Course unit title:	Solar Energy				
Course unit code:	AEEE360				
Type of course unit:	Required				
Level of course unit:	Bachelor (1st Cycle)				
Year of study:	2				
Semester when the unit is delivered:	5 (Fall)				
Number of ECTS credits allocated:	6	Lectures:	3	Labs:	0
Name of lecturer(s):	Dr Nicholas Christofides				
Aim of the Course	The course familiarizes students with the properties of sunlight and solar geometry and equips them with the basic knowledge necessary to appreciate the harnessing possibilities of solar energy. Solar PV and thermal technologies are subsequently introduced.				
Learning outcomes of the course unit:	• Identify and associate the properties of sunlight and solar geometry • Understand the fundamental operating mechanisms by which PV cells generate electrical energy. • Assess and examine solar radiation data and measurements. • Understand and classify solar thermal technologies and systems.				
Mode of delivery:	Face-to-face				
Prerequisites:	None		Co-requisites:	None	
Course contents:	1. Introduction to Solar Energy: solar energy, the greenhouse effect 2. Properties of sunlight: basics of light, photons, solar radiation in space and terrestrial solar radiation, motion of the sun, solar time, elevation angle, declination angle, azimuth angle, position of the sun 3. Solar radiation: solar radiation on a tilted surface, calculation of insolation (solar radiation energy on a surface), measurement and analysis of solar radiation 4. Photovoltaics: the PV phenomenon, semiconductor materials and structure, generation and recombination, diode equations for PV 5. Cells, modules and arrays: solar cell operation, IV characteristics and efficiency of cells, module design, interconnection effects, temperature effects, lifetime of PV modules 6. Solar collectors: description, flat plate, concentrating collectors, temperature effects, effects of dust and shading, performance, efficiency, characteristics, practical considerations 7. Solar thermal power systems: Parabolic troughs, Sterling engines, Solar towers, thermal storage				
Recommended and/or required reading:					
Textbooks:	• T. Kissell, Introduction to Solar Principles, Pearson, 2012 • J.A. Duffie, W.A. Beckman, Solar Engineering of Thermal Processes, 4th Edition, John Wiley & Sons Wiley, 2013				
References:	• S.P. Sukhatme, Solar Energy: Principles of thermal collection and storage, 3rd edition, Mc Graw Hill 2008 • G.N. Tiwari, Solar Energy: Fundamentals, design, modeling and applications, revised edition, Alpha Science Intl Ltd, 2015				
Planned learning activities and	Students are taught the course through lectures (3 hours per week) in classrooms via projector presentations and by the use of the whiteboard. Following major				

teaching methods:	lecture topics and chapters, mathematical problems and examples are solved during class. Exercises for assessed homework are also a standard practice for this course as well as at least one assignment. Lecture presentations are available for students to download via the university e-learning platform. Students are also advised to use the recommended course textbook or reference books for further reading and practice in solving related exercises. Further literature search is encouraged by assigning students to identify a specific problem related to some issue, gather relevant scientific information about how others have addressed the problem and report this information in written or orally. Students are assessed continuously and their knowledge is evaluated through tests with their assessment weight, date and time being set at the beginning of the semester via the course outline. Students are prepared for the final exam, by revision on the matter taught, problem solving and concept testing. Overall, the course assessment is both formative and summative and aims to comply with the subject's expected learning outcomes and the quality of the course.
Assessment methods and criteria:	• Assignments/Homework 10% • Tests 30% • Final Exam 60%
Language of instruction:	English
Work placement(s):	No