

CE 305: Civil Engineering Materials

Instructor	<i>Moneeb Genedy, PhD student, UNM Civil Engineering.</i> Centennial Engineering Center (CEC, Room 2000) e-mail: moneeb@unm.edu
Assistants	<i>Lab TA: Ala Eddin Douba, Douba@unm.edu</i> <i>Mr. Kenny Martinez, (CE laboratory supervisor, CEC Room 1001)</i> Tel: 259-1818 e-mail: kennym@unm.edu
Lectures	<i>Twice weekly (Sections 001/002/003):</i> Dane Smith Hall 129, Tuesday and Thursday 11:00 – 12:15 pm
Laboratory	<i>Once Weekly:</i> <i>T, W 2:00-4:50 & R 12:30 – 3:20 pm, CEC Room 1006</i>
Office Hours	Tuesday/Thursday 10.00-11.00 am CEC Room 1006
Expected Outcomes (From Civil Engineering Departmental Goals)	<u><i>The course contributes to the following educational outcomes as part of the objectives of the Civil Engineering Department</i></u> 1- An ability to design and conduct experiment and analyze and interpret data 2- An ability to communicate effectively 3- Breath of technical skills to communicate across boundaries 4- Effective at oral communications
Learning Objectives	<u><i>After completing this course the student shall be able to</i></u> 1- Explain the material classification from atomic bond energy point of view 2- Explain the basic crystalline lattice structures and crystallography 3- Explain phase changes in materials using phase diagrams 4- Explain the basics of steel metallurgy including iron-carbon phase diagram and the process of corrosion. 5- Calculate stresses and strains of materials under different types of forces 6- Draw the stress-strain graph of materials (e.g. steel) and explain how to infer basic mechanical properties from stress-strain curves. 7- Understand the meaning and value of nanotechnology 8- Draw aggregate grading curves and design optimal grading 9- Explain cement chemistry and the effect of different cement components on strength and heat of hydration 10- Explain the factors affecting the mechanical, durability, and dimensional stability of normal strength concrete (NSC) performance 11- Understand how to produce high performance concrete (HPC) 12- Design concrete mixes for both NSC and HPC 13- Explain relation of wood properties with respect to grain directions 14- Explain the relationship between fibers direction and fiber composite strength
References	- Moneeb will provide notes for the course. All the notes will also be posted on the course website. There is no <u>required</u> textbook for this course. - A list of references will be provided for the students. Course web link: https://learn.unm.edu/

- Assignments**
- A total of five assignments will be given to students. The list of all assignments and their due dates are available below
 - The following rules apply to all assignments:
 - o The 100% grade for the assignments represents 15% of the course grade
 - o Assignments shall be delivered on due date or marked of 50% maximum.
 - o Assignments delayed for 1 week after due date will be rejected.
 - o Electronic submission of assignments is not accepted.

#	Assignment	Tentative Due Date
1	Fundamentals and Materials Variability (20%)	September 22, 2016
2	Behavior of Materials under Stress (20%)	October 18, 2016
3	Steel and Aggregate (20%)	November 1, 2016
4	Cement & Concrete (20%)	November 29, 2016
5	Concrete Mix Design (20%)	TBD

- Lab reports**
- Preparing the laboratory report is the students' responsibility.
 - The lab report is a team work. Teams are formed by the instructor.
 - Lab reports are due at 2:05 pm the day of the next lab! No exceptions!
 - No lab reports after 2:05 pm will be accepted. No late lab reports are accepted.
 - Lab procedures are available on the web
http://civil.unm.edu/classes/content/ce_305/ce_305.htm

- Lab Rules**
- Students shall follow the following lab rules to ensure their safety. Students not following these rules will be asked to leave the lab
- 1- Students are not allowed to wear shorts in the lab.
 - 2- Students are not allowed to wear flip flops or sandals in the lab. Students shall wear a shoe with closed front.
 - 3- Students are not allowed to operate any equipment without the permission from the TA.
 - 4- Students shall follow the instructions by the TA and the lab supervisors.
 - 5- Students are supposed to read the lab materials before attending the lab. All lab materials are available on the lab website. Additional materials will be given to students at the start of the lab.

- Lab Resources**
- http://civil.unm.edu/classes/content/ce_305/ce_305.htm
- Lab Attendance**
- Reading materials for the lab will be available on the following website.
 - Attendance will be taken regularly in the laboratory at arrival and when leaving.
 - No absence of the laboratory is allowed without permission.
 - Maximum excused absence from the labs is two times.
 - Students missing *three laboratories will have grade "F"*.
 - No one is allowed to enter the laboratory after **2:05 pm**.

