

# CIVE 437

## WASTEWATER TREATMENT FACILITY DESIGN

**Instructor:** Dr. Kimberly Catton

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**Office location:** Scott 250

**Lecture Time:** 12:00 - 12:50 pm (MWF)

**Lecture Location:** B2

**Class website:** [canvas.colostate.edu](http://canvas.colostate.edu)

**Phone:** 970-491-3689

**Office hours:** By appointment

### **OVERVIEW**

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The goal of this course is to introduce students to the process of wastewater treatment plant design. This class requires prerequisites or co-requisites of CIVE 438 and CIVE 401. This class is a project-based course so the outcome will be a set of drawings and design calculations for an example wastewater treatment plant.

#### **Course Objectives:**

- Design treatment processes in a wastewater treatment plant
- Integrate process design with electrical, instrumentation and structural design needs
- Produce a design notebook with appropriate calculations
- Produce plans for the wastewater treatment plant

### **COURSE LOGISTICS**

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#### **Textbook and reading assignments:**

#### **RECOMMENDED TEXTS:**

1. Qasim. Wastewater Treatment Plants: Planning, Design and Operation. CRC Press
2. Metcalf and Eddy. Wastewater Engineering: Treatment and Reuse. McGraw Hill

#### **Design Notebooks**

Students may work in pairs for the assigned design task. Each pair will maintain a design notebook with the calculations for each section of the notebook. The notebook will receive a grade from the instructor and peer evaluation during the design reviews.

#### **Wastewater Treatment Facility Plans**

A set of drawings will be generated for the general design of each component of the wastewater treatment plant. The drawings will be graded on completeness, clarity, and innovation.

#### **Presentations**

Each group of three will give a one hour lecture on an advanced topic on wastewater treatment. Presentations will require pictures, schematics and drawings of any example cases of the treatment technology. Please include at least 3 recent research findings (google scholar) in your presentation.

### Course Evaluation

Assignments will be weighted as follows:

Presentation	30%
Design Notebooks	25%
Design Drawings	25%
Classroom Assignments	20%

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

### 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 in a team on all assignments.

### **TENTATIVE COURSE SCHEDULE (READING CHAPTERS ARE PARENTHESIS FROM QASIM)**

<b>WEEK</b>	<b>LECTURE TOPIC</b>	<b>PRACTICAL TOPIC</b>
1	Introduction	Project Introduction/General Drawings
2	Basic Design Considerations (1-6)	Predesign
3	Hydraulic Profiles (7,21)	Hydraulic Profile
4	Pump Stations (8)	Pump Stations
5	Flow Measurement and Structures (10)	Yard Piping
6	Pretreatment-Headworks (11)	Mechanical Drawings (Pumps)
7	Primary Sedimentation (12)	<b>Design Review of General Drawings</b>
8	Aeration Basins(13)	Standard Details
9	Secondary Clarifiers (13)	Mechanical Drawings (continued)
10	Biological Nutrient Removal (13)	Structural Drawings
11	Disinfection (14)	<b>Design Review of S &amp; M Drawings</b>
12	Effluent Disposal (15)	Instrumentation Drawings (P&IDs)
13	Sludge Dewatering and Thickening (16 -19)	Specifications
14	<b>Student Presentations</b>	<b>Student Presentations</b>
15	<b>Student Presentations</b>	<b>Student Presentations</b>
	<b>Finals Week (May 9: 7:30 – 9:30 AM) (TBA)</b>	<b>Final Design Review of Drawings and Calculations</b>

### ADVANCED TREATMENT TOPICS

1. DESIGNING FOR WATER REUSE
2. ADVANCED TREATMENT DESIGNS FOR PHOSPHORUS REMOVAL
3. ADVANCED TREATMENT DESIGNS FOR NITROGEN REMOVAL
4. TREATMENT SYSTEMS FOR PRODUCED WATER FROM HYDRAULIC FRACTURING
5. SMALL-SCALE SYSTEMS (INTERNATIONAL) WASTEWATER DESIGN
6. REMOVING PHARMACEUTICALS/LOW CONCENTRATION POLLUTANTS FROM THE WASTE STREAM
7. SUSTAINABLE ENERGY DESIGN FOR WASTEWATER PROJECTS