UNIVERSITY of NICOSIA

Course Code	Course Title	ECTS Credits
MENG-486	Alternative Energy Systems	6
Department	**Semester**	**Prerequisites**
Engineering	Fall, Spring	ECE-210
Type of Course	**Field**	**Language of Instruction**
Elective	Engineering	English
Level of Course	**Year of Study**	**Lecturer(s)**
1st Cycle	4th	Dr Marios Nestoros
Mode of Delivery	**Work Placement**	**Co-requisites**
Face-to-face	N/A	None

Objectives of the Course:

The main objectives of the course are to:

- Introduce the most important renewable energy sources and the corresponding systems used for energy conversion
- Familiarize students with the physical laws that underpin the renewable energy technologies
- Discuss the operation and performance of the different engineering systems used
- Present the social, environmental and economic issues associated with each renewable energy technology

Learning Outcomes:

After completion of the course students are expected to:

- Demonstrate understanding of the requirements for energy conversion from renewable sources
- Demonstrate understanding of the key characteristics of the different renewable energy source systems
- Present principles and techniques to analyze the physical and operational aspects of the taught renewable energy systems
- Demonstrate understanding of the operational aspects of renewable energy systems and their utilization as a source of electrical energy
- Demonstrate understanding of the limitations of each technology and the environmental impact they have

Course Contents:

- Introduction: fossil fuel based technologies, energy consumption, energy and environment, renewable and alternative energy resources
- Solar Energy: solar radiation logistics, solar photovoltaic conversion, limitations of cell efficiency, stand alone and grid connected PV cell operation, solar thermal conversion systems, solar thermal collector energy balance, economics of solar

energy and environmental considerations.

- Wind Energy: wind characteristics, wind turbines and conversion efficiency, Environmental issues
- Hydropower: principle, size and types of energy conversion schemes, pumped storage, assessment of annual energy output, turbine and generator types, environmental impact
- Tidal Energy: cause of tides, ocean energy potential, tidal energy technologies,
- Wave Energy: water waves, conversion devices, social environmental aspects
- Geothermal Energy: resources and technologies, basic principles, operation, performance, efficiency and cost, economics, environmental impact.
- Biomass: biomass types, basic principles, operation, performance, efficiency, cost, advantages and disadvantages, economics, environmental impact.

Learning Activities and Teaching Methods:

Lectures, in-class examples and exercises, discussion

Assessment Methods:

Homework, midterm test, final exam, assignments

Required Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
J. Twidell, A. D. Weir	Renewable Energy Resources	Taylor and Francis	2010	9780419 253303

Recommended Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
Godfrey Boyle	Renewable Energy, Power for a Sustainable Future	Oxford University Press	2012	9780199 545339
McKay	Sustainable Energy – Without the Hot Air. McKay	http://www.inference.phy.cam.ac.uk/sustainable/book/tex/sewtha.pdf		
J. Andrews and N. Jelly	Energy Science principle's, technologies and impacts	Oxford University	2013	9780199 592371