CE 497C Ecological Engineering
Tuesday, Thursday 11:15 – 12:30 pm in 203 Leonhard

INSTRUCTOR: Dr. Michael Gooseff
OFFICE: 231 P Sackett Building
TELEPHONE: 867-0044
EMAIL: mgooseff@engr.psu.edu
OFFICE HOURS: Dr. Gooseff’s: FRIDAYS 10 am-12 pm, WEDNESDAYS 10 am-12 pm, or by appointment


GRADING:
- Participation 10% (In-Class Exercises)
- Homework 30%
- Bi-Weekly Quizzes 40%
- Project 20%

Final grades will be based on the weighted-average specified above and assigned as follows:
- A = 94-100%
- A- = 90-93%
- B+ = 87-89%
- B = 84-86%
- B- = 80-83%
- C+ = 76-79%
- C = 70-75%
- D = 60-69%
- F < 60%

I reserve the right to adjust your grades. Your grade will only improve if adjustments are necessary. Feel free to contact me during office hours or by appointment if you have grade-related questions or concerns.

COURSE GOALS:
Enable you to understand and apply the fundamental principles of ecology and application to engineering solutions in natural settings. Civil and Environmental engineers are consistently challenged by pollution or remediation problems in natural settings. This course provides a framework for engineering solutions to such problems by restoring ecosystem function.

ABET EDUCATIONAL OBJECTIVES:
- Gain a solid understanding of the basic principles of mathematics, science, and engineering.
- Be able to apply this understanding to advance your technical competency in Civil and Environmental Engineering
- Be able to use the techniques, skills, and modern engineering tools learned in this course for practice in Civil and Environmental Engineering and/or graduate education.

ABET EDUCATIONAL OUTCOMES:
- An ability to apply your knowledge of mathematics, science, and engineering.
- An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

IN-CLASS PARTICIPATION:
Please bring your text, notes, a calculator, and scrap paper to each class. You will be participating in the solution and discussion of in-class exercise problems. You will work alone or in small groups while solving these problems. Each group will hand in their attempt to solve the problem with each member’s signature on the paper. Simply attempting the solution will result in full participation credit for the day. These in-class exercises will require that you complete the assigned readings prior to the beginning of each class.
Note that participation counts for 10% of your grade. You are encouraged to keep your notes/materials organized.
ON-LINE CLASS PARTICIPATION:
All course emails and web postings will be made using the ANGEL course management software. You will need to regularly login (https://cms.psu.edu/default.asp) to check course announcements, download in-class example solutions, and access posted homework solutions.

Important: When you 1st login into the system you must configure “My Settings” to forward course emails to your primary email account as follows:

Step 1: Login into system
Step 2: Click “My Settings”
Step 3: Click “System Settings”
Step 4: Type your PSU Email under “Forwarding Address” and set “Forwarding Mode” as shown below:

**Forwarding Address**
email@engr.psu.edu

**Forwarding Mode**
Forward my course mail and keep as new in course

Step 5: Click “Save”. You now should receive all course announcements in your primary email account as well as your ANGEL account.

HOMEWORK:
Homework will be assigned bi-weekly and is due at the beginning of class on the Thursday of the subsequent week. Late homework will not be accepted. Feel free to work on the assignments in groups of 2 or 3. If you are doing group work, hand in 1 copy with everyone’s name.

Each assignment requires:
- Your name(s) on each page of stapled solutions
- A legible step-by-step presentation (in pencil) of the solutions (include problem diagrams)
- In the case of essay questions, please type and print out your responses
- Boxed answers presented in proper units for problems

Solutions will be made available (on the class ANGEL site) after your assignments have been collected.

QUIZZES:
This class has no mid-term or final exams. Quizzes will be given in class on the dates listed below (every 2 weeks, on Thursdays). Your grade in this class will not include your worst quiz grade. Make-up quizzes will not be given. In extreme cases, a quiz grade will be replaced by the average of your grades on the remaining quizzes (proof of illness or emergency will be required). For quizzes, you must work in pencil. You are allowed to bring in a calculator (in most cases the simplest of calculators will suffice), but no other cell phones, blackberries or any other electronics will be allowed.

