

EFD 42-11

DEPARTMENT Environmental and Ecological Engineering EFFECTIVE SESSION Fall 2012 (201310)

INSTRUCTIONS: Please check the items below which describe the purpose of this request.

- 1. New course with supporting documents
2. Add existing course offered at another campus
3. Expiration of a course
4. Change in course number
5. Change in course title
6. Change in course credit/type
7. Change in course attributes (department head signature only)
8. Change in instructional hours
9. Change in course description
10. Change in course requisites
11. Change in semesters offered (department head signature only)
12. Transfer from one department to another

PROPOSED:

EXISTING:

Subject Abbreviation EEE Course Number 48000 Long Title EEE Senior Design Short Title EEE Senior Design

TERMS OFFERED

Check All That Apply:

Summer Fall Spring

CAMPUS(ES) INVOLVED

Calumet Cont Ed Ft. Wayne Indianapolis N. Central Tech Statewide W. Lafayette

Abbreviated title will be entered by the Office of the Registrar if omitted. (30 CHARACTERS ONLY)

CREDIT TYPE

1.Fixed Credit: Cr. Hrs. Variable Credit Range: Minimum Cr. Hrs Maximum Cr. Hrs 3 Equivalent Credit: Yes No

COURSE ATTRIBUTES: Check All That Apply

1. Pass/Not Pass Only 2. Satisfactory/Unsatisfactory Only 3. Repeatable Maximum Repeatable Credit: 3 4. Credit by Examination 5. Special Fees 6. Registration Approval Type Department Instructor 7. Variable Title 8. Honors 9. Full Time Privilege 10. Off Campus Experience

Table with columns: Schedule Type, Minutes Per Mtg, Meetings Per Week, Weeks Offered, % of Credit Allocated. Rows include Lecture, Recitation, Presentation, Laboratory, Lab Prep, Studio, Distance, Clinic, Experiential, Research, Ind. Study, Pract/Observ.

Cross-Listed Courses

COURSE DESCRIPTION (INCLUDE REQUISITES/RESTRICTIONS):

Senior-level environmental and ecological engineering design projects. Projects will integrate knowledge and skills gained earlier in the degree program and stress the application of the design process to interdisciplinary environmental and/or ecological engineering systems. May be re-peated for a maximum of three credits. Restrictions: Senior standing in BSEEE degree program, or consent of instructor.

\*COURSE LEARNING OUTCOMES:

Students successfully completing this course will be able to exhibit: (1) an ability to apply material and concepts from previous EEE coursework to an innovative design project; (2) an understanding of the complete design process and an ability to perform the process; (3) an ability to identify and acquire new knowledge as a part of the problem-solving/design process; (4) an ability to function on multidisciplinary teams; (5) an ability to communicate professional designs and design decisions effectively; (6) an awareness of professional ethics and responsibility of engineers; and (7) an appreciation of the role of engineering and of EEE in social contexts.

Calumet Department Head Date Calumet School Dean Date
Fort Wayne Department Head Date Fort Wayne School Dean Date
Indianapolis Department Head Date Indianapolis School Dean Date
North Central Department Head Date North Central Chancellor Date
West Lafayette Department Head Date West Lafayette College/School Dean Date

West Lafayette Registrar Date

TO: Faculty of the College of Engineering  
FROM: Faculty of the Division of Environmental and Ecological Engineering  
SUBJECT: New Undergraduate Course, EEE 48000, EEE Senior Design

The Curriculum Committee of the Division of Environmental and Ecological Engineering has approved the new course listed below. This action is now submitted to the Engineering Faculty with a recommendation for approval.

**EEE 48000: EEE Senior Design**

*Sem. 1,2. Lecture 0-1, Pract/Observation 0-2, cr. 1-3*

Prerequisite: Senior standing in BSEEE degree program, or consent of instructor.

**Course description:**

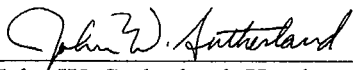
Senior-level environmental and ecological engineering design projects. Projects will integrate knowledge and skills gained earlier in the degree program and stress the application of the design process to interdisciplinary environmental and/or ecological engineering systems. May be repeated for a maximum of three credits.

**Reasons:**

The Division of Environmental and Ecological Engineering seeks to add the senior design course as the final, integrating experience for students in the proposed BSEEE degree program. The goal is to provide an integrated, multidisciplinary, and flexible design experience for EEE, allowing students to create and evaluate designs that address important issues of environmental and ecological engineering, defined broadly. The course also serves as part of a continual emphasis on design and systems thinking skills throughout the curriculum, and as a location for instruction and experience in creativity, communication, problem definition, and integration of EEE with other engineering fields.

