CIE 622 Engineering Materials

Course Syllabus and Policies
Department of Civil and Environmental Engineering, University of New Hampshire
Lecture: 11:10 AM- 12:30 PM TR, Theater I MUB

Instructor: Dr. Eshan V. Dave, Assistant Professor
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Office Hours: 1:30 – 3:00 pm TR, 3:00 – 4:00 pm W, or by appointment.

Teaching Assistants (Office Hours):
Mr. Chris DeCarlo (cjs234@wildcats.unh.edu), Office Hours: M1:30 – 2:30 pm; T 3:30 – 4:30 pm
Mr. Rasool Nemati (rn1006@wildcats.unh.edu), Office Hours: T R 2:30 – 3:30 pm
Mr. Saman Salari (ss1165@wildcats.unh.edu), Office Hours: W 1:30 – 2:30 pm, F 12:00 – 1 pm
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Course Management System: mycourses.unh.edu

Course Description:
Structural properties and applications of the various materials used in civil engineering projects, including steel, cement, mineral aggregates, concrete, timber, and bituminous materials. Microstructure and properties of common metals, plastics, and ceramics.

Prerequisites: CIE major and CIE 526 Strength of Materials, or permission.

Course Objectives:
To develop a basic understanding of the structural properties of Portland cement concrete, asphalt concrete, steel and related civil engineering materials, to learn how to lead as a project manager and work as a team member in obtaining, analyzing, and developing a technical report based on a laboratory experience.

This class is designed to help students gain knowledge on following topics related to infrastructure materials:

- Selection criteria and considerations;
- Behavior to different types of loading and boundary conditions;
- Fundamental and engineering properties of interest and their evaluation through laboratory testing;
- Design of construction materials (Portland cement concrete and asphalt concrete);
- Specifications for acceptance of materials; and
- Insight on sustainability of infrastructure materials.

Course Syllabus (Tentative Schedule):

Week	Date	Topic	Reading	Homework
1	30-Aug	1. Introduction, Mat. Selection, Beh. of Mat.	Pg. 1-43	
	1-Sep	2. Metals - 1	Pg. 91-112	HW-1
2	6-Sep	2. Metals - 2	Pg. 112-138; 152-169	
	8-Sep	3. Wood	Pg. 456-502	HW-2
3	13-Sep	4. Crystal Structures and States of Matter - 1	Pg. 58-76	
	15-Sep	4. Crystal Structures and States of Matter - 2	Pg. 77-87	HW-3
4	20-Sep	5. Aggregate - 1	Pg. 177-192	
	22-Sep	5. Aggregate - 2	Pg. 193-203	HW-4
5	27-Sep	5. Aggregate - 3	Pg. 204-215	
	29-Sep	4. PCC Proportioning - 1	Pg. 271-286	HW-5
6	4-Oct	4. PCC Proportioning - 2	Pg. 287-293	
	6-Oct	Make-up / Review		
	6-Oct	**EXAM - 1**		
7	11-Oct	5. Portland Cement - 1	Pg. 227-239	
	13-Oct	5. Portland Cement - 2	Pg. 239-247	HW-6
8	18-Oct	5. Admixtures and SCMs	Pg. 247-260	
	20-Oct	6. Portland Cement Concrete (PCC) - 1	Pg. 293-301	HW-7
9	25-Oct	6. Portland Cement Concrete (PCC) - 2	Pg. 301-312	
	27-Oct	6. Portland Cement Concrete (PCC) - 3	Pg. 312-324	HW-8
10	1-Nov	6. Portland Cement Concrete (PCC) - 4	Pg. 324-340	
	3-Nov	Make-up / Review		
	4-Nov	**EXAM - 2**		
11	8-Nov	7. Masonry	Pg. 357-369	
	10-Nov	8. Asphalt Concrete - 1	Pg. 373-385	HW-9
12	15-Nov	8. Asphalt Concrete - 2	Pg. 386-394	
	17-Nov	8. Asphalt Concrete - 3	Pg. 394-409	HW-10
13	22-Nov	8. Asphalt Concrete - 4	Pg. 409-427	
	THANKSGIVING HOLIDAY			
14	29-Nov	8. Asphalt Concrete - 5	Pg. 427-440	HW-11
	1-Dec	8. Asphalt Concrete - 6	Pg. 440-446	
15	6-Dec	9. Phase Diagrams	Pg. 73-79	HW-12
	8-Dec	Make-up / Review / Wrap-up		
	13-Dec	**FINAL EXAM (15:30 - 17:30)**		

