COURSE OUTLINE HUMANITARIAN ENGINEERING AND RESILIENT SOCIETY

1. GENERAL

SCHOOL	SCHOOL OF ENGINEERING		
DEPARTMENT	PREVENTION AND MANAGEMENT OF CRISIS AND DISASTERS: INNOVATIVE TECHNIQUES IN CIVIL PROTECTION		
LEVEL OF STUDIES	ISCED level 7 – Master's or equivalent level		
COURSE CODE	CP10.1	**SEMESTER**	2nd Semester
COURSE TITLE	Humanitarian Engineering and Resilient Society		

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**
	3.0	6.0
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:	NO
TEACHING & EXAMINATION LANGUAGE:	Greek, English (students will be encouraged to complete their assignments in English to improve their communication skills in a foreign language/NATO's official language).
COURSE OFFERED TO ERASMUS STUDENTS:	YES
COURSE URL:	https://eclass.duth.gr/courses/

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.

At the end of the course the student will be able to:

- *Understand the fundamental principles of humanitarian engineering and its role in addressing crises, natural disasters, and social challenges.*
- *Analyze the challenges and needs of vulnerable populations in emergency situations and develop sustainable and resilient solutions.*
- *Apply technical and technological solutions to support societal resilience, with a focus on sustainability and innovation.*
- *Develop skills in planning and managing humanitarian projects, considering social, environmental, and economic factors.*
- *Understand the legal and institutional framework of humanitarian action and the importance of international cooperation in relief and recovery programs.*

- *Evaluate the resilience of societies and infrastructures and design strategies for disaster prevention and response.*
- *Collaborate with interdisciplinary teams, contributing to the development and implementation of comprehensive humanitarian solutions.*
- *Cultivate critical thinking and ethical awareness, proposing interventions that promote social cohesion, sustainable development, and equal access to essential services.*

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	*Demonstration of social, professional and moral responsibility and sensitivity to gender issues*
Teamwork	*Critical thinking*
Working in an international environment	*Promoting free, creative and inductive reasoning*
Working in an interdisciplinary environment	
Production of new research ideas	

- Search, analysis, and synthesis of data and information, using appropriate technologies
- Adaptation to new situations
- Decision-making
- Independent work
- Teamwork
- Working in an international environment
- Working in an interdisciplinary environment
- Production of new research ideas
- Project design and management
- Respect for diversity and multiculturalism
- Respect for the natural environment
- Demonstration of social, professional, and ethical responsibility and sensitivity to gender issues
- Critical thinking and self-reflection
- Promotion of free, creative, and inductive thinking

3. COURSE CONTENT

The aim of the course is to equip students with the necessary knowledge, skills, and methodological approaches to understand, analyze, and apply techniques and strategies that enhance societal resilience, especially in times of crisis and humanitarian need.

Specifically, the course aims to:

- Provide an understanding of the principles of humanitarian engineering and its relationship with sustainable development and social resilience.
- Explore the ethics of humanitarian engineering through case studies of both successful and failed practices.
- Develop low-cost prototype designs with a focus on human preparedness and protection against natural and technological hazards.

- Analyze the impacts of natural and human-made disasters and explore methods for prevention, mitigation, and response through technological and engineering solutions centered on people and society.
- Apply sustainable technologies and infrastructure that support the resilience of communities, particularly in vulnerable, remote, or underdeveloped areas.
- Build crisis management skills through the organization, design, and implementation of relief and recovery initiatives.
- Study and evaluate international initiatives and institutional frameworks related to humanitarian action, sustainable development, and social resilience.
- Promote collaborative and interdisciplinary approaches through participation in team projects and simulations of real-world humanitarian scenarios.
- Encourage critical thinking and innovative solutions, enabling students to develop new approaches for enhancing societal resilience.

The course emphasizes interdisciplinary collaboration, sustainable development, and the human-centered application of engineering to support communities facing challenges, enhancing their resilience and promoting solutions with social and environmental impact.

4. LEARNING & TEACHING METHODS - EVALUATION

<table>
<tr><td>TEACHING METHOD
Face to face, Distance learning, etc.</td><td>Distance learning (online)</td></tr>
<tr><td>USE OF INFORMATION & COMMUNICATIONS TECHNOLOGY (ICT)
Use of ICT in Teaching, in Laboratory Education, in Communication with students</td><td>PPT slides
Video/Podcast (Audio)
MS Teams
email</td></tr>
<tr><td>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.</td><td>
<table>
<tr><th>Activity</th><th>Workload/semester</th></tr>
<tr><td>Lecture Topics</td><td>36</td></tr>
<tr><td>Bibliographic research & analysis</td><td>48</td></tr>
<tr><td>Team project work</td><td>60</td></tr>
<tr><td>Assignments</td><td>36</td></tr>
<tr><td>Total</td><td>180</td></tr>
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<tr><td>STUDENT EVALUATION
Description of the evaluation process</td><td>1. Lecture Topic Quiz (Individual, online multiple-choice quiz) – 20%</td></tr>
</table>

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*	2. Design Presentation (Group, online project presentation on team's humanitarian engineering topic) – 25% 3. Design Report (Group, online report development on team's humanitarian engineering topic) – 35% 4. Reflection (individual, short essay reflecting on course experience and course-related knowledge application in civil protection) – 20% Student evaluation languages Greek and English (students will be encouraged to complete their assignments in English to improve their communication skills in a foreign language/NATO's official language).

5. SUGGESTED BIBLIOGRAPHY

1. Amadei, B., & Wallace, W. A. (2009). Engineering for Humanitarian Development. IEEE Technology and Society Magazine, 28(4), 6-15.
2. Mazzurco, A., & Daniel, S. (2020). Socio-Technical Thinking of Students and Practitioners in the Context of Humanitarian Engineering. Journal of Engineering Education, 109(2), 243-261.
3. Harbison, J. R. (2021). Engineering a Resilient Society: Adaptation and Innovation for Sustainable Development. Springer.
4. Bhamra, R. S. (2015). Organizational Resilience: Concepts, Integration, and Practice. CRC Press.
5. Redman, C. L., & Miller, T. R. (2015). The Technological Resilience of Cities: Planning for Sustainable and Adaptable Infrastructure. Journal of Planning Education and Research, 35(3), 265-277.