COURSE OUTLINE

1. GENERAL

SCHOOL	ENGINEERING		
DEPARTMENT	ENVIRONMENTAL ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE		**SEMESTER**	**9**
COURSE TITLE	ENVIRONMENTAL COASTAL ENGINEERING		
TEACHING ACTIVITIES *If the ECTS Credits are distributed in distinct parts of the course e.g., lectures, labs etc. If the ECTS Credits are awarded to the whole course, then please indicate the teaching hours per week and the corresponding ECTS Credits.*		**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
	Lectures	2	
	Exercises/Practicals	1	
Please, add lines if necessary. Teaching methods and organization of the course are described in section 4.			
COURSE TYPE *Background, General Knowledge, Scientific Area, Skill Development*	SCIENTIFIC AREA		
PREREQUISITES:	Physical Oceanography, Meteorology, Management of Inland and Coastal Aquatic Systems, Environmental Fluid Mechanics.		
TEACHING & EXAMINATION LANGUAGE:	GREEK		
COURSE OFFERED TO ERASMUS STUDENTS:	YES		
COURSE URL:	https://eclass.duth.gr/courses/TMC139/		

2. LEARNING OUTCOMES

Learning Outcomes

Please describe the learning outcomes of the course: Knowledge, skills and abilities acquired after the successful completion of the course.

A) Knowledge-based

- Student introduction to the concepts of ocean wave processes,
- Understanding the transformation processes of ocean waves as they propagate to the coastal zone,
- Understanding the basic equations describing the ocean waves propagation, the methods of predicting waves using wave and/or meteorological datasets, and the interactions of waves with coastal technical works,
- Comprehending the mechanisms of coastal erosion and the tools of coastal protection.

B) Skills/Competences acquired

- Capacity to solve wave equations to acquire wave characteristics,
- Ability to estimate extreme wind and wave events,
- Capacity to design coastal technical works for coastal erosion mitigation,
- Capacity to implement a wave, technical and environmental impact assessment study for the coastal environment

General Skills

Name the desirable general skills upon successful completion of the module

Search, analysis and synthesis of data and information,	*Project design and management*
ICT Use	*Equity and Inclusion*
Adaptation to new situations	*Respect for the natural environment*
Decision making	*Sustainability*

Autonomous work *Teamwork* *Working in an international environment* *Working in an interdisciplinary environment* *Production of new research ideas*	*Demonstration of social, professional and moral responsibility and sensitivity to gender issues* *Critical thinking* *Promoting free, creative and inductive reasoning*
ICT use; Decision-making; Project design and management; critical thinking; autonomous work	

3. COURSE CONTENT

This course introduces the student to the coastal environment and its characteristics, the coastal dynamic processes with particular emphasis on understanding the ocean waves, their transformations during their propagation towards the coast, the methodologies of processing short and long-term wave datasets aiming towards the probabilistic investigation of extreme events, the assessment methods of wave characteristics in areas where only meteorological data are available, elements of wave mechanics and engineering and waves numerical modeling. The properties of coastal sediments are also presented, together with the methods of assessment of longshore and cross-shore wave-induced currents and sediment transport. Numerical models of sedimentary budgets are shown, in accordance to models of shoreline evolution and prediction, and wave-technical works interactions. The issue of coastal erosion is analyzed, and the various methods of coastal protection (hard, soft and hybrid) are explained. Special attention is given to the beach nourishment technology (methods, procedures, cost and environmental impacts).

At the end of the course, students prepare and submit a full technical and environmental impact assessment study for a coastal technical intervention.

Exercises/Practicals:

1. Computation of wave characteristics at the open sea,
2. Determination of waves transformation at the coastal sea,
3. Computation of wave characteristics at the coastal zone,
4. Analysis of short-term wave datasets,
5. Computation of wave spectrum using wave measurements,
6. Analysis of long-term wave datasets,
7. Extreme event analysis and probability over threshold (POT) exercises,
8. Computation of longshore wave-induced current,
9. Computation of longshore sediment transport,
10. Wave study implementation.

