



蘇州大學  
Soochow University

# CEN 342 Hydraulic Engineering

Winter 2024

**Course Credits:** 4

**Contact Hours:** 56 hours

**Instructor:** TBA

**Email:** TBA

## **COURSE OBJECTIVES**

This course is a comprehensive exploration of the principles, applications, and technologies associated with fluid mechanics, particularly in the context of hydraulic systems. This course is designed to provide students with a solid foundation in the theory and practical aspects of hydraulics, which is essential in various engineering disciplines, such as mechanical, civil, and aerospace engineering. Modules include theory and operations of centrifugal pumps, gradually-varied open channel flows, flow measurements and more.

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

1. Gain the fundamental understanding of the principles that govern hydraulic systems;
2. Develop the skills to analyze, design, and troubleshoot hydraulic systems in real-world engineering scenarios;
3. Be familiarized with relevant industry standards, codes, and safety regulations pertaining to hydraulic systems;
4. Explore the global impact of hydraulic technology and its role in various industries worldwide;
5. Discuss ethical and environmental considerations in hydraulic system design and operation, including waste management and sustainable practices.

## **PREREQUISITES**

CEN 215 Fluid Mechanics



## GRADING

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

ITEM	POINTS
4 Quizzes	20 Points
2 Exercises	20 Points
Midterm Exam	30 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

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### Required Texts:

1. Russell C. Hibbeler, *Fluid Mechanics*, 2nd Edition, Pearson, 2018.
2. Sulzer Pumps, *Centrifugal Pump Handbook*, 3rd Edition, Elsevier Butterworth Heinemann, 2010.
3. P. Novak; A.I.B. Moffat; C. Nalluri; R. Narayanan, *Hydraulic Structures*, 4th Edition, CRC Press, 2007.

### Recommended (Optional) Texts or Other Materials:

None

## COURSE TOPICS

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MODULE	TASKS
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Module 1	<b>Topics:</b> Topic 1: Types of Fluid Flow Topic 2: Fluid Flow Descriptions Topic 3: Steady Flow through a Pipe Topic 4: Steady Laminar Flow within a Smooth Pipe <b>Assessments:</b> Quiz#1
Module 2	<b>Topics:</b> Topic 5: Pipe Systems Topic 6: Energy Conversion In Centrifugal Pumps Topic 7: Behavior of Centrifugal Pumps in Operation Topic 8: Flow in an Open Channel <b>Assessments:</b> Quiz#2
Module 3	<b>Topics:</b> Topic 9: Open-Channel Flow Classifications Topic 10: Flow Measurement: Venturi Meter, Nozzle Meter and Orifice Meter Topic 11: Unsteady flows Topic 12: Energy and Hydraulic Grade Lines <b>Assessments:</b> Midterm Exam Quiz#3
Module 4	<b>Topics:</b> Topic 13: The Reynolds Transport Theorem Topic 14: Hydraulic models Topic 15: Sedimentation in reservoirs Topic 16: Types of water power development <b>Assessments:</b> Quiz#4 Exercise#1
Module 5	<b>Topics:</b> Topic 17: Transport on inland waterways Topic 18: Waves and offshore engineering Topic 19: Range of validity of linear theory Topic 20: Wave motion, Wave breaking and Wave reflection <b>Assessments:</b> Final Exam Exercise#2

## 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



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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**

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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 professors from seeing you have learned the course material.