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Template syllabus of the revised course

Course Name : Ocean and Coastal Engineering
Number of credits : 3 (5 ECTS)

Period: Spring semester

Cooordinator	**Dr. Teh Hee Min**
Credits	3 credits (5 ECTS)
Lecturers	**Dr. Teh Hee Min, Dr Siti Habibah Shafiai**
Level	Undergraduate
Host institution	Universiti Teknologi PETRONAS
Course duration	12 weeks
New/revised	Revised

Summary

This course introduces the fundamental principles and concepts of ocean and coastal engineering. It gives an overview in a number of subjects including wave theories, wave transformations, design wave specifications, wind, tides, sediment transport, coastal and estuarine morphology.

Target student audiences

Final year undergraduate students from Bachelor of Civil and Environmental Engineering with Honours.

Prerequisites

Required courses (or equivalents): None

Aims and objectives

The main objective of this course is to develop understanding on the fundamental principles in ocean and coastal engineering.

The Authentic Tasks are:

General learning outcomes:

By the end of the course, successful students will be able to:

1. Evaluate the properties of offshore and near shore waves, and establish design wave specifications.
2. Assess currents and tidal processes.
3. Formulate sediment budget and perform shoreline evolution analysis.

Overview of sessions and teaching methods

The course will make most of interactive and self-reflective methods of teaching and learning.

Learning methods

- Lecture
- Discussion

Course outline

Topic 1
Introduction to Ocean and Coastal Engineering
- Terminology of the ocean and coasts
- Ocean environmental forces
- Introduction to coastal protection measures and their applications

Topic 2
Wave Generation
- Wind and wave
- Types of waves
- Wave characteristics
- Wave theories and their applications
- Small-amplitude wave theory:
  water particle velocities, accelerations, pressure variation induced by wave motion, influence of water depth on wave characteristics, group velocity & energy propagation
- Physical modelling demonstration

Topic 3
Wave Transformation
- Wave shoaling
- Wave breaking
- Wave refraction
- Wave diffraction
- Wave reflection
- Wave run-up.

Topic 4
Statistical Properties and Spectra of Sea Waves
- Random wave profiles and representative waves
- Spectra of sea waves
- Statistical analysis of extreme waves

Topic 5
Tides and Currents
- Origin of the tides
- Characteristics of the tides
- Harmonic analysis & prediction of the tides
- Tides in estuaries
- Types of currents

Topic 6
Coastal Sediment Transports
- Onshore-offshore sediment transport
- Longshore sediment transport
- Estuarine processes

Topic 7
Coastal Morphology
- Sediment budget for a coastal system
- Estuarine morpho dynamics
- Long-term prediction of shoreline changes
- Introduction to numerical simulation using commercial software (1-day seminar)

Literature

Main Reference:

1. Reeve, D., Chadwick, A. & Fleming, C. (2004). "Coastal Engineering – Processes, Theory and Design Practice. Spon Press.

Optional References:

1. Kamphuis, J. W. (2000). "Introduction to Coastal Engineering and Management", World Scientific.
2. Sorensen, R. W. (2005). "Basic Coastal Engineering", 3rd Edition, Plenum Publishing Corporation.
3. Dean, G. R (2002). "Coastal Processes with Engineering Applications". Cambridge University Press.

Course workload

The table below summarizes course workload distribution:

Activities	**Learning outcomes**	**Assessment**	**Estimated workload (hours)**
In-class activities (36 hours)			
Guided Learning and Moderated in-class discussions	1. Evaluate the properties of offshore and near shore waves, and establish design wave specifications.	Class participation and preparedness for discussions	21
Guided Learning and Moderated in-class discussions	2. Assess currents and tidal processes.	Class participation and preparedness for discussions	6
Guided Learning and Moderated in-class discussions	3. Formulate sediment budget and perform shoreline evolution analysis .	Class participation and preparedness for discussions	9
Independent work (84 hours)			
Self-Learning (Independent Learning)	1. Evaluate the properties of offshore and near shore waves, and establish design wave specifications.	Quizzes and Tests	37.5
Self-Learning (Independent Learning)	2. Assess currents and tidal processes.	Quizzes and Tests	15
Self-Learning (Independent Learning)	3. Formulate sediment budget and perform shoreline evolution analysis .	Quizzes and Tests	31.5
Total			***120***

Grading

The students' performance will be based on the following:

Assessment	Coursework (Assignments/Project, Quizzes, Tests)- 50%: Final Examination – 50%
Evaluation	A (85 - 100) A- (80 – 84.9) B+ (75 – 79.9) B (65 – 74.9) C+ (55 - 64.9) C (50 – 54.9) D+ (45 – 49.9) D (40 –44.9) F (<40)