

# CEE 431 Water and Wastewater Engineering (3)

## 1 Course Description

Hydrologic fundamentals of water demand and supply; water and wastewater distribution; collection systems; quality characterization; analytical methods for water quality management. Pre: CEE330.

## 2 Learning Objectives

After students take this course, students should be able to:

- have in-depth overview of environmental engineering and fundamentals of wastewater treatment
- understand and use water and wastewater characteristics for the process design and optimization later
- apply modeling approaches to understand, analyze, and predict treatment phenomena and performances
- understand the wastewater treatment as a coupled process of chemical, physical, and biological processes with scientific fundamentals.

## 3 Textbook

Students can read this book online, download PDF files of each chapter with a limited number of pages per download, and download/read the book using Adobe Digital Editions.

- Title: Environmental engineering : principles and practice
- Authors: Mines, Richard O. and Plunkett, Angela Mines.
- Publisher: Chichester, England : Wiley-Blackwell
- Year: 2014
- ISBN: 1-118-78599-1, 1-118-78590-8
- The textbook is available at
  - URL: <https://ebookcentral.proquest.com/lib/uhm/detail.action?docID=7104075&pq-origsite=primo>

## 4 Instructor

|              |   |
|--------------|---|
| Instructor   | Prof. Albert S. Kim                             |
| Office       | POST 203C                                       |
| Phone:       | 956-3718  |
| Email:       | albertsk@hawaii.edu                             |
| Course URL:  | Laulima and Google Classroom (class code: TBA)  |
| TA (grader)  | None  |
| Office hours | TBA, Shortly after each class or by appointment |

## 5 Grading

| Items           | Percentage (%) | Achievement | Grade |
|-----------------|----------------|-------------|-------|
| Online activity | 10             | 90 – 100 %  | A     |
| Homework        | 10             | 76 – 90 %   | B     |
| Midterm 1       | 25             | 65 – 76 %   | C     |
| Midterm 2       | 25             | 50 – 65%    | D     |
| Final           | 30             | < 50%       | F     |

## 6 Lectures

- Date and time: TBA or asynchronous
- Location: Online

## 7 Class Schedule

Exams are not accumulative as their chapters are indicated in the table below.

## 8 Notes and Rules

- Homework will be assigned on a daily basis and cumulatively due Fridays.
- There will be three exams, and specific times and formats will be announced.
- Students' homework *should contain* proper figures, diagrams, procedures, and/or enough detailed explanation and should be very well organized in a logical flow.
- Homework must be submitted fully online using Google Classroom. The file name should have a standard format of, e.g., CEE431SM24\_HW##\_LastName\_First.docx, e.g. **CEE431SM24\_HW01\_Kim\_Albert.docx**. No spaces and special characters should included in file names.
- Students do not need to type any mathematical derivations using the Equation Editor or MathType in MS Word files unless you really want to for your own record. But, students' hand-writing should be eligible although hand-written derivation procedures are enough to get credits.

Table 1: Course and Exam Schedule

| Week | Lecture | Chapter                                 | Ch. Sec.  |
|------|---------|---|-----------|
| 1    | 1       | 2. Essential chemistry concepts         | 2.2       |
|      | 2       |   | 2.3-2.5   |
|      | 3       |   | 2.6, 2.7  |
|      | 4       |   | 2.8       |
|      | 5       |   | 2.9       |
| 2    | 6       | 3. Water and wastewater characteristics | 3.2, 3.3  |
|      | 7       |   | 3.4       |
|      | 8       |   | 3.5       |
|      | 9       |   | 3.6       |
|      | 10      | Midterm 1 (Ch. 2 and Ch. 3)             | MT1       |
| 3    | 11      | 5. Environmental systems: modeling and  | 5.1-5.3   |
|      | 12      | reactor design                          | 5.4       |
|      | 13      |   | 5.5       |
|      | 14      | 6. Design of water treatment systems    | 6.3       |
|      | 15      |   | 6.4       |
| 4    | 16      |   | 6.5, 6.6  |
|      | 17      |   | 6.7, 6.8  |
|      | 18      |   | 6.9       |
|      | 19      |   | 6.10-6.12 |
|      | 20      | Midterm 2 (Ch. 5 and 6)                 | MT2       |
| 5    | 21      | 4. Essential biology concepts           | 4.1-4.3   |
|      | 22      |   | 4.4,4.5   |
|      | 23      |   | 4.6-4.9   |
|      | 24      | 7. Design of water treatment systems    | 7.1-7.4   |
|      | 25      |   | 7.5       |
| 6    | 26      |   | 7.6       |
|      | 27      |   | 7.9       |
|      | 28      |   | 7.10      |
|      | 29      |   | 7.11      |
|      | 30      | Final Exam (Ch. 4 and Ch. 7)            | Final     |