PURDUE UNIVERSITY
REQUEST FOR ADDITION, EXPIRATION,
OR REVISION OF A GRADUATE COURSE
(50000-60000 LEVEL)

DEPARTMENT Engineering
EFFECTIVE SESSION Fall 2014

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

- 1. New course with supporting documents (complete proposal form)
- 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
- 8. Change in instructional hours
- 9. Change in course description
- 10. Change in course requisites
- 11. Change in semesters offered
- 12. Transfer from one department to another

PROPOSED:
Subject Abbreviation CE
Course Number 50060

EXISTING:
Subject Abbreviation
Course Number 51900

Long Title Advanced Water Treatment Processes
Short Title Advanced Water Treatment

TERMS OFFERED
Check All That Apply:
- Fall
- Spring
- Summer

CAMPUS(ES) INVOLVED
- Calumet
- Cont Ed
- Ft Wayne
- Tech Statewide
- Indianapolis
- N. Central
- 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.
2. Variable Credit Range: Minimum Cr. Hrs. (Check One) To Maximum Cr. Hrs.
3. Equivalent Credit: Yes
4. Thesis Credit: Yes

COURSE ATTRIBUTES: Check All That Apply
- 1. Pass/No Pass Only
- 2. Satisfactory/Unsatisfactory Only
- 3. Repeatable
- 4. Credit by Examination
- 5. Fees: [ ] Coop [ ] Lab Rate Request

Schedule Type
- Lecture
- Recitation
- Presentation
- Laboratory
- Lab Prep
- Studio
- Distance
- Clinic
- Experiential
- Research
- Ind. Study
- Pract/Obs

Minutes Per Mth
75
Meetings Per Week
2
Weeks Offered
16
% of Credit Allocated
100

COURSE DESCRIPTION (INCLUDE REQUISITES/RESTRICTIONS):
P: CE 36500 or equivalent or permission from instructor. Advanced water treatment mechanisms and processes, including physical chemical and microbiological processes, fate and transport of environmental contaminants, process fundamentals, reaction kinetics, partitioning and volatilization of environmental contaminants.

* COURSE LEARNING OUTCOMES

Calumet Department Head

Calumet School Dean

Calumet Director of Graduate Studies

Fort Wayne Department Head

Fort Wayne School Dean

Fort Wayne Director of Graduate Studies

Indianapolis Department Head

Indianapolis School Dean

IUPUI Associate Dean for Graduate Education

North Central Department Head

North Central School Dean

North Central Director of Graduate Studies

West Lafayette Department Head

West Lafayette College/School Dean

Date Approved by Graduate Council

Graduate Council Secretary

Date

West Lafayette Registrar

OFFICE OF THE REGISTRAR
Supporting Document
to accompany the Registrar's FORM 40G when:

1. Requesting a New Graduate Course (Complete Section I)
or
2. Adding Distance as an Additional Schedule Type (Complete Section II)

To: Purdue University Graduate Council
From: Faculty Member: Dong Chen
Department: Engineering
Campus: Fort Wayne
Date: November 25, 2013
Subject: Supporting Document to the Registrar's Form 40G

Contact for information if questions arise:
Name: Dong Chen
Phone Number: 260-481-6353
E-mail: chend@engr.ipfw.edu
Campus Address: ETCS, Room 327F

Course Subject Abbreviation and Number: CE 5xx00
Course Title: Advanced Water Treatment Processes

SECTION I

A. Justification for the Course:

• Provide a complete and detailed explanation of the need for the course (e.g., in the preparation of students, in providing new knowledge/training in one or more topics, in meeting degree requirements, etc.), how the course contributes to existing majors and/or concentrations, and how the course relates to other graduate courses offered by the department, other departments, or interdisciplinary programs.

The Department of Engineering has approved a new civil engineering concentration to its Master in Engineering degree. This course will be used to provide new knowledge in water treatment processes design.

• Justify the level of the proposed graduate course (50000- or 60000-level) including statements on, but not limited to: (1) the target audience, including the anticipated number of undergraduate and graduate students who will enroll in the course; and (2) the rigor of the course.

