisciplinary focus (drawing students from the natural and social sciences, engineering and beyond), the MS-SD will be a unique program that is distinct from any other current graduate degree offerings at UI or the other Regent's institutions.

Relationship to existing programs at other colleges and universities. The proposed MS will not duplicate any existing programs at other colleges and universities in Iowa. Iowa State University (ISU) is the most likely university in Iowa to offer sustainability programming. Therefore, the program sought broad feedback during proposal development from relevant programs at ISU that sustainability components in their programs. ISU programs that were consulted include:

- Environmental Science Graduate Program
  (via Dr. Tom Isenhart, Director of Graduate Studies)
- Civil, Construction and Environmental Engineering
  (via Dr. Jiehua Jay Shen, Director of Graduate Education in CCEE)
- Interdisciplinary Graduate Program in Sustainable Agriculture
  (via Dr. J. Arbuckle, Sustainable Agriculture Program Chair)
- Sustainable Environments program in Industrial Design
  (via Dr. Seda McKilligan, Interim Department Chair of the Industrial Design program)
- Biorenewable Resources and Technology
  (via Dr. Robert Brown, program director)

All programs were supportive of the proposed MS-SD and indicated no concern in potential overlap. The closest potential for overlap is with the Interdisciplinary Graduate Program in Sustainable Agriculture at ISU, but after additional consultation with Dr. J. Arbuckle, it became clear that no such overlap exists as the MS-SD is not focused on agriculture (the primary focus of the MS-SD is community development, more broadly, with no specific emphasis on agricultural systems). As outlined in a supporting letter from ISU Graduate College Dean William Graves, ISU faculty in related programs concluded that the proposed MS-SD was strong and will not overlap significantly with Iowa State's related offerings.

The program also consulted with Dr. Mark Welford, Head and Professor of Geography at the University of Northern Iowa (UNI). Dr. Welford indicated that his department is also comfortable with the proposed MS-SD (see email in appendix).

Unique features. The University of Iowa (UI) has long been a leader in sustainability. An upcoming report will show that UI met or exceeded 7 of the 8 of its 2020 sustainability goals. Specifically focused on sustainability research, education, and outreach:

- UI has awarded 466 Sustainability Certificates to participating undergraduates since the inception of the certificate program in 2009;
- UI currently offers a Sustainability Science major, which was launched in 2019 and now (as of January 2021) has 27 undergraduate students seeking a Sustainability Science B.S. degree;
- Over $48,500 has been allocated to student sustainability projects through the Green Initiative Fund, which was created in 2014 and supported by UI Undergraduate Student Government and the Graduate Professional Student Government;
- UI researchers have received over $135 million in funding for sustainability research since 2010;
- Since 2010, the UI has awarded 146 sustainability research fellowships to undergraduate students through the Iowa Center for Research by Undergraduates;
- The UI has received almost $20M in external funding to support the Water Sustainability Research Initiative, of which MS-SD developers Bennet and Cwiertny were participating faculty members. This includes a $4M NSF Graduate Research Training Grant to develop an engineering graduate program focused on Sustainable Water Development (SWD); and
- The UI has built a network of over 101 sustainability experts developing transdisciplinary collaborations from the natural and social sciences, to medicine, engineering, mathematics, humanities and the arts.

Clearly, UI has significant momentum in research, scholarship, training and engagement around sustainability. With established excellence in this field, the UI is ideally positioned to create and support the MS-SD to further expand its leadership in this area.

Resources to establish a high-quality program. All necessary personnel, facilities and equipment are readily available and adequate to establish and maintain the MS-SD as a high quality graduate degree program. In terms of facilities, the trainees in this MS-SD will only require office space during their first year of study, and this is available through existing facilities accessible to the coordinating programs (SWD in CEE, SPPA and GSS). For trainees continuing onto a second year thesis project, any additional facilities or equipment will be provided, as needed, by their project partner and coordinating faculty mentor.

