a) General			
School	ENGINEERING		
Academic unit	MECHANICAL ENGINEERING		
Level of studies	Undergraduate		
Course code	MM108Y01	*Semester*	8
Course title	**Smart energy buildings**		

Independent teaching activities	*Weekly teaching hours*	*ECTS*
Lectures	3	6.0
Laboratory exercises	2	

Course type	Knowledge deepening/consolidation
Course category	Compulsory for Direction 1
Prerequisite courses	-
Language of instruction and examinations	Greek / English
Is the course offered to Erasmus students	Yes
Course website (url)	https://moodle.uniwa.gr/course/view.php?id=1239

b) Learning outcomes and general competences

b1. Learning outcomes

Upon successful completion of this course, the student will be able to:
- Identify the main characteristics of smart energy buildings
- Identify the basic mechanisms of building energy consumption
- Identify building elements that require energy upgrade
- Apply techniques and technologies that determine a building to be smart-energy
- Evaluate different options for the energy upgrade of buildings
- Apply the legislation in force concerning building energy consumption

b2. General competences

- Data collection, synthesis, analysis and evaluation
- Decision - making
- Teamwork
- Environmental responsibility
- Production of free, creative and inductive thinking

c) Syllabus

Theory: Legislation and regulation on building energy performance; energy audit instruments and devices; electrical/thermal energy consumption audit; audit of building's electromechanical installations' performance; bioclimatic design; operation principles of passive solar systems; interventions for improving building energy performance; natural ventilation principles; buildings' thermal comfort conditions estimation indices; methodology for the assessment of comfort conditions in the interior of buildings; building energy audit with the use of appropriate devices and software; energy audit technical reporting; energy design of new buildings.

Lab: Building energy audit equipment; energy audits' legislative framework; measuring energy parameters of building operation; energy audit of building envelope; energy audit of the central heating system; air conditioning energy audit; recording of energy parameters; application of energy-saving measures; energy performance software applications.

d) Teaching and learning methods - Evaluation

Delivery	Face - to - face (classroom lectures, lab)

<table>
<tr><td>Use of information and communications technology</td><td colspan="2">- Commercial/free/open-source software
- Multimedia applications
- MS Teams/Moodle/e-class</td></tr>
<tr><td rowspan="7">Teaching methods</td><td>Activity</td><td>Semester workload</td></tr>
<tr><td>Lectures</td><td>26</td></tr>
<tr><td>Tutorials</td><td>13</td></tr>
<tr><td>Laboratory exercises</td><td>26</td></tr>
<tr><td>Computational exercises</td><td>13</td></tr>
<tr><td>Individual work</td><td>78</td></tr>
<tr><td>Course total</td><td>156</td></tr>
<tr><td>Student performance evaluation</td><td colspan="2">For the theoretical part of the module, individual and/or group assignments and presentation of the assignments. A written final exam that includes short-answer questions and solving of numerical problems.
For the lab part of the module, individual and/or group assignments and written or oral exam or presentation, for each assignment and case study.</td></tr>
<tr><td colspan="3">e) Suggested bibliography</td></tr>
<tr><td colspan="3">1. Lewis, J.O., Goulding, J., Steemers, T., (1992). Energy in architecture: European Passive Solar Handbook, ed. Batsford Ltd, London.
2. Kavadias, K. A. (2010). Integration of stand-alone and hybrid wind energy systems into buildings. In J. K. Kaldellis (Ed.), Stand-alone and hybrid wind energy systems. Technology, energy storage and applications (pp. 475–505). Woodhead Publishing.
3. Monge-Barrio, A., Gutiérrez, A. S.-O. (2018). Passive Energy Strategies for Mediterranean Residential Buildings: Facing the Challenges of Climate Change and Vulnerable Populations. Springer International Publishing.
4. Philips, D., (2004). Daylighting: Natural Light in Architecture, ed. Architectural Press, Oxford.
5. Hestnes A., Hastings S. R., Saxhof B. (1996). Solar Energy Houses. James & James London, ISBN 1873936699.</td></tr>
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