The typical student will proceed through the course as part of a full-year experience, taking one credit in the first semester, with an emphasis on exploration, problem scoping and definition, building of design skills, and development of partnerships; and two credits in the second semester, with an emphasis on project implementation and communication.

The course is designed with considerable flexibility for students to participate in a wide variety of projects. This recognizes the importance of EEE concepts and ideas to all of engineering, and will allow partnerships with external entities and with senior design teams and courses in the Schools of Engineering.



John W. Sutherland, Head  
Division of Environmental and Ecological Engineering

APPROVED FOR THE FACULTY  
OF THE SCHOOLS OF ENGINEERING  
BY THE ENGINEERING  
CURRICULUM COMMITTEE

ECC Minutes #1  
Date 8/31/11  
Chairman ECC R. Cipra

**EEE 48000: EEE Senior Design (EFD 42-11)**

**Level:** Undergraduate

**Course Instructor(s):** Primary instructor TBD. Several EEE and other engineering faculty may participate as advisors/coaches to individual design teams.

**Course Outcomes and Structure:**

EEE 48000 will serve as the senior-level integrating design experience for the BSEEE degree. Course outcomes are:

*Students successfully completing the EEE senior design experience will be able to exhibit:*

- i. an ability to apply material and concepts from the discipline of environmental and ecological engineering and other disciplines of engineering to an innovative design project
- ii. an understanding of the design process and an ability to perform the process, including design thinking tools, problem definition, innovation, iteration, individual learning, communication, project planning, economic and environmental analyses, meeting needs of stakeholders, and acting within all applicable constraints
- iii. an ability to identify and acquire new knowledge as a part of the problem-solving/design process
- iv. an ability to function on multidisciplinary teams and an appreciation for the contributions from individuals from multiple disciplines
- v. an ability to communicate effectively with audiences with widely-varying backgrounds
- vi. an awareness of professional ethics and responsibility of engineers
- vii. an appreciation of the role of engineering and of environmental and ecological engineering in social contexts

Because of the applicability of Environmental and Ecological Engineering concepts to all disciplines of engineering, EEE will actively seek partnerships with the schools of engineering and other engineering programs (such as EPICS and GEP), particularly seeking to create joint senior design teams. We envision mutually beneficial situations where a senior design team would be constructed including one or more students taking EEE 48000, and one or more students taking the senior design course in their discipline. EEE students would therefore be assigned as the environmental and ecological impact expert on the design team, and design projects across the college would include important consideration of environmental and sustainability concerns. We believe that this model mirrors a common interdisciplinary structure of professional engineering design teams.

The course structured to allow students to complete the requirements in one semester or two; however, the two-semester sequence will be considered the default, and a one-semester experience will be allowed only in exceptional circumstances). The course is therefore structured in two modules: (a) design skills and problem definition; and (b) design development and realization.

**Course outline, scheduling, and grading:**

The typical student will complete the EEE 48000 senior design experience in two semesters, completing one module in each semester. In exceptional circumstances, some students may complete both modules in a single semester.

**Module A: Design skills and problem definition (1 credit, or equivalent)**

Module A has two components:

- i. a series of lectures on design skills, including (tentatively):
  - need identification
  - research on needs of users
  - utility and values of designs
  - eliciting and organizing customer and other stakeholder input
  - concept generation
  - socially conscious design
  - value and opportunity in sustainability
  - eco-design concepts and opportunities
  - innovation and creativity tools
  - economic decision-making
  - environmental and ecological assessment
  - project management, including QFD

These topics will be presented as online lecture videos followed by a discussion group of all EEE senior design students and the course instructor.

- ii. assignments in defining a problem and proposing a design project: students will be given the context of the design project, but will need to use the skills and concepts in the lectures above to create two proposals for design projects; one of the two will then be chosen (or modified) to be implemented in module B.

**Grading of module A:**

25% assignments and discussion participation related to design skills lectures

35% first design proposal

40% second design proposal

**Module B: design development (2 credits, or equivalent)**

Students will work with a design team of students in EEE 48000 or in other senior design experiences and courses across the College. Primary goals include implementation and communication of the design project identified in Module A. The course meeting schedule will be flexible (i.e., no regular formal lecture time), but students will be expected to provide regular status and progress updates with course instructors and with other faculty partners and coaches assigned to each team.

**Grading of module B:**

30% mid-term design review (oral, with supplementary written material)

70% final design presentation (oral and written report)

Grading note: If students take both module A and module B in the same semester, the composite grade will be determined by combining  $1/3$  of module A scores +  $2/3$  of module B scores.

**Textbook:**

None; students may be assigned papers from the primary literature related to design skills.

**Previous teaching:**

This course has not been offered previously. EEE intends to offer the course for the first time in Fall 2012.