The target audience is graduate and undergraduate senior students. It is anticipated to have more than five students at the beginning of the offering and steadily increasing to more than 10 students in the class. The course rigor will be at a level of graduate courses and include but not limited to an independent project or research work submitted, presented, and defended by the end of the semester.
B. Learning Outcomes and Method of Evaluation or Assessment:

- Describe the course objectives and student learning outcomes that address the objectives (i.e., knowledge, communication, critical thinking, ethical research, etc.).

  Upon successful completion of the course, students should be able to:
  1) Characterize aqueous and environmental contaminants or pollutants
  2) Determine and design appropriate treatment processes to purify water and wastewater.
  3) Understand chemical equilibriuum and quantitatively determine the distribution of contaminant species at equilibrium status.
  4) Use stoichiometry and reaction kinetics to determine the concentration and fate of environmental contaminants during degradation processes.
  5) Be familiar with physical and chemical treatment processes.

- Describe the methods of evaluation or assessment of student learning outcomes. (Include evidence for both direct and indirect methods.)

  The assessment of the courses will be based on:
  1) Direct measurements such as homework, quizzes, exams, term paper/project.
  2) Indirect measurements such as class participation, discussion, and student survey at the end of the semester to evaluate to what degree the students believe they master the learning outcomes of the course.

- Grading criteria (select from drop down boxes); include a statement describing the criteria that will be used to assess students and how the final grade will be determined.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Exams and Quizzes</th>
<th>Criteria</th>
<th>Papers and Projects</th>
<th>Criteria</th>
<th>Attendance and Class Participation</th>
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</thead>
<tbody>
<tr>
<td>Criteria</td>
<td>Homework</td>
<td>Criteria</td>
<td></td>
<td>Criteria</td>
<td>Attendance and Class Participation</td>
</tr>
</tbody>
</table>

- Identify the method(s) of instruction (select from drop down box) and describe how the methods promote the likely success of the desired student learning outcomes.

<table>
<thead>
<tr>
<th>Method of Instruction</th>
<th>Lecture</th>
<th>Method of Instruction</th>
<th>Presentation</th>
<th>Method of Instruction</th>
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<tbody>
<tr>
<td>Method of Instruction</td>
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<td>Method of Instruction</td>
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<td>Method of Instruction</td>
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C. Prerequisite(s):

- List prerequisite courses by subject abbreviation, number, and title.

  CE 36500 Environmental Engineering or equivalent or permission from the instructor.

- List other prerequisites and/or experiences/background required. If no prerequisites are indicated, provide an explanation for their absence.

  Graduate standing or senior in engineering.

D. Course Instructor(s):

- Provide the name, rank, and department/program affiliation of the instructor(s).

  Dong Chen, Ph.D., P.E., Assistant Professor of Civil Engineering, Civil Engineering program.

- Is the instructor currently a member of the Graduate Faculty?  X  Yes — No
  (If the answer is no, indicate when it is expected that a request will be submitted.)
E. Course Outline:
• Provide an outline of topics to be covered and indicate the relative amount of time or emphasis devoted to each topic. If laboratory or field experiences are used to supplement a lecture course, explain the value of the experience(s) to enhance the quality of the course and student learning. For special topics courses, include a sample outline of a course that would be offered under the proposed course.

1) Fate and Transport of Contaminants
2) Reaction Kinetics
3) Process Fundamentals
4) Partitioning and Volatilization
5) Carbon Adsorption
6) Air Stripping
7) Membrane Processes
8) Advanced Oxidation Processes
9) Bioremediation

F. Reading List (Including course text):
• A primary reading list or bibliography should be limited to material the students will be required to read in order to successfully complete the course. It should not be a compilation of general reference material.


G. Library Resources
• Describe the library resources that are currently available or the resources needed to support this proposed course.

The following books and references are available in IPFW library.


H. Example of a Course Syllabus (While not a necessary component of this supporting document, an example of a course syllabus is available, for information, by clicking on the link below, which goes to the Graduate School’s Policies and Procedures Manual for Administering Graduate Student Programs. See Appendix K.)


