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.

- [x] New course with supporting documents (complete proposal form)
- [ ] Add existing course offered at another campus
- [ ] Change in course title
- [ ] Change in course number
- [ ] Change in course description
- [ ] Change in course attributes
- [ ] Change in instructional hours
- [ ] Change in course requisites
- [ ] Change in semesters offered
- [ ] Transfer from one department to another

Proposed:
- Subject Abbreviation: CE
- Course Number: 51900
- Long Title: Advanced Soil Mechanics
- Short Title: Advanced Soil Mechanics

Existing:
- Subject Abbreviation
- Course Number

Terms Offered:
- Check all that apply:
  - [x] Fall
  - [x] Spring
  - [ ] Summer

Campus(es) Involved:
- Calumet
- Cont Ed
- N. Central
- Ft. Wayne
- Tech Statewide
- W. Lafayette
- Indianapolis

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

<table>
<thead>
<tr>
<th>CREDIT TYPE</th>
<th>COURSE ATTRIBUTES: Check All That Apply</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Fixed Credit: Cr. Hrs.</td>
<td>1. Pass/Not Pass Only</td>
</tr>
<tr>
<td>2. Variable Credit Range: Minimum Cr. Hrs (Check One) To Maximum Cr. Hrs.</td>
<td>2. Satisfactory/Unsatisfactory Only</td>
</tr>
<tr>
<td>3. Equivalent Credit/Yes</td>
<td>3. Repeatable</td>
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<tr>
<td>4. Thesis Credit: Yes</td>
<td>4. Maximum Repeatable Credit:</td>
</tr>
<tr>
<td>Schedule Type</td>
<td>5. Fees: Coop Lab Rate Request</td>
</tr>
<tr>
<td>Lecture</td>
<td>Include comment to explain fee</td>
</tr>
<tr>
<td>Recitation</td>
<td></td>
</tr>
<tr>
<td>Presentation</td>
<td>6. Registration Approval Type</td>
</tr>
<tr>
<td>Laboratory</td>
<td>Department</td>
</tr>
<tr>
<td>Lab Prep</td>
<td>Instructor</td>
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<tr>
<td>Studio</td>
<td>7. Variable Title</td>
</tr>
<tr>
<td>Distance</td>
<td>8. Honors</td>
</tr>
<tr>
<td>Clinic</td>
<td>9. Full Time Privilege</td>
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<tr>
<td>Experiential</td>
<td>10. Off Campus Experience</td>
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<tr>
<td>Research</td>
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<td>Ind. Study</td>
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<tr>
<td>Pract/Obser</td>
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<tr>
<td>Cross-Listed Courses</td>
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</table>

Course Description (Include Requisites/Restrictions):
P. CE 38000 and CE 38100 or equivalent or permission from instructor. This course presents an advanced treatment of soil mechanics with emphasis on the following topics: nature of soil, effective stress principle, permeability and seepage, stress-strain-strength behavior of coarse- and fine- grained soils; consolidation theory and settlement analysis and laboratory and field methods for evaluation of soil properties in design practice. Course in scope are performed by laboratory experiments.

*Course Learning Outcomes
See attached

Calumet Director of Graduate Studies: Date
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 Department Head: Date
North Central School Dean: Date

West Lafayette Department Head: Date
West Lafayette College/School Dean: Date

Graduate Area Committee Convener: Date
Graduate Dean: Date

IUPUI Associate Dean for Graduate Education: Date
North Central Director of Graduate Studies: Date

Date Approved by Graduate Council: Date
Graduate Council Secretary: Date

West Lafayette Registrar: Date

Office of the Registrar
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 geotechnical engineering 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 are graduate and undergraduate senior students. It is anticipated to have more than five students at the beginning of the offering and steadily increase to have more than 10 students in the class. The course rigor will be at a level of graduate courses and include but 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.).

