CIVE 439
Chemical Concepts in Environmental Engineering

Instructor: Dr. Kimberly Catton
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Office location: Scott 250
Lecture Time: 3 lectures (MW) 2:00-2:50 pm
Lecture Location: Eddy 200
Laboratory Time: Wednesday 3:00-5:40 pm
Laboratory Location: Engineering B105
Office hours: By appointment
Class website: canvas.colostate.edu

OVERVIEW
The goal of this course is to apply chemical concepts to environmental engineering problems.

Course Objectives:
- Understand the basic chemical concepts (materials balance, chemical kinetics, chemical reactions)
- Apply chemical concepts in environmental engineering through a group design project that incorporates environmental ethics, teamwork, and design calculations
- Synthesize the basic process of design for environmental engineers through current topics

COURSE LOGISTICS

REQUIRED TEXT:
No textbook.

RECOMMENDED TEXTS:
Davis and Cornwall (2012). Introduction to Environmental Engineering.
Metcalf and Eddy. Wastewater Engineering

In-class Participation
There will be a participation grade for this class to represent attendance at lecture and laboratory. The grade will also include consideration for contributions during the semester.

Homework Assignments
Homework will be assigned weekly throughout the semester. The format of the homework will be varied throughout the semester.

Exams
One midterm exam will be given after the review of the basic material. The midterm will be a take home assignment performed in groups of 2 or 3. You are not allowed to discuss the material between groups.
Group project
The class will include a group design project. During the first two weeks of the semester you will form 4-5 student design teams that will each focus on a part of the project. The lecture will support the topics needed to work on the design projects. The lab sections will also be designed to support the material you need for the project and your group will be expected to give short weekly updates on the project and longer presentations. Each project will be assigned two design teams with different portions of the project. This is meant to simulate a jointly performed consulting contract. You will be required to give one joint final presentation on the project at the final exam.

A final report will be due from each team the second to last week of class. A revised final report will be due at the final with both design teams input. This report should not just be a stapled copy of the two separate reports but rather a polished, concise report of the entire scope of the project. The outline of the final report should include the following

1. Background on the project (1 single-spaced page)
2. Literature Review (have similar projects been completed or cited studies on projects). What have you incorporated into your project? (3 single-spaced page limit)
3. Environmental ethics discussion of the project (1 page single-spaced page limit)
4. Discussion of significant decisions and design options that were made on the project design and implementation (5 single spaced page limit)
5. Design Documentation (10 single-spaced page limit) (you can reference items in an appendix to save on space)
6. Cost-Benefit analysis of design options (3 single-spaced pages)

Evaluation of the project will occur through the presentations throughout the semester and the final report. Each group will be required to sign and submit a group contract that clearly states the expectations of the group. Your final grade will include a self-evaluation and a group evaluation score. A reflection assignment will also be due at the final that summarizes what you have learned about environmental engineering design and the group design process. The breakdown of this grade will be group assignments (10%), group presentations (10%), final presentation (20%), group report (30%), final report (20%), final reflection assignment (10%).

Course Evaluation
Assignments will be weighted as follows:
- Participation Score 10%
- Assignments 20%
- Midterm Exam 20%
- Group Project 50%

Grading will be assigned according to a fixed grade scale and will use the +/- grade system as described in the CSU catalog.
**Tentative Course Schedule**

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<thead>
<tr>
<th>Week</th>
<th>Lecture Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>Introduction to Environmental Engineering, Environmental Issues</td>
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<td>2</td>
<td>Environmental Rules and Regulations</td>
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<td>3</td>
<td>Materials Balances – Advection/Diffusion</td>
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<td>4</td>
<td>Reactor Kinetics - Chemical Reactions</td>
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<td>5</td>
<td>Unit Process Principles</td>
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<td>6</td>
<td>Unit Process Principles</td>
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<td>7</td>
<td><strong>Midterm Exam: Monday October 5th, 2015</strong></td>
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<td>7</td>
<td>Aqueous Chemistry</td>
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<td>8</td>
<td>Researching Treatment Efficiency</td>
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<td>9</td>
<td>Treatment Design</td>
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<td>11</td>
<td>Treatment Design</td>
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<td>12</td>
<td>Project Logistics</td>
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<td>13</td>
<td>Cost-Benefit Analysis</td>
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<td>14</td>
<td>Contemporary Design Topics</td>
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<tr>
<td>15</td>
<td>Emerging Contaminants and Treatment Needs</td>
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**Final Exam: Tuesday, December 17th 7:30 AM-9:30 AM**
**Academic Integrity**
This course will adhere to the Academic Integrity Policy of the Colorado State University General Catalog (Page 7) and the student conduct code. The academic integrity policies specific to this course are as follows: (1) Students may work together on homework and laboratory assignments, (2) students will turn in individual work for the homework assignments, (3) students will work independently on exams but are allowed to bring handwritten notes to the exam. The Department of Mechanical Engineering Student Academic Integrity Policy is appended to this document for your reference.

**Academic Honesty:**
All Mechanical Engineering students are required to adhere to the Policies and Guiding Principles (section 1.6 of the CSU general catalog) governing student conduct, and the Mechanical Engineering Student Academic Integrity Policy (on the Current Students page of the ME web site). Please review both links.

**Collaboration and Cheating:**
The default at Colorado State University is that no collaboration is allowed unless expressly permitted, and students are expected to abide by the Colorado State University Student Conduct Code at all times. At no time is plagiarism, sabotage, or dishonesty permitted; all references used must be cited.
For this course, collaboration is allowed on homework and classwork, but all work submitted must be that of the individual(s) submitting said work. The final project is a team collaboration, and inter-team collaboration is allowed so long as both teams agree to it. Tests are individual work, only, and no collaboration is permitted. Violation of academic ethics may result in a zero on an assignment, negative points on an assignment, a zero for the course, or other consequences determined by the instructor based on the violation. Note: “assignment” is meant here to include all graded aspects of this course including but not limited to homework, projects, and tests.

**Disability Statement:**
If you are a student with a documented disability who will require accommodations in this course, please contact Resources for Disabled Students (RDS; rds.colostate.edu) for assistance in developing a plan to address your academic needs.