EXTRA CREDIT:
NOTE - you may submit one of the following with each homework assignment, but not both...
1) Ecological Engineering in the News: This course introduces you to the importance of ecology and engineering solutions to ecosystem impacts. You can earn an additional 10% on each of the 7 homework assignments, if
you find examples in newspapers, magazines, or the internet of real-world problems where the topics covered in this course play a vital role. To earn this credit, you will need to submit a 1-paragraph (<300 words), well written synopsis with your homework assignment that provides:

- Summary of the issue (in your own words)
- Brief discussion of how the problem relates to this class (what principles covered in class are important in solving the problem?)
- Reference for where you found the story
- You must turn these in with each homework assignment throughout the semester (i.e., you have a 2 week window to generate each one). Please keep them separate from your homework assignments, however (i.e., do not staple them to your homework).

NOTE that your source MUST be a reputable source of factual information. Blogs, case studies from individuals that are not ‘officially’ published or peer-reviewed are NOT acceptable.

2) Current Research in Ecological Engineering: Similar to Ecological Engineering in the News, you can earn an additional 10% on each of the 7 homework assignments if you attend and turn in your report of a seminar on campus that is related to ecological engineering or applied ecology. I will announce such seminars in class, though you are welcome to find them on your own as well. If you choose to attend one that I have not announced, please contact me first to approve it. You will need to submit a 2 paragraph report where 1 paragraph is a short summary of the seminar and the 2nd paragraph discusses how the seminar content relates to this class.

PROJECT
You will complete a term project in this class that achieves one of the following objectives:
1) evaluates the design and implementation of an ecological engineering project,
2) proposes a design and implementation plan for an ecological engineering solution to an existing problem, or
3) provides an evaluation of the current state of the art of an ecological engineering activity (i.e., a specific activity, not a general theme in ecological engineering).
You will work on these projects alone and present your findings in the last class period of the semester. You will also need to write a companion paper that is due on the last day of class (10 pages of text, double spaced, not including figures, tables and bibliography). Note that you have two ‘reports’ required early in the semester (see schedule below). These are meant to get you thinking about your project in advance so that you do not wait until the last minute to complete the project. These pre-project reports will be detailed in class and will count for 20% of the total project grade. You will have the opportunity to turn in your final report to me two weeks before it is due for me to review and edit. I will provide you with suggestions to improve grammar, structure, and general writing within one week. You will then have a remaining week to make edits and turn in.

ACADEMIC INTEGRITY
The College of Engineering’ statement on academic integrity is available at http://www.engr.psu.edu/CurrentStudents/acadinteg.aspx. Please review this information as it provides details on what constitutes a violation of academic integrity, how violations are dealt with, and penalties for violations.

SPECIAL FALL 2009 FLU PROTOCOLS
[from the University] In compliance with Pennsylvania Department of Health and Centers for Disease Control recommendations, students should NOT attend class or any public gatherings while ill with influenza. Students with flu symptoms will be asked to leave campus if possible and to return home during recovery. The illness and self-isolation period will usually be about a week. It is very important that individuals avoid spreading the flu to others.

Most students should be able to complete a successful semester despite a flu-induced absence. To do so, and safeguard the rest of campus, please contact me immediately via email if you have flu symptoms and plan to pursue a self-isolation period. I will do my best to work with you during that time. However, it is your
responsibility to acquire notes for missed classes and complete missed assignments within one week of your return. This is a large class and the burdens for planning, assignment generation and grading are onerous.

Should the instructor, TA, or grader(s) catch the flu and have to pursue self-isolation, we ask in advance that you expect to have potential delays in delivery of class content (i.e., lectures), and/or potentially slow return times for graded assignments.

The bottom line here is that none of us want the flu. All students, faculty, and staff are expected to balance their ability to safeguard their health and the campus, with the demands associated with their responsibilities. Faculty, TAs, graders, and staff will work within reason to complete the semester as best possible. Students in the class are expected to also do their best to complete the class to the best of their ability.

**COURSE SCHEDULE** (subject to change, if topics require more lecture time)
Note that reading assignments will be made more specific in class. “Ch. X” refers to a section of the textbook for this class by P.C. Kangas.