4. LEARNING & TEACHING METHODS - EVALUATION

TEACHING METHOD *Face to face, Distance learning, etc.*	Classroom lectures in using power-point overheads (uploaded in e-class) and blackboard-solved exercises. A book is distributed containing the theoretical part of the course. Personal course notes and weekly assignments are regularly updated on the e-class platform.
USE OF INFORMATION & COMMUNICATIONS TECHNOLOGY (ICT) *Use of ICT in Teaching, in Laboratory Education, in Communication with students*	Teaching algorithms on data processing for wave and wave-induced currents using R programming, weekly exercises developing algorithms for waves data processing using R.
TEACHING ORGANIZATION *The ways and methods of teaching are described in detail.* *Lectures, Seminars, Laboratory Exercise, Field Exercise, Bibliographic research & analysis, Tutoring, Internship (Placement), Clinical Exercise, Art Workshop, Interactive learning, Study visits, Study / creation, project, creation, project. Etc.* *The supervised and unsupervised workload per activity is indicated here, so that total workload per semester complies to ECTS standards.*	

Activity	*Workload/semester*
Lectures	26
Exercises	13
Weekly exercises	26
Semester Project	30
Seminar	3

STUDENT EVALUATION *Description of the evaluation process*	Course evaluation is based on: a) weekly exercises, solved by the students, submitted through e-class to the lecturer and discussed in the class (30%), b) semester project conducting

Assessment Language, Assessment Methods, Formative or Concluding, Multiple Choice Test, Short Answer Questions, Essay Development Questions, Problem Solving, Written Assignment, Essay / Report, Oral Exam, Presentation in audience, Laboratory Report, Clinical examination of a patient, Artistic interpretation, Other/Others *Please indicate all relevant information about the course assessment and how students are informed*	a wave and shoreline protection study (20%), and c) the final written exam (50%). Assessment Language: Greek/English Multiple Choice Test and Short Answer Questions Problem Solving

5. SUGGESTED BIBLIOGRAPHY

1. «Environmental Coastal Engineering Online Notes», Sylaios Georgios, University Course Lectures.
2. «Introduction in Coastal Engineering and Ports Design», Koutitas Ch., 1996.
3. «Ports and Harbors Engineering», Vol. 1, Quinn A., 1998

ANNEX OF THE COURSE OUTLINE

Alternative ways of examining a course in emergency situations

Teacher (full name):	
Contact details:	
Supervisors: (1)	
Evaluation methods: (2)	
Implementation Instructions: (3)	

(1) Please write YES or NO

(2) Note down the evaluation methods used by the teacher, e.g.

- *written assignment* or/and exercises
- written or oral examination with distance learning methods, provided that the integrity and reliability of the examination are ensured.

(3) In the **Implementation Instructions** section, the teacher notes down clear instructions to the students:

a) in case of **written assignment and / or exercises:** the deadline (e.g. the last week of the semester), the means of submission, the grading system, the grade percentage of the assignment in the final grade and any other necessary information.

b) in case of **oral examination with distance learning methods:** the instructions for conducting the examination (e.g. in groups of X people), the way of administration of the questions to be answered, the distance learning platforms to be used, the technical means for the implementation of the examination (microphone, camera, word processor, internet connection, communication platform), the hyperlinks for the examination, the duration of the exam, the grading system, the percentage of the oral exam in the final grade, the ways in which the inviolability and reliability of the exam are ensured and any other necessary information.

c) in case of **written examination with distance learning methods**: the way of administration of the questions to be answered, the way of submitting the answers, the duration of the exam, the grading system, the percentage of the written exam of the exam in the final grade, the ways in which the integrity and reliability of the exam are ensured and any other necessary information.

There should be an attached list with the Student Registration Numbers only of students eligible to participate in the examination.