

## COURSE CONTENT

<b>Academic Year</b>	AY2020/21	<b>Semester</b>	1
<b>Course Coordinator</b>	A/P Law Wing Keung, Adrian (CEE)		
<b>Course Code</b>	CV4116		
<b>Course Title</b>	Coastal Engineering		
<b>Pre-requisites</b>	CV2015		
<b>No of AUs</b>	3		
<b>Contact Hours</b>	Lecture: 26 hrs; Tutorial: 13 hr; Lab: 0 hr.		
<b>Proposal Date</b>	7 Feb 2020		

### Course Aims

This is a final year 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.

### Intended Learning Outcomes (ILO)

By the end of this course, you would be able to:

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

**Assessment (includes both continuous and summative assessment)**

Component	Course LO Tested	Related Programme LO or Graduate Attributes	Weighting	Team/Individual	Assessment rubrics
1. Final Examination	1, 2, 3, 4, 5, 6	CEE SLOs (a), (b), (c) and (l).	60%	Individual	NA
2 Continuous Assessment (CA1: 2 Quizzes)	1, 2, 3, 4, 5, 6	CEE SLOs (a), (b), (c) and (l).	40%	Individual	NA
Total			100%		

\* CEE SLO = Civil and Environmental Engineering Learning Outcomes (as per EAB Student Learning Outcomes (subset of 12 points))

(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.

(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 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

### **Learning and Teaching approach**

Class meets thrice per week with 2 hours of lectures and 1 hour of tutorial.

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

### **Reading and References**

#### 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

### **Course Policies and Student Responsibilities**

#### **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. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

### Course Instructors

Instructor	Office Location	Phone	Email
A/P Law Wing Keung, Adrian	N1-01c-98	6790 5296	<a href="mailto:cwklaw@ntu.edu.sg">cwklaw@ntu.edu.sg</a>
A/P Lo Yat Man, Edmond	N1-01b-38	6790 5268	<a href="mailto:cymlo@ntu.edu.sg">cymlo@ntu.edu.sg</a>

### Planned Weekly Schedule

Week	Topic	Course LO	Mode
1	Introduction and coastal water level fluctuations	1	Lectures and Tutorials
2	Coastal water level fluctuations	1	Lectures and Tutorials
3	Wind wave generation and analysis	1	Lectures and Tutorials
4	Linear Water theory	2	Lectures and Tutorials
5	Wave mechanics	2	Lectures and Tutorials
6	Wave transformation and Coastal sediment transport	2,3	Lectures and Quiz
7	Coastal sediment transport Extreme waves and Weibull distribution	4	Lectures and Tutorials
8	Design wave specification	4	Lectures and Tutorials
9	Morison equation - theory	5	Lectures and Tutorials
10	Morison equation – nonlinear extension using stream function theory	5	Lectures and Tutorials
11	Wave forces on vertical wall structures	6	Lectures and Tutorials
12	Types of coastal structures; breakwater design	6,7	Lectures and Quiz
13	Rubble mound structures and toe protection	7	Lectures and Tutorials