

CE 360 Structural Analysis I

Department of Civil Engineering King Saud University

Course Description: CE 360 Structural Analysis I 4 (4,1,0) (Required for a BSCE degree)	Classification of structures; loads and structural design. Geometric stability and determinacy. Analysis of statically determinate frames: Computations of reactions, axial force, shear force and bending moment diagrams. Deformation of beams, frames and trusses using virtual work method. Influence lines for beams. Analysis of statically indeterminate beams, frames and trusses using Force Method. Moment Distribution Method for beams and nonsway frames. Introduction to computer applications. 4 (4,1,0)
Prerequisite	GE 201 (Statics), CE 302 (Mechanics of Materials), Prerequisite by Topics: 1. Understanding of equilibrium equations to analyze engineering problems. 2. Determining the internal forces in beams, frames and trusses. 3. Determining the area properties of various cross sections. 4. Understanding stress-strain relationship – normal stresses.
Course Learning Objectives	Students completing this course successfully will be able to 1. Understand basic structural engineering concepts 2. Determine magnitude of different types of loads in accordance to the related codes. 3. Idealization of structures and loads in relation with real structures. 4. Determine the internal forces for frames. 5. Formulate the related equations and draw the shear force and bending moment diagrams for frames. 6. Use Virtual work method to determine the deformations of beams, frames and trusses resulted from loads including temperature effects and fabrication errors. 7. Understand and apply influence lines for solving civil engineering problems. 8. Analysis of statically indeterminate beams, frames and trusses using Force Method. 9. Moment Distribution Method for beams and nonsway frames. 10. Use computer software to solve determinate and indeterminate structures 11. Improve the communication skills, including reading, writing, oral presentations
Topics Covered	1. Classification of structures; loads; structural design. 2. Structural Idealization and different types of floor systems. 3. Analysis of statically determinate structures 4. Shear and moment diagrams in frames. 5. Virtual work in trusses, beams and frames 6. Influence lines. 7. Analysis of statically indeterminate beams, frames and trusses using Force Method. 8. Moment Distribution Method for beams and non-sway frames 9. Computer applications.
Class/ tutorial Schedule	Class is held three times per week in 50-minute lecture sessions. There is also a 50-minute weekly tutorial associated with this course.
Computer Applications	Commercial and educational structural software are encouraged to be used during the course.
Project	A project based on conceptual design is offered for students in groups during the course, to orient the students towards the concept of structures as it

	act in the real life. Students are required to design, manufacture and test their assigned projects within the constraints identified in the project. A written report and oral presentation is required.
Contribution of Course to Meeting the Professional Component	<ol style="list-style-type: none"> 1. Students learn the analysis process to be involved in designing various structural components used in professional structural engineering. 2. Students improve their writing, communication and presentation skills. 3. Students recognize the role of professional societies in developing codes and standards and updating current knowledge.
Relationship of Course to Program Outcomes	<ol style="list-style-type: none"> 1. Students apply algebra, elementary calculus, and principles of mechanics. 2. Students are able to identify and formulate an engineering problem and to develop a solution. 3. Students recognize the importance of analysis in designing structural components. 4. Students are encouraged to submit accurate analysis in an efficient and professional way. 5. Students recognize their role with an engineering team carrying other aspects for analyzing structures, in terms of choosing the structural systems and the interaction of decisions made by various architectural and engineering teams. 6. Students are encouraged to recognize the different structural systems and their range of applications. 7. Students recognize the ethical and professional responsibility in achieving accurate structural analysis for safe and economical design, and its impact on the well-being of the society. 8. Students recognize the need for technical updating on a continuing basis, since the course emphasizes on the changing nature of software, codes and specifications. 9. Students recognize the importance of reading and understanding technical contents in English in order to achieve life-long learning and be able to carryout their responsibilities. 10. Students recognize the important role of computers in facilitating analysis and design of structural members and systems. 11. Students are encouraged to improve their writing, communication and presentation skills.
Textbook(s) and/or Other Required Material	<ol style="list-style-type: none"> 1. Structural Analysis, by R.C. Hibbeler, Prentice-Hall (latest Edition, SI Units) 2. The Saudi Building Code (SBC 301), "Design Loads for Buildings and Structures"
Prepared by	Dr. M. Iqbal Khan and Dr. Shehab Mourad
Course Web Page	http://faculty.ksu.edu.sa/Shehab Mourad
Date of Preparation	1 st Semester 1431- 1432

Grade Distribution

Mid-term Exam	30%
Quizzes and Tutorial Attendance	10%
Project	10%
Final Exam	50%

Class Quiz:

Quizzes will be conducted from time to time in both lecture and tutorial classes. Tutorial marks will be based on quiz, homework and attendance.

Mid Term Exams:

First Mid-Term - 7th Week

Second Mid-Term – 13th Week