



University of Nicosia, Cyprus

Course Code CEE-422	Course Title Computer-Aided Structural Analysis and Design	ECTS Credits 5
Department Engineering	Semester Fall, Spring	Prerequisites CEE-321
Type of Course Elective	Field Civil & Environmental Engineering	Language of Instruction English
Level of Course 1 st Cycle	Year of Study 4 th	Lecturer(s) Dr Panayiotis Polycarpou
Mode of Delivery Face-to-face	Work Placement N/A	Co-requisites None

Objectives of the Course:

The main objectives of the course are to:

1. Teach how to use structural analysis software for the static and dynamic analysis of structures.
2. Explain how the various structural analysis software applications work.
3. Explain how to assess and validate the computed results and how these are related to the modelling assumptions

Learning Outcomes:

After completion of the course students are expected to:

- Build the mathematical model of a given physical structure
- Formulate and use each one of the various types of finite elements
- Identify and explain all steps involved in the Direct Stiffness Method
- Model a simple building, using a commercial analysis software and analyse it for both static and seismic actions
- Perform structural design of the simulated structure, according to the code requirements

Course Contents:

Introduction: basic theory of the Finite Element Method, overview of the Direct Stiffness Method and its application in the analysis of trusses and framed structures

Modelling principles: Types of finite elements and their degrees of freedom, truss, beam, plane stress, plane strain, shell, solid elements, selection of appropriate elements for the various types of structures

Frame structures modelling: Beams, columns, stairs, plates and shells, shear walls, supports, diaphragms, masses, dynamic degrees of freedom.

Programming: implementation of the direct stiffness method in MATLAB code, development of a simple algorithm to perform dynamic analysis of simple multi-degree of freedom systems

Finite Element Analysis Software: Capabilities, uses, advantages and limitations of structural engineering computer software, modelling a simple building, performance of static analysis, response spectrum analysis, direct integration dynamic analysis, non-linear analysis, post-processing of the results, combinations, design according to the European standards (Eurocodes)

Learning Activities and Teaching Methods:

Lectures, examples and exercises in computer lab, homework assignments

Assessment Methods:

Homework assignments, Project, mid-term exam(s), final exam.

Required Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
S.M. Holzer	Computer Analysis of Structures: Matrix Structural Analysis Structured Programming	Elsevier Science	1985	978-0444009432

Recommended Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
Bathe K.J.	Finite Element Procedures	Prentice Hall	2007	978-0979004902