

Course unit title:	<b>Sustainable Evaluation and Retrofits of Structures</b>		
Course unit code:	CESU 320		
Type of course unit:	Compulsory (for Specialization in Sustainable Construction)		
Level of course unit:	Bachelor (1st Cycle)		
Year of study:	3		
Semester when the unit is delivered:	6 (Spring)		
Number of ECTS credits allocated :	6		
Name of lecturer(s):	Dr Petros Christou, Dr Paris Fokaides		
Aim of the Course	This course introduces the students to the fundamentals of the retrofit of existing buildings. The first part of the course describes the basic concepts and terminology and presents the retrofit techniques of the structural retrofitting of existing buildings. The second part of the course presents the various methods for the energy upgrade of the existing buildings.		
Learning outcomes of the course unit:	<ul style="list-style-type: none"> <li>○ Understand the basic concepts and familiarize the student with the terminology related to the retrofitting of structures</li> <li>○ Identify the sources of structural damage and present the methods for their assessment</li> <li>○ Present the overall philosophy of structural retrofitting and understand the various methods that are available</li> <li>○ Present the concept and the relevant codes for the seismic retrofit of existing buildings</li> <li>○ To provide all the required feedback to students to be in position of take a decision whether to renovate or not a building based on energy criteria</li> </ul>		
Mode of delivery:	Face-to-face		
Prerequisites:		Co-requisites:	None
Course contents:	<p><b>Module 1: Retrofit Fundamentals</b></p> <ul style="list-style-type: none"> <li>○ Terminology</li> <li>○ Earthquake resistant structures</li> <li>○ The goals and objectives of retrofit</li> <li>○ Identification of sources for structural damage</li> <li>○ Identification methods for accessing the damage level</li> <li>○ Codes and specifications for the strengthening/retrofitting of structures</li> </ul> <p><b>Module 2: Structural Retrofit Philosophy</b></p> <ul style="list-style-type: none"> <li>○ Retrofit at the element level</li> <li>○ Retrofit at the structure level</li> <li>○ Selective techniques</li> </ul> <p><b>Module 3: Seismic Retrofit of Existing Structures</b></p> <ul style="list-style-type: none"> <li>○ The steps for seismic retrofit</li> <li>○ Retrofit of reinforced concrete buildings</li> <li>○ Retrofit of steel buildings</li> <li>○ Retrofit of historical buildings</li> </ul> <p><b>Module 4: Retrofitting and Energy Upgrades</b></p> <ul style="list-style-type: none"> <li>○ Energy upgrade of buildings shell</li> <li>○ Techniques, materials and practices in the energy upgrade of building</li> <li>○ Installation of renewable energy technologies into renovated buildings shell</li> <li>○ Decision making for buildings energy upgrade</li> <li>○ The role of building services into buildings energy upgrade</li> </ul>		
Recommended and/or required reading:			

Textbooks:	<ul style="list-style-type: none"> <li>○ Guidelines for Seismic Retrofit of Existing Buildings, International Code Council, ISBN-10: 1580010768</li> <li>○ Renewable Energy: Technology, Economics and Environment, Martin Kaltschmitt, Wolfgang Streicher, Andreas Wiese Springer, ISBN: 978 354 070 947 3</li> </ul>
References:	<ul style="list-style-type: none"> <li>○ Sustainable Retrofit and Facilities Management, Paul Appleby, Routledge, 2013, ISBN-10: 0415531098</li> </ul>
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"> <li>• Midterm Exams: 40%</li> <li>• Assignments: 10%</li> <li>• Final Exam 50%</li> </ul>
Language of instruction:	English
Work placement(s):	No