CATALOG DESCRIPTION: Application of unit operations and processes to the design of integrated wastewater treatment plants; critical analysis of existing designs. Additional projects/assignments required for graduate credit.

PREREQUISITES: CE 431


INSTRUCTOR: Dr. Erik R. Coats, Ph.D., P.E.

TIME AND PLACE: 9:30-10:20 MWF
JEB 26

OFFICE HOURS: 4:30-5:45 MTuWTh
and by appointment

COURSE OBJECTIVES & STUDENT LEARNING OUTCOMES: The purpose of this course is to educate engineering students on the current and anticipated future practices for the design and operation of advanced water and wastewater treatment facilities. Emphasis will be placed on integrating individual unit operations and processes to achieve overall treatment objectives and to satisfy the given constraints. Upon successful completion of this course, you should be able to:

1. Develop design criteria (e.g., mass and flow inputs; performance requirements; general bulk-aggregate physical, chemical, biochemical, and biological kinetic and stoichiometric parameters) necessary for the preparation of designs for advanced water and wastewater treatment unit operations and processes.
2. Analyze secondary and tertiary water and wastewater treatment components and systems to determine overall process and individual unit effectiveness.
3. Troubleshoot process “failures” associated with secondary and tertiary water/wastewater treatment systems.
4. Complete basic designs for secondary and tertiary water and wastewater treatment unit operations and processes, including basic system layout and selection/specification of certain equipment.

An important philosophy I want you to embrace in this class is to immerse yourself into the material such that you UNDERSTAND THE FUNDAMENTALS rather than simply commit material to short-term memory. In the long term you will realize significant benefits by embracing this approach, both in your continued education and as practicing engineers.

One last point: spelling, grammar, sentence construction, and overall communications skills are vital areas for success in engineering. Therefore, these will be considered in my grading of your work. Proficiency, or lack thereof, could easily be the difference in a final letter grade.

TOPICS COVERED: The topics to be covered in this course are identified in the attached course calendar. This calendar is intended as a general guide to the student. Deviations, shifts in schedule, and subject additions may occur as the semester proceeds.

COURSE PROFILE: Three semester credits. Three 50-minute lectures per week.

Reading: Reading assignments will generally be assigned in advance of lecture. You are expected to review class handouts and read assigned textbook sections/journal articles in advance of each lecture.
Furthermore, not all material in the assigned reading will be covered in class; however, you are still responsible for said material.

**Homework/Design Problems:** Homework/design problems will be assigned routinely. On the day homework/design problems are due, place your completed work at the front desk before each class starts. Unexcused late work will not be accepted. Solutions will be posted on the course web site. Programming in MathCad or other computer usages will be required for some homework sets. Conversely, programming in MathCad or other computer usages will be prohibited for some homework sets.

Homework will generally be assigned problems from your textbook. On occasion, graduate students will be required to complete more homework problems.

Design problems will be assigned that represent real-world projects. I typically derive these projects from either my own experiences, or from some of my colleagues. The design problems would seem to be approached in an arbitrary and sometimes incomprehensible manner, that are provided with too little or too much basic data, and that require using assumptions which should be based on designer experience. You may then argue that you do not have any experience, hence the reason you are taking this course. This course, however, will be structured such that you will begin to enhance these necessary skills. If you intend to remain in engineering after graduation, you will doubtless spend the rest of your professional life solving problems for which too little or too much data are given, and making assumptions with little to base them on except intuition.

Undergraduates (CE 432) will complete the design problems in instructor-assigned groups; graduate students (CE 532) will complete the design problems independently.

**Completing the homework and design problems must be imperative for you – not only do they represent a large part of your grade, the material will be covered on the quizzes and final exam.**

**Examinations:** Approximately 5-8 short mini-exams will be given in class. Generally, mini-exams will cover that material covered since the last mini-exam, although there will be some inherent overlap of material throughout the course. The schedule for these mini-exams will be announced the class day prior.

The mid-term exam will be comprehensive from the beginning of the semester, and will be 50 minutes in length. The final exam, which will be two hours in length, will be semester comprehensive. I also reserve the right to assign one or both of these exams as take-home exams. Examination material will include any/all material covered in class, any/all material from the assigned readings, and material pertaining to the homework/design problems. A student may reschedule an exam if said student has three exams scheduled on the same day; this applies to the final exam as well. Moreover, the final exam date is fixed and not subject to change or to rescheduling except as otherwise allowed by the University.

For the graduate students, both the mid-term and final exam will include additional problems beyond those assigned to the undergraduates.

**Class Attendance and Participation:** Some of the material covered during lectures will not be in your text or readings, although you will be responsible for it whether you choose to come to class or not.

**Class attendance and participation should be one of your higher priorities this term.**
ASSESSMENT OF STUDENT PROGRESS TOWARD COURSE OBJECTIVES:
The primary method of assessing student’s progress will be through homework (20%), design problems (25%), mini-exams (15%), mid-term exam (20%), and a final examination (20%).

- The penalty for cheating is failure of the course.
- Penalty for missing an exam or quiz without prior approval of excuse - 0.0 - unless there are (serious) mitigating circumstances.

GRADING SCALE: Successful completion of this course, and your earned grade, will be determined according to the following scale:

90% ≤ A  
80% ≤ B < 90%  
70% ≤ C < 80%  
65% ≤ D < 70%  
F < 65%

In addition to the above scale, your final grade will be influenced by your performance on the final examination as follows:

>80% final examination score required to earn an ‘A’ in the course  
>70% final examination score required to earn a ‘B’ in the course  
>60% final examination score required to earn a ‘C’ in the course

PROFESSIONAL COMPONENT: This course contributes primarily to the students’ knowledge of engineering topics, and does provide design experience. More specifically, this course integrates concepts of environmental engineering and hydraulics into the design of water and wastewater treatment facilities. Emphasis will be given to the actual design of basic treatment plant unit process and unit operations, along with the management of design projects and preliminary design studies. Economic analyses, which are an integral component in a design course, are addressed through the evaluation of various alternative treatment mechanisms and technologies.

CLASS WEB PAGE: The URL for our class web page is listed at the top of this syllabus. I will utilize this web page to post homework, design problem, and quiz solutions, and other selective material pertinent to the course.

DISABILITY SUPPORT SERVICES-REASONABLE ACCOMMODATIONS STATEMENT: Reasonable accommodations are available for students who have a documented disability. Please notify the instructor during the first week of class of any accommodation(s) needed for the course. Late notification may mean that requested accommodations might not be available. All accommodations must be approved through Disability Support Services located in the Idaho Commons Building, Room 333.

DSS can be reached at: 885-7200 or by e-mail at: dss@uidaho.edu  
Website at: http://www.access.uidaho.edu or http://www.webs.uidaho.edu/aap

This syllabus and the associated class schedule are subject to change in the event of extenuating circumstances or by mutual agreement between the instructor and students.

PREPARED BY: Erik R. Coats, August 2007