TO: The Faculty of the College of Engineering

FROM: The Faculty of the Division of Environmental and Ecological Engineering

RE: Change to Existing Course: EEE 48000 EEE Senior Design — Change in Schedule Type to include Laboratory Component

The Academics Committee of the Division of Environmental and Ecological Engineering has approved the following changes to an existing course. This action is now submitted to the Engineering Faculty with a recommendation for approval.

From: **EEE 48000: EEE Senior Design**
Sem 1,2. Lecture 1, cr 1-3
Prerequisite: Senior standing in BSEEE degree program or consent of instructor
May be repeated for a maximum of 3 credits total
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.

To: **EEE 48000: EEE Senior Design**
Sem 1,2. Lecture 1-2, Laboratory 0-1, cr 1-3
Prerequisite: Senior standing in BSEEE degree program or consent of instructor
May be repeated for a maximum of 3 credits total
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.

Reason: This change represents a correction to EFD 42-11 which will allow EEE to offer the course with the scheduling and credit distribution originally intended. The previous EFD included 0-2 credits of schedule type "Practice/Study/Observation," or PSO. The Registrar's Office amended the Form 40 to remove this, because university policies prohibit assigning credit to a PSO schedule section. The Associate Registrar has recommended that the course be amended to use the Laboratory schedule type instead of PSO, as this more closely fits our course plan: the Laboratory schedule type allows credit to be awarded to students for a regularly-scheduled practical class period under the direct supervision of faculty or other instructional staff.

The typical student will proceed through the course as part of a full-year experience, earning one credit (with the Lecture schedule type, formally meeting 50 min/week)

in the first semester, with an emphasis on exploration, problem scoping and definition, building of design skills, and development of partnerships; and two credits (one for Lecture schedule type, formally meeting 50 min/week, one for Laboratory schedule type, formally meeting 100-150 min/week) in the second semester, with an emphasis on project implementation and communication.

The course is designed, however, to allow a student to finish the senior design in one semester in extraordinary circumstances, such as when the specific design project needs to be completed on an faster schedule. These students will receive two credits for lecture (meeting 100 min/week), and one credit for laboratory (meeting 100-150 min/week).

John Sutherland

John W. Sutherland
Fehsenfeld Family Head
Division of Environmental and Ecological Engineering

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

ECC Minutes 06 2/1/13

Date 2/1/13

Chairman ECC

Office of the Registrar
FORM 40 REV. 5/11

PURDUE UNIVERSITY
REQUEST FOR ADDITION, EXPIRATION, OR REVISION OF AN UNDERGRADUATE COURSE
(10000-40000 LEVEL)

Print Form

DEPARTMENT Environmental and Ecological Engineering

EFFECTIVE SESSION Fall 2013 (201410)

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
- [x] 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	Subject Abbreviation	EEE
Course Number	48000	Course Number	48000
Long Title	EEE Senior Design		
Short Title	EEE Senior Design		

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

TERMS OFFERED
Check All That Apply:
[x] Fall [x] Spring [ ] Summer

CAMPUS(ES) INVOLVED
- [ ] Calumet
- [ ] Cont Ed
- [ ] Ft. Wayne
- [ ] Indianapolis
- [ ] N. Central
- [ ] Tech Statewide
- [x] W. Lafayette

CREDIT TYPE
1. Fixed Credit: Cr. Hrs.
2. Variable Credit Range: Minimum Cr. Hrs 1
(Check One) To [x] Or [ ]
Maximum Cr. Hrs. 3
3. Equivalent Credit: Yes [ ] No [ ]

COURSE ATTRIBUTES: Check All That Apply
1. Pass/Not Pass Only [ ]
2. Satisfactory/Unsatisfactory Only [ ]
3. Repeatable [x]
Maximum Repeatable Credit: 3
4. Credit by Examination [ ]
5. Fees: [ ] Coop [ ] Lab [ ] Rate Request
Include comment to explain fee
6. Registration Approval Type
Department [ ] Instructor [ ]
7. Variable Title [ ]
8. Honors [ ]
9. Full Time Privilege [ ]
10. Off Campus Experience [ ]

ScheduleType	Minutes Per Mtg	Meetings Per Week	Weeks Offered	% of Credit Allocated
Lecture	50	1-2	16	67-100
Recitation				
Presentation				
Laboratory	100-150	1	16	0-33
Lab Prep				
Studio				
Distance				
Clinic				
Experiential				
Research				
Ind. Study				
Pract/Observ				

Cross-Listed Courses

2013 FEB -6 AM 9:55
RECEIVED
OFFICE OF THE REGISTRAR

COURSE DESCRIPTION (INCLUDE REQUISITES/RESTRICTIONS):

Senior-level environmental and ecological 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. Restrictions: Senior standing (90+ credits) in the 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 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 Faculty Senate Chair	Date	Vice Chancellor for Academic Affairs	Date
West Lafayette Department Head	11/5/12 Date	West Lafayette College/School Dean	2/1/13 Date
		West Lafayette Registrar	2/21/13 Date

OFFICE OF THE REGISTRAR

2/18/13
8-13

Supporting Documentation for EFD 08-13

NOTE: Except in locations where new notes in italics have been added, this supporting documentation is identical to what was submitted with the original EFD (#42-11). The course is not changing; this EFD is merely an administrative change of the schedule type to allow us to offer the course as originally proposed.

EEE 48000: EEE Senior Design

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

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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 A will be offered using the "Lecture" schedule type.

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)

Module B will be offered using the "Lecture" schedule type for one credit, and the "Laboratory" schedule type for one credit.

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 been offered as EEE 49500 in Fall 2012 and Spring 2013, with 11 students total. Fu Zhao, John Howarter, Chad Jafvert, and Christina Murphy were instructors of record for the course.