**Contact: Rachel Boon**

# REQUEST FOR NEW PROGRAM AT THE IOWA STATE UNIVERSITY: BS OF ENVIRONMENTAL ENGINEERING

**Action Requested:** Consider approval of the request by Iowa State University for a Bachelor of Science Environmental Engineering from the College of Engineering.

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

**Background:**

Description of proposed program. The Bachelor of Science in Environmental Engineering will be a new degree offered by the College of Engineering and housed in the Department of Civil, Construction, and Environmental Engineering. Undergraduate students in this BS Environmental Engineering degree will complete a newly established core curriculum covering the engineering and science (geology, biology and chemistry) knowledge necessary for the design and implementation of affordable solutions for environmental challenges involving land, air and water. These new graduates will have a strong academic foundation in the engineering methods necessary to solve complex current and future infrastructure challenges within the diverse areas of environmental engineering.

Academic objectives. The B.S. degree in environmental engineering is designed to prepare students with the engineering skills necessary for entry into environmental engineering positions within public (federal, military, state and community) and private (industry) sectors. A few years after graduation, students completing the environmental engineering B.S. degree will have

- Pursued successful careers and expertise in environmental engineering or a related profession
- Collaborated effectively on multi-disciplinary teams to address the needs of society and the environment
- Pursued lifelong learning, professional development, and licensure as appropriate for their career goals.

**Learning Outcomes**

After earning the B.S. degree in environmental engineering students will:

- apply knowledge of environmental engineering concepts, tools and technologies for advancing the environmental aspects of critical infrastructure systems.
- explain the engineering and science of water supply and distribution, waste collection and processing, air quality control, residuals recycling and public health protection.
- design environmental engineering systems which are able to meet organizational needs within realistic constraints such as economic, environmental, social, legal and ethical expectations.
- function effectively on multi- and inter-disciplinary teams.

Relationship to existing programs at the institution. No other program at ISU offers an accredited environmental engineering degree. To explore possible overlap with existing programs, we discussed this proposal with the Department of Agricultural and Biosystems Engineering (ABE), the Department of Chemical and Biological Engineering (CBE), and the interdisciplinary Environmental Science program. For example, ABE offers a Land and Water Resources Engineering option in agricultural engineering and a bioenvironmental option in biological systems

engineering, and CBE offers several courses with similar fundamental concepts but different application. As documented in letters of support, all are positive about the development of a new environmental engineering degree. Such a degree will complement other environmental programs on campus.

Relationship to existing programs at other colleges and universities. The University of Iowa recently received Board of Trustees approval to start a four-year B.S. degree in Environmental Engineering. This program is the first such offering in the State of Iowa. The relationship between the proposed B.S. degree and the program at the University of Iowa is similar to the relationship between the existing B.S. degrees in civil engineering at the two universities.

Unique features. ISU has a long history of environmental engineering excellence at both academic and research levels and a commensurate reputation within academic, public and private sectors. One such noteworthy feature is that our environmental engineering emeritus faculty member, Professor Jack Cleasby, is one of ISU's current members of the National Academy of Engineering. As a source of some of the best civil engineers in the country, the Department of Civil, Construction, and Environmental Engineering continues to seek ways to meet the current and future needs of engineering and society.

Resources to establish a high-quality program. Iowa State University's Department of Civil, Construction, and Environmental Engineering has the necessary faculty, staff and facilities resources to launch this new environmental engineering BS degree offering. As this new degree program grows in size, however, additional resources will naturally be necessary in terms of additional faculty slots, additional advisory staff support, and additional teaching assistant investments. These additions will be reasonably paced in relation to escalating enrollments.

Student demand. This new degree option will allow students who have a strong interest in obtaining an environmental engineering degree to directly pursue this education. Student interest and demand for this new degree offering has been repeatedly confirmed during discussions with freshmen and sophomores in C E105 Introduction to the Civil Engineering Profession, as well as graduating seniors in C E 403 Program and Outcome Assessment. Many of these students express a strong interest in pursuing environmental engineering in more depth than the environmental emphasis of the civil engineering B.S. currently allows.

Workforce need/demand. The job outlook for environmental engineers is excellent. The following quote validating the current and expected high-level job growth conditions for environmental engineering was taken from a 2018 Bureau of Labor Statistics web site: "Employment of environmental engineers is projected to grow by 8 percent from 2016 to 2026, about as fast as the average for all engineering occupations. State and local governments' concerns regarding water availability and quality should lead to efforts to increase the efficiency of water use." The latter point about state and local water quality concerns is particularly relevant for Iowa, where there is significant national-level attention being given to ongoing, and rapidly escalating, environmental engineering efforts within our cities to remediate the release of wastewater nitrate contaminants into surface waters. And much the same escalation with environmental engineering efforts is also underway with many western states faced with severe drought challenges and acute requirements for water reclamation improvements.

