Annexe A: New/Revised Course Content in OBTL+ Format

Course Overview

Expected Implementation in Academic Year (New format)	AY2023-2024
Semester/Trimester/Others (specify approx. Start/End date)	Semester 2
Course Author * Faculty proposing/revising the course	Lee-Chua Lee Hong
Course Author Email	clhlee@ntu.edu.sg
Course Title	Civil Engineering Materials
Course Code	CV1013
Academic Units	3
Contact Hours	39
Research Experience Components	Not Applicable

Course Requisites (if applicable)

Pre-requisites	
Co-requisites	
Pre-requisite to	
Mutually exclusive to	
Replacement course to	
Remarks (if any)	

Course Aims

The course aims to develop a good understanding of common civil engineering materials, and their properties and significance to the design of infrastructure. Students should also develop the ability to apply knowledge learned in the course to select materials that fulfil the requirements of specific engineering applications.

Course's Intended Learning Outcomes (ILOs)

Upon the successful completion of this course, you (student) would be able to:

ILO 1	Understand ingredients of concrete
ILO 2	Design concrete mixes
ILO 3	Understand fresh and hardened properties of concrete
ILO 4	Understand the standard tests and interpret test results related to concrete
ILO 5	Understand the mechanical and physical properties of composite
ILO 6	Understand the mechanical and physical properties of steel
ILO 7	Understand the mechanical and physical properties of wood
ILO 8	Understand the mechanical and physical properties of asphalt
ILO 9	Understand the standard tests and interpret test results related to asphalt
ILO 10	Design asphalt mixes

Course Content

S/N	Topic	Lecture hours
1	Concrete	21
2	Composite	3
3	Steel	6
4	Wood	3
5	Asphalt	6
	Total hours	39

Reading and References (if applicable)

Text

Mamlouk, M.S. and Zaniewski, J.P. Materials for Civil and Construction Engineers. International Version, 3rd Ed., Pearson, 2011.

References

Atkins, H.N. Highway Materials, Soils, and Concretes. 3rd Ed., Prentice-Hall, New Jersey, 1997 (Ch. 6, pp.209-241).

Young, J.F., Mindess, S., Gray, R.J. and Bentur, A. The Science and Technology of Civil Engineering Materials. International Edition, Prentice-Hall International, Inc., New Jersey, 1998.

Somayaji, S. Civil Engineering Materials. 2nd Ed., Prentice-Hall, New Jersey, 2001.

Jackson, N. and Dhir, R.K., Civil Engineering Materials. 5th Ed., Palgrave, New York, 1996.

Derucher, K.N., Korfiatis, G.P., and Ezeldin, A.S. Materials for Civil & Highway Engineers. 4th Ed., Prentice-Hall, New Jersey, 1998 (Ch. 14).

Neville, A.M. and Brooks, J.J. Concrete Technology. Longman Group, 1987.

Mindess, S., Young, J.F., and Darwin, D. Concrete. 2nd Ed., Prentice-Hall, New Jersey, 2003.

Planned Schedule

Week or Session	Topics or Themes	ILO	Delivery Mode	Activities	Readings
1	Introduction, Cement and hydration	1	In-person	Lectures	
2	Introduction , Cement and hydration	1	In-person	Lectures	
3	Aggregate	1	In-person	Lectures	
4	Admixture, Fresh concrete properties and testing	1, 3, 4	In-person	Lectures	
5	Mix design of concrete, Mixing, placing, and curing	2, 4	In-person	Lectures	
6	Properties of hardened concrete	3	In-person	Lectures	
7	Testing of hardened concrete properties	4	In-person	Lectures	
8	Composite	5	In-person	Lectures	
9	Steel	6	In-person	Lectures	
10	Steel	6	In-person	Lectures	
11	Wood	7	In-person	Lectures	
12	Asphalt	8-10	In-person	Lectures	
13	Asphalt	8-10	In-person	Lectures	

Learning and Teaching Approach

Approach	How does this approach support you in achieving the learning outcomes?
Lectures	Present the course contents via lecture notes, animations, and videos, which provide the essential background and concepts required for students to achieve above specified learning outcomes.
Quizzes	Two quizzes to test your understanding on the knowledge learned with regard to asphalt, steel, wood, composite, and concrete.