Students who successfully complete this course will be able to:
1. Understand the principle of effective stress and elasticity theory related to soil mechanics
2. Analyze and interpret the state of stress in soil using Mohr Circle
3. Evaluate various failure criteria for soils
4. Understand the behavior of coarse- and fine-grained soils in dry and saturated conditions
5. Evaluate the rate of consolidation using simplified and finite difference techniques
6. Understand the stress-strain-strength behavior of soils in drained and undrained conditions
7. Estimate the soil's shear strength for design purposes

- 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 measures include homework, quizzes, exams, term paper/project.
2) Indirect measures include class participation and student survey at the end of semester to evaluate to what degree 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>Homework</th>
<th>Criteria</th>
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<tbody>
<tr>
<td>Criteria</td>
<td>Papers and Projects</td>
<td>Criteria</td>
<td>Laboratory Exercises</td>
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</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>Lecture</th>
<th>Method of instruction</th>
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<tbody>
<tr>
<td>Method of instruction</td>
<td>Presentation</td>
<td>Method of instruction</td>
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<tr>
<td>Method of instruction</td>
<td>Laboratory</td>
<td>Method of instruction</td>
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</tbody>
</table>

C. Prerequisite(s):

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

CE 38000 Soil Mechanics and CE 38100 Soil Mechanics Laboratory

- 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).

Dr. Ahmadreza Hedayat, 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. Nature of Soil, Soil Composition, Identification, and Classification
2. Stresses in Soils, Mohr Circle, Failure Theories, and Stress Path
3. Basics of One Dimensional Groundwater Flow
4. Behavior of Dry Sands
5. Effective Stresses Principle, Capillary, and Soil Suction
6. Behavior of Saturated Sands
7. Behavior of Saturated Clays
8. Soil Stability

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.

Text Book:

References

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)
1. Instructor Information

Name and Title: Ahmadreza Hedayat, Assistant Professor of Civil Engineering
Office: ET 321D
Office Hours: TBD
Contacts: Phone: (260) 481-0324
E-mail: hedayata@ipfw.edu

2. Course Information

Course title and number: CE 5xx00 “Advanced Soil Mechanics”
Number of credit hours: 3
Course description: This course presents an advanced treatment of soil mechanics with emphasis on the following topics: nature of soil; effective stress principle; permeability and seepage; stress-strain-strength behavior of coarse- and fine- grained soils; consolidation theory and settlement analysis; and laboratory and field methods for evaluation of soil properties in design practice. Concepts in course are reinforced by laboratory experiments.
Course prerequisites: CE 38000 Soil Mechanics and CE 38100 Soil Mechanics Laboratory or equivalent or permission from instructor.
Description of students for whom the course was designed: Graduate or Senior Engineering students.
Additional reference lists and reading assignments will be provided for each specific course topic, as needed.
Indiana University – Purdue University Fort Wayne (IPFW)

CE 5xx Syllabus Bridge Design Fall 2014

Course Outline
1. Nature of Soil, Soil Composition, Identification, and Classification
2. Stresses in Soils, Mohr Circle, Failure Theories, and Stress Path
3. Basics of One Dimensional Groundwater Flow
4. Behavior of Dry Sands
5. Effective Stresses Principle, Capillary, and Soil Suction
6. Behavior of Saturated Sands
7. Behavior of Saturated Clays
8. Soil Stability

3. Goals and Course Outcomes

1. Course Goals:

   To provide students with both practical and theoretical knowledge of mechanics of soils at the advanced level required for design applications.

2. Course Outcome:

   Upon successful completion of the course, students should be able to:

   1. Understand the principle of effective stress and elasticity theory related to soil mechanics
   2. Analyze and interpret the state of stress in soil using Mohr Circle
   3. Evaluate various failure criteria for soils
   4. Understand the behavior of coarse- and fine-grained soils in dry and saturated conditions
   5. Evaluate the rate of consolidation using simplified and finite difference techniques
   6. Understand the stress-strain-strength behavior of soils in drained and undrained conditions
   7. Estimate the soil’s shear strength for design purposes
   8. Evaluate the potential deformation of soil and the stability of structures during staged construction
   9. Evaluate the engineering properties of soils and foster a fundamental understanding of applied soil mechanics

4. Course Policies

Homework

Homeworks are based on material introduced in class and assigned approximately every week. Homework should be handed in at the beginning of class on the due date. The solutions must be well organized and clean (poor organization will affect your grade). Collaboration with classmates is encouraged, but each student must submit his/her own homework. Late assignments will not be accepted for grading.

