

TED UNIVERSITY

CE 311

Structural Analysis

SYLLABUS/FALL 2022

Course Information

Required or Elective	<input checked="" type="checkbox"/> Required <input type="checkbox"/> Elective	Date Prepared	September 2022
Semester	Fall 2022	Class Hours and Classrooms	Tu 13:00-13:50 (G101) & Th 09:00-10:50 (G101)
Course Credit Hours/ ECTS credits	(3+0+0) 3 / 6	Pre-requisite/ Co-requisite	-
Level of Course	Junior	Language of Instruction	<input checked="" type="checkbox"/> English <input type="checkbox"/> Turkish
Instructors and their office hours	Assoc. Prof. Dr. Özkan Kale (ozkan.kale@tedu.edu.tr) (D 304) (Office hours: By appointment)		
Teaching Assistant(s)			
Textbook	Structural Analysis by R.C. Hibbeler, 8th Edition, Prentice Hall, 2011.		
Recommended Readings	1) Fundamentals of Structural Analysis by K.Leet, C.M.Uang, A.M.Gilbert, 4th Edition, McGraw-Hill, 2011 2) Matrix Structural Analysis by W.McGuire, R.H.Gallagher, R.D.Ziemian, 2nd Edition, Wiley, 1999 3) Matrix Analysis of Structures by A. Kassimali, 2nd Edition, Cengage Learning, 2012		
Course Web Pages	I already added all of you to the course web page on Moodle http://moodle.tedu.edu.tr . Please follow this course web page regularly to have access to the posted course materials and announcements.		

Course Description

Introduction to structural analysis. Displacement methods: Slope deflection, moment distribution, special topics. Stiffness method, derivation of element stiffness matrices, assembly procedures. Computerized implementation of the stiffness method and use of instructional programs. Large scale structural analysis. Influence lines and moving loads.

Course Objective

This is an introductory level course to analysis of statically determinate and indeterminate structures. Main objective of this course is to introduce the students the displacement and stiffness methods.

Course Learning Outcomes

On successful completion of this course, students will be able to:

1. Compute internal forces and support reactions in statically determinate trusses, beams and frames (B4)
2. Examine deformations, unknown member and support forces in structures by the application of work and energy methods (B4)
3. Analyze statically indeterminate frame and truss structures by application of the force method (B4)
4. Analyze 2D frame structures by application of the slope-deflection equations (B4)
5. Analyze 2D truss and frame structures by application of the stiffness method (B4)
6. Analyze 2D frame structures by application of the moment distribution method (B4)
7. Develop influence lines for statically determinate and indeterminate structures (B3)
8. Implement the stiffness method in a programming language (B5)

Course Assignments

- A. **Term Project (10%):** Term project will contribute towards 10% of the total grade.
- B. **Midterm Exams (55%):** There will be two midterm exams.
- C. **Final (35%):** There will be a cumulative final.

Course Assessments & Learning Outcomes Matrix

Assessment Methods	Course Learning Outcomes
Term Project	all
Midterm Exam I	#1, #2, #3
Midterm Exam II	#4, #5
Midterm Exam III	#5, #6, #7
Final Exam	#2, #3, #4, #5, #6, #7

Relationship to Program Outcomes

This course contributes to fulfillment of the following program outcomes:

- ii. Apply knowledge of mathematics, science, and engineering to design and implement original, innovative and sustainable civil engineering systems or processes to meet desired needs within a greater societal context
- vi. Identify, formulate, and solve engineering problems
- xi. Employ state-of-the-art engineering techniques and computing tools necessary for creative engineering solutions

Week	Topics
1	<ul style="list-style-type: none"> • Introduction and structural determinacy/indeterminacy
2	<ul style="list-style-type: none"> • Internal member diagrams: axial, shear and moment diagrams for beams and frames
3	<ul style="list-style-type: none"> • Principle of work and energy: Virtual work and unit dummy load method for structures
4	<ul style="list-style-type: none"> • Analysis of statically indeterminate structures by force method: derivation of force method
5	<ul style="list-style-type: none"> • Analysis of statically indeterminate structures by force method: application of force method
6	<ul style="list-style-type: none"> • Analysis of structures by displacement method: application of slope-deflection equations
7	<ul style="list-style-type: none"> • Analysis of structures by displacement method: application of slope-deflection equations • Midterm-1
8	<ul style="list-style-type: none"> • General stiffness method: introduction to stiffness method
9	<ul style="list-style-type: none"> • General stiffness method: development of element stiffness matrix for truss, beam, frame elements
10	<ul style="list-style-type: none"> • General stiffness method: development of element stiffness matrix for truss, beam, frame elements
11	<ul style="list-style-type: none"> • General stiffness method: analysis of 2D structures – from element to system level
12	<ul style="list-style-type: none"> • Analysis of structures by displacement method: introduction to moment distribution method
13	<ul style="list-style-type: none"> • Analysis of structures by displacement method: application of moment distribution method • Midterm-2
14	<ul style="list-style-type: none"> • Influence lines for statically determinate and indeterminate structures

Course Policies and Some Remarks

General

The course outline and schedule are tentative, and it will be adapted to the pace of the class.

Attendance

To get a good grade, I strongly advise my students not to miss any course.

Calculator Policy

You may use a scientific calculator during the exams. Programming the calculator before or during the exams are not allowed.

Plagiarism

Collaboration on non-collected homework and in studying is strongly encouraged; however, the work you hand in must be solely your own. Sharing written work before it is turned in to be graded is academic dishonesty. For more information on TEDU policy on intellectual integrity see the link https://ds.tedu.edu.tr/sites/default/files/content_files/tedu_ogrenci-el-kitabi-2016.pdf.

Make Up Exams

Make-up exams for midterm exams will NOT be offered. The only exceptions are illness or emergency (e.g., death in family, a traffic accident, etc.). In case of an illness or emergency you need to supply a documentation that supports your claim. Also please read the document given in the link <http://www.tedu.edu.tr/tr/main/yonetmelikler-ve-yonergeler>

Student Services Info

Specialized Support and Students with Disabilities

Students who may require specialized support due to a disability affecting mobility, vision, hearing, learning, mental or physical health should consult with Specialized Support and Disability Coordinator, Asst. Prof. Emrah Keser E-mail: emrah.keser@tedu.edu.tr, or visit the website at <https://www.tedu.edu.tr/tr/main/engelsiz-tedu>.