

### CE555 - Masonry Design

Course Title	Masonry Design				
Course Code	CE555				
Course Type	Elective				
Level	MSc (Level 2)				
Year / Semester	2 <sup>nd</sup> / 3 <sup>rd</sup>				
Teacher's Name	Antonis Michael				
ECTS	7	Lectures / week	3	Laboratories / week	
Course Purpose	<p>This course deals with the subject of load bearing masonry structures. This course is not normally taught in undergraduate programs however load bearing masonry has been used in Cyprus particularly in industrial buildings for many years. Also traditional buildings in Cyprus are built in masonry stone. This fact makes the particular course useful and necessary for a practicing engineer. This course aims to introduce the students to masonry structures and provide them with the necessary skills to design load bearing masonry structures unreinforced and reinforced. The students are expected to perform their own research on particular aspects or practical applications through journal articles and case studies.</p>				
Learning Outcomes	<ol style="list-style-type: none"> <li>1. Define masonry materials and their mechanical properties.</li> <li>2. Apply appropriate code provisions for the design of masonry structural components/members.</li> <li>3. Determine engineering parameters for masonry materials.</li> <li>4. Design unreinforced and reinforced masonry walls.</li> <li>5. Analyze long masonry walls for crack control.</li> <li>6. Design masonry columns and pilasters.</li> </ol>				
Prerequisites	None		Corequisites	None	
Course Content	<p><b>Bricks, blocks and mortars:</b> Introduction, Bricks and blocks, Mortars, Proportioning and strength, Choice of unit and mortar, Wall ties, Concrete infill and grout, Reinforcing steel</p> <p><b>Masonry properties:</b> General, Compressive strength, Strength of masonry in combined compression and shear, The tensile strength of masonry, Stress-strain properties of masonry, Effects of workmanship on masonry strength</p> <p><b>Codes of practice for structural masonry:</b> Codes of practice: general, Description of Eurocode 6 Part 1–1</p> <p><b>Design for compressive loading:</b> Introduction, Wall and column behavior under axial load, Wall and column behavior under eccentric load,</p>				

	<p>Slenderness ratio, Calculation of eccentricity, Vertical load resistance, Vertical loading, Modification factors</p> <p><b>Reinforced masonry:</b> Introduction, Flexural strength, Shear strength of reinforced masonry, Deflection of reinforced masonry beams, Reinforced masonry columns, using EN1996–1–1</p>								
<p>Teaching Methodology</p>	<p>The course is presented through theoretical lectures in class and experimental exercises in the laboratory. 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 (drawings, graphs, photographs etc.) that would otherwise be very difficult to do. As part of the learning process students are required to solve course related problem exercises. Exercises are also given as homework assignments which are part of the student course assessment. Students are expected to take notes in class during lectures; however, all course material is available to students through the class website on the e-Learning platform.</p> <p>Students are assigned a design project which requires them to collect data for the design a masonry structure on their own. These forces students to research the specific subject, find imposed loads, select materials, model the structure, analyze it and come up with a design that meets code requirements. The students are required to present their work in class and submit an electronic report showing all of their work.</p> <p>Finally the instructor will be available to students during office hours or by appointment in order to provide any necessary tutoring.</p>								
<p>Bibliography</p>	<p><b>Textbooks:</b></p> <ol style="list-style-type: none"> <li>1. “Design of Structural Elements: Concrete, Steelwork, Masonry and Timber Designs to British Standards and Eurocodes”, 3<sup>rd</sup> Edition, Chanakya Arya, 2009, Taylor &amp; Francis, ISBN13: 978-0-415-46719-3 (hbk), ISBN13: 978-0-203-92650-5 (ebk).</li> <li>2. “Design of Masonry Structures”, 3<sup>rd</sup> Edition, A. W. Hendry, B. P. Sinha and S. R. Davies, 2004, Taylor &amp; Francis, ISBN 0 419 21560 3 (Print Edition), ISBN 0-203-37498-3 (Adobe eReader Format).</li> </ol> <p><b>References:</b></p> <p>CYS EN1996: Eurocode 6: Design of Masonry Structures – Part 1-1: General rules for buildings. Rules for reinforced and unreinforced masonry.</p>								
<p>Assessment</p>	<p>Student assessment is based on homework assignments, an individual project, midterm exams and a final exam. The assessment criteria are provided with each assignment, project and exam for the specific course. The weights for each assessment method are as follows:</p> <table data-bbox="491 1756 1054 1944"> <tr> <td>Midterm Exams</td> <td>20%</td> </tr> <tr> <td>Homework Assignments</td> <td>10%</td> </tr> <tr> <td>Design Project</td> <td>20%</td> </tr> <tr> <td>Final Exam (Comprehensive)</td> <td>50%</td> </tr> </table>	Midterm Exams	20%	Homework Assignments	10%	Design Project	20%	Final Exam (Comprehensive)	50%
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<p>Language</p>	<p>English</p>								