Lab Schedule:

Lab	Topic	Laboratory section meeting day and date														
	Section→	1	9	3	11	5	13	7	15	2	10	4	12	6	14	8
	Day→	M	Mpm	T	Tpm	W	Wpm	R	Rpm	M	Mpm	T	Tpm	W	Wpm	R
	TA→	Rasool	Rasool	Saman	Chris	Chris	Rasool	Saman	Chris	Saman	Rasool	Saman	Chris	Chris	Rasool	Saman
1	Metal & Wood	12-Sep	12-Sep	13-Sep	13-Sep	14-Sep	14-Sep	15-Sep	15-Sep	Arrange	Arrange	6-Sep	6-Sep	7-Sep	7-Sep	8-Sep
2	Aggregate	26-Sep	26-Sep	27-Sep	27-Sep	28-Sep	28-Sep	29-Sep	26-Sep	19-Sep	19-Sep	20-Sep	20-Sep	21-Sep	21-Sep	22-Sep
		19-Sep	19-Sep	20-Sep	20-Sep	21-Sep	21-Sep	22-Sep	22-Sep	28-Nov	28-Nov	29-Nov	29-Nov	30-Nov	30-Nov	1-Dec
NO LABS WEEK OF OCTOBER 3																
3	Concrete Mixing	10-Oct	10-Oct	11-Oct	11-Oct	12-Oct	12-Oct	13-Oct	13-Oct	17-Oct	17-Oct	18-Oct	18-Oct	19-Oct	19-Oct	20-Oct
4	Concrete Testing	24-Oct	24-Oct	25-Oct	25-Oct	26-Oct	26-Oct	27-Oct	27-Oct	31-Oct	31-Oct	1-Nov	1-Nov	2-Nov	2-Nov	3-Nov
5	Beam Testing	Week of November 7th - Times arranged														
6	Asphalt	28-Nov	28-Nov	29-Nov	29-Nov	30-Nov	30-Nov	1-Dec	1-Dec	14-Nov	14-Nov	15-Nov	15-Nov	16-Nov	16-Nov	17-Nov
NO LABS WEEK OF DECEMBER 5																

No Labs week of November 21st
No Labs week of December 5th

Reschedule due to Labor Day (Reschedule to Friday 9/5 is strongly recommended)
Schedule times with your TAs

Course Philosophy:

My obligations as the instructor include: (a) being knowledgeable and current on the subject matter and industry needs; (b) providing clear explanations and examples; (c) helping assess your abilities and areas of growth; (d) soliciting and sharing your inputs and experiences with the entire class; (e) providing relevant and challenging homework, in-class exercises, quizzes, and exams; (f) maximizing the potential for learning by giving useful, timely feedback on the exercises mentioned in 'e'; (g) starting and finishing class on time, and; (h) helping to maintain a positive, collegial classroom climate.
Your obligations as the student include: (a) completing assignments on time and to the best of your ability; (b) contributing to classroom discussions actively and positively; (c) arriving to class on time and maintaining an excellent attendance record, and; (d) communicating ideas, questions, and concerns to the instructor as they arise.

Classroom Etiquette and Conduct:

Classroom lectures and exercises will be informal to the extent that you are encouraged to ask questions and offer discussion at any time you wish. However, side discussions between students are distracting to other students during lectures and formal demonstrations and will be highly frowned upon. You must always show respect to other students, **as maintaining a positive and collegial climate is of utmost importance to me.** Other important conduct issues include: coming to all classes and being on-time; not reading the newspaper or doing other tasks during class time; turning off cell phones and not sending text messages; etc. Remember, while there are no specific grades assigned to good classroom etiquette, making a favorable or unfavorable impression through your classroom conduct could influence a borderline grade. Appropriate classroom conduct promotes an environment of academic achievement and integrity. Disruptive classroom behavior that substantially or repeatedly interrupts either the instructor's ability to teach, or student learning, is prohibited. Students are expected adhere to Students are expected adhere to UNH's Student Code of Conduct:
http://www.unh.edu/vpsas/handbook/student-code-conduct-and-conduct-process

Grading:

The performance of students enrolled in CiE 622 will be assessed using the following scoring system:

Homework assignments……..10%
Lab Assignments……..30%
Quizzes……...5%
Exam 1……17.5%
Exam 2……17.5%
Final exam……...20%

Total……100%

Final grades will be based upon cutoffs that might be adjusted on basis of overall class performance; however, final grade cutoffs will not exceed the following:
A = 94%; A- = 90.0%; B+ = 88%; B = 86.5%; B- = 83.5%; C+ = 80%, C = 75%, C- = 70%, etc…

