COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF SCIENCES		
ACADEMIC UNIT	DEPARTMENT OF PHYSICS		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**407**	**SEMESTER**	**7**
COURSE TITLE	NATURAL ENERGY SOURCES, NATURAL RESOURCES AND THEIR ENVIROMENTAL IMPACT		

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**
	4	4
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*	Special background
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	http://ecourse.uoi.gr/course/view.php?id=565

(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*

The course deals with the alternative sources of energy, i.e. the renewable ones and the nuclear energy in connection with the conventional, non renewable sources (oil, coal and natural gas). Also, energy exploitation systems are discussed as well as the environmental impact of energy sources. The presentation is descriptive by means of basic concepts of Physics and use of elementary Mathematics. Upon completion of the course, the students will

- be able to describe the alternative energy sources
- have established sensitivity on energy saving through rational energy use
- have established sensitivity on the sustainable development through the use of natural energy reserves while respecting environmental protection.

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…*
	…….

Search for, analysis and synthesis of data and information, with the use of the necessary technology.
Working independently.
Respect the natural environment.
Criticism and self-criticism.
Production of free, creative and inductive thinking.

(3) SYLLABUS

Renewable and conventional energy resources. Solar energy, wind energy, biomass, hydropower. Use of energy sources and environmental impact. Natural resources (water, forests, fuel sources etc), ecosystems. Management, use and disposal of natural resources. Natural hazards and natural environmental disasters. Sustainable development. Statistical and mathematical models for studying of the natural energy sources and resources. Non-renewable natural energy sources. Sources of conventional fuels (Fossil fuels, natural gas etc). Nuclear energy (fission, controlled thermonuclear fusion). Problems and solutions.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Use of Moodle on-line learning platform for the dissemination of notes, problem sets as well as contacting the students
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.*	

Activity	***Semester workload***
Lectures	39
Tutorials	13
Bibliography study	33
Non-guided study	12
Exams	3

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	Course total: ***100***
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.*	Written exam at the end of the course containing theory and problem solving.

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:
- Related academic journals:

Suggested bibliography :

- G. Pantis - I. Pnevmatikos, Energy sources, University of Ioannina, 2011.
- P.Giannoulis, New energy sources, University of Patras, 2001.
- J. A. Duffie, W. A. Beckman, Solar engineering of thermal processes, second edition, John Willey & Sons., 1991.
- A.B. Meinel and M. P. Meinel, Applied solar energy, Addison-Wesley, 1976.
- S. Wieder, An Introduction to solar energy for scientists and engineers, Krieger Publishing Company, 1992.
- W. Palz, Solar electricity: An economic approach to solar energy, Unesco, Butterworths, 1978.
- R. DiPippo, Geothermal Power Plants: principles, applications, case studies and environmental impact, *second edition*, Elsevier, 2008.
- D. T Swift-Hook, Wind energy and the environment, Institution of Electrical Engineers, London, U.K. : P. Peregrinus on behalf of the Institution of Electrical Engineers, 1989.
- R. L. Murray, Nuclear Energy: an introduction to the concepts, systems and applications of nuclear processes, fourth edition, Butterorth-Heinemann, 1993.
- F. F. Chen, Introduction to Plasma Physics, Plenum, 1977.