Cost.

| | **COSTS (year 1 & year 2)** | **TOTAL COSTS** |
|---|---|---|
| Total Yearly Cost (Year 1) Replacement retiring tenure-track faculty salary, benefits with new tenure- | 0 | 0 |
| Total Yearly Cost (Year 2) | 0 | |
| Total Yearly Cost (Year 3) new Faculty salary & benefits, new academic advisor & New TA stipend, benefits | no cost included | |
| Total Yearly Cost (Year 4) | | |
| Total Yearly Cost (Year 5) New tenure track faculty salary, benefits start-up | no cost included | |

Projected student enrollment.

| | Y 1 | Y 2 | Y 3 | Y 4 | Y 5 | Y 6 | Y 7 |
|---|---|---|---|---|---|---|---|
| Undergraduate | 25 | 60 | 100 | 150 | 200 | 220 | 240 |

Accreditation. Yes. As with all engineering programs at ISU, the environmental engineering program will apply for accreditation through ABET, which has accredited over 70 environmental engineering programs in the U.S. The application for accreditation will occur once students graduate from the program, and we will strive to apply to be reviewed in 2024, the next ABET review of engineering programs at ISU.

Evaluation plan. The program will strive to become accredited through ABET. As part of the ABET process the program will need to assess student outcomes. The CCEE department has an established assessment process that will oversee the assessment of the environmental engineering degree. The department is also evaluated by the college based on enrollment and student performance.

Date of implementation. August 2020

**Letters of Support**

THE UNIVERSITY OF IOWA

COLLEGE OF ENGINEERING
**Civil & Environmental Engineering**

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February 15, 2019

Iowa State University
Civil, Construction and Environmental Engineering
813 Bissell Road
Ames, IA 50011-1066

Dear Professor David Sanders:

As Chair of the Department of Civil and Environmental Engineering at The University of Iowa (UI), we are supportive of your plans to offer a new Bachelor of Science in Engineering (BSE) with a major in Environmental Engineering in the Department of Civil, Construction, and Environmental Engineering at Iowa State University (ISU). We understand that BSE degree is intended for students preparing for practice and advanced study in environmental engineering, and that the proposed program start date is Fall 2020. We began offering a similar undergraduate program in environmental engineering at the UI in Fall 2017. The degree program addresses unmet needs in the environmental engineering field; interest in the program is high and enrollment has grown. As the National Academy of Engineering's recent publication of *Environmental Engineering for the 21st Century* shows, the challenges of the future will need professionals specifically trained in this area.

Our two departments have a long history of collaborating to educate Iowans and conduct high-quality research in environmental, transportation, structures, and water resources. Offering this new degree will provide a broader set of opportunities for Iowans to become trained to help design systems for treating and conveying clean drinking water and wastewater, providing clean air, managing solid waste, managing environmental remediation, and stimulating the economies of resource-constrained communities wishing to secure food, energy, and water.

We look forward to continuing to work with you to increase educational opportunities for Iowans.

Sincerely,

A Allen Bradley Jr.

Professor A. Allen Bradley Jr.
Department Chair

THE UNIVERSITY OF IOWA

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Engineering Arts and Sciences
Iowa City, Iowa 52242-1527
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September 23, 2019

Professor David Sanders, Department Chair
Civil, Construction, and Environmental Engineering
Iowa State University
394 Town Engr
813 Bissel Rd
Ames, IA 50011

Dear Professor Sanders:

As Dean of the College of Engineering at the University of Iowa, I support your plans to offer a new Bachelor of Science in Environmental Engineering in the Department of Civil, Construction, and Environmental Engineering at Iowa State University. I understand that the degree is intended for students preparing for practice and advanced study in environmental engineering and that the proposed program start date is Fall 2020.

I am pleased with the continued collaboration of your department with the Department of Civil and Environmental Engineering at the University of Iowa. The collaboration includes your support of the degree program in environmental engineering offered here starting in Fall 2017, as well as discussions on developing a similar program at ISU. I believe that Iowa needs more environmental engineers and that offering this new degree will provide a broader set of opportunities for Iowans to become trained to help design systems for treating and conveying clean drinking water and wastewater, providing clean air, managing solid waste, managing environmental remediation, and stimulating the economies of resource-constrained communities wishing to secure food, energy, and water.

We look forward to continuing to work with you to increase educational opportunities for Iowans.

Sincerely,

Alec Scranton

Alec B. Scranton
Dean of Engineering