(Revised and Approved by the Graduate Council 2/13)
SECTION II

New graduate degree program policies and guidelines, approved by the Indiana Commission for Higher Education on August 10, 2012, require additional documentation regarding modes of delivery. Please complete Section II when adding an additional mode of delivery to an existing graduate course.

A. Justification for New Proposed Mode of Delivery (Complete)

B. Learning Outcomes and Method of Evaluation or Assessment:
(Complete if different from approved mode of delivery)

- Describe the course objectives and student learning outcomes that address the objectives (i.e., knowledge, communication, critical thinking, ethical research, etc.).

- Describe the methods of evaluation or assessment of student learning outcomes. (Include evidence for both direct and indirect methods.)
• Grading criteria (select from drop down boxes); include a statement describing the criteria that will be used to assess students and how the final grade will be determined.

Criteria
Criteria
Criteria

• Identify the method(s) of instruction (select from drop down box) and describe how the methods promote the likely success of the desired student learning outcomes.

Method of Instruction
Method of Instruction
Method of Instruction
Method of Instruction
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Method of Instruction
Method of Instruction

C. Prerequisite(s):
(Complete if different from approved mode of delivery)

• List prerequisite courses by subject abbreviation, number, and title.

• List other prerequisites and/or experiences/background required. If no prerequisites are indicated, provide and explanation for their absence.

D. Course Instructor(s):

• Provide the name, rank, and department/program affiliation of the instructor(s).

• Is the instructor currently a member of the Graduate Faculty? — Yes — No
(If the answer is no, indicate when it is expected that a request will be submitted.)
E. Course Outline:
   (Complete if different from approved mode of delivery)
   • Provide an outline of topics to be covered and indicate the relative amount of time or emphasis devoted to each topic. If laboratory or field experiences are used to supplement a lecture course, explain the value of the experience(s) to enhance the quality of the course and student learning. For special topic courses, include a sample outline of a course that would be offered under the proposed course.

F. Reading List (including course text):
   (Complete if different from approved mode of delivery)
   • A primary reading list or bibliography should be limited to material the students will be required to read in order to successfully complete the course. It should not be a compilation of general reference material.

   • A secondary reading list or bibliography should include material students may use as background information.
G. Library Resources
(Complete if different from approved mode of delivery)

- Describe the library resources that are currently available or the resources needed to support this proposed course.
1. Instructor Information

Name and Title: Dong Chen, Assistant Professor of Civil Engineering.
Office: ET 327F
Office Hours: TBD
Contacts: Phone: (260) 481-6356.
E-mail: chend@engr.ipfw.edu

2. Course Information

Course title and number: CE 5xx00 “Advanced Water Treatment Processes”
Number of credit hours: 3
Course description: Advanced water treatment mechanisms and processes, including physical chemical and microbiological processes, fate and transport of environmental contaminants, process fundamentals, reaction kinetics, partitioning and volatilization of environmental contaminants.
Course prerequisites: CE 36500 Environmental Engineering or equivalent or permission from the instructor.
Description of students for whom the course was designed: Graduate or Senior Engineering students.


3. Course Outline

1) Fate and Transport of Contaminants
2) Reaction Kinetics
3) Process Fundamentals
4) Partitioning and Volatilization
5) Carbon Adsorption
6) Air Stripping
7) Membrane Processes
8) Advanced Oxidation Processes
9) Bioremediation
3. Goals and Course Outcomes

1. Course Goals:
   To learn the principles and design of advanced water treatment processes; and to understand the removal and transformation processes of aqueous and environmental contaminants.

2. Course Outcome:
   Upon successful completion of the course, students should be able to:
   1) Characterize aqueous and environmental contaminants or pollutants
   2) Determine and design appropriate treatment processes to purify water and wastewater.
   3) Understand chemical equilibrium and quantitatively determine the distribution of contaminant species at equilibrium status.
   4) Use stoichiometry and reaction kinetics to determine the concentration and fate of environmental contaminants during degradation processes.
   5) Be familiar with physical and chemical treatment processes.
   6) Be familiar with microbiological treatment processes.
   7) Understand selected contemporary global water and wastewater issues such as water shortage, wastewater reuse and emerging contaminants.

