

## Construction & Building Engineering Courses (CB)

Structural Analysis & Metallic Structures Courses Group

### CB 241 – Structural Analysis 1

#### COURSE INFORMATION

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Course Title: Structural Analysis 1

Code: CB 241

Hours: Lecture – 4 Hrs.                      Tutorial – 2 Hrs.                      Credit –3.

Prerequisite: BA 141

#### GRADING

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Class Performance/Attendance: 10%

Midterm # 1/Assignments – (7<sup>th</sup> Week): 30%

Midterm # 2/Assignments – (12<sup>th</sup> Week): 20%

Final Exam: 40%

#### COURSE DESCRIPTION

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Definition of a structure, its support conditions and its various structural forms in addition to various loading conditions that a structure must support. Study the stability and determinacy of structures. Calculation of reaction forces. Basic concepts of structural analysis. Calculation of the internal forces (normal forces, shear forces and bending moments) and its distribution on statically determinate beams, frames and arches. Member forces in trusses. Influence lines and its use to calculate the maximum response functions in structures.

#### TEXT BOOK

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Structural Analysis Si, 7/E by RUSSELL C. HIBBELER. Publisher: Prentice Hall.

#### REFERENCE BOOKS

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Mechanics of Materials by BEER, F.P. & JOHNSTON, E.R Publisher: McGraw Hill Book Company, New York.

Analysis and Behavior of Structures by ROSSOW, EDWIN C. Publisher: Prentice Hall, New Jersey, USA, 1996.

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Structural Analysis by TARTAGLIONE, LOUIS C. Publisher: McGraw Hill, New York, USA, 1991.

Analysis of Structures by WEST, HARRY H. Publisher: John Wiley & Sons, New York, USA, 1989.

Fundamental of Structural Analysis by WEST, HARRY H. Publisher: John Wiley & Sons, Inc., New York, USA, 1993.

### COURSE AIM

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The course aims is to give students the basic understanding of the structural analysis of statically determinate structures.

### SPECIFIC OUTCOMES OF INSTRUCTION

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The Student should be able to perform the structural analysis of different forms of determinate structures.

### COURSE OUTLINE

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- Week Number 1:* Introduction to structural analysis, scope, the definition of a structure, its forms, supports and loads.
- Week Number 2:* Basic concepts of structural analysis. Study the stability and determinacy of structures. Equilibrium, Free-body diagram, Reaction forces, Worked examples
- Week Number 3-4:* Internal Forces, sign convention, Relationships between load, shear & bending moment. Methods of calculation of internal forces, Worked examples.
- Week Number 5:* Internal forces in simple beams subjected to concentrated & uniformly distributed loads, Worked examples.
- Week Number 6:* Internal forces in simple beams subjected to non-uniform distributed loads. Worked examples.
- Week Number 7:* Internal forces in compound beams Principle of superposition. Worked examples & 7th week examination.
- Week Number 8:* Internal forces in inclined beams. Worked examples.
- Week Number 9-10:* Internal forces in simple, three-hinged, closed, multi-storey & multi-bay frames. Worked examples.
- Week Number 11-12:* Internal forces in arches. Worked examples & 12th week examination.
- Week Number 13-14:* Member forces in statically determinate planar trusses. Worked examples.

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*Week Number 15:* Influence lines and its use to calculate the maximum response functions in statically determinate beams and trusses. Worked examples.

*Week Number 16:* Final Exam.

### COURSE COORDINATOR AND DEMAND

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*Course Coordinator:* Dr. Mostafa Khalifa.

*Course Demand:* *Required*