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

Course Overview

The sections shown on this interface are based on the templates UG OBTL+ or PG OBTL+
If you are revising/duplicating an existing course and do not see the pre-filled contents you expect in the subsequent sections e.g. Course Aims, Intended Learning Outcomes etc. please refer to Data Transformation Status for more information.

Expected Implementation in Academic Year	AY 2022-2023
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	Coastal Engineering
Course Code	CV4116
Academic Units	3
Contact Hours	39
Research Experience Components	Not Applicable

Course Requisites (if applicable)

Pre-requisites	CV2020 Water Resources Engineering
Co-requisites	
Pre-requisite to	
Mutually exclusive to	
Replacement course to	
Remarks (if any)	

Course Aims

This is a course on coastal engineering and its applications. The course provides a fundamental understanding of coastal engineering covering basic principles of coastal water fluctuations, wind wave processes, linear water wave theory and wave mechanics, and sediment transports. It also covers the basic analysis of coastal structures such as involving the use of Morison's equation, and understandings of coastal protection, breakwater and harbour design.

Course's Intended Learning Outcomes (ILOs)

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

ILO 1	Analyse tidal fluctuations levels via its tidal components.
ILO 2	Identify different components of coastal water level fluctuations
ILO 3	Apply linear wave theory to determine wave conditions at various offshore coastal locations.
ILO 4	Quantify statistical measures of wave parameters such as wave heights and return periods.
ILO 5	Use Morison equation in calculations of wave loads
ILO 6	Differentiate between different types of coastal structures and their functions
ILO 7	Perform design of vertical wall and rubble mound structures.

Course Content

S/N	Topic	Lecture Hrs	Tutorial Hrs
1.	Coastal water level fluctuations: tides, storm surge, tsunami, seiches, sea level rise; Wind wave generation and analysis	6	3
2.	Mechanics of wave motion: linear wave theory, wave kinematics, wind wave generation, wave refraction, diffraction and reflection.	5	3
3.	Coastal processes: beach sediment properties and analysis. Beach profiles. Surf dynamics and sediment transport. Beach stability.	2	1
4.	Design wave characteristics: breaking and non-breaking waves, extreme waves	3	1
5.	Wave forces on cylinders. Morison equation.	3	2
6.	Types of coastal structures and coastal protection. Design of vertical walls and rubble mound structures.	4	2
7.	Breakwater types and design. Toe protection.	3	1
	Total:	26	13

Reading and References (if applicable)

Textbooks:

1. Basic coastal engineering by Robert M Sorensen. Springer Science+Business Media 2006, 3rd Edition.

Reference:

1. United States Coastal Engineering Research Center., "Shore Protection Manual", Vol.1 and 2, Vicksburg, Mississippi, US Army Coastal Engineering Research Center, 1984.

2. Coastal Engineering Manual. US Army Coastal Research Center, 2002.

3. Coastal Engineering: Processes, Theory and Design Practice, by D. Reeve, A. Chadwick, and C. Fleming. Spon Press, 2004

Planned Schedule

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
1	Introduction and coastal water level fluctuations	1		In-person	Lectures and Tutorials
2	Coastal water level fluctuations	1		In-person	Lectures and Tutorials
3	Wind wave generation and analysis	1		In-person	Lectures and Tutorials
4	Linear Water theory	2		In-person	Lectures and Tutorials
5	Wave mechanics	2		In-person	Lectures and Tutorials
6	Wave transformation and Coastal sediment transport	2,3		In-person	Lectures and Quiz
7	Coastal sediment transport Extreme waves and Weibull distribution	4		In-person	Lectures and Tutorials
8	Design wave specification	4		In-person	Lectures and Tutorials
9	Morison equation - theory	5		In-person	Lectures and Tutorials
10	Morison equation – nonlinear extension using stream function theory	5		In-person	Lectures and Tutorials

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
11	Wave forces on vertical wall structures	6		In-person	Lectures and Tutorials
12	Types of coastal structures; breakwater design	6,7		In-person	Lectures and Quiz
13	Rubble mound structures and toe protection	7		In-person	Lectures and Tutorials

Learning and Teaching Approach

Approach	How does this approach support you in achieving the learning outcomes?
Lecture	Formal lectures on the topics with examples
Tutorial	In depth discussion of tutorial problems with step-by-step solution process discussion.

Assessment Structure

Assessment Components (includes both continuous and summative assessment)

No.	Component	ILO	Related PLO or Accreditation	Weightage	Team/Individual	Rubrics	Level of Understanding
1	Summative Assessment (EXAM): Final exam(Final Examination)	1, 2, 3, 4, 5, 6	CEE SLOs (a), (b), (c) and (l).	60	Individual	Holistic	Relational
2	Continuous Assessment (CA): Test/Quiz(CA1: Quiz 1)	1, 2, 3, 4, 5, 6	(a), (b), (c) & (l).	20	Individual	Analytic	Multistructural
3	Continuous Assessment (CA): Test/Quiz(CA2: Quiz 2)	1-6	(a), (b), (c) & (l).	20	Individual	Analytic	Multistructural

Description of Assessment Components (if applicable)

EAB Graduate Attributes

"Engineering Knowledge

Apply the knowledge of mathematics, natural science, engineering fundamentals, and an engineering specialisation to the solution of complex engineering problems."

"Problem Analysis

Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences."

"Design / Development of Solutions

Design solutions for complex engineering problems and design systems, components or processes that meet the specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations."

"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."

"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."

"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."

"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."

"Ethics

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

"Individual and Team Work

Function effectively as an individual, and as a member or leader in diverse teams and in multidisciplinary

settings."

"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."

"Project Management and Finance

Demonstrate knowledge and understanding of the engineering 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."

"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

Feedback will be through dissemination of your performance in quizzes as well as review of the quiz questions in class. Follow-up consultation will be arranged as needed.
Besides having interactive discussion during tutorial, we encourage you to initiate individual consultation sessions on your 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	Basic
Learning Agility	Intermediate
Critical Thinking	Intermediate
Design Thinking	Intermediate

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)

Students are expected to complete all assigned pre-class readings and activities, attend all seminar classes punctually and take all scheduled assignments and tests by due dates. Students are expected to take responsibility to follow up with course notes, assignments and course-related announcements for seminar sessions they have missed. Students are expected to participate in all seminar discussions and activities.

Policy (Absenteeism)

Absence from quiz 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.

Policy (Others, if applicable)

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Last Updated By: Yang, En-Hua