Your final course letter grade cannot be greater than twice the GPA point equivalent of your exam average. This maximum letter grade is calculated as follows:

1. Calculate exam average using percentages above
2. Convert average exam grade to equivalent GPA points using the following formula:
   GPA exam points = 0.1*Exam grade – 5.5
   (this equation comes from the relationships 95=4.0, 85=3.0, 75=2.0, 65=1.0)
3. Multiply the average GPA exam grade by two
4. Determine maximum course letter grade using the following table:

Exam Average GPA point range	Maximum Course Letter Grade
>3.833	A
3.500-3.882	A-
3.167-3.499	B+
2.833-3.166	B
2.500-2.832	B-
2.167-2.499	C+
1.833-2.166	C
1.500-1.832	C-
1.167-1.499	D+
0.833-1.166	D
0.500-0.832	D-
<0.500	F

Example:

Exam Scores	Average Exam Score	Average GPA Exam Grade	2 x Avg GPA Exam Grade	Maximum Course Letter Grade
Ex 1: 65	(65+72+70)/3 = 69.0	69.0*0.1-5.5=1.400	2.800	B-
Ex 2: 72				
Final: 70				

Exams:

Comprehensive closed notes and closed book exams will be given. You will be allowed to bring an 8 inch x 5 inch index card to use as a reference sheet (provided by instructor). You will not be allowed to make up exams without prior approval of the instructor or a certified medical excuse. Only **approved calculators** may be used in the exam. It is your responsibility to make sure you have an approved calculator to use in the exam – any non-approved calculator will be confiscated during the exam.

Calculators: Only **NCEES approved calculators** are to be used in the exams. Casio: All fx-115 models. Any Casio calculator must contain fx-115 in its model name, Hewlett-Packard: The HP33s and HP 35s models, Texas Instruments: All TI-30X and TI-36X models. Any Texas Instruments calculator must contain either TI-30X or TI-36X in its model name. See http://ncees.org/exams/calculator-policy/ for a list of approved calculators.

Homework Assignments:

All assigned homework are to be submitted before **4:00 pm** on the due date. Assignments turned in after this time will be considered late. Late assignments will be accepted with a 20% penalty within 24 hours. After 24 hours, no delinquent homework will be accepted for credit. Rare exception to late homework policy will be made for valid excuse. Arrangements should be made ahead of the due date, if applicable.

Submitted homework will follow the guidelines listed below. A professional format is required to obtain a grade on homework.

- Work should be done on one side of the paper only, and it is preferable that it be done on 8-1/2" x 11" engineering computation paper.
- Each problem should start on a new page and be clearly labeled (exceptions can be made for very short problems). Work should be organized carefully and presented neatly.
- Work should be done in pencil only, a straight edge shall be used and final answers shall be boxed.
- Name, homework number, and due date should appear on each page. If you consulted with anyone (student, TA, professor, etc.) on the solution of the problem, such consultation should also be explicitly acknowledged in writing.
- All plots should be generated using computer software (Excel, Matlab etc.). Plots drawn on plain sheet of paper or engineering paper will not be graded.
- Use of Cramster or other similar resources is not allowed and will be considered cheating.

Quizzes:

During each lab session we will have a short quiz at the beginning. It will usually be few short questions based on the reading assignment (from handout for lab posted on Blackboard) for the lab as well as the reading assignments for the lectures from preceding week. No make-up quizzes will be offered. The lowest scoring quiz will be dropped from the calculation of final course grade.

Lab Activities and Assignments:

- Background: The lab is part of the course. Labs will be posted on Canvas. Lab TAs demonstrate equipment, lab groups self-organize. Lab groups are responsible for all data collection and clean-up.
- Lab sections meet every other week M T W R 2:10-5:00pm, M W 6:40-9:30, T R 5:10-8:00p, Kingsbury Hall, Room S123 (alternates weeks with CIE 642). Please carefully review lab schedule on page 3 of this syllabus a well as the file posted on "mycourses" in calendar format.
- Coordination: For each lab, each group must identify a group leader. Group leader is responsible for ensuring that all lab facets are completed, written, and submitted on time. Group leader grade is worth 3 times that of other group members. An individual may serve as a group leader a maximum of two times.
- Attire: Casual, Safe, closed-toe shoes (no flip-flops or sandals), clothes that you do not mind getting dirty, no dangling attire that could get caught in equipment.

