a) General			
School	ENGINEERING		
Academic unit	MECHANICAL ENGINEERING		
Level of studies	Undergraduate		
Course code	MM109E02	*Semester*	9
Course title	**Energy storage and energy saving**		

Independent teaching activities	*Weekly teaching hours*	*ECTS*
Lectures	2	4.5
Laboratory exercises	2	
Course type	Knowledge deepening/consolidation	
Course category	Compulsory Elective for Direction 1	
Prerequisite courses	-	
Language of instruction and examinations	Greek	
Is the course offered to Erasmus students	No	
Course website (url)		

b) Learning outcomes and general competences

b1. Learning outcomes

Upon successful completion of this course, the student will be able to:
- Become familiar with electrical and thermal energy storage systems
- Determine the most suitable energy storage configuration for a given energy application
- Estimate the optimum size of an energy storage system
- Become familiar with the modern energy saving techniques
- Develop a complete energy saving study
- Determine the optimum energy saving solution for a given energy system

b2. General competences

- Search for, analysis and synthesis of data and information with the use of the necessary technology
- Team work
- Production of new research ideas
- Respect for the natural environment
- Production of free, creative and inductive thinking

c) Syllabus

Theory: Basic energy storage systems, principles of operation, study of energy storage systems' operation, sizing of energy storage systems, techno-economic evaluation of energy storage systems, environmental-social benefits, novel energy storage technologies, basic principles of energy saving and rational use of energy, energy consumption in production sectors of the Greek economy, energy saving in the residential and building sectors, energy saving in the industrial sector, in agriculture and in transportation, study of combined heat and power systems, cost-benefit analysis for energy saving interventions, environmental benefits of energy saving interventions, legal and financing framework, energy saving contracts financed by third parties.
Lab: Sizing of energy storage systems, evaluation of energy storage systems, techno-economic evaluation of energy storage systems, energy consumption analysis and energy saving recommendations, application of an integrated energy saving plan.

d) Teaching and learning methods - Evaluation

Delivery	Face-to-face (classroom, working groups, lab)
Use of information and	- Commercial/free/open source software

<table>
<tr><td>communications technology</td><td colspan="2">- Multimedia applications
- MS Teams/Moodle/
- Site visits
- Open courses</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>12</td></tr>
<tr><td>Laboratory exercises</td><td>20</td></tr>
<tr><td>Computational exercises</td><td>6</td></tr>
<tr><td>Individual work</td><td>66</td></tr>
<tr><td>Course total</td><td>130</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 assignments (30%) and written final exam (40%), including short-answer questions and computational problems.
For the lab part of the module: Individual and/or group assignments and written exam or presentation, per assignment and case study examined (30%).
The theoretical part of the module holds 70% of the final grade weight, and the lab part holds 30%.</td></tr>
<tr><td colspan="3">e) Suggested bibliography</td></tr>
<tr><td colspan="3">Kaldellis, J. K. (Ed). (2010). Stand-alone and hybrid wind energy systems. Technology, energy storage and applications. Woodhead Publishing. ISBN 978-1-84569-527-9.
Πέρδιος, Σ. (2010). Οικονομική αξιολόγηση επεμβάσεων για εξοικονόμηση ενέργειας. ΣΕΛΚΑ.</td></tr>
</table>