CIVE 437
WASTEWATER TREATMENT FACILITY DESIGN

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Office location: Scott 250
Lecture Time: 12:00 - 12:50 pm (MWF)
Lecture Location: B2
Class website: canvas.colostate.edu

OVERVIEW

The goal of this course is to introduce students to the process of wastewater treatment plant design. This class requires prerequisites or corequisites 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

Textbook and reading assignments:

RECOMMENDED TEXTS:
1. Qasim. Wastewater Treatment Plants: Planning, Design and Operation. CRC Press

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)

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<th>Week</th>
<th>Lecture Topic</th>
<th>Practical Topic</th>
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<td>1</td>
<td>Introduction</td>
<td>Project Introduction/General Drawings</td>
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<td>2</td>
<td>Basic Design Considerations (1-6)</td>
<td>Predesign</td>
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<td>3</td>
<td>Hydraulic Profiles (7,21)</td>
<td>Hydraulic Profile</td>
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<td>4</td>
<td>Pump Stations (8)</td>
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<td>5</td>
<td>Flow Measurement and Structures (10)</td>
<td>Yard Piping</td>
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<td>6</td>
<td>Pretreatment-Headworks (11)</td>
<td>Mechanical Drawings (Pumps)</td>
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<td>7</td>
<td>Primary Sedimentation (12)</td>
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<td>Aeration Basins(13)</td>
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<td>9</td>
<td>Secondary Clarifiers (13)</td>
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<td>10</td>
<td>Biological Nutrient Removal (13)</td>
<td>Structural Drawings</td>
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<td>11</td>
<td>Disinfection (14)</td>
<td>Design Review of S &amp; M Drawings</td>
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<td>Effluent Disposal (15)</td>
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<td>13</td>
<td>Sludge Dewatering and Thickening (16 -19)</td>
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<td></td>
<td>Finals Week (May 9: 7:30 – 9:30 AM) (TBA)</td>
<td>Final Design Review of Drawings and Calculations</td>
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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 Wastestream
7. Sustainable Energy Design for Wastewater Projects