The MS-SD will develop four new courses at UI that will represent core courses for trainees in the program, but they will also be made available to all graduate and upper division undergraduate students at UI. These courses will be offered through the Graduate College, but cross-listed with the home department of the participating faculty leading the course. During program development and approval at UI, the Deans of the respective colleges for faculty developing the MS-SD (i.e., Colleges of Engineering, Liberal Arts and Sciences, and the Graduate College) all agreed to support these cross-discipline teaching opportunities once the program is established.

Student demand. Through already established undergraduate programs at UI focused on sustainability, we see steadily increasing demand for more and graduate level training content in this area. For example, the undergraduate Sustainability Certificate program has maintained high enrollment numbers and sustained growth since its creation in 2009. Since its inception, UI has

awarded 466 Sustainability Certificates to participating undergraduates in the certificate program. Also, the undergraduate Sustainability Sciences major, in just its second year of existence, has 29 students enrolled the program and is currently exceeding all expectations for program growth. Likewise, the undergraduate Bachelor of Science degree in Environmental Engineering approved in 2017 has seen steady growth to 53 students enrolled in fall 2020. Many of these undergraduates seek opportunities for graduate training in a sustainability related field. The proposed program will help to retain these undergraduates at UI, thereby increasing the potential for them to remain working in Iowa after completion of a graduate degree.

Anticipated demand for this program is also based on the success of the NSF NRT-supported Sustainable Water Development Graduate program in CEE. With its focus on promoting sustainability in resource-constrained communities and innovative training that included preparation for diverse careers and off-site professional training activities akin to internships, the program attracted a diverse cohort of students from across the United States to UI. While successful, the SWD program is limited in its reach and impact by being housed in the College of Engineering. There are opportunities to engage a broader population of prospective students beyond Engineering through an interdisciplinary program housed in the Graduate College that is open to students from broader educational backgrounds (e.g., sciences, math) than engineering.

Workforce need/demand. 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, for example, renewable energy, increasing rural resiliency, and the development of more sustainable urban infrastructure. A compelling example is the rapid growth of wind energy in Iowa, with Iowa being a national leader in wind energy with more than half of its electricity produced by wind. New wind projects have created thousands of new job opportunities in Iowa (estimated at 15,000 for 2020 by Environmental Defense Fund), which has benefited Iowa communities of all sizes. A knowledgeable workforce is needed to address such challenges, and the MS-SD program is designed to provide the knowledge and skills needed to help build this more sustainable future in Iowa, the U.S., and around the world.

Graduates of the MS-SD program will obtain employment across a variety of sectors that intersect with sustainability and sustainable development. This includes jobs in public service at the local, state or federal level in all areas related to the environment (e.g., watershed management coordinators, state natural resource departments, sustainability directors for cities across the United States, or analysts and scientists at government agencies like USDA or EPA). Graduates may find employment in the private sector as consultants for industries seeking to improve the sustainability of their operations and processes (e.g., sustainable supply chain and waste management and minimization; sustainability reporting, metric development and management). With an MS degree, graduates of the MS-SD will be better qualified for positions in the private sector including Chief Sustainability Officer, Director of Sustainability, and Sustainability Project Manager or Coordinator, which are positions of growing importance at both large and small companies, alike. Opportunities will also exist for careers in global development, working internationally with NGOs and other organizations that strive to advance sustainable development goals worldwide, particularly in resource-constrained areas of the developing world. Degree recipients should also be well positioned to pursue additional graduate studies toward a PhD, MBA or JD degree.

