

Course unit title:	Structural aspects in renewable energy applications		
Course unit code:	CESU 420		
Type of course unit:	Compulsory (for Specialization in Sustainable Construction)		
Level of course unit:	Bachelor (1st Cycle)		
Year of study:	4		
Semester when the unit is delivered:	7 (Fall)		
Number of ECTS credits allocated :	6		
Name of lecturer(s):	Dr Paris Fokaides, Dr Petros Christou		
Aim of the Course	The purpose of this course is to present the topics in civil engineering that are related to the development of renewable energy technologies applications. The fundamental principles of renewable energy sources applications will be introduced and an analysis of large structures that are deemed necessary for the operation of renewable energy sources power plants will be analyzed.		
Learning outcomes of the course unit:	<ul style="list-style-type: none"> ○ Understand the basic concepts of renewable energy sources applications ○ Be aware of large structures deemed necessary for the proper operation of renewable energy sources power plants ○ Present and analyze the structures related to on ground renewable energy technologies applications (solar trackers, wind tower, anaerobic digestion reactor) ○ Present and analyze the structures related to coastal renewable energy technologies applications (tidal turbines, off shore wind towers) ○ Present and analyze the structures related to underground renewable energy technologies applications (geothermal heat exchanger) 		
Mode of delivery:	Face-to-face		
Prerequisites:		Co-requisites:	None
Course contents:	<p>Module 1: Renewable energy technologies fundamentals</p> <ul style="list-style-type: none"> ○ Renewable energy technologies fundamentals ○ Classification of renewable energy technologies ○ National action plan for the penetration of renewable energy technologies in national energy mixture ○ Licensing procedure for renewable energy projects <p>Module 2: On ground renewable energy structures</p> <ul style="list-style-type: none"> ○ PV tracker <ul style="list-style-type: none"> ○ Single axis trackers ○ Dual axis trackers ○ Wind tower <ul style="list-style-type: none"> ○ Consisting parts ○ Guyed Tower ○ Lattice tower ○ Tubular tower ○ Anaerobic digestion reactor <p>Module 3: Coastal renewable energy structures</p> <ul style="list-style-type: none"> ○ Tidal generator <ul style="list-style-type: none"> ○ Concept and basic prototypes ○ Off shore wind tower <ul style="list-style-type: none"> ○ Bottom-mounted axial turbines ○ A cable tethered turbine 		

	<p>Module 4: Underground renewable energy structures</p> <ul style="list-style-type: none"> ○ Drilling equipment, methods and technology, advanced drilling techniques, design of wells and casing programs, cementing techniques. ○ Borehole geology and stratigraphy interpretation of drill cuttings and cores ○ Cleaning and repair of production wells, well maintenance. ○ Stress orientation and characterization, hydraulic fracturing.
Recommended and/or required reading:	
Textbooks:	<ul style="list-style-type: none"> ○ Wind Energy Explained: Theory, Design and Application, James F. Manwell, Jon G. McGowan, Anthony L. Rogers, Wiley, 2 edition, 2010, ISBN-10: 0470015004 ○ Renewable Energy: Technology, Economics and Environment, Martin Kaltschmitt, Wolfgang Streicher, Andreas Wiese Springer, ISBN: 978 354 070 947 3
References:	
Planned learning activities and teaching methods:	<p>The course is presented through theoretical lectures in class. The lectures present to the student the course content and allow for questions. The material is presented using visual aids (i.e. PowerPoint presentation slides, documentaries, etc.). The aim is to familiarize the student with the different and faster pace of presentation and also allow the instructor to present related material that would otherwise be very difficult to do. The learning process is enhanced with the requirement from the student to carry in-class discussions and tackling of hypothetical scenarios in small-group exercises. Homework Assignments, which are required as part of the students assessment for the course, allows students the opportunity to carry out independent work, synthesize basic concepts presented in class, as well as hone their writing and presentation skills. Besides from the notes taken by students in class, all of the course material is made available through the class website which is available through the University's E-learning platform ("Moodle"). The instructor is available to students during office hours or by appointment in order to provide necessary guidance.</p>
Assessment methods and criteria:	<ul style="list-style-type: none"> ● Midterm Exams: 40% ● Assignments: 10% ● Final Exam 50%
Language of instruction:	English
Work placement(s):	No