

## 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	AY2023-2024
Semester/Trimester/Others (specify approx. Start/End date)	Semester 1
Course Author * Faculty proposing/revising the course	Lee-Chua Lee Hong
Course Author Email	clhlee@ntu.edu.sg
Course Title	Inland and Coastal Flood Management
Course Code	CV4121
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 final year course on inland and coastal flood management. The course provides the understanding of inland hydrological analysis, drainage system design, climate change effect, coastal water fluctuations, flood risk assessment, shoreline management and protection measures, and groundwater and geotechnical considerations. It also covers the related coastal management design knowledge and understandings, including levees and sea walls, and polders, together with ecological considerations.

## Course's Intended Learning Outcomes (ILOs)

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

ILO 1	Quantify flood risks for engineering designs
ILO 2	Perform hydrological analysis for inland rainfall, runoff, and drains
ILO 3	Analyse coastal sea level fluctuations and compound flooding
ILO 4	Comprehend available measures for coastal and shoreline protection
ILO 5	Understand the role of ground water seepage in flood management
ILO 6	Incorporate geotechnical considerations for design and construction of dam, sea wall, or other flood-related infrastructures

## Course Content

S/N	Topic	Lecture Hrs	Tutorial Hrs
1.	Quantification of flood risks (flood frequency and risk assessment)	4	2
2.	Hydrological analysis (rainfall design, climate change, inland flood control infrastructure)	6	3
3.	Coastal water level fluctuations (tide, storm surge, sea level rise, wave runup, compound flooding)	4	2
4.	Shoreline management and protection measures (bank protection, levees, seawalls, ecological considerations)	4	2
5.	Groundwater considerations (concepts, seepage management, applications)	4	2
6.	Geotechnical considerations (site investigation, geotechnical design, soil improvement)	4	2
Total:		26	13

## Reading and References (if applicable)

1. Coastal Engineering: Processes, Theory and Design Practice, by D. Reeve, A. Chadwick, and C. Fleming. Spon Press, 2004
2. Engineering Hydrology, by K. Subramanya, McGraw Hill, International Edition, Third Edition, 2009.
3. Geotechnical Engineering of Dams, by Robin Fell, Patrick MacGregor, David Stapledon, Graeme Bell, Mark Foster, CRC Press, Second Edition, 2015.
4. Introduction to Coastal Engineering and Management, by J. William Kamphuis, World Scientific, 2002

## Planned Schedule

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
1	Quantification of flood risks	1		In-person	Lectures and Tutorials
2	Quantification of flood risks	1		In-person	Lectures and Tutorials
3	Hydrological aspect of floods	2		In-person	Lectures and Tutorials
4	Hydrological aspect of floods	2		In-person	Lectures and Tutorials
5	Hydrological aspect of floods	2		In-person	Lectures and Tutorials
6	Coastal water level fluctuations	3		In-person	Lectures and Tutorials
7	Coastal water level fluctuations	3		In-person	Lectures and Quiz
8	Shoreline management and protection measures	4		In-person	Lectures and Tutorials
9	Shoreline management and protection measures	4		In-person	Lectures and Tutorials
10	Groundwater considerations	5		In-person	Lectures and Tutorials
11	Groundwater considerations	5		In-person	Lectures and Quiz
12	Site investigation and soil characterization	6		In-person	Lectures and Tutorials

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
13	Geotechnical design (bearing capacity, settlement, and slope stability, soil improvement)	6		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	Continuous Assessment (CA): Test/Quiz(CA1: Quiz 1)	1, 2 & 3	SLOs (a), (b), (c) and (l).	20	Individual	Analytic	Multistructural
2	Continuous Assessment (CA): Test/Quiz(CA2: Quiz 2 )	4, 5 & 6	SLOs (a), (b), (c) and (l).	20	Individual	Analytic	Multistructural
3	Summative Assessment (EXAM): Final exam(Final Examination)	1, 2, 3, 4, 5, 6	SLOs (a), (b), (c) and (l).	60	Individual	Holistic	Relational

Description of Assessment Components (if applicable)

## 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

1. 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.
2. 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
Learning Agility	Intermediate
Problem Solving	Advanced
Critical Thinking	Advanced
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 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. Students are expected to participate in all group project discussions and activities.

## Policy (Absenteeism)

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.

## Policy (Others, if applicable)

Last Updated Date: 04-07-2024 05:06:12

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