



蘇州大學
Soochow University

CEN 490 Advanced Concrete Technology

Summer 2024

Course Credits: 4

Contact Hours: 56 hours

Instructor: TBA

Email: TBA

COURSE OBJECTIVES

This course provides an in-depth exploration of concrete technology, covering various aspects including properties of cement, material composition, special concrete formulations, fresh and hardened properties, advanced cementitious composites, fracture mechanics, testing techniques, and future trends. Students will gain a comprehensive understanding of concrete as a structural material, its properties, manufacturing processes, and the latest advancements in cementitious composites and testing methods. Emphasis will be placed on practical applications and emerging trends in sustainable concrete technology.

Upon completion of this course, students will be able to:

1. Understand the different types of cement, their hydration process, and physical properties.
2. Analyze the classification, grading, and properties of aggregates used in concrete production;
3. Develop skills in mix design, manufacturing, and placement of fresh concrete;
4. Evaluate the structure and properties of hardened concrete, including strength, dimensional stability, and durability;
5. Explore advanced cementitious composites and their applications in construction;
6. Understand concrete fracture mechanics and nondestructive testing techniques;
7. Discuss current trends and future developments in concrete technology.



PREREQUISITES

CEN 285 Materials Science for Civil Engineers

GRADING

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

ITEM	POINTS
Quizzes	20 Points
Assignments	20 Points
Midterm Exam	20 Points
Course Project	10 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:

Zongjin Li, Xiangming Zhou, Hongyan Ma, Dongshuai Hou, *Advanced Concrete Technology*, 2nd Edition, Wiley, 2022.

Recommended (Optional) Texts or Other Materials:

P. Mehta, Paulo J. M. Monteiro, *Concrete: Microstructure, Properties, and Materials*, 4th Edition, McGraw Hill, 2013.

COURSE TOPICS

MODULE	TASKS
Module 1	Topics: Topic 1: Introduction to Concrete Topic 2: Characteristics and Types



	<p>Topic 3: Factors Influencing Concrete Properties Topic 4: Approaches to Study Concrete Assessments: Quiz#1</p>
Module 2	<p>Topics: Topic 5: Materials for Making Concrete: Aggregates Topic 6: Cementitious Binders Topic 7: Admixtures Topic 8: Water Assessments: Quiz#2 Assignment#1</p>
Module 3	<p>Topics: Topic 9: Fresh Concrete: Introduction Topic 10: Workability and Rheology Topic 11: Mix Design, Manufacture, and Delivery Topic 12: Placing and Curing Assessments: Midterm Exam</p>
Module 4	<p>Topics: Topic 13: Materials Structure of Concrete Topic 14: Materials Structure of Concrete (Cont.) Topic 15: Properties of Hardened Concrete Topic 16: Durability of Concrete: Chemical Attack, Frost Action, and Thermal Effects Assessments: Quiz#3 Assignment#2</p>
Module 5	<p>Topics: Topic 17: Advanced Cementitious Composites Topic 18: Advanced Cementitious Composites (Cont.) Topic 19: Concrete Fracture Mechanics Topic 20: The Application of Fracture Mechanics Assessments: Quiz#4 Course Project</p>



Module 6	<p>Topics: Topic 21: Nondestructive Testing in Concrete Engineering Topic 22: Nondestructive Testing in Concrete Engineering (Cont.) Topic 23: Sustainability of Concrete Topic 24: The Future and Development Trends of Concrete</p> <p>Assessments: Final Exam</p>
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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.



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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 professors from seeing you have learned the course material.