There is growing awareness in the private sector for the need to integrate sustainability into business operations. The 2020 Sustainability Leaders Survey (which surveyed over 700 experts representing business, government, NGOs and academia across 71 countries to evaluate the progress of the sustainability agenda) found increasing concern over climate change, biodiversity

loss, water scarcity and water pollution as drivers for corporations to integrate sustainability into their business strategy for corporate social responsibility. Moreover, the Survey found that *"while having sustainability as part of the core business model continues to be key to sustainability leadership, setting ambitious targets and committing to the United Nations Sustainable Development Goals (SDGs) is also increasingly recognized by experts and is now seen as an equally significant attribute of leadership."* Thus, businesses that wish to be recognized leaders in sustainability will be seeking a workforce that is not only familiar with the SDGs but also able to operationalize these goals to help strengthen and advance their own business model and operations.

All available forecasts suggest a bright employment outlook for professionals seeking new and emerging sustainability careers. Although the U.S. Bureau of Labor and Statistics (BLS) does not yet provide job statistics for sustainability professionals, they have produced a report on careers in sustainability given the growing importance of sustainability professionals to many organizations (see: Is a Sustainability Career on Your Green Horizon?).

More generally, BLS projects job growth in occupations related to helping the environment and/or conserving natural resources. For example, careers as Environmental Scientists and Specialists are a reasonable proxy for sustainability professionals, and the BLS projects a job outlook with 8% growth (which is must faster than the average outlook for other careers) between 2019 to 2029 for these disciplines.

More specific to sustainability professionals, the GreenBiz State of the Profession 2020 report found that 67% of sustainability hires in 2020 came from outside a large company, indicating that sustainability is not simply being added as a responsibility into existing positions but rather is seen an independent, professional position that companies are specifically targeting through hiring. The report also found a 10% increase in the job postings on LinkedIn with titles related to Sustainability, which is greater than the overall growth in all job postings on the website. The report also found a 7.5% increase in LinkedIn members with a Sustainability job title over the past year, which was larger than the overall growth in total members on the website. Likewise, in 2020, the U.S. Green Building Council identified Sustainability Specialists (defined as professionals trained to address organizational sustainability issues, such as waste stream management, green building practices, and green procurement plans) as a green job with "high growth potential". Thus, while statistics from BLS may not yet be available for sustainability focused careers, all available metrics suggest the profession will play a burgeoning and increasingly important role across all employment sectors.

Resources to establish the program.

SOURCES	TOTAL AMOUNT
NSF NRT Grant for Sustainable Water Development	$15,000
UI Graduate College "Grand Challenge" Grant	$10,000

Cost. No students will be enrolled the first year, but rather this year will be used for marketing the program, recruiting the first cohort of students for entry Fall 2022 and course development. There will only be minor costs needed to develop this program attributed to these activities in Year 1.

These funds are available through the existing sources listed above, such that no additional funding will be required. Specifically, as part of the ongoing NSF NRT grant (Cwiertny PI), funds are budgeted to support efforts that institutionalize best practices developed during the training grant. These funds will be used for marketing and recruiting to help establish the MS-SD, which

will serve as evidence of the institutional change at UI that NSF seeks through their NRT grant program. Also, the Graduate College has previously awarded a Grand Challenge grant to the faculty team (Cwiertny, Scherer, Bennet and Laurian) to assist with the development and implementation of this idea. Funds remain on that grant that can be used in Year 1 to assist with marking, recruiting and course development.

Beyond Year 1, the funding model for the program is such that it keeps costs associated with delivery and administration low, if not negligible. Students are self-supported (i.e., they pay their own tuition) during their first year in the program. Students pursuing a project-based thesis in their second year will do so with support they secure (with assistance from the participating faculty) from either (i) their employer (if they are a mid-career professional), (ii) a program partner (e.g., industry, consulting), (iii) participating MS-SD faculty (additional experts in sustainability at UI that will be allowed to mentor thesis students), (iv) a UI research center (e.g., Center for Health Effects of Environmental Contamination, the Iowa Flood Center), or (v) a combination thereof.

	Total Costs
Year 1	$20,000
Year 2	$20,000
Year 3	$20,000
Year 4	$20,000
Year 5	$20,000
Year 6	$20,000
Year 7	$20,000

Projected student enrollment.

