### Instructions

- New course with supporting documents
- Add existing course offered at another campus
- Expiration of a course
- Change in course number
- Change in course title
- Change in course credit/type
- Change in course attributes (department head signature only)
- Change in instructional hours
- Change in course description
- Change in course requisites
- Change in semesters offered (department head signature only)
- Transfer from one department to another

### Proposed

<table>
<thead>
<tr>
<th>Subject Abbreviation</th>
<th>EEE</th>
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<tbody>
<tr>
<td>Course Number</td>
<td>3000</td>
</tr>
<tr>
<td>Long Title</td>
<td>Environmental and Ecological Systems Modeling</td>
</tr>
<tr>
<td>Short Title</td>
<td>Environ Ecol Syst Modeling</td>
</tr>
</tbody>
</table>

Abbreviated title will be entered by the Office of the Registrar if omitted. (50 CHARACTERS ONLY)

### Credit Type

1. Fixed Credit: Cr. Hrs. 3
2. Variable Credit Range: Minimum Cr. Hrs. (Check One) 0 or 12
   Maximum Cr. Hrs. 0
3. Equivalent Credit: Yes

### Course Attributes

- Pass/No Pass Only
- Satisfactory/Unsatisfactory Only
- Repeatable
- Maximum Repeatable Credit: 3
- Credit by Examination
- Special Fees

### 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. Emphasis on understanding and conceptualizing important processes, data analysis, algorithm development, and competency in the use of programming tools. Prerequisites: MA 15200 or MA 16600 or equivalent.

### Terms Offered

- Summer
- Fall
- Spring

### Campus(es) Involved

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

### Cross-Listed Courses

- 
- 
- 

### Department Heads and School Deans

- 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
- West Lafayette Department Head: Date
- West Lafayette College/School Dean: Date
PURDUE UNIVERSITY
REQUEST FOR ADDITION, EXPIRATION,
OR REVISION OF AN UNDERGRADUATE COURSE
(10000-40000 LEVEL)

DEPARTMENT: Division of Environmental and Ecological Engineering
EFFECTIVE SESSION: Fall 2009

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

- [x] New course with supporting documents
- [ ] Add existing course offered at another campus
- [ ] Expiration of a course
- [ ] Change in course number
- [ ] Change in course title
- [ ] Change in course credit/type
- [ ] Change in course attributes (department head signature only)
- [ ] Change in instructional hours
- [ ] Change in course description
- [ ] Change in course requisites
- [ ] Change in semesters offered (department head signature only)
- [ ] Transfer from one department to another

PROPOSED:

- Subject Abbreviation: EEE
- Course Number: 30000
- 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. (20 CHARACTERS ONLY)

EXISTING:

- Subject Abbreviation
- Course Number
- Long Title
- Short Title

TERMS OFFERED:

Check All That Apply:
- [x] Summer
- [ ] Fall
- [ ] Spring

CAMPUS(ES) INVOLVED:

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

CREDIT TYPE:

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

SCHEDULE INFO:

- Lecture: Minutes Per Mtg: 50
- Meetings Per Week: 3
- Weeks Offered: 15
- % of Credit Allocated: 100

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.

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 Chancellor Date

West Lafayette Department Head Date

West Lafayette College/School Dean Date

West Lafayette Registrar Date

OFFICE OF THE REGISTRAR
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. Emphasizes 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)

4. Grading

<table>
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<tr>
<th>Component</th>
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<tr>
<td>Problem Assignments</td>
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</tr>
<tr>
<td>Exam 1</td>
<td>20%</td>
</tr>
<tr>
<td>Exam 2</td>
<td>25%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>25%</td>
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