4. Course Policies

Exams
All exams are closed books and notes unless advised otherwise. NO make-up exams will be given. Exceptions may be considered in case of illness, serious emergencies, or other university sponsored activities. However, appropriate evidences must be presented in order to qualify for exceptions.

Homework
You are expected to work the assigned homework problems individually, although you may discuss the assignments. Homework is due at the beginning of the class period one week after which it is assigned unless otherwise specified. Late homework will NOT be accepted. Exceptions may be considered in case of illness, serious emergencies, or other university sponsored activities. However, appropriate evidences must be presented in order to qualify for exceptions. All homework must be submitted on 8½"x11" white paper or on engineering design paper.

Project
At least one project will be assigned during the semester. This project will cover topics in a somewhat open-ended manner and will probably require literature search and technical evaluations. Late projects will NOT be accepted.

Policies
- My commitment is to create a climate for learning characterized by respect for each other and the contributions each person makes to class. I ask that you make a similar commitment.
- Do not be late for class. No eating and turn off beepers and cell phones during class.
- Adherence to the Student Conduct Code is expected.
Students are expected to attend all classes. If you miss a class for any reason you are responsible for determining what material was covered, what assignments were made, and what announcements were made.

Students with a disability should contact the SSD office at Walb 113 (481-6657) or visit the SSD website at www.ipfw.edu/ssd for a description of services available.

Students are expected to be above reproach in all scholastic activities. Students who engage in scholastic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course. Scholastic dishonesty included but not limited to submission for credit of any work or materials that are attributable in whole or in part to another person. For more information about academic honesty rules and regulations, you may visit IPFW regulations at: http://www.ipfw.edu/academics/regulations/honesty.shtml

Grades

Averages will be calculated using the following point distribution (Total 100%):
- Homework ........................................... 10%
- Project .................................................. 20%
- Mid Term 1 ............................................. 20%
- Mid Term 2 ............................................. 20%
- Final Exam .............................................. 30%

Grades will be assigned as follows:

<table>
<thead>
<tr>
<th>For % Score</th>
<th>Grade</th>
<th>Grade Point Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>95</td>
<td>A+</td>
<td>4.0</td>
</tr>
<tr>
<td>90</td>
<td>A</td>
<td>4.0</td>
</tr>
<tr>
<td>88</td>
<td>A-</td>
<td>3.7</td>
</tr>
<tr>
<td>85</td>
<td>B+</td>
<td>3.3</td>
</tr>
<tr>
<td>80</td>
<td>B</td>
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<tr>
<td>78</td>
<td>B-</td>
<td>2.7</td>
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<tr>
<td>75</td>
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<td>70</td>
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<tr>
<td>68</td>
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<td>1.7</td>
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<tr>
<td>65</td>
<td>D+</td>
<td>1.3</td>
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<tr>
<td>60</td>
<td>D</td>
<td>1.0</td>
</tr>
<tr>
<td>&lt;60</td>
<td>F</td>
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</tr>
</tbody>
</table>

Email Notices I expect that you will receive any emails I send to your IPFW email account. Either check this account regularly (daily) or forward the messages to an account that you do check daily.

Comments Please feel free to stop by any time if you have any comments or suggestions. Any suggestions that will benefit the class are appreciated, and I will try my best to address any concerns that you might have.
<table>
<thead>
<tr>
<th>Important Dates</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>August 29</td>
<td>Last day for full refund</td>
</tr>
<tr>
<td></td>
<td>Pass/Not Pass and Audit-to-Credit Deadline</td>
</tr>
<tr>
<td>September 1</td>
<td>Labor Day Holiday</td>
</tr>
<tr>
<td>October 6</td>
<td>Project assigned</td>
</tr>
<tr>
<td>October 20</td>
<td>Midterm Exam</td>
</tr>
<tr>
<td>October 13-14</td>
<td>Fall Recess</td>
</tr>
<tr>
<td>November 26-28</td>
<td>Thanksgiving Recess</td>
</tr>
<tr>
<td>December 15-22</td>
<td>Last Week of Classes and Final Exam</td>
</tr>
</tbody>
</table>