CES540 - Timber Design

Course Title	Timber Design				
Course Code	CES540				
Course Type	Elective				
Level	MSc (Level 2)				
Year / Semester	2nd / 3rd				
Teacher's Name	Antonis Michael				
ECTS	7	Lectures / week	3	Laboratories / week	
Course Purpose	This course deals with the subject of timber design. This course is not normally taught in undergraduate programs however timber structures are used more often in recent years in Cyprus. In other areas of the world timber is one of the major materials used in construction of housing. The aim of this course is to introduce the students to the timber structures and equip them with the necessary skills to design timber structures based on relevant code requirements. The students are expected to perform their own research on particular aspects or practical applications through journal articles and case studies.				
Learning Outcomes	1. Apply appropriate code provisions for the design of timber structural components/members. 2. Identify the existence of lateral bracing and/or blocking in compression and bending members. 3. Calculate the design strength of a glulam or sawn lumber members based on the ultimate limit states. 4. Calculate the strength of all modes of failure for connectors. 5. Model and analyze the forces on various components of a diaphragm using flexible diaphragm models. 6. Understand timber engineering technology.				
Prerequisites	None	Corequisites	None		
Course Content	**Timber as a structural material:** introduction, the structure of timber, types of timber, natural characteristics of timber, strength grading of timber, engineered wood products (EWPS). **Relevant Eurocodes:** Eurocode 0: basis of structural design, Eurocode 1: actions on structures, Eurocode 5: design of timber structures. **Design of members subjected to flexure:** design considerations, design for ultimate limit states (ULS) (bending, shear, bearing (compression perpendicular to the grain), torsion, combined shear and torsion), design for serviceability limit states (SLS) **Design of members and walls subjected to axial or combined axial**				

	And flexural actions: design considerations, design of members subjected to axial actions, members subjected to combined bending and axial loading, design of stud walls. **Design of glued laminated members:** design considerations, design of glued-laminated members with tapered, curved or pitched curved profiles, finger joins **Design of wall diaphragms:** in-plane racking resistance of timber walls under horizontal and vertical loading, in-plane racking resistance of timber walls using method b in EC5 **Design of metal dowel type connections:** introduction, metal dowel type fasteners, design considerations, failure theory and strength equations for laterally loaded connections formed using metal dowel fasteners, multiple dowel fasteners loaded laterally, design strength of a laterally loaded metal dowel connection. **Moment capacity of connections formed with metal dowel fasteners or connectors:** introduction, design considerations, the effective number of fasteners in a row in a moment connection, moment behavior in timber connections: rigid model behavior, the analysis of structures with semi-rigid connections.
Teaching Methodology	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. Students are assigned a design project which requires them to collect data for the design a timber structure on their own. These forces students to research the specific subject, find imposed loads, select structural system, 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. Finally the instructor will be available to students during office hours or by appointment in order to provide any necessary tutoring.
Bibliography	**Textbooks:** “Structural Timber Design to Eurocode 5”, 2nd Edition, Jack Porteous and Abdy Kermani, 2007, Wiley-Blackwell Publishing, ISBN: 978-1-118-59729-3. **References:** CYS EN1995: Eurocode 5: Design of Timber Structures – Part 1-1: General rules and rules for buildings

Assessment	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: Midterm Exams 20% Homework Assignments 10% Design Project 20% Final Exam (Comprehensive) 50%
Language	English