Submitted by: Keith E. Whitfield, Provost and Senior Vice President for Academic Affairs

ESTABLISHMENT OF A NEW PROGRAM FOR THE MASTER OF SCIENCE DEGREE IN ENVIRONMENTAL AND SUSTAINABILITY ENGINEERING

Recommendation

It is recommended that the Board of Governors establish a new degree program, the Master of Science in Environmental and Sustainability Engineering, effective Fall 2020.

Background

The Department of Civil Engineering has been an integral part of the College of Engineering since its inception in 1925. The early form of the Department focused on the traditional fields of geotechnical, transportation and structural engineering, with later additions of environmental engineering and construction management. Following the widespread realization of the critical environmental condition of the nation's waters, soils, and air and the subsequent adoption of significant environmental legislation in the 70's and 80's, environmental engineering became a mainstay of the department. In recognition of the increased research funding and visibility of the environmental focus of the department, the official name was changed to the Department of Civil and Environmental Engineering (CEE) in 1990. However, there was no change in the available degree options that accompanied this name change. Students continue to graduate with a BS, MS, or PhD in Civil Engineering. The purpose of the present proposal is to provide students the opportunity to a degree which clearly designates the environmental specialization; an MS in Environmental and Sustainability Engineering.

The environmental engineering specialty within CEE has achieved significant recognition throughout the Great Lakes region for the quality of our graduates and the applications of our research. This program has great potential to expand its reputation to a national platform, especially in the development of smart city solutions for decaying water infrastructure, legacy contaminants, and the energy/water/emissions nexus. With recent faculty additions and a long-term research funding base, we are now poised to establish a new graduate degree program in environmental engineering (MSEE) while we strengthen our multidisciplinary interactions / partnerships with multiple units within and outside the College of Engineering at WSU. Two research programs led by our CEE faculty, Healthy Urban Waters (HUW) and Flint Area Community Health Partnership (FACHEP), involve researchers from many disciplines including ChE, ECE, Law, Geology, Med School, Biology, Public Health, Urban Planning and IEHS. The environmental engineering specialty has recently added several adjunct faculty from collaborating units, including Pharmacology and Geology. Through collaboration with regional partners, and leveraging NSF funding, our environmental faculty are expanding a suite of three urban field stations for research discovery and graduate training. This unique network of field stations, including sites at Belle Isle, Lake St. Clair Metropark and the Great Lakes Water Authority's (GLWA) Water Works Drinking Water Plant have the opportunity to become the envy of environmental engineering researchers nationwide. Furthermore, the real-life training in both engineering and public health that is possible through the highly visible, long-term project in Flint, makes the environmental engineering program at WSU a truly signature one.

Program Description

The MSESE program aims to advance environmental engineering and sustainability to enhance human well-being through the development, application, and dissemination of relevant knowledge. We do this by educating students and conducting research within the following focus, or core, areas:

1. **Systems & Resources** – topics within this area vary in scale and include: modeling of groundwater, surface water, and air systems; engineered systems such as drinking water distributions systems; and interactions between the environment and urban systems (e.g. stormwater management).
2. **Treatment & Sensing Technologies** – topics within this area focus on the mitigation and quantification of pollutants loads to the environment, including humans, within all media (air, water, soils).
3. **Bio-chemical-physical Processes –** topics within this area focus on fundamental process that control the fate and transport of pollutants, including remediation techniques.
4. **Environmental Exposure and Risk –** topics within this area focus on identifying, quantifying and reducing risk.

Admissions Requirements

Applicants must have earned a bachelor's degree with an undergraduate degree GPA of 3.00 or higher. Qualified admission is possible for applicants with a GPA of 2.5-3.0 if the applicant has significant relevant professional experience. The proposed program will admit students with Bachelor's Degrees or the equivalent in Engineering and other qualified Science programs if there is a demonstrated aptitude for quantitative analysis.

Curriculum Requirements:

The minimum requirements for the Master degree are **30 credits** under one of two degree plans approved by the College of Engineering:

Plan A: consists of a minimum of twenty-four credit hours of course-work in combination with a minimum of six credits of thesis.

Plan B: consists of a minimum of thirty credits of course-work.
Students will be required to take 12 credits in common core courses and 9 credits in other courses outside their area of focus.

Graduation Requirements:

All coursework must be completed in accordance with the Graduate School and the regulations governing graduate scholarship and degrees.

Program Administration:

Administration of the MSESE degree will be integrated with the current departmental administration of its existing civil engineering degree programs. A special advisory council of ESE faculty will meet on a more frequent basis to perform more detailed reviews of the program and report their findings to the department faculty.

Budget and Resource Requirements:

This program is based upon the existing environmental specialty focus areas offered within the current Civil Engineering MS Degree Program. As such, support for the faculty and facilities of the new (proposed) MSESE Degree is already in place. No additional expenses are expected.

Approvals

The proposal was approved by the faculty of the Department of Civil Engineering, the Academic Operations Committee of the College of Engineering, the Dean of the College of Engineering, the Graduate Council, and the Provost.