Grading

Component	% Final Grade-CE 305
Assignments & Quizzes	15
Laboratory reports	20
Two Mid-term exams	30
Final exam	30
Final Laboratory Oral exam	5

Title IX

In an effort to meet obligations under Title IX, UNM faculty, Teaching Assistants, and Graduate Assistants are considered “responsible employees” by the Department of Education. This designation requires that any report of gender discrimination which includes sexual harassment, sexual misconduct and sexual violence made to a faculty member, TA, or GA must be reported to the Title IX Coordinator at the Office of Equal Opportunity (oeo.unm.edu). For more information on the campus policy regarding sexual misconduct, see: <https://policy.unm.edu/university-policies/2000/2740.html>

Lectures - Tentative Schedule(Subject to change at the discretion of the instructor)

Lecture #	Date	Topic
1	August 23	Introduction
2	August 25	Lab Instructions and Report Writing
3	August 30	Chapter 1: Fundamentals of Engineering Materials
4	September 1	Chapter 1: Fundamentals of Engineering Materials
5	September 6	Chapter 1: Fundamentals of Engineering Materials
6	September 8	Chapter 1: Fundamentals of Engineering Materials
7	September 13	Chapter 2: Material Variability, Sampling and Error Analysis
8	September 15	Chapter 2: Material Variability, Sampling and Error Analysis
9	September 20	Chapter 3: Behavior of Materials under Stress
10	September 22	Chapter 3: Behavior of Materials under Stress
11	September 27	Chapter 3: Behavior of Materials under Stress
12	September 29	Chapter 3: Behavior of Materials under Stress
---	October 4	FIRST MID-TERM (15 % of Total Grade)
13	October 6	Chapter 3: Behavior of Materials under Stress
14	October 11	Chapter 4: Steel microstructure
---	October 13	FALL BREAK
15	October 18	Chapter 4: Steel phase diagram
16	October 20	Chapter 4: Mechanical properties of steel, principles of corrosion
17	October 22	Chapter 5: Aggregate
18	October 25	Chapter 5: Aggregate
19	October 27	Chapter 6: Portland Cement
20	November 1	Chapter 6: Portland Cement
21	November 3	Chapter 6: Portland Cement
---	November 8	SECOND MID-TERM (15 % of Total Grade)
22	November 10	Chapter 7. Concrete Admixtures
23	November 15	Chapter 8: Concrete
24	November 17	Chapter 8: Concrete
25	November 22	Chapter 8: Concrete
---	November 24	THANKSGIVING BREAK
26	November 29	Chapter 8: Concrete
27	December 1	Chapter 8: High Performance Concrete (HPC)
28	December 6	Chapter 9: Concrete Mix Design
29	December 8	Chapter 9: Concrete Mix Design
	December 13	FINAL EXAM 12:30 to 2:30 Dane Smith Hall 129

CE 305 Laboratory - Tentative Schedule

Lab #	Date	Lab assignment
---	Aug 23 – Aug 25	No Lab
1	Aug 30 – Sep 1	Measurement devices
2	Sep 6 – Sep 8	Tension test of mild steel
3	Sep 13 – Sep 15	Charpy V-Notch impact test, Steel hardness testing using Rockwell and Vickers Indenters
4	Sep 20 – Sep 22	Fiber composite tension test
5	Sep 27 – Sep 29	Compression and bending tests of wood
6	Oct 4 – Oct 6	Aggregate gradation, unit weight and voids
---	Oct 11 – Oct 13	FALL BREAK
7	Oct 18 – Oct 20	Concrete batching and plastic concrete test (Slump, yield, air content), PCC sample preparation.
8	Oct 25 – Oct 27	Concrete cylinder capping, 7 day compressive strength and Non-destructive testing of concrete
9	Nov 1 – Nov 3	Cement mortar, setting time, Blain fineness
10	Nov 8 – Nov 10	Asphalt Lab
11	Nov 15 – Nov 17	28 day PCC testing: compressive strength, Young's modulus & Poisson's ratio of PCC, flexural strength, splitting tension and pulse velocity
--	Nov 22 – Nov 24	THANKSGIVING BREAK
--	Nov 29 – Dec 1	REVIEW WEEK
--	Dec 6 – Dec 8	ORAL EXAM

- *All laboratory reports are due at the time for starting the next lab except the concrete laboratory report.*
- *One report on ALL concrete laboratories is due on Nov29 – Dec 1, 2016 based on your section. This shall be one report integrating all observations and analyses for concrete experiments (lab numbers 7, 8 and 11).*