EEE.6.7 Thermodynamics & Heat Transfer Principles

COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	EEE.6.7	SEMESTER	6
COURSE TITLE	Thermodynamics & Heat Transfer Principles		
INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*		WEEKLY TEACHING HOURS	CREDITS
		3	3
Total		3	3
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).			
COURSE TYPE *general background, special background, specialised general knowledge, skills development*	General Background		
PREREQUISITE COURSES:	NO		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	NO		
COURSE WEBSITE (URL)			

(2) LEARNING OUTCOMES

Learning outcomes
The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described. *Consult Appendix A* • *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area* • *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B* • *Guidelines for writing Learning Outcomes*
Upon successful completion of the course, the student will be able to: • Know and be able to handle the fundamental laws of thermodynamics • Understand the thermodynamic properties that govern energy systems • Apply the laws of thermodynamics to the solution of energy problems • Solve simple thermodynamic problems and consequently evaluate efficiencies of heat engines, refrigeration engines and heat pumps • Analyze and calculate various thermodynamic quantities in energy systems. • Describe the fundamental principles and laws that govern Heat Transfer.

- Distinguish the forms of heat transfer (conduction, convection, radiation).
- Distinguish and apply the fundamental equations of Heat Transfer.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	…….

The course aims to cultivate the following skills:

- Research, analyze and synthesize data and information, by application of the necessary technologies
- Autonomous work
- Promotion of free, creative and inductive thinking

(3) SYLLABUS

In the context of the course, students are taught: Thermodynamic systems, Thermodynamic properties, Thermodynamic equilibrium, Thermodynamic processes, Thermodynamic cycles, Energy, Work, Heat, Law of ideal gases, Constitutive equation of ideal gases, Van der Waals equation, Work of ideal gases, Properties of the pure substance, Tables of thermodynamic properties, First law of thermodynamics, Equation of continuity, Specific Heat capacities, Second Thermodynamic law, The Thermal machine, Heat pump, Carnot Cycle, Entropy of the Pure substance, Maxwell equations, Thermal engine cycles, Introductory concepts of Heat Transfer, Basic principles of thermal conductivity, One-dimensional thermal conduction, Basic principles of heat conduction, Heat exchangers.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Physical presence of students - In classroom
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	• Use of Audio-visual material and multimedia applications • Update and ancillary training material through the course web site and via e-mail
TEACHING METHODS *The manner and methods of teaching are described in detail.* *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	

Activity	*Semester workload*
Lectures	39
Preparation of coursework (individual work)	39
Study	12
Course total	***90***

STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure* *Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	Assessment Language: Greek Written examination: 100% Written examination involves solving a series of exercises related to the entire course subject. Optional coursework preparation of up to 20%, Deducted by the percentage of written examination

(5) ATTACHED BIBLIOGRAPHY

1. Νίκας, Π. Κ. (2011). Εφαρμοσμένη Θερμοδυναμική για Μηχανικούς. Leeder Enterprises.
2. Eastop & McConkey (1998). Applied Thermodynamics for Engineering Technologists. Longman
3. Cengel & Boles (2011). Θερμοδυναμική για Μηχανικούς (Μετάφραση). Τζιόλας.
4. Παπαϊωάννου, Α. (2007). Θερμοδυναμική (Βασικές αρχές και νόμοι-Καθαρές ουσίες). Τόμοι 1 & 2. Εκδόσεις Κοράλι.
5. Νίκας Κ.-Σ. Π. (2010). Αρχές της Μετάδοσης Θερμότητας για Μηχανικούς. Αυτοέκδοση.