

# CEE 375 CONSTRUCTION MATERIALS

Fall 2023

Instructor/Office/Phone: Lin Shen / Holmes 344 / 956-6561

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Classrooms: Kuy306 (Classroom) / Holmes 101 (Lab)

Time: Mon/Wed (Fri if necessary for conference...) 8:30 a.m.– 9:20 a.m.

Lab Section 1 (Mondays) 2:30 p.m. – 4:20 p.m.

Lab Section 2 (Wednesdays) 2:30 p.m. – 4:20 p.m.

Lab Section 3 (Wednesdays) 4:30 p.m. – 6:20 p.m.

Office Hours: Mondays and Wednesdays 9:30 a.m. – 11:30 a.m.  
Or by appointment  
Or whenever I'm in the office

Lab Assistant: Rumesh Senthilnathan

Email: rsenthil@hawaii.edu

## **Objective**

This course discusses the properties of cement, mortar, and concrete, including fresh properties, such as setting and hardening, flowability, compatibility, etc., and mechanical properties includes strength and elastic moduli. The methods of designing concrete mixtures will also be covered. Other construction materials, such as steel, wood, and asphalt and their applications will also be discussed. The class will be taught through lectures and hands-on "get-dirty" work in the laboratory.

## **Texts**

Materials for Civil and Construction Engineers, Mamlouk and Zaniewski, 5<sup>TH</sup> or 4<sup>th</sup> Edition

## **References:**

### Handouts

Concrete, by Mindess, Young, and Darwin, 2<sup>nd</sup> Edition, 2003

Concrete structure, properties, and materials, by Mehta and Monteiro, 2<sup>nd</sup> Edition, 1993

Design and Control of Concrete Mixtures, 14<sup>th</sup> or later Edition, Portland Cement Association

## **Class Attendance**

Attendance is highly advisable. In-class quizzes will be counted toward your final grade. Punctuality and preparation for class are a reflection of your responsibility toward your education. Your active participation is encouraged and expected.

### **Homework**

All homework must be completed and turned in on the due date for full credit. Each student shall be ready to explain and discuss his or her solutions when the homework is due.

### **Laboratory Work and Reports**

The labs will be used to prepare various cement and concrete mixtures and perform subsequent tests. From the lab sessions and report preparation, you will develop the ability to conduct laboratory and field work, to analyze and interpret data, and to write report and communicate your ideas effectively.

### **Research Paper**

Students will be divided into groups and each group will write a research paper covering current topics of cement and concrete research. A short presentation is also required at the end of the semester. Sample topics and guidelines will be provided.

### **Exams**

There will be one midterm exam and the final exam. All exams are closed book (1-2 cheat sheets allowed).

### **Grading**

In-class quizzes	5%				
Homework	10%	95	A+	77	C+
Lab report	15%	93	A	73	C
Mid-term	25%	90	A-	70	C-
Final	35%	87	B+	67	D+
Research paper	5%	83	B	63	D
Paper presentation	5%	80	B-	60	D-

### **NOTE**

\*Students must adequately complete all writing assignments to pass the course with a D grade or better. Students who do not complete all writing assignments will get a D- or an F and will not earn W Focus credit.

\*Oral and written feedback will be given during class and marked on assignments. Opportunity to revise after feedback may also be provided.

\*The total amount of pages of writing is about 50, including ~5 for Homework and quizzes, ~40 for lab reports, and ~5 for research papers.

**TENTATIVE CLASS SCHEDULE: CEE 375 CONSTRUCTION MATERIALS**

**Lectures**                      **Mondays, Wednesdays 8:30 AM to 9:20 AM**  
**Lab(L1/L2/L3)**                **Mon(2:30pm-4:20pm)/Wed(2:30pm-4:20pm)/Wed(4:30pm-6:20pm)**

**Fall 2023 (schedule may be subject to change)**

wk	Class No.	Date	Day	Subject	Lab
1	1	8/21	Mon	1 Course Introduction	No lab
	2	8/23	Wed	2 Cement Chemistry	
2	3	8/30	Wed	3 Hydration	No lab
	4	9/1	Fri	4 Microstructure	
3	4	9/4	Mon	<b>Labor Day- No Class</b>	No lab
	5	9/6	Wed	5 Components of concrete (mineral admixtures)	
4	6	9/11	Mon	6 Components of concrete (chemical admixtures)	<b>Introduction, mineral &amp; chemical admixtures</b>
	7	9/13	Wed	7 Components of concrete (water and aggregate)	
5	8	9/18	Mon	8 Compacting, curing	<b>Aggregate properties (grading, Bulk Density)</b>
	9	9/20	Wed	9 Early age properties	
6	10	9/25	Mon	10 Compressive strength (influence factors)	<b>Aggregate properties (Specific Gravity, absorption)</b>
	11	9/27	Wed	11 Mix design	
7	12	10/2	Mon	Quiz: In-Class Mix Design	<b>Casting normal concrete (slump, unit weight)</b>
	13	10/4	Wed	12 Elastic modulus, other mechanical properties	
8	14	10/9	Mon	Guest Lecture 1 Jon Young	7-day compressive strength
	15	10/11	Wed	13 Durability I	
9	16	10/16	Mon	14 Durability II	14-day compressive strength
	17	10/18	Wed	15 High performance concrete - introduction	
10	18	10/23	Mon	Midterm Review	21-day strength;
	19	10/25	Wed	16 Volume Stability (Viscoelastic properties)	
11	20	10/30	Mon	17 Steel/Fiber Reinforced concrete, SCC	<b>Casting High Strength Concrete, 28-day strength;</b>
	21	11/1	Wed	<b>Mid-term</b>	
12	22	11/06	Mon	18 SCC, Other types of concrete	HSC 7-day
	23	11/08	Wed	19 NDT	
13	24	11/13	Mon	Guest lecture 2 Reza	HSC 14-day
	25	11/15	Wed	20 Wood & Composites	
14	26	11/20	Mon	21 Asphalt 1	HSC 21-day
	27	11/22	Wed	22 Asphalt 2	
15	28	11/27	Mon	<b>Research paper presentation 1</b>	HSC 28-day
	29	11/29	Wed	<b>Research paper presentation 2</b>	
16	30	12/4	Mon	<b>Research paper presentation 3</b>	
	31	12/6	Wed	Final Review	
17		12/11	Fri	<b>Final Exam – 7:30–9:30 a.m.</b>	