BOĞAZİÇİ UNIVERSITY
Department of Civil Engineering

Syllabus of COURSE CE 355.01

1. CE 355.01: Structural Analysis

2. COURSE INFORMATION
Credits: (4+0+0) 4
Lecture Hours: Monday 11:00-13:00, Wednesday 11:00-13:00
Lecture Hall: M2181 (Monday), M2230 (Wednesday)
Precept Hours: Th 16:00-18:00, M2181
Office Hours: Wednesday (10:00-11:00)

3. COURSE INSTRUCTOR
Assistant Prof. Serdar Selamet
Office: M3310
Email: serdar.selamet@boun.edu.tr
Phone: +90 (212) 359 64 30
Webpage: http://www.ce.boun.edu.tr/selamet

Teaching Assistant
Cem Tura
Email:cem.tura@boun.edu.tr

4. COURSE TEXTBOOK
Hibbeler, R.C., *"**Structural Analysis**"* Prentice Hall, 2012.

Other Supplemental Materials
- H. West, "Analysis of structures: an integration of Classical and Modern Methods", Wiley, 1989. TA645 .W43 1989.
- Ghali, A.M. Neville and T.G. Brown, "Structural Analysis: A Unified Classical and Matrix Approach," 6th edition, Spon Press, 2009. TA645 .G48 2009.
- J.C. McCormac, "Structural analysis," Harper & Row, 1984. TA645 .M3 1984.

5. COURSE DESCRIPTION (Catalog)
Assumptions, principles of equilibrium in determining reactions, bending moments and shear diagrams. Influence lines. Determination of displacements by virtual work. Castigliano`s theorem and moment area theorems. Statically indeterminate structures. Force and displacement method of approach using slope-deflection method. Flexibility and stiffness methods. Virtual work, strain energy, moment area and moment distribution methods. Matrix methods of structural analysis. Introduction to computer programs and use of program packages for structural analysis.

Course Type
Required

Prerequisite
CE 246 (Strength of Materials)

Laboratory and Computer Usage
Instructions for the usage of modern structural analysis softwares (such as SAP2000 etc.) are provided during the course.

Grading Policies

Homework	15% of the grade.
Quizzes	10% of the grade.
Midterms	1 midterm (25% each).
Attendance	10% of the grade.
Final	40% of the grade.

6. SPECIFIC GOALS FOR THE COURSE

COURSE OUTCOMES

(1) To have an understanding of and appreciation for basic concepts in structural analysis such as equilibrium, stability, static and kinematic indeterminacy, compatibility, and superposition.

(2) To have some intuition about structural behavior through sketches of deflected shapes and internal forces.

(3) To know the basics basic principles of mechanics regarding work and energy, and to their uses in structural engineering.

(4) To be able to apply fundamental techniques in the framework of force and displacement methods to the analysis of simple structures.

STUDENT OUTCOMES
Example: This course is intended to contribute to the following program outcomes:

(a) An ability to apply knowledge of mathematics, science and engineering

(e) An ability to identify, formulate and solve engineering problems

7. TOPICS COVERED
Introduction and overview of statics, beams & statically determinate frames, work & energy, force (flexibility) method of analysis, moment distribution, stiffness method.

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Week	Date	Topics	Reading Assignment	Grading	Content
1	Sep. 28, Sep. 30	Statically Determinate Structures & Internal Loadings	Ch.1, Ch.2, Ch.3, Ch.4	HW1	Structure and load models. Indeterminacy & stability. Brief review of truss analysis. Shear force and bending moment diagrams for frames.
2	Oct. 05, Oct. 07				
3	Oct. 12, Oct. 14	Approximate Methods	Ch.7		Statically indeterminate structures: trusses, portal frames with vertical and lateral loadings.
4	Oct. 19, Oct. 21	Deflections	Ch.8, Ch.9		Evaluating deflections by double integration. Moment-area and conjugate beam theorems. Strain energy. Principle of virtual work. Calculation of displacements with virtual work.
5	Oct. 26, Oct. 28				
6	Nov. 02, Nov. 04			HW2	
7	Nov. 09, Nov. 11				
8	Nov. 16, Nov. 18	Influence Lines	Ch.6		Beam Analogy Method, Moving Load Analysis
9	Nov. 23, Nov. 25	Force Method	Ch.10	**MT1**	Redundancy. Compatibility equations. Flexibility matrix. Analysis for environmental effects.
10	Nov. 30, Dec. 02	Displacement Method: Slope-Deflection	Ch.11	HW3	Fixed-end moments. Analysis of different types of structures.
11	Dec. 07, Dec. 09				
12	Dec. 14, Dec. 16	Displacement Method: Moment Distribution	Ch.12		Fixed end moments. Member stiffness. Distribution factor. Moment distribution without joint translation.
13	Dec. 21, Dec. 23			HW4	
14	Dec. 28, Dec. 29	Stiffness Method	Ch.14,Ch.15,Ch.16	**MT2** HW5	Kinematic indeterminacy. Degrees of freedom and coordinate system. Stiffness matrix for a truss element. Transformation matrices. Global stiffness matrix. Equilibrium equations.