



Course Outline

1 BASIC INFORMATION

1.1 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.

1.2 LAB EXPERIMENTS

1. Laboratory safety rules, machine handling rules, measuring devices and sampling techniques.
2. Sieve analysis of aggregate (ASTM C316)
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)

1.3 COURSE INFORMATION

1. Undergraduate course
2. 3 credit hours course: 3 hours of classroom contact per week
3. Two classes per week having 1.5 hours of duration

1.4 PREREQUISITE COURSES:

1. None

1.5 FACULTY

1. Name: Md. Tareq Hossain Khondoker, MSc, Lecturer, DCEE, Initial: THK
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5. Office hours: Every weekday 12:00 pm – 2:00 pm. except Thursday.

1.6 CLASS HOURS:

- Section 1: ST 1:00 pm – 2:30 pm (Room# SAC 210)



North South University

Department of Civil and Environmental Engineering (DCEE)

CEE 214: Engineering Materials

1.7 TEXT BOOK:

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

1.8 REFERENCE BOOKS:

1. *Concrete Technology (2nd or latest edition)* – A.M. Neville and J.J. Brooks
2. *Engineering Materials* – M.A. Aziz

2 COURSE OBJECTIVES AND OUTCOMES

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.

2.1 COURSE OUTCOMES (COs):

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

- 2.1.1 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.
- 2.1.2 CO2: Analyze design requirements and perform cement concrete mix design for realistic civil engineering projects giving proper considerations for special needs and constrains.
- 2.1.3 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.

2.2 MAPPING OF COURSE OUTCOMES TO BSCEE PROGRAM OUTCOMES

L: Slightly maps (low); M: Moderately maps (medium); H: Substantially maps (high)

	PO - 1	PO - 2	PO - 3	PO - 4	PO - 5	PO - 6	PO - 7	PO - 8	PO - 9	PO - 10	PO - 11	PO - 12	PO - 13
CO1	H												
CO2			H										
CO3					H								

2.3 CO DELIVERY AND ASSESSMENT



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Department of Civil and Environmental Engineering (DCEE)
CEE 214: Engineering Materials

Course outcomes	Bloom's taxonomy, domain/level (C: Cognitive, P: Psychomotor A: Affective)	Delivery methods and activities	Assessment tools
CO1	A1, C2, C3	Lecture, Notes, Video	Exams (Quiz, Mid, Final), Homework
CO2	A3, C4, C5, P4	Lectures, Notes, Practice Problems	Design Exam, Assignment
CO3	P1, P2, P3	Lecture, Demonstration	Participation, Lab report, Exam (practical)

2.3.1 Cognitive domain (knowledge-based): C

1: Knowledge, 2: Comprehension, 3 Application, 4 Analysis, 5: Synthesis, 6: Evaluation

2.3.2 The affective domain (emotion-based): A

1: Receiving, .2: Responding, 3: Valuing, 4: Organizing, 5: Characterizing

2.3.3 The psychomotor domain (action-based): P

1: Perception, 2: Set, 3: Guided response, 4: Mechanism, 5: Complex overt response, 6: Adaptation, 7: Origination

3 BSCEE PROGRAM OUTCOMES (PO)

3.1.1 PO – 1: Engineering Knowledge

Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex civil engineering problems.

3.1.2 PO – 2: Problem analysis

Identify, formulate, research the literature and analyze complex civil engineering problems and reach substantiated conclusions using first principles of mathematics, the natural sciences and the engineering sciences.

3.1.3 PO – 3: Design/development of solutions

Design solutions for complex civil engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety as well as cultural, societal and environmental concerns.

3.1.4 PO – 4: Investigation

Conduct investigations of complex problems, considering design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.

3.1.5 PO – 5: Modern tool usage

Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex civil engineering activities with an understanding of the limitations.

3.1.6 PO – 6: The engineer and society

Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional civil engineering practice.



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3.1.7 PO – 7: Environment and sustainability

Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development.

