

**TO:** The Engineering Faculty  
**FROM:** The Faculty of Environmental & Ecological Engineering  
**RE:** New Engineering Concentration

The Faculty of Environmental & Ecological Engineering has approved the following new Concentration from the College of Engineering. This action is now submitted to the Engineering Faculty with a recommendation for approval.

**TITLE:**

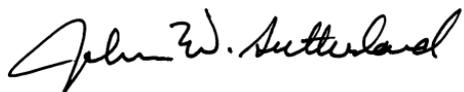
Professional Masters in Sustainability Engineering

**DESCRIPTION:**

The goal of the Professional Master's Concentration in Sustainability Engineering (PMSE) is to provide focused technical training in sustainability engineering. Content will be accessible in residential and hybrid modes in West Lafayette and Indianapolis campuses; available online to students anywhere in the world.

**RATIONALE:**

The need for this concentration comes from discussions with the Purdue EEE External Advisory Council, other leading industrial professionals in the state of Indiana, and in consultation from faculty and leadership across Purdue College of Engineering and in collaborating units in College of Science, Agriculture, Business, and Purdue Online.



---

Fehsenfeld Family Head of Environmental & Ecological Engineering

Link to Curriculog entry:

<https://purdue.curriculog.com/proposal:28192/form>

## Professional Masters in Sustainability Engineering

### Participating faculty:

PMSE Organizing Committee: John Howarter (Associate Professor of EEE/MSE), Loring Nies (Professor EEE/CE), Lindsey Payne (Assistant Professor of Practice EEE), John Sutherland (Professor and Head of EEE), Fu Zhao (Professor EEE/ME,)

### Target Audience:

- Current Purdue BS students wishing to undertake graduate studies, improve their skills, and increase their employability in key industry sectors.
- Domestic and international students at other institutions who, upon graduating, wish to receive a Professional Master's concentration from Purdue to gain a professional degree from a top U.S. Engineering College to improve their skills and increase their employability in key industry sectors.
- Practicing engineers and working professionals wishing to return for additional technical depth to improve their career path. This includes dedicated full time academic focus and a longer timeline learning-while-working mode which will feature a greater degree of online content.
- STEM undergraduates from other disciplines who need to increase their technical knowledge of sustainability as applied to their own domain or discipline of training. Notably, the current EEE graduate programs have about 50% of students from non-Civil / Environmental background. Due to the relatively contemporary nature of the discipline, many colleges and universities do not offer Sustainability Engineering as a discipline or major at the graduate or undergraduate level.

### Curriculum:

Core Sustainability Engineering Courses: 9 credits

Sustainability Engineering Electives: 9-21 credits

Professional Breadth Electives: 0-12 credits

#### Sustainability Engineering Core Courses

EEE 695- Incoming Graduate Student Seminar

EEE 560- Modules- variable title

EEE 530- Life Cycle Assessment

Credits

1 Credit

2 Credit

3 Credit

Current Mode

Residential

Residential

Residential

Required Option- Choose 1 of Following

EEE 597/CE 597- Global Sustainable Engineering

EEE 505 Fundamentals of Sustainability Engineering

3 Credit

3 Credit

Online

In development

Upon approval of the graduate concentration faculty will immediately transition all of the above courses to include online mode of delivery.

The core includes 695 seminar which is required for all students in their first semester of enrollment. Students are able to select the balance of 8 core credits from the above list. This list is likely to expand as the program grows. No less than 9 credits will be from EEE designated courses. In recent years, EEE has offered between 6 and 10 credits annually under the 560 designation. Because most 560 courses are 1 credit, these easily stack with the 1 credit seminar.

EEE 505, 530, 597 represent the balance of options for the 9 credit core. Because each course is currently planned to be offered once per year, having some curricular flexibility is desired in the near term. As EEE plans to grow in online presence and Indianapolis campus, we plan to immediately expand our course delivery mode to be residential & online for all core courses with the residential offering alternating between Indianapolis and West Lafayette responsive to enrollment and teaching resources.

EEE 505 is in development and has the intention to be a cross-disciplinary course with high enrollment from beyond engineering students providing any student with an interest in sustainability a strong technical foundation regardless of disciplinary background. We expect this course to be highest annual enrollment and to be included in future sustainability related concentrations that originate from other domains across Purdue.

EEE 530 is currently at capacity and has annual waitlist. Expansion into the Indianapolis and online modes will provide opportunity to appropriately scale the enrollment.

EEE 597 is a course with long standing enrollment relative to the online only platform. Expansion to residential students would likely increase annual enrollment.

#### Sustainability Engineering Electives

Students will be required to take an additional 9 credits of engineering coursework which should align with their career goals. These courses can be from EEE or any other Engineering discipline at the graduate level. The following table includes courses which are currently available online and in residential mode and align with career options of students preparing for careers in Sustainability Engineering.

ABE59100/BME59500	Polymeric Biomaterials
BME50100	Biostatistics
BME56300	Quality Systems for Regulatory Compliance
BME56400	Ethical Engineering of Medical Tech
BME59500	Entrepreneurship in BME
BME59500	Ethical Engineering of Medical Devices
CE50701	Geospatial Data Analytics
CE50801	Geographic Information Systems
CE51300	Lighting and Daylighting Design of Buildings
CE54300	Coastal Engineering
CE54400	Subsurface Hydrology
CE54900	Computational Watershed Hydrology
CE55000	Physico/Chemical Processes in Environmental Engineering
CE56401	Data Science for Smart Cities
CE56601	Network Models for Connected and Autonomous Vehicles
CE56901	Smart Logistics
CE59700	Biological Wastewater Treatment
CE59700	Design of Urban Water Infrastructure
CE59700	Design Principles and Practices of Drinking Water Systems
CE59700	Global Sustainable Engineering
CE59700	Plastics in Infrastructure and the Environment

CE59700	Sustainable Building Design Construction and Operation
CE59700	Water Chemistry for Environmental and Ecological Engineering
CE59700	Water Supply In Developing Countries
CE63600	NonDestructive Testing and Sensing for Civil Infrastructures
CE65000	Photochemical Reactors: Theory, Methods & Applications
ECE50836	Intro to Data Mining
ECE51018/ME59700	Hybrid Electric Vehicles
ECE51216	Digital Systems Design Automation
ECE59500	Semiconductor Fundamentals
ECE59500/ME597000	Intro to Electronics Packaging and Heterogeneous Integration
IE53000	Quality Control
IE53300	Industrial Applications of Statistics
IE54500	Engineering Economic Analysis
IE54600	Economic Decisions in Engineering
IE57000	Manufacturing Process Engineering
IE59000	Design Lean Six Sigma Black Belt
ME51100	Heat Transfer in Electronic Systems
ME51800	Analysis of Thermal Systems
ME52500	Combustion
ME55300	Product and Process Design
MSE53000	Materials Processing in Manufacturing
MSE53500	Lean Manufacturing
MSE56800	Additive Manufacturing of Materials

#### Professional Breadth Electives

Students are permitted (but not required) to apply up to 12 credits of Professional Breadth Electives on their plan of study, which includes 500 and 600 level coursework from colleges of Agriculture, Business and Science. Students can petition for up to six credits from other programs with written justification of alignment with career goals. Students are not required to take any Professional Breadth courses and the balance of their credits can come entirely from the Engineering Electives.