



CEN 316 Principles of Hydraulics

Winter 2024

Course Credits: 4

Contact Hours: 56 hours

Instructor: TBA

Email: TBA

COURSE OBJECTIVES

This course designed to provide students with a comprehensive understanding of the fundamental principles and applications of hydraulic systems. The course covers topics such as fluid properties, hydrostatics, flow in pipes, hydraulic pumps, control valves, and hydraulic circuits. Emphasis is placed on both theoretical concepts and practical applications to equip students with the necessary knowledge and skills.

Upon Completion of this Course, students will be able to:

1. Understand the properties of fluids and their relevance to hydraulic systems
2. Apply the principles of hydrostatics to analyze pressure and forces in fluid-filled systems
3. Comprehend the working principles and characteristics of hydraulic pumps
4. Apply quantitative skills to solve business problems and make the best of business opportunities
5. Evaluate the performance and selection of control valves for specific applications

PREREQUISITES

CEN 203 Engineering Fluid Mechanics

GRADING

Grades will be determined by accumulating points, with 100 points being the maximum, as follows:



ITEM	POINTS
Labs	45 Points
Midterm	25 Points
Final Exam	30 Points
Total	100 Points

Late submissions will be graded at the end of the course. Grades will be assigned according to the following rule:

$$A \geq 90 > B \geq 80 > C \geq 70 > D \geq 60 > F.$$

We reserve the right to make adjustments to the overall grading policy.

COURSE MATERIALS

Required Texts:

Andrew Chadwick; John Morfett; Martin Borthwick, *Hydraulics in Civil and Environmental Engineering*, 6th Edition, CRC Press, 2021.

Recommended (Optional) Texts or Other Materials:

None

COURSE TOPICS

MODULE	TASKS
Module 1	Topics: Topic 1: Hydrostatics Topic 2: Sediment transport Topic 3: Behaviour of real fluids Topic 4: Flow in pipes and closed conduits Assessments: Lab#1: Pressure Control and Regulation
Module 2	Topics: Topic 5: Pressure surge in pipelines Topic 6: Computational hydraulics Topic 7: Wave theory Topic 8: Principles of fluid flow Assessments: Lab#2: Fluid Contamination Analysis



Module 3	Topics: Topic 9: Dimensional analysis and the theory of physical models Topic 10: Pipeline systems Topic 11: Energy line and hydraulic gradient Topic 12: Boundary conditions Assessments: Midterm
Module 4	Topics: Topic 13: Flood hydrology Topic 14: Conceptual storage-routing models Topic 15: Hydraulic structures Topic 16: Hydraulic machines Assessments: Lab#3: Hydraulic Pump Efficiency
Module 5	Topics: Topic 17: River and canal engineering Topic 18: Design of stable alluvial channels Topic 19: Coastal engineering Topic 20: Coastal profile and coastal area models Assessments: Final Exam

ATTENDANCE

1) Class attendance is required. Missing classes without permission will lead to decrease in overall grade.

Missing less than two classes: no penalty.

Missing more than two classes: 7% will be taken off from the overall grade.

If the instructor reports a student's frequent missing of class to the Soochow University Academic Administration Office, the student might get a written warning and might be prohibited from attending final exam.

2) Participants in this course are expected to arrive in class promptly and adequately prepared. The primary objective of this course is to critically engage with the readings and the subject matter. Therefore, course participants are expected to have completed the reading prior to class and prepare thoughtful reflections/commentaries to share with fellow colleagues.

LEARNING REQUIREMENTS



- 1) Late assignments are not acceptable and are subjected to grade deductions.
- 2) Assignments submitted in the wrong format will be counted as not submitted.
- 3) Failure to submit or fulfill any required course component results in failure of the class.
- 4) Make-up for midterm and final exams only with valid excuses, as defined by the University.
- 5) In order to earn a Certificate of Completion, participants must thoughtfully complete all assignments by stated deadlines and earn an average quiz score of 50% or greater.

TECHNOLOGY POLICY

The use of electronic devices in class is distracting, both for the user and for the rest of the class. Only non-programmable calculators can be used in the tests and exam. Any attempts to use cell phones and other electronic communication devices will be seemed as cheating. Laptops are discouraged, unless you use them for activities DIRECTLY related to the course (eg., note taking, reading course documents).

ACADEMIC INTEGRITY POLICY

Soochow University highly values the academic integrity and aims to promote the academic fairness, honesty and responsibility. Any academic dishonesty behaviors and any attempts to cheats and plagiarism will be reported to the university administration office. A written warning and the relevant penalties will be imposed. The record might be shown on the official university transcript.

DISABILITY ACCOMMODATION

Soochow University is committed to maintaining a barrier-free environment so that students with disabilities can fully access programs, courses, services, and activities at Soochow University. Students with disabilities who require accommodations for access to and/or participation in this course are welcome.

Note:

Please contact the University Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents



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professors from seeing you have learned the course material.