

EFD 39-11

DEPARTMENT Environmental and Ecological Engineering

EFFECTIVE SESSION Fall 2012 (201310)

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

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

PROPOSED:

Subject Abbreviation EEE
Course Number 25000
Long Title Environmental, Ecological, and Engineering Systems
Short Title Envir. Ecol. and Engr. Syst.

EXISTING:

Subject Abbreviation _____
Course Number _____

TERMS OFFERED

Check All That Apply:

- Fall Spring Summer

CAMPUS(ES) INVOLVED

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

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

CREDIT TYPE

1. Fixed Credit: Cr. Hrs. 3
2. Variable Credit Range: _____
Minimum Cr. Hrs. _____
(Check One) To Or
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: _____
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

ScheduleType	Minutes Per Mtg	Meetings Per Week	Weeks Offered	% of Credit Allocated
Lecture	50	3	16	100
Recitation				
Presentation				
Laboratory				
Lao Prep				
Studio				
Distance				
Clinic				
Experiential				
Research				
Ind. Study				
Pract/Observ				

OFFICE OF THE REGISTRAR
RECEIVED
2011 SEP 19 AM 9:59
Cross-listed Courses

COURSE DESCRIPTION (INCLUDE REQUISITES/RESTRICTIONS):

An overview of systems thinking and examples, and applications to environmental, ecological, and engineering systems. Students will develop an understanding of complex and global systems, along with the tools and analysis methods required to deal with them. Basic environmental and ecological science concepts are also included. Prerequisite: sophomore standing (30+ credit hours).

*COURSE LEARNING OUTCOMES:

Successful students in this course will develop: (1) an understanding of the types of relationships and dynamics common in complex systems, including environmental systems, ecological systems, and engineering systems; (2) the ability to apply fundamental systems tools and modeling approaches to a wide variety of engineering, environmental, and ecological problems; (3) an understanding of the foundational concepts and vocabulary of global environmental and ecological systems; and (4) an appreciation of the complexity of contemporary issues related to society and EEE, including an understanding of the roles and responsibilities of stakeholders.

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 _____
Central Faculty Senate Chair _____ Date _____	Vice Chancellor for Academic Affairs _____ Date _____
West Lafayette Department Head _____ Date _____	West Lafayette College/School Dean _____ Date _____

[Signature] _____ Date 9/23/11
West Lafayette Registrar

UD922/11

TO: The Faculty of the College of Engineering
FROM: The Division of Environmental and Ecological Engineering
SUBJECT: New Undergraduate Course, EEE 25000, Environmental, Ecological, and Engineering Systems

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

EEE 25000: Environmental, Ecological, and Engineering Systems

Sem. 1, Lecture 3, Credits 3

Prerequisite: Sophomore standing

Course description:

An overview of systems thinking and examples, and applications to environmental, ecological, and engineering systems. Students will develop an understanding of complex and global systems, along with the tools and analysis methods required to deal with them. Basic environmental and ecological science concepts are also included.

Reasons:

This course is planned as a foundational core course in the proposed Environmental and Ecological Engineering undergraduate curriculum. It is anticipated that students will typically take this course in the fall semester of their second year; it therefore represents the first introduction to the discipline of EEE. The course will be required for the BSEEE degree and will be recommended to all students pursuing the EEE Minor.

The course introduces students to the complexity of environmental, ecological, and engineering systems and tools required for understanding these systems. Primary learning objectives include helping students develop:

- an understanding of the types of relationships and dynamics common in complex systems, including environmental systems, ecological systems, and engineering systems, and their interactions
- the ability to apply systems tools and approaches to a variety of engineering, environmental, and ecological problems (and to problems that combine more than one of these), including
 - the ability to model, including semi-quantitative and temporal relationships
 - the ability to describe and diagram systems, and understand connections and feedbacks
- an understanding of the foundational concepts and vocabulary of global environmental and ecological systems
- an appreciation of the complexity of contemporary issues related to society and EEE, including an understanding of the roles and responsibilities of stakeholders.



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 25000: Environmental, Ecological, and Engineering Systems (EFD 39-11)

Level: Undergraduate

Course instructor(s): TBD

Course Outline:*Part 1: Systems and tools (four weeks)*

- Introduction to systems; importance and failures of systems
- Systems diagramming and structures, feedbacks, models and modes of systems
- Graphical behavior of systems, stability and oscillations, delays
- Thresholds, chaos, systems failure, and limits
- Policy implications of systems and systems thinking

Part 2: Environmental systems (five weeks)

- Introduction to atmospheric systems and behavior
- Fundamentals of environmental water systems
- Chemical and biological cycling
- Current environmental system changes
- Modeling environmental system changes using systems diagramming tools

Part 3: Ecological systems (two weeks)

- Ecological system fundamentals
- Limits to growth, lessons from ecosystem collapse
- Ecological cycles, models, and thought experiments

Part 4: Engineering systems and synthesis (four weeks)

- Industrial ecology, and applying environ./ecol. systems to industrial systems
- Energy systems
- Risk and uncertainty in engineering systems
- Introduction to sustainable manufacturing
- Applying modeling and systems diagramming tools to integrated systems

Textbooks:

- Donella H. Meadows, *Thinking in Systems: A Primer*, 2008, Chelsea Green Publishing.
- Brian Walker and David Salt, *Resilience Thinking: Sustaining Ecosystems and People in a Changing World*, 2006, Island Press.

Grading:

- 30% Homework (approximately weekly), including calculations, short answer questions on concepts, and reflection assignments.
- 20% Projects (about two in the semester): team projects that use modeling and systems tools to produce complex analysis
- 20% Mid-term exam
- 30% Final exam

Previous Teaching:

The course was offered for the first time as EEE 49500 in Fall 2010, Prof. John Sutherland and Dr. Stephen Hoffmann co-taught the course, though they will likely not be teaching it regularly in the future. Enrollment was 14 students.

