Office of the Registrar
FORM 40 REV. 7/08

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

EFD 33-09

DEPARTMENT Division of Environmental and Ecological Engineering EFFECTIVE SESSION ~~Fall 2009~~ Spring 2010

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

- [X] 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	Subject Abbreviation
Course Number 30000	Course Number
Long Title Environmental and Ecological Systems Modeling	
Short Title Environ Ecol Syst Modeling	

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

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

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

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	15	100
Recitation				
Discussion				
Laboratory				
Lab Prep				
Studio				
Distance				
Clinic				
Experiential				
Research				
Ind. Study				
Pract/Observ				

Cross-Listed Courses

COURSE DESCRIPTION (INCLUDE REQUISITES/RESTRICTIONS):

Introduction to computational methods for describing physical, chemical, and microbiological processes that occur in natural and engineered aqueous systems, including rivers and lakes, and within water and wastewater treatment systems. Emphases on understanding and conceptualizing important processes, data analysis, algorithm development, and competency in the use of programming tools. Prerequisites: MA 16200 or MA 16600 or equivalent.

	Date		Date
Calumet Department Head		Calumet School Dean	
Fort Wayne Department Head		Fort Wayne School Dean	
Indianapolis Department Head		Indianapolis School Dean	
Northwest Department Head		North Central Chancellor	
West Lafayette Department Head	5/19/09	West Lafayette College/School Dean	9/4/09
		West Lafayette Registrar	11/30/09

OFFICE OF THE REGISTRAR

11/25/10

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Print Form

EFD 33-09 file

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Course Number	30000	Course Number	
Long Title	Environmental and Ecological Systems Modeling		
Short Title	Environ Ecol Syst Modeling		

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Minimum Cr. Hrs
(Check One) To [ ] Or [ ]
Maximum Cr. Hrs.
3. Equivalent Credit: Yes [ ] No [ ]

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3. Repeatable [ ]
Maximum Repeatable Credit: [ ]
4. Credit by Examination [ ]
5. Special Fees [ ]
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Fort Wayne Department Head	Date	Fort Wayne School Dean	Date
Indianapolis Department Head	Date	Indianapolis School Dean	Date
No. entral Department Head	Date	North Central Chancellor	Date
West Lafayette Department Head	5/19/09 Date	West Lafayette College/School Dean	9/4/09 Date
		West Lafayette Registrar	Date

OFFICE OF THE REGISTRAR

Sent 11/05 LM

Engineering Faculty Document No. 33-09

December 11, 2008

TO: The Faculty of the College of Engineering

FROM: The Faculty of the Division of Environmental and Ecological Engineering (DEEE)

RE: New Undergraduate Course **EEE 30000**

The faculty 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 30000 Environmental and Ecological Systems Modeling

Sem. 1, Class 3, cr. 3.

Prerequisite: MA 16200 or MA 16600 or equivalent.

Course Description: Introduction to computational methods for describing physical, chemical, and microbiological processes that occur in natural and engineered aqueous systems, including rivers and lakes, and within water and wastewater treatment systems. Emphases on understanding and conceptualizing important processes, data analysis, algorithm development, and competency in the use of programming tools.

Reasons: This course is a cornerstone course of the Ecological Engineering Plan of Study of Multidisciplinary Engineering and is envisioned as a cornerstone course for a potential future EEE degree program. It introduces students at the sophomore and junior level to basic process models used for analysis of ecological systems and for design of engineered environmental systems. After completing this course, students will be able to: 1) Apply simple models to natural and engineered systems, 2) Identify processes critical to proper formulation of ecological and environmental models, 3) Formulate models to analyze specific issues concerning natural waters and wastewaters, 4) Encode model algorithms into common software packages, 5) List limitations and assumptions of classic and self-formulated models. The Course was taught for the first time in fall 2008 under the variable title number CE 49700 (section 005) with an enrollment of 14 students

Inez Hua
Interim Head and Professor
Division of Environmental and Ecological Engineering

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

ECC Minutes #28

Date 5/6/09

Chairman ECC Raymond Cipra

Supporting Documentation:

1. Course Instructor: Chad Jafvert and others

2. Course Outline

I. Introduction (1 week)
   A. Course guidelines and objectives
   B. Review of units and unit conventions, the mass balance approach
   C. Documenting information on the worksheet, graphical display of data, data processing

II. Equilibrium & Steady-State Mass Balances and Calculations (2 weeks)
   A. Box equilibrium models, partition coefficients (air, water, soil distribution)
   B. Quantitative structure-activity relationships (QSARs)
   C. Steady-state assumptions and models (Example: Reverse Osmosis)

III. Regression Analysis (2 weeks)
   A. The worksheet (continued), Graphs
   B. Least-squares analysis, minimizing residuals on any function.
   C. Introduction to chemical measurement techniques (Example: NO_3^- by IC and ISE)
   D. Standard Curves

IV. Reactions in "Batch" Systems (3 weeks)
   A. Calculating first-order and pseudo-order decay constants
   B. Reactions in series (Examples: carbonaceous biochemical oxygen, denitrification).
   C. Higher-order reactions (Example: redox conditions of metal species)

V. Homogeneous Completely Mixed Flow-Through Systems (2 weeks)
   A. Analytical solutions (Examples: tanks and lakes)
   B. Numerical solutions (Example: Euler's method in Excel's VBA)
   C. Systems in Series (Example: compartmentalized (and stratified) lakes)

VI. Plug-Flow Systems (2 weeks)
   A. The mass balance approach (Example: Chlorine contact chambers)
   B. With steady-state assumptions (Example: the Streeter-Phelps eq. for Rivers)

VII. Introduction to Dispersive Systems (2 weeks)
   A. The 1-D advection-dispersion equation
   B. Analytical solutions and boundary values.

VIII. Further Applications (1 week)

3. Textbook: Chemical Fate and Transport in the Environment, 2nd Ed., by H.R. Hemond and E. J., Fechner-Levy, Academic Press, 2000.

4. Grading

Problem Assignments	30%
Exam 1	20%
Exam 2	25%
Final Exam	25%