Assessment Structure

Assessment Components (includes both continuous and summative assessment)

No.	Component	ILO	Related PLO or Accreditation	Weightage	Description of Assessment Component	Team/Individual	Rubrics	Level of Understanding
1	Summative Assessment (EXAM): Final exam(Final Examination)	1 to 10	CVE SLO a, g	60		Individual	Holistic	Relational
2	Continuous Assessment (CA): Test/Quiz(Quiz)	1 to 3	CVE SLO a, g	20		Individual	Analytic	Multistructural
3	Continuous Assessment (CA): Test/Quiz(Quiz)	4 to 7	CVE SLO a, g	20		Individual	Analytic	Multistructural

Description of Assessment Components (if applicable)

* CVE SLO stands for Student Learning Outcome For Civil Engineering Progamme (Per BEng Civil Engineering Accreditation)

CVE SLOs (2018)

a) Engineering knowledge: Apply the knowledge of mathematics, natural science, engineering fundamentals, and an engineering specialisation to the solution of complex engineering problems;

b) Problem Analysis: Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences;

c) Design/development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

d) Investigation: Conduct investigations of complex problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

e) Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

f) The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

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

h) Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

i) Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams and in multidisciplinary settings.

j) Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

k) Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and economic decision-making, and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

l) Life-long Learning: Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

Formative Feedback

1. Feedback will be through the dissemination of the student's performance in quizzes as well as review of the quiz questions in class.

2. Additional channel will be through individual consultation initiated by students on their particular learning needs.

NTU Graduate Attributes/Competency Mapping

This course intends to develop the following graduate attributes and competencies (maximum 5 most relevant)

Attributes/Competency	Level
Care for Environment	Intermediate
Decision Making	Basic
Critical Thinking	Basic
Design Thinking	Basic

Course Policy

Policy (Academic Integrity)

Good academic work depends on honesty and ethical behaviour. The quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honour Code, a set of values shared by the whole university community. Truth, Trust and Justice are at the core of NTU's shared values. As a student, it is important that you recognize your responsibilities in understanding and applying the principles of academic integrity in all the work you do at NTU. Not knowing what is involved in maintaining academic integrity does not excuse academic dishonesty. You need to actively equip yourself with strategies to avoid all forms of academic dishonesty, including plagiarism, academic fraud, collusion and cheating. If you are uncertain of the definitions of any of these terms, you should go to the academic integrity website for more information. On the use of technological tools (such as Generative AI tools), different courses / assignments have different intended learning outcomes. Students should refer to the specific assignment instructions on their use and requirements and/or consult your instructors on how you can use these tools to help your learning. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

Policy (General)

The standing university policy governing student responsibilities shall apply.

As a student of the course, you are required to abide by both the University Code of Conduct and the Student Code of Conduct. The Codes provide information on the responsibilities of all NTU students, as well as examples of misconduct and details about how students can report suspected misconduct. The university also has the Student Mental Health Policy. The Policy states the University's commitment to providing a supportive environment for the holistic development of students, including the improvement of your mental health and wellbeing.

Students are expected to take responsibility to follow up with lectures, course notes, and online materials. Students are expected to participate in all lectures and quizzes.

Policy (Absenteeism)

The quizzes make up a significant portion of your course grade. Absence from quizzes without a valid reason will affect your overall course grade. Valid reasons include falling sick supported by a medical certificate and participation in NTU's approved activities supported by an excuse letter from the relevant bodies. There will be no make-up opportunities for quizzes.

If you miss a quiz, you must inform your course lecturer and coordinator via email. Students who miss quizzes with valid reasons will have to provide the CEE Undergraduate Office with medical certificates or excuse letter from the relevant bodies.

Policy (Others, if applicable)

This course will adopt NTU's policy on the use of AI for take-home assignments and reports, and project reports and presentation slides. More details could be found via the link https://entuedu.sharepoint.com/sites/Student/dept/ctlp/SitePages/Exploring-the-Impact-of-Generative-Artificial-Intelligence-(GAI)-Tools-on-Education.aspx#1-proper-citations-and-acknowledgements

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