Reading Assignments:

Required reading assignments will be given during each lecture, and the reading must be completed before the beginning of the next lecture.

Revaluation of Grades:

All requests for reevaluation of homework assignment or exam grades must be made using the request for regrade form available on Blackboard and should be turned in to the course box within one week of the assignment's return. Regrade requests received beyond the 1-week deadline will not be considered.

Attendance:

Students are expected to attend all scheduled class meetings. It is the responsibility of students to plan their schedules to avoid excessive conflict with course requirements. However, there are legitimate and verifiable circumstances that lead to excused student absence from the classroom. These are

subpoenas, jury duty, military duty, religious observances, illness, bereavement for immediate family, and NCAA varsity intercollegiate athletics.

Academic Integrity:

Students are expected to follow the **University of New Hampshire's Academic Honesty** policy (http://www.unh.edu/vpsas/handbook/academic-honesty). In particular, this means that the student assumes responsibility for every problem, quiz, and exam s/he submits. The policy is contained in the "Student's Rights, Rules and Responsibilities" published by the University.

Students are expected and encouraged to get ideas and information from articles and books that you read, and from discussions and other electronic media such as internet, but that work must be used responsibly. If you use ideas obtained from another source (whether it is print, electronic, film or another person), you must give clear credit in your submission (regardless of whether it is an electronic source, another person(s) or in printed version) in the form of an appropriate attribution. If you use the words of one of these sources--whether a phrase, a sentence, a paragraph or more--those works must be appropriately punctuated and attributed to their sources, so as to distinguish them from your own. This is also true of paraphrasing another's words. Failure to do so is plagiarism. It is unethical to submit the same paper for more than one course--don't do it! Cheating on assignments or examinations, plagiarizing, or any other act which violates the rights of another student in academic work or that involves misrepresentation of your own work may result in grade reduction on the assignment/quiz/test or a grade reduction in the class (including the possibility of failing the class). I expect you to do your own assigned work.

It is recommended that you form informal study groups to foster a cooperative effort in learning the course material. Groups are encouraged to study, work, and learn together. However, the work you submit must be your own. Please review online tutorial on plagiarism (http://Cola.unh.edu/plagiarism-tutorial-0).

Students with Disabilities:

The University is committed to providing students with documented disabilities equal access to all university programs and facilities. If you think you have a disability requiring accommodations, you must register with Disability Services for Students (DSS). If you have received an accommodation letter for this class, please contact me immediately so we can discuss the necessary arrangements. Contact DSS at www.unh.edu/disabilityservices/clockwork, (603) 862-2607 or disability.office@unh.edu. Students who are already registered with the Access Office and wish to receive accommodations in this course are strongly encouraged to share their Accommodation Letter with me in a timely manner. Individual student accommodations cannot be made during the day of an exam.
Your academic success in this course is very important to me. If, during the semester, you find emotional or mental health issues are affecting that success, please contact the University's Counseling Center (3rd floor, Smith Hall; 603 862-2090/TTY: 7-1-1), which provides counseling appointments and other mental health services.

Student Athletes:

Please contact the instructor within the first two weeks of classes to make necessary homework/lab/exam arrangements for team travel time. Policies cannot be made during the day of an exam.

Use of Class Notes and Course Material:

Taking notes is a means of recording information but more importantly of personally absorbing and integrating the educational experience. However, broadly disseminating class notes beyond the classroom community or accepting compensation for taking and distributing classroom notes undermines instructor interests in their intellectual work product while not substantially furthering instructor and student interests in effective learning.

Text and References:

Required Text: Materials for Civil and Construction Engineers (**4th Edition**), ISBN: 978-0-13-432053-3 / 0-13-432053-0. Authors: Michael S. Mamlouk, John P. Zaniewski

Other References:

1. Civil Engineering Materials (2nd Edition), ISBN: 013083906. Author: Shan Somayaji.
2. Design and Control of Concrete Mixtures, 15th Edition, Portland Cement Association
3. Annual Book of ASTM Standards, ASTM International, West Conshohocken, PA.
4. Concrete (2nd Edition), ISBN: 0130646326. Authors: S. Mindness, J. F. Young, D. Darwin.
5. Construction Materials, Methods, and Techniques (3rd Edition), ISBN: 1435481089. Authors: W. P. Spence and E. Kultermann.
6. Hot Mix Asphalt Materials, Mixture Design and Construction (3rd Edition), ISBN: 0914313021. Authors: Brown, Kandhal, Roberts, Kim, Lee and Kennedy.