<table>
<thead>
<tr>
<th>Lec. #</th>
<th>Week/Date</th>
<th>Topic</th>
<th>Reading</th>
<th>Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1T – Aug. 25</td>
<td>Course Introduction</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1R – Aug. 27</td>
<td>Ecology Introduction</td>
<td>Ch. 1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>2T – Sep. 1</td>
<td>General Ecology I</td>
<td></td>
<td>Homework #1 due</td>
</tr>
<tr>
<td>4</td>
<td>2R – Sep. 3</td>
<td>General Ecology II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>3T – Sep. 8</td>
<td>Ecology of Streams I</td>
<td></td>
<td>Quiz #1 (Lect. 1-5)</td>
</tr>
<tr>
<td>6</td>
<td>3R – Sep. 10</td>
<td>Ecology of Streams II</td>
<td></td>
<td>Homework #2 due</td>
</tr>
<tr>
<td>7</td>
<td>4T – Sep. 15</td>
<td>Ecology of Natural Wetlands I (D. Wardrop)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>4R – Sep. 17</td>
<td>Ecology of Natural Wetlands II (D. Wardrop)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>5T – Sep. 22</td>
<td>Engineering Treatment Wetlands I</td>
<td>Ch. 2</td>
<td>Quiz #2 (Lect. 6-9)</td>
</tr>
<tr>
<td>10</td>
<td>5R – Sep. 24</td>
<td>Engineering Treatment Wetlands II</td>
<td>Ch. 2</td>
<td>Project report #1 due</td>
</tr>
<tr>
<td>11</td>
<td>6T – Sep. 29</td>
<td>Soil Ecology I (J. Kaye)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>6R – Oct. 1</td>
<td>Soil Ecology II (J. Kaye)</td>
<td></td>
<td>Homework #3 due</td>
</tr>
<tr>
<td>13</td>
<td>7T – Oct. 6</td>
<td>Soil Bioengineering I</td>
<td>Ch. 3</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>7R – Oct. 8</td>
<td>Soil Bioengineering II</td>
<td>Ch. 3</td>
<td>Quiz #3 (Lect. 10-13)</td>
</tr>
<tr>
<td>15</td>
<td>8T – Oct. 13</td>
<td>Microcosmology I</td>
<td>Ch. 4</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>8R – Oct. 15</td>
<td>Microcosmology II</td>
<td>Ch. 4</td>
<td>Homework #4 due</td>
</tr>
<tr>
<td>17</td>
<td>9T – Oct. 20</td>
<td>Restoration Ecology I</td>
<td>Ch. 5</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>9R – Oct. 22</td>
<td>Restoration Ecology II</td>
<td>Ch. 5</td>
<td>Quiz #4 (Lect. 14-17)</td>
</tr>
<tr>
<td>19</td>
<td>10T – Oct. 27</td>
<td>Stream Restoration Engineering I (P. Johnson)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>10R – Oct. 29</td>
<td>Stream Restoration Engineering II (W. Oberholtzer)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>11T – Nov. 3</td>
<td>Stream Restoration Engineering III</td>
<td></td>
<td>Homework #5 due</td>
</tr>
<tr>
<td>22</td>
<td>11R – Nov. 5</td>
<td>Stream Ecosystem Restoration Engineering I</td>
<td></td>
<td>Project report #2 due</td>
</tr>
<tr>
<td>23</td>
<td>12T – Nov. 10</td>
<td>Stream Ecosystem Restoration Engineering II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>12R – Nov. 12</td>
<td>Stream Ecosystem Restoration Engineering III</td>
<td></td>
<td>Homework #6 due</td>
</tr>
<tr>
<td>25</td>
<td>13T – Nov. 17</td>
<td>Exotic Species I</td>
<td>Ch. 7</td>
<td>Quiz #6 (Lect. 22-35)</td>
</tr>
<tr>
<td>26</td>
<td>13R – Nov. 19</td>
<td>Exotic Species II</td>
<td>Ch. 7</td>
<td></td>
</tr>
</tbody>
</table>

**Nov.23-29, no lectures – Thanksgiving Break – Enjoy...**

| 27     | 14T – Dec. 1 | Economics and Ecological Engineering I | Ch. 8   |                                                  |
| 28     | 14R – Dec. 3 | Economics and Ecological Engineering II | Ch. 8   | Homework #7 due                                  |
| 29     | 15T – Dec. 8 | Conclusion                             |         | Quiz #7 (Lect. 26-29)                            |
| 30     | 15R – Dec. 10 | Project presentations                  |         |                                                  |