

FUE - Future University in Egypt

Faculty of Engineering and Technology Department of Architectural Engineering

Course Specifications

SCM 214: Theory of Structures

Programme (s) on which the course is given:	B.Sc. in Architectural Engineering
Major or minor element of programmes:	(Not Applicable)
Department offering the programme:	Architectural Engineering
Department offering the course:	Structural Engineering & Construction Management
Academic year/Level:	Level Two - 4 th semester
Date of specification approval:	November 2017

A- Basic Information

Title: Theory of Structures	Code: SCM 214
Credit Hours: 3 Cr. Hrs.	
Lectures: 2 Hrs.	
Tutorial: <u>2 Hrs.</u>	
Total: 4 Hrs.	
Prerequisite: MEC 121	

B- Professional Information

1- Catalog Course Description:

Types of structures and loads, classification of structural elements (link, beam, column and shell), types of structures (trusses, frames, arches, cables and surface structures), analysis of statically determinate structures for beams and frames using the equations of equilibrium, stability and determinacy for beams and frames, internal forces developed in structural members subjected to different types of loads (normal force, shear force and bending moment), analysis of truss structures, determine the internal forces in truss members using section and joint methods.

Lecture Hours 2, Exercise/Lab 2.

2- Overall aims of the course:

Upon successful completion of the course, the student should be able to:

1. Identify the types of structural members.
2. Verify the stability of various types of structural systems.
3. Name the causes of instability of structures.
4. Identify the determinacy of a structure and its degree.
5. Apply the equations of equilibrium to get the reactions at supports for different structures subjected to different load types.

6. Calculate the internal force values at any sections in beam or frame structures under various loads.
7. Draw the internal force diagrams for beam and frame structures subjected to concentrated, uniform and triangle loads.
8. Recognize the relationship between load, shear and bending moment in frame elements.
9. Analyze truss structures and determine internal forces in truss members using joint and section methods.

3- Intended learning outcomes of course (ILOs):

3.1. Program ILOs related to course:

A01 Demonstrate knowledge and understanding of concepts and theories of basic and engineering sciences appropriate to architectural engineering.

A06 Demonstrate knowledge and understanding of different building construction systems and execution design methods and techniques

B02 Compare, analyze and criticize different engineering problems and case studies, evaluate design alternatives and conclude results based on analytical thinking

B08 Analyze results of numerical models and assess their limitations.

B11 Integrate relationship of structure, building materials, and construction elements into design process.

C02 Apply numerical modeling methods to engineering problems.

D05 Manage tasks and resources

D09 Work under stressful environments and within constraints of time and budget

3.2. Course Detailed ILOs:

a- **Knowledge and understanding:**

By the end of this course the student should be able to:

- a1. Define various types of structural members.
- a2. Identify the stability of structures.
- a3. Identify the determinacy of structures.
- a4. State the equations of equilibrium.

b- **Intellectual skills:**

By the end of this course the student should be able to:

- b1. Apply the equations of equilibrium.
- b2. Analyze various types of instability of structures.
- b3. Analyze the determinacy of structures and the degree of indeterminacy.
- b4. Relate the relationship between load, shear and bending moment in frame elements.

c- **Professional and practical skills:**

By the end of this course the student should be able to:

- c1. Determine the reactions of determinate structures using the equations of equilibrium.
- c2. Calculate the internal force values at any sections in beam or frame structures under various loads.
- c3. Draw the internal force diagrams for beam and frame structures subjected to concentrated, uniform and triangle loads.
- c4. Determine the internