COURSE OUTLINE

1. GENERAL

SCHOOL:	Engineering		
DEPARTMENT:	Electrical and Computer Engineering		
LEVEL OF STUDY:	Undergraduate		
COURSE UNIT CODE:	7.005	**SEMESTER**	7th
COURSE TITLE:	Energy Planning in Buildings		

COURSEWORK BREAKDOWN	**TEACHING WEEKLY HOURS**	**ECTS Credits**
Theory (Lectures)	2	3
Tutorial/Exercises	1	1
TOTAL	**3**	**4**

COURSE UNIT TYPE:	Specialized knowledge/Consolidation
PREREQUISITES:	No
LANGUAGE OF INSTRUCTION/EXAMS:	Greek
COURSE DELIVERED TO ERASMUS STUDENTS	No
COURSE WEB PAGE (URL)	https://eclass.hmu.gr/courses/ECE164/

2. LEARNING OUTCOMES

Learning Outcomes

The course "Energy Planning in Buildings" aims to give students advanced knowledge on the issue of proper energy design of buildings. For this purpose, the main categories of buildings and their characteristics are given, whereas the calculation methodology and the assumptions taken into account according to the Greek Regulation on the Energy Efficiency of Buildings (KENAK) and the corresponding implementation software (TEE KENAK) are also described. In addition, the operation of modern control and automation systems for buildings is emphasized.
Upon successful completion of the course, the students will be able to:

1. Distinguish the basic categories of buildings and the systems they include
2. Combine the assumptions included in the Greek Regulation on the Energy Efficiency of Buildings (KENAK) and implement the necessary calculations
3. Be familiar with the concept of the "Smart Building", as well as with the capabilities provided by modern control and automation systems in buildings
4. Combine the appropriate knowledge to prepare an energy audit in buildings using appropriate software

General Skills

- Retrieve, analyse and synthesise data and information, with the use of necessary technologies
- Decision making
- Autonomous work
- Work in an interdisciplinary environment
- Project planning and management
- Respect for the natural environment

3. SYLLABUS

- Introduction in energy regulations
- Energy audit methodology, Greek Regulation on the Energy Efficiency of Buildings (KENAK)
- Building operating conditions: Reference building, thermal zones, desired indoor conditions

- Building envelope: Heat transfer coefficient (U-value), opaque elements, frames, thermal bridges, shading, ventilation
- Heating, cooling, air conditioning (HVAC) and domestic hot water systems
- Lighting of buildings, utilization of natural lighting
- Renewable energy and combined heat and power (CHP) technologies in buildings
- Control and automation devices, sensors, actuators, communication protocols, "Smart Buildings"
- Building Management Systems (BMS)
- Interfacing "Smart Buildings" with "Smart Grids"
- Proposals for energy upgrading of buildings, economic and technical analysis of interventions in buildings
- Measuring devices for energy audits
- Software tools (TEE KENAK)

4. TEACHING METHODS - ASSESSMENT

MODE OF DELIVERY	In-Class Face-to-Face
USE OF INFORMATION AND COMMUNICATION TECHNOLOGY	• Use of ICTs in lecturing • Use of ICT in Laboratory Teaching • Use of ICTs for the communication with students via the e-class platform
TEACHING ORGANIZATION	

Method description/Activity	***Semester Workload***
Lectures	40
Study and analysis of bibliography	10
Tutorial	10
Homework exercises and project	20
Independent study	40
Total Contact Hours	**120**

ASSESSMENT METHODS

Assessment Language: Greek
All announcements for the course regulations and complementary reading material are permanently posted in the course e-class. The course grade incorporates the following evaluation procedures:

Student Assessment methods
1. Written final exam (80%) which includes:
   - Solving problems related to quantitative and qualitative data
   - Short answer questions
   - Multiple choice questions
2. Homework exercises and project (20%)

5. RECOMMENDED BIBLIOGRAPHY

-Recommended Bibliography:

- G. Pantelidis, New Guide to Energy Inspection of Buildings,Dedemadis, 2015 (in Greek).
- P. Kosmopoulos, Buildings, energy and environment, University Studio Press, 2008 (in Greek).
- S. Perdios, Energy Inspection of Buildings and Industries, SELKA - 4M, 2006 (in Greek).

- M. Krarti, Energy Audit of Building Systems: An Engineering Approach (2nd Edition), CRC press, 2010.
- J. F. Kreider, P. S. Curtiss, and A. Rabl, Heating and Cooling of Buildings: Design for Efficiency (2nd Edition), CRC Press, 2010.
- A. Sumper and A. Baggini, Electrical Energy Efficiency: Technologies and Applications. John Wiley & Sons, 2012.
- A. Apostolou, T. Nikolaou, D. Kolokotsa, C. Munteanu, and G. Stavrakakis, Integrated Intelligent Systems for the Efficient Management of Indoor Environment and Energy in Buildings, Politechnium, Iasi, 2013.
- S. Wang, Intelligent Buildings and Building Automation, Spon Press, 2010.
- G. J. Levermore, Building Energy Management Systems: An Application to Heating, Natural Ventilation, Lighting and Occupant (2nd Edition), Routledge, 2000.

-Relevant scientific journals:

- Energy and Buildings
- Building and Environment
- Buildings
- Applied Energy
- Energy