



North South University
Department of Civil and Environmental Engineering (DCEE)

CEE 214: Engineering Materials

Spring 2018

Course Syllabus

INSTRUCTOR: JBr - Prof. Javed Bari, PhD, PE, FIEB
Professor, CEE
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CLASS HOURS: ST 9:40 am – 11:10 am (Room #SAC 213)

LAB HOURS: R 9:40am – 12:50 pm (Lab #B116)

OFFICE HOURS: STR 11:30 pm – 12:30 pm, MW 10:00 am – 11:00 am, or by appointment

CREDIT HOURS: 3

COURSE DESCRIPTION:

Mechanical behavior of materials; variability; atomic structures and properties of materials; properties, selection criteria, applications and uses of steel, aluminum, mineral aggregates, Portland cement, Portland cement concrete, asphalt, asphalt concrete, masonry, wood, protective coating materials, and composites; concrete mix design; and basic laboratory tests of materials.

DETAIL COURSE CONTENTS:

1. Material engineering concepts and basic material properties such as stress and strain, elastic, plastic and time dependent responses, non-mechanical properties, variability, etc.
2. Atomic structures and properties of materials.
3. Steel, Aluminum and other non-ferrous metals.
4. Mineral aggregates.
5. Portland cement and Portland cement concrete.
6. Asphalt and asphalt concrete.
7. Masonry, brick, tile, etc.
8. Wood, Composites, and Protective coating materials.
9. Basic laboratory experiments of materials commonly used in civil engineering.

LAB EXPERIMENTS:

1. Laboratory safety rules, machine handling rules, measuring devices and sampling techniques.
2. Sieve analysis of aggregate (ASTM C136)
3. Specific gravity and absorption of coarse aggregate (ASTM C127)
4. Bulk unit weight and voids in aggregate (ASTM C29)
5. Normal consistency of cement (ASTM C187)
6. Setting times of cement (ASTM C191)
7. Fineness of cement (ASTM C184)
8. Slump of freshly mixed Portland cement concrete (ASTM C143)
9. Making and curing concrete cylinders and beams (ASTM C31)
10. Compressive strength of cylindrical concrete specimens (ASTM C39)

COURSE OBJECTIVES:

1. Provide students with an understanding of the type, nature and use of materials commonly and recently being used in civil engineering structures and projects.
2. Prepare students for the design and analysis of cement concrete mixture for using in realistic civil engineering projects giving proper considerations for special needs and constrains.
3. Deliver students appropriate knowledge on identifying which experiments would be required for common materials used in a Civil Engineering project, provide them hands-on experience on correctly conducting those laboratory experiments and prepare them for analysis of the experimental data to conform to specifications.

MAPPING OF COURSE OUTCOME-PROGRAM OUTCOME (CO-PO):

Sl.	Course Outcomes (COs)	Program Outcome ¹	Bloom's taxonomy Domain /level ²	Delivery methods and activities	Assessment tools
CO1	Comprehend the type, nature and use of materials commonly and recently being used for civil engineering purposes and apply the knowledge learned in this course to select suitable materials and properly use them in engineering structures and projects.	PO-1	A1, C2, C3	Lecture, Notes, Video	Exams (Quiz, Mid, Final), Homework
CO2	Analyze design requirements and perform cement concrete mix design for realistic civil engineering projects giving proper considerations for special needs and constrains.	PO-3	A3, C4, C5, P4	Lectures, Notes, Practice Problems	Design Exam
CO3	Identify which experiments would be required for common materials used in a Civil Engineering project, correctly conduct those laboratory experiments and analyzes the experimental data to conform to specifications.	PO-5	P1, P2, P3	Lecture, Demonstration	Participation, Lab report, Exam

Notes:

1. BSCEE Program Outcomes (POs):

- PO - 1: Engineering Knowledge
- PO - 2: Problem analysis
- PO - 3: Design/development of solutions
- PO - 4: Investigation
- PO - 5: Modern tool usage
- PO - 6: The engineer and society
- PO - 7: Environment and sustainability
- PO - 8: Ethics
- PO - 9: Individual work and teamwork
- PO - 10: Communication
- PO - 11: Project management and finance
- PO - 12: Life-long learning
- PO - 13: Contemporary Issues.

2. Domains and Levels of Bloom's Taxonomy

- "Cognitive" Domain (C): C1 - Recall data, C2 - Understand, C3 - Apply, C4 - Analysis, C5 - Synthesize, and C6 - Evaluate.
- "Affective" Domain (A): A1 - Receive, A2 - Respond, A3 - Value, A4 - Organize personal value system, and A5 - Internalize value system.
- "Psychomotor" Domain (P): P1 - Imitation, P2 - Manipulation, P3 - Develop precision, P4 - Articulation, and P5 - Naturalization.

