

COURSE OUTLINE

1. GENERAL

SCHOOL	OF ENGINEERING		
DEPARTMENT	OF ENVIRONMENTAL ENGINEERING		
LEVEL OF STUDIES	7 TH LEVEL		
COURSE CODE	TMC307	SEMESTER	6 TH
COURSE TITLE	ENERGY BUILDING DESIGN		
TEACHING ACTIVITIES <i>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.</i>	TEACHING HOURS PER WEEK	ECTS CREDITS	
	4 HOURS	5	
<i>Please, add lines if necessary. Teaching methods and organisation of the course are described in section 4.</i>			
COURSE TYPE <i>Background, General Knowledge, Scientific Area, Skill Development</i>	BACKGROUND SKILLS DEVELOPMENT		
PREREQUISITES:	Math, Transport phenomena, Atmospheric Physics		
TEACHING & EXAMINATION LANGUAGE:	GREEK (Instruction, Examination)		
COURSE OFFERED TO ERASMUS STUDENTS:	NO		
COURSE URL:	https://eclass.duth.gr/courses/TMC307/		

2. LEARNING OUTCOMES

Learning Outcomes <i>Please describe the learning outcomes of the course: Knowledge, skills and abilities acquired after the successful completion of the course.</i>																
The course aims at: <ul style="list-style-type: none"> Familiarise students with energy behaviour and energy design of buildings issues, as well as understating of its energy and thermal balance and the parameters that shape it Understand the main principles and main systems of energy design of a building Create knowledge and correlation building's design with the energy behaviour and performance of the building Understanding of basic methods of thermal, energy measurements in buildings Ability to propose optimum building design solutions for buildings high energy performance. 																
General Skills <i>Name the desirable general skills upon successful completion of the module</i>																
<table border="0"> <tr> <td><i>Search, analysis and synthesis of data and information, ICT Use</i></td> <td><i>Project design and management</i></td> </tr> <tr> <td><i>Adaptation to new situations</i></td> <td><i>Equity and Inclusion</i></td> </tr> <tr> <td><i>Decision making</i></td> <td><i>Respect for the natural environment</i></td> </tr> <tr> <td><i>Autonomous work</i></td> <td><i>Sustainability</i></td> </tr> <tr> <td><i>Teamwork</i></td> <td><i>Demonstration of social, professional and moral responsibility and sensitivity to gender issues</i></td> </tr> <tr> <td><i>Working in an international environment</i></td> <td><i>Critical thinking</i></td> </tr> <tr> <td><i>Working in an interdisciplinary environment</i></td> <td><i>Promoting free, creative and inductive reasoning</i></td> </tr> <tr> <td><i>Production of new research ideas</i></td> <td></td> </tr> </table>	<i>Search, analysis and synthesis of data and information, ICT Use</i>	<i>Project design and management</i>	<i>Adaptation to new situations</i>	<i>Equity and Inclusion</i>	<i>Decision making</i>	<i>Respect for the natural environment</i>	<i>Autonomous work</i>	<i>Sustainability</i>	<i>Teamwork</i>	<i>Demonstration of social, professional and moral responsibility and sensitivity to gender issues</i>	<i>Working in an international environment</i>	<i>Critical thinking</i>	<i>Working in an interdisciplinary environment</i>	<i>Promoting free, creative and inductive reasoning</i>	<i>Production of new research ideas</i>	
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<i>Production of new research ideas</i>																
<ul style="list-style-type: none"> Retrieve, analyse and synthesise data and information with the use of necessary technologies Apply knowledge in practice 																

- Make decisions
- Work autonomously
- Work in an interdisciplinary team
- Generate new research ideas
- Respect for the natural environment
- Promote free, creative and inductive thinking

3. COURSE CONTENT

1. Introduction to energy efficiency –The Renovation Wave strategy - Energy balance in different building categories - Thermal requirements of buildings (Energy gains and losses, Heat flows in building shell.)
2. Energy policy in the built environment - Nearly Zero Energy Buildings (nZEB)
3. Basic principles of energy and environmental design of buildings and renewable energy resources (orientation, solar geometry, potential, etc.)
4. Climate and materials
5. Ventilation and Natural Cooling (Natural Cooling Techniques: Shading, Natural Cooling Systems)
6. Lighting and Natural lighting
7. RES - Solar energy systems for buildings
8. RES - Biomass applications for buildings
9. RES - Geothermal applications for buildings
10. Advances building energy simulation methodologies - Building energy simulation software
11. Examples of energy building design and nZEBs

4. LEARNING & TEACHING METHODS - EVALUATION

TEACHING METHOD <i>Face to face, Distance learning, etc.</i>	Face to face	
USE OF INFORMATION & COMMUNICATIONS TECHNOLOGY (ICT) <i>Use of ICT in Teaching, in Laboratory Education, in Communication with students</i>	Use of ICT in Teaching, in Laboratory Education, in Communication with students	
TEACHING ORGANISATION <i>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.</i> <i>The supervised and unsupervised workload per activity is indicated here, so that total workload per semester complies to ECTS standards.</i>	Activity	Workload/semester
	Lectures	40
	Calculation assignment	35
	Group Literature assignment	35
	Assignments presentation	10
	Exams	30
	Total	150
STUDENT EVALUATION <i>Description of the evaluation process</i> <i>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,</i>	<ul style="list-style-type: none"> • Calculation assignemte (35%) • Written Essay / Report (35%) • Written exam (Written Exam with Multiple Choice Questions and Written Exam with Short Answer Questions) (30%) 	

Clinical examination of a patient, Artistic interpretation, Other/Others

Please indicate all relevant information about the course assessment and how students are informed

The evaluation criteria can be found on the course website (e-class)

5. SUGGESTED BIBLIOGRAPHY

- Kosmopoulos P., Perivolaris A., Environmental design: Zero energy buildings, University Studio Press, Thessaloniki, 2017 (in greek).
- Xronaki E., Bioclimatic design: Climate change, Environment and Sustainability (2nd edition), University Studio Press, Thessaloniki, 2017 (in greek).
- Papadopoulos M., Axarli Kl., Energy design and passive solar systems for buildings, Ενεργειακός σχεδιασμός και παθητικά ηλιακά συστήματα κτιρίων, Kyriakidis Publications IKE

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.