



Course Syllabus

Course Code	Course Title	ECTS Credits
CEE-220	Structural Analysis I	5
Prerequisites	Department	Semester
MENG-250	Engineering	Fall/Spring
Type of Course	Field	Language of Instruction
Required/Elective	Civil & Environmental Engineering	English
Level of Course	Lecturer(s)	Year of Study
1 st Cycle	Dr Panayiotis Polycarpou	2 nd
Mode of Delivery	Work Placement	Corequisites
Face-to-face	N/A	None

Course Objectives:

The main objectives of the course are to:

- Present the various types of loads on structures.
- Develop an understanding of the purpose and the basic principles of structural analysis
- Familiarize students with the mathematical modeling of civil engineering structures and their loading.
- Explain the various methods of analysis of determinate structures, such as beams, trusses, and rigid frames
- Introduce students to the basic theory of elasticity and the analytical methods for calculating deflections in beams.
- Provide an understanding on the influence lines and maximum load on beams

Learning Outcomes:

After completion of the course students are expected to be able to:

- Construct the mathematical model of a given physical structure and represent the various loads applied on it (gravity, wind, snow, etc)
- Identify the various types of supports and internal releases.
- Recognize whether a structure is determinate, indeterminate, internally and externally stable or unstable.
- Perform analysis of determinate beams, trusses and frame structures, subjected to static

loads

- Draw the internal forces and bending moment diagrams of determinate beams and frames
- Extract the equation of the elastic curve and calculate the deflections at various positions of simple determinate beams.
- Draw influence lines of simple determinate beams.

Course Content:

- Classification of structures. Types of loads. Equilibrium of structures.
- External and Internal forces. Types of supports and internal releases.
- Static determinacy, indeterminacy, and instability.
- Calculating support reactions of planar determinate structures.
- Plane and Space Trusses. Determinacy and stability of plane trusses. Analysis methods: (i) Method of joints; (ii) Method of sections (Ritter method).
- Complex and Compound trusses. Identifying zero-force members. Analysis of simple space trusses.
- Simple and continuous (Gerber) beams. Internal forces and moment. Axial Force, Shear, and Bending Moment at a cross-section.
- Shear and Bending Moment Diagrams. Mathematical relation between bending moment, shear force and distributed load.
- Analysis of Frame structures. Axial, Shear and Bending moment diagrams.
- Deflections (Geometric Methods). Elastic curve. Qualitative deflected shape. Differential equation for beam deflection. Bernulli-Euler principle. Direct integration Method, Moment Area Method and Conjugate Beam Method for calculating deflections.
- Principle of superposition. Symmetry and Anti-symmetry.
- Influence lines of simple beam structures.

Learning Activities and Teaching Methods:

Lectures, in-class examples and exercises

Assessment Methods:

Homework assignments, mid-term exams, final exam.

Required Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Structural Analysis, SI Edition, 5 th Ed.	Aslam Kassimali	Cengage Learning	2015	9781285051505

Recommended Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Structural Analysis, 9 th Edition	R.C. Hibbeler	Prentice Hall	2015	9780133955361
Structural and Stress Analysis	Megson, T. H. G	Elsevier	2005	9780750662215 (E-book)
Fundamentals of Structural Analysis, 4 th Edition	K. Leet, CM Uang & A. Gilbert	McGraw-Hill	2011	9780073401096