

Course unit title:	Reinforced Concrete Structures I		
Course unit code:	CE310		
Type of course unit:	Compulsory		
Level of course unit:	Bachelor		
Year of study:	3		
Semester when the unit is delivered:	6 (Spring)		
Number of ECTS credits allocated :	6		
Name of lecturer(s):	Dr. Demetris Nicolaides		
Learning outcomes of the course unit:	<ol style="list-style-type: none"> 1. Explain the principles of codes of practice and Limit State Design. 2. Describe the process of analysis of the structure at the Ultimate Limit State. 3. Analyse the process and methods of analysis of reinforced concrete (RC) sections. 4. Analyse the method of design of (RC) beams and slabs for bending and shear. 5. Analyse the principles and procedure of design of short columns resisting biaxial bending and axial forces. 		
Mode of delivery:	Face-to-face		
Prerequisites:	CE240	Co-requisites:	None
Recommended optional program components:			
Course contents:	<p><u>Introduction</u></p> <p>Introduce the principles of Codes of practice. Explain limit state design. Explain characteristic material strengths and loads. Introduce factors of safety (partial and global) and combinations of actions.</p> <p><u>Analysis of Structures at the Ultimate Limit State (ULS)</u></p> <p>Describe the process and methods of Analysis of structures at the Ultimate Limit State. Specify load combinations and patterns, explain the concept of favourable and unfavourable loading effects. Describe the process for the analysis of beams and frames and specify the importance of Moment Envelope Curves.</p> <p><u>Analysis of Reinforced Concrete Sections</u></p> <p>Explain the relations of stress and strain in reinforced concrete sections. Describe the distribution of strains and stresses across a section in bending and derive the design equations for singly and doubly reinforced sections in bending at the ULS. Analyse the equivalent rectangular, the rectangular-parabolic and the triangular stress blocks.</p> <p><u>Design of Reinforced Concrete Beams and Slabs</u></p> <p>Introduce the concept of preliminary analysis and member sizing of beams. Analyse the principles and methods of design of rectangular beams and slabs for bending with no moment redistribution. Explain the concept and process of design of RC beams and slabs for shear. Highlight the importance of punching shear in slabs.</p> <p><u>Design of Columns</u></p> <p>Analyse the column classification and the possible failure modes. Describe the design process of short columns resisting moments and axial forces and the also the process for the design of short columns with biaxial bending.</p>		
Recommended and/or required reading:			
Textbooks:	Reinforced Concrete Design to Eurocode 2, 7 th Edition, 2012, W.H. Mosley, R. Hulse and J.H. Bungey, Palgrave.		

References:	<p>Designers' Guide to EN 1992-1-1 and EN 1992-1-2. Eurocode 2: Design of Concrete Structures. General Rules and Rules for Buildings and Structural Fire Design. A. W. Beeby and R. S. Narayanan, 2005.</p> <p>EN 1992 Eurocode 2: Design of Concrete Structures</p> <p>EN 1990 Eurocode 0: Basis of Structural Design</p> <p>EN 1991: Eurocode 1: Actions on Structures</p>
Planned learning activities and teaching methods:	<p>The course is delivered through theoretical lectures in class and educational field visits. The lectures present to the student the course content and allow for questions. Part of the material is presented using visual aids. The aim is to familiarize the student with the different and faster pace of presentation and also allow the instructor to present related material (photographs, videos, etc.). The learning process is enhanced with the requirement from the student to solve relevant examples. Besides from the notes taken by students in class, all of the course material is available through the class website and also through e-learning platform. Finally the instructor is available to students during office hours or by appointment in order to provide any necessary tutoring.</p>
Assessment methods and criteria:	<ul style="list-style-type: none"> • Coursework 50% • Final Exam 50%
Language of instruction:	English
Work placement(s):	No