CENE 410 Unit Operations in Environmental Engineering
Course Syllabus
Fall 2014, 3 credit hours

General Information

Time & Location:  
CENE 410-1 (7017): TuTh 4:00pm – 4:50pm Engr 314  
CENE 410-A (12272): Tu: 5:00pm – 7:30pm Engr 245  
CENE 410-B (12419): Th: 5:00pm – 7:30pm Engr 245

Instructor: Paul Gremillion  
Office: Room 203, Engineering  
Phone: (928) 523 5382  
Email: paul.gremillion@nau.edu  
Office Hours: 12:30 – 2:30pm, TuTh, or by appointment

Course Prerequisite

Pre-requisite or co-requisite: CENE 480.

Catalog Description

Design of unit operations in water, wastewater, waste management, and/or air quality engineering. Student-generated data informs and drives the design of relevant processes.

Course Objectives

Students are expected to demonstrate attainment of the following outcomes:

1. Conduct experiments, and analyze and interpret the data for engineering design of unit operations. (ABET Outcomes b, c, e)
2. Model and design systems using analytical tools from engineering practice. (ABET Outcomes c, k)
3. Document experimental results and summarize appropriate design solutions to environmental engineering problems. (ABET Outcome g)

Course Structure and Approach

Through lectures, in-class activities, and assignments, students will apply the principles learned in CENE 150, CENE 280, and other foundation course to design reactors commonly used in environmental engineering. We will use contemporary approaches to solve design problems in various areas of environmental engineering. We will use laboratory-generated data to develop preliminary reactor designs. Students will prepare individual reports or technical memoranda for each of these design exercises.

Textbook

Most course material will be provided in your BBLearn folders or on the internet. It may be necessary to obtain electronic course material from the following text: Wastewater Engineering Treatment and Resource Recovery, 5th Edition, Metcalf & Eddy, 2014.
Recommended Optional Materials / References

Provided on BBLearn.

Course Outline (subject to revision)

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 – 3</td>
<td>Rainwater harvesting design</td>
</tr>
<tr>
<td>4 – 7</td>
<td>Coagulation / flocculation design</td>
</tr>
<tr>
<td>8 – 11</td>
<td>Sludge digestion</td>
</tr>
<tr>
<td>12 – 15</td>
<td>Air stripping</td>
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</tbody>
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Assessment of Student Learning Outcomes

Methods of Assessment: Learning outcomes will be assessed via homework, projects, and examinations.

**Design Problems** are assigned to accomplish components of each of the four design tasks. Assignments will be either individual or group efforts.

**Design Reports** are the final product of your work on each topic. Assignments will either be individual or group efforts.

**Presentations** will be made at the conclusion of each of the design tasks.

**Attendance and Participation** will be assessed based on attendance records for the lecture and lab, contribution to class discussions, and participation in group assignments.

**Final Exam** will test for comprehension of quantitative and conceptual aspects of the course material.

Grading System (10-point scale by percentage of total points):

<table>
<thead>
<tr>
<th>Item</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design Problems (4 sets)</td>
<td>100</td>
</tr>
<tr>
<td>Design Reports (4)</td>
<td>100</td>
</tr>
<tr>
<td>Presentations (4)</td>
<td>80</td>
</tr>
<tr>
<td>Attendance and Participation</td>
<td>20</td>
</tr>
<tr>
<td>Final Exam</td>
<td>50</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>350</strong></td>
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Course Policies

**Use of CECMEE Laboratories:** Any teams using any CECMEE Lab (including the Field Station) or performing site visits must complete the EHS Safety Training and Field Safety courses ([http://nau.edu/Research/Compliance/Environmental-Health-and-Safety/Training/](http://nau.edu/Research/Compliance/Environmental-Health-and-Safety/Training/)) and acknowledge reading of all SOPs for tool use. You must receive approval by the CENE Lab Instructor prior to accessing any laboratory facility. Any failure to comply with safety or cleanup requirements will be reflected in your course grade.
Attendance: Attending class is mandatory. Students in this course are expected to be responsible for their behavior, including attendance and the consequences of their absence. Attendance will be taken on a regular basis. These data will be used to evaluate borderline grades (±0.5%) and for other appropriate purposes as might arise.

Submission Deadlines: Due dates and times for design problems and reports will be announced with the assignment. Material submitted after the deadline will be penalized one letter grade for every week-day the assignment is late.

Course Deadlines: For the Fall 2014 16 week (standard) semester, the dates are: Add/Drop Deadline – 9/4/14; Withdrawal (W) Deadline – 10/24/14. Dates for 5 and 8 week, etc., sessions can be found here: http://nau.edu/Registrar/Important-Dates/Fall/ (click on session deadlines). Note, you can also find the Final Exam schedule at the link above.

Extra Credit, Make-up Assignments, Tests, and Retesting: There are no make-up assignments or tests without prior consent of the instructor. There may be options for extra-credit work, however any such assignments will be provided to the entire class. There will be no individual options.

Snow Closure Policy: In the event of campus closure during finals week, the final exam will be administered online through BBLearn.

Plagiarism and Cheating: Plagiarism and cheating are subject to the Arizona Board of Regents’ Code of Conduct Section 5-308 and the procedures outlined in the NAU Student Handbook. Websites for these documents are: http://www.azregents.edu/policymanual/default.aspx and http://nau.edu/Student-Life/Student-Handbook/

University Policies

University policies in the Student Handbook that must also be observed include the following. They can be found at http://www4.nau.edu/avpaa/policy1.html.

1. Safe Environment Policy
2. Students with Disabilities
3. Academic Contact Hour Policy
4. Academic Integrity
5. Research Integrity
6. Sensitive Course Materials
7. Classroom Disruption Policy

Engineering Policy – Professional Ethics and Code of Conduct

Exceptionally high standards of honor and integrity are fundamental and essential to the study and practice of engineering and construction management. Academic preparation for these professions must be conducted in an atmosphere which fosters these values.

In addition to compliance with the Student Code of Conduct and the Academic Dishonesty Policy that apply to all students at NAU, engineering and construction management students are expected to conduct themselves professionally. Violation of the National Society of Professional Engineers (NSPE) Code of Ethics, found at http://www.nspe.org/Ethics/CodeofEthics/index.html, or the
American Society of Civil Engineers (ASCE) Code of Ethics, found at http://asce.org/Leadership-and-Management/Ethics/Code-of-Ethics/, may lead to dismissal from the College’s academic programs.

Violations of these codes will be handled as detailed in the publications listed above, and will be documented in the student’s advisement file.

Faculty members may ask students to affirm in writing that they have neither given nor received unauthorized aid on an examination or assignment.