Graduate	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7
Majors	5	7	10	15	20	25	25
Non-Majors	50	50	100	100	100	100	100

In the early years of the program, most students are likely to come from the undergraduate population at the UI, especially students from the BS programs in Sustainability Sciences and Environmental Engineering, as well as students who have completed the undergraduate Sustainability Certificate program. Over time, as reputation and recruiting efforts expand, the program expects to enroll undergraduates from other institutions that have an interest in sustainability, sustainable development and related fields. The MS-SD program was designed to be intentionally broad, so as to attract students from diverse educational backgrounds including engineering, the natural sciences, and social sciences. In addition, UI will work to integrate working professionals that can complete the program through a part-time plan of study.

Accreditation. There are no accreditation agencies for degrees or graduate programs in the area of sustainability.

Evaluation plan. To assess effectiveness, the program will look at metrics pertaining to the level of interest in the program, which includes number of applicants to those enrolled from year to year, as well as retention within the program. Program leadership will also track placement of graduates (initial and 5 years out) to ensure graduates are competitive in the workforce, finding jobs that align with SDGs, and employed in occupations that they are enthusiastic about and find satisfying. Through the SWD NRT program, the leadership team has developed a strong

relationship with the Center for Evaluation and Assessment along with many tools for evaluation (e.g., surveys, focus group questions, etc.).

Date of implementation. December 2021.

Letters of Support

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

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April 23, 2021

Dr. John C. Keller
Associate Provost for Graduate and Professional
Education Dean of the Graduate College
University of
Iowa Iowa
City, IA
52242

Dear John,

Thank you for contacting me about the proposal from the University of Iowa for a new master's degree program in sustainable development. I appreciate that you sought input from Iowa State University about the proposal, specifically whether significant overlap might exist with our portfolio of graduate programs.

Iowa State University offers graduate programs in subject areas related to sustainable development. These programs include sustainable agriculture, sustainable environments, industrial design, and environmental science. The leader of one Iowa State program identified some potential areas of overlap and suggested we should explore those in greater depth. Subsequently, the relevant faculty members at Iowa and Iowa State met to confer. I was informed after that meeting that your proposed program in sustainable development looked quite strong and will not overlap significantly with Iowa State's related offerings.

Based on the discussions that have occurred among the relevant faculty at our institutions, I am pleased to express Iowa State's support for the proposed master's degree in sustainable development at the University of Iowa.

Sincerely,

William R. Graves
Dean of the Graduate College and Professor

Danger, Wendy

Subject: FW: [External] Re: A proposed MS in Sustainable Development at UI

From: Mark Welford <mark.welford@uni.edu>
Date: Sunday, March 14, 2021 at 12:42 PM
To: "Bennett, David A" <david-bennett@uiowa.edu>
Subject: [External] Re: A proposed MS in Sustainable Development at UI

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As a department, we are comfortable in supporting your proposal.

Mark

On Thu, Feb 18, 2021 at 1:58 PM Bennett, David A <david-bennett@uiowa.edu> wrote:

> Dear Mark,
>
> We are proposing to create an Interdisciplinary Graduate Program in Sustainable Development here at the UI. It is an MS only program that would be offered joint among Civil and Environmental Engineering, Geographical and Sustainability Sciences, and School of Planning and Public Affairs. We have moved the attached proposal through the approval process here at UI and are now getting it ready for the Regents to review.
>
> We wanted to reach out and share the proposal with your department and see if you would be supportive of the program. If you are comfortable supporting it, our team would then reach out your provost for a letter of support. If you have any questions or concerns, we would be happy to answer them via email or chat with you on zoom.
>
> Best wishes,
> Dave
>
> David Bennett
> Professor and DEO
> Department of Geographical and Sustainability Sciences
> The University of Iowa

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Dr. Mark Welford
Head and Professor of Geography at University of Northern Iowa

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