TEXT:

Materials for Civil and Construction Engineers (3rd or latest Edition; published by Pearson Prentice-Hall) – by: Michael S. Mamlouk and John P. Zaniwski.

AVAILABILITY OF COURSE MATERIALS:

All the lecture notes are available at the university common folder "Resource". You can print them from there. However, for some lectures, extra sheets might require to be collected from the photocopy shop. Other than lecture notes, relevant materials like class schedule, course outline, reading materials, etc are available at different sub-folders of the same as well. Students are advised to check the folders at regular intervals.

EVALUATION:	Class participation and attendance	10%
	Assignments/Homeworks	10%
	Class tests	10%
	Laboratory Experiments	15%
	Design Exam	10%
	Midterm Exam(s)	20%
	Final Exam	25%

EXAM POLICY:

The format of the class tests will be based on a combination of multiple choice or short questions as well as descriptive questions. Students are thus advised to prepare for any type of questions. Usually no makeup for class test is made. NO MAKE UP MID-TERM OR FINAL EXAM WILL BE ARRANGED UNLESS AN ABSOLUTELY UNAVOIDABLE VALID REASON FOR ABSENCE IS FOUND. For such unavoidable circumstances, written explanation of the situation must be submitted before the exam. If any class test or mid-term exam cannot be held on the due date, the exam will be automatically shifted to the very next available class, unless otherwise announced.

EXAM NOTICE:

Prior notices for will be provided in the class, except for a sudden quiz. No excuse will be granted simply because someone was absent at previous class and did not know the exam notice.

GRADING POLICY:

Generally, NSU grading policy will be followed. However, minor deviation is still possible depending on the situation.

LAB INSTRUCTIONS

The course instructor or lab assistant/coordinator must be consulted before using any lab facility. Students are strongly advised to follow the general lab safety rules. Note that closed toe shoes are mandatory in all Civil Engineering laboratories. No sandals will be allowed in the lab. It is a student's responsibility to read the test procedures and text assignments before the scheduled labs.

CODE OF CONDUCT:

It is highly requested to maintain discipline in the class like not to be late, refrain from making noise during lecture time, not to leave the class early. Especially, adopting unfair means in the exams will be considered as a serious crime and the student shall be placed to the university disciplinary

committee. Evidence of copying assignments shall be seriously punished as well. About attendance, if someone is too late in the class he might not get attendance or half-attendance.

LECTURE SCHEDULE:

* One Day = 1.5 lecture hours, Total 24 days lecture = 36 lecture hours

Day*	Outcome/ Material Covered	Reference Reading	Activity	Due
Day-1	Course overview & Introduction	-	Discussion	-
Day-2	Material Engineering Concepts	Chap-1	Lecture	-
Day-3	Basic properties of engineering materials cont'd	-do-	Assign HW-1	-
Day-4	Basic properties of engineering materials cont'd	-do-	Lecture	-
Day-5	Atomic structure of materials	Chap-2	Lecture	HW-1 Due
Day-6	Atomic str. of materials, cont'd	-do-	Quiz -1+Lec.	-
Day-7	Steel	Chap-3	Lecture	-
Day-8	Steel and other non-ferrous metals	Chapters 3 and 4	Lecture	-
Day-9	Mid Exam	Chapters 1-4	Exam	-
Day-10	Mineral aggregates	Chap-5	Lecture	-
Day-11	Mineral aggregates	-do-	Assign HW-2	-
Day-12	Mineral aggregates	-do-	Lecture	-
Day-13	Portland cement	Chap-6	Quiz-2+Lec.	HW-2 Due
Day-14	Portland cement, cont'd	-do-	Lecture	-
Day-15	Portland cement concrete	Chap-7	Lecture	-
Day-16	Concrete mix design	-do-	Lecture	-
Day-17	Mixing and handling of concrete	-do-	Lecture	-
Day-18	Finishing and curing of concrete	-do-	Lecture	-
Day-19	Design Exam	Chapters 5-7	Test	-
Day-20	Brick, Sand, Surki & Tiles	Chap-8 and Handout	Assign HW-3	-
Day-21	Asphalt	Chap-9	Lecture	-
Day-22	Asphalt Concrete	-do-	Quiz-3+Lec.	HW-3 Due
Day-23	Wood	Chap-10	Lecture	-
Day-24	Composite Materials and Protective Coating Materials	Handout	Lecture	-
Final Exam (As per schedule declared by NSU)				