3.1.8 PO – 8: Ethics

Apply ethical principles and commit to professional ethics, responsibilities and the norms of the civil engineering practice.

3.1.9 PO – 9: Individual work and teamwork

Function effectively as an individual and as a member or leader of diverse teams as well as in multidisciplinary settings.

3.1.10 PO – 10: Communication

Communicate effectively about complex engineering activities with the engineering community and with society at large. Be able to comprehend and write effective reports, design documentation, make effective presentations and give and receive clear instructions.

3.1.11 PO – 11: Project management and finance

Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work as a member or a leader of a team to manage projects in multidisciplinary environments.

3.1.12 PO – 12: Life-long learning

Recognize the need for and have the preparation and ability to engage in independent, life-long learning in the broadest context of technological change.

3.1.13 PO – 13: Contemporary Issues

Demonstrate sound knowledge on global and local contemporary civil engineering issues.



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4 COURSE ASSESSMENT

4.1 TEACHING/LEARNING STRATEGIES

4.1.1 Lectures

- Attend all classes punctually
- Learn methods that are not precise in the textbook
- Follow worked examples taught in the class and provided in the textbook
- Solve exercises from the textbook and innovative problems in the assignments

4.1.2 Tutorials & Group work

- Contact course instructor/teaching assistant whenever required
- Be guided by course notes from the previous semesters from senior students
- Work with peers to solve problems, discuss with friends

4.1.3 Private study

- Review lecture material and textbook

4.2 ASSESSMENT

- Course credit hour plus one (In this course $3+1 = 4$) quizzes will be taken to check if you are following the lectures attentively to check the basic knowledge
- Midterm exam and final exam will contain comprehensive construction materials problems to assess complete understanding of the course contents
- Assignments will be given for solving practical problems

4.3 EVALUATION:

Distribution of numerical scores		
Class attendance	5%	
Assignments	10%	
Quizzes	20%	Best 3 out of 4 will be counted
Lab Experiments	20%	Participation, Reports, and Exam
Midterms	20%	One hour
Final Exam	25%	One hour thirty minutes

4.4 GRADING POLICY:

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

4.5 EXAM POLICY:

No makeup for quiz and in-class exam is possible. MAKE UP for 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.



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5 LECTURE SCHEDULE

* One Day = 1.5 lecture hours, Total 22 lecture = 33 lecture hours

Day	Material covered	Textbook Chapter
Day-1	Course overview and Introduction	
Day-2	Material Engineering Concepts	Chapter 1
Day-3	Basic properties of engineering materials cont'd	Chapter 1
Day - 4	Basic properties of engineering materials cont'd	Chapter 1
Day-5	Atomic structure of materials	Chapter 2
Day-6	Atomic structure of materials cont'd	Chapter 2
Day-7	Steel	Chapter 3
Day-8	Steel and other non-ferrous metals	Chapter 3 and 4
Day-9	Mid Exam	Chapters 1 - 4
Day-10	Mineral Aggregates	Chapter 5
Day-11	Mineral Aggregates	Chapter 5
Day-12	Mineral Aggregates	Chapter 5
Day-13	Portland Cement	Chapter 6
Day-14	Portland Cement	Chapter 6
Day-15	Portland Cement Concrete	Chapter 7
Day 16	Concrete mix design	Chapter 7
Day-17	Mixing and handling of concrete	Chapter 7
Day-18	Finishing and curing of concrete	Chapter 7
Day-19	Design exam	Chapters 5 - 7
Day-20	Brick, Sand, Surki & Tiles	Chapter 8
Day-21	Asphalt	Chapter 9
Day-22	Asphalt Concrete	Chapter 9
Day-23	Wood	Chapter 10
Day-24	Composite Materials and Protective Coating Materials	Chapter 11

6 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.
- Adopting unfair means in the exams will be considered as a serious crime and the student shall be placed to the university disciplinary committee.
- All materials should be neat and clear, and demonstrate professionalism
- Direct duplication of the work of another is a big offense
- Paraphrasing another person's work with very minor changes keeping the meaning is also plagiarism