Term Project

The purpose of the term project is to give students the opportunity to work collaboratively on a specific topic related to Soil Mechanics. The term project will be accomplished through the following stages:

(1) Topic selection. Due date: September 8.
(2) Paper presentation. The paper associated with the topic will be presented in class. Due date: Week of September 29.
(3) Written report submitted. The report should have a maximum length of 15 pages
Indiana University – Purdue University Fort Wayne (IPFW)

CE 5xx Syllabus  Advanced Soil Mechanics  Fall 2014

double spaced, 12-point character size, Times font or similar. Abstract and references are not included in the total number of pages. Figures and Tables are part of the maximum number of pages. Due date: November 10.

(4) Peer review of the papers. Each paper will be reviewed by two or more students. Due date: November 24.

(5) Final presentation. The completely finished project is presented in class during the week of December 8.

**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.

**Grading**

- Homeworks............................................... 25%
- Midterm Exam ......................................... 20%
- Term Project ............................................ 25%
- Final Exam ............................................. 30%

<table>
<thead>
<tr>
<th>Score</th>
<th>&gt;= 95</th>
<th>90-94.9</th>
<th>85-89.9</th>
<th>80-84.9</th>
<th>75-79.9</th>
<th>70-74.9</th>
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<td>Grade</td>
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<td>A- or B+</td>
<td>B</td>
<td>B- or C+</td>
<td>C</td>
<td>C- or D+</td>
<td>D</td>
<td>F</td>
</tr>
</tbody>
</table>

**Ethics, Disabilities, and Emergencies**

Students are expected to abide by IPFW Student Conduct Code (analogous to ASCE code of ethics), as well as on a personal code of ethics based on a value system which adheres to the highest standards of academic integrity. Any breach of academic honesty will be handled in accordance with established university procedures. [http://www.ipfw.edu/committees/senate/regulations/honesty.html](http://www.ipfw.edu/committees/senate/regulations/honesty.html)

If you have a disability and need assistance, special arrangements can be made to accommodate most needs. Contact the Director of Services for Students with Disabilities (Walb Union Bldg., Room 113, (481-6657)) as soon as possible to work out the details. For more information, please visit the web site for SSD [http://new.ipfw.edu/offices/disabilities/text-version](http://new.ipfw.edu/offices/disabilities/text-version)

In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances. Information will be provided via email and/or Blackboard. IPFW’s Emergency website at: [https://www.ipfw.edu/offices/police/emergency/](https://www.ipfw.edu/offices/police/emergency/)

**Important Dates**

- August 29: Last Day for Full Refund
- September 1: Pass/Not Pass and Audit-to-Credit Deadline
- September 8: Labor Day Holiday
- Term Project Topic Selection
- Week of September 29: Term Project Paper Presentation
<table>
<thead>
<tr>
<th>CE 5xx Syllabus</th>
<th>Bridge Design</th>
<th>Fall 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>October 13-14</td>
<td>Fall Recess</td>
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<tr>
<td>October 20</td>
<td>Midterm Exam</td>
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<tr>
<td>November 10</td>
<td>Term Project Written Report</td>
<td></td>
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<tr>
<td>November 24</td>
<td>Term Project Peer Review</td>
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<td>November 26-28</td>
<td>Thanksgiving Recess</td>
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<tr>
<td>Week of December 8</td>
<td>Term Project Presentation</td>
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<tr>
<td>December 15-22</td>
<td>Last Week of Classes and Final Exam</td>
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