

Course Title	Renewable Energy Sources				
Course Code	ECE442				
Course Type	Elective				
Level	Bachelor (1st Cycle)				
Year / Semester	4 th Year / 6 th Semester				
Teacher's Name	TBA				
ECTS	6	Lectures / week	3 hours / 14 weeks	Laboratories / week	N/A
Course Purpose and Objectives	The objective of this course is to describe the significance of renewable energy resources and in particular, to identify the potential of renewable energy technologies. The course further explains the physical phenomena of each renewable resource, the operation of different renewable technologies and the important topics and concepts in component specifications, design and sizing.				
Learning Outcomes	<p>Upon successful completion of this course, students should be able to:</p> <ul style="list-style-type: none"> • Define the requirements for energy and energy conversion from renewable sources • Examine the different existing renewable energy technologies • Describe aspects of renewable energy resources and their utilization as a source of energy • Provide a range of principles and techniques for the analysis and description of the physical and operational aspects of solar, wind, hydro, geothermal and biomass technologies • Analyse and solve renewable energy problems • Increase awareness on renewable energy sources 				
Prerequisites	ECE320	Co-requisites	None		
Course Content	<p>Introduction: Overview of energy, force, energy and power. Energy transfer and different forms of energy. Energy crisis and market potentials. Conventional sources of energy and climate change. Introduction to renewable energy sources, solar energy direct and indirect uses. Non-solar renewable sources.</p> <p>Solar energy resource: Earth's energy budget. Solar radiation and the spectrum of solar radiation. Measuring solar radiation. Earth motion around the Sun.</p> <p>Solar energy direct uses: Solar-electric energy conversion principle. Photovoltaic effect and semi-conductors. Photovoltaic types. Basic principles, operation, performance, efficiency, cost, advantages and disadvantages. Photovoltaic technologies. Irradiance, spectral and thermal response. Photovoltaic system types,</p>				

	<p>performance and applications. Economics, potentials and environmental impact.</p> <p>Solar energy direct uses: Solar thermal technologies. The nature of the resource. Solar-thermal energy conversion principle. Solar thermal collector types. Basic principles of solar collectors (reflection, transmittance and refraction). Solar thermal collector energy balance. Solar thermal system types, performance and applications. Economics, potentials and environmental impact.</p> <p>Solar energy indirect uses: Wind energy technologies. The nature of the resource. The wind (Energy and power in the wind). Wind-electric energy conversion principle. Wind turbine types. Basic principles, operation, performance, efficiency, cost, advantages and disadvantages. Power and energy from wind turbines. Economics, potentials and environmental impact.</p> <p>Solar energy indirect uses: Biomass energy technologies. The nature of the resource. Biomass energy conversion principle. Biomass types. Basic principles, operation, performance, efficiency, cost, advantages and disadvantages. Economics, potentials and environmental impact.</p> <p>Solar energy indirect uses: Hydro energy technologies. The nature of the resource. A brief history on hydro-power. Hydro-electric energy conversion principle. Types of hydro-electric plants. Propellers and turbines. Basic principles, operation, performance, efficiency, cost, advantages and disadvantages. Economics, potentials and environmental impact.</p> <p>Non-solar renewable sources: Tidal energy technologies. The nature of the resource. Tidal energy conversion principle. Tidal energy types. Basic principles, operation, performance, efficiency, cost, advantages and disadvantages. Economics, potentials and environmental impact.</p> <p>Non-solar renewable sources: Geothermal energy technologies. Geothermal energy conversion principle. Technologies for geothermal resource exploitation. Basic principles, operation, performance, efficiency, cost, advantages and disadvantages. Economics, potentials and environmental impact.</p> <p>World trends in renewable energy sources: Energy consumption overview. Meeting worldwide energy consumption using renewable resources. Renewable energy potential in Cyprus. Grid-Integration of renewable sources.</p>
Teaching Methodology	Face- to- face

Bibliography	<p>G. Boyle, Renewable Energy, Power for a sustainable future. Oxford University press</p> <p>S. R. Wenham, M. A. Green and M. E. Watt, Applied Photovoltaics. Earthscan</p> <p>F. Antonios, C. Durschner and K. Remmers, Photovoltaics for Professionals. Earthscan</p>								
Assessment	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="padding-right: 20px;">Examinations</td> <td style="text-align: center;">70%</td> </tr> <tr> <td style="padding-right: 20px;">Assignments/Lab</td> <td style="text-align: center;">20%</td> </tr> <tr> <td style="padding-right: 20px;">Class Participation and Attendance</td> <td style="text-align: center;">10%</td> </tr> <tr> <td></td> <td style="text-align: center;">100%</td> </tr> </table>	Examinations	70%	Assignments/Lab	20%	Class Participation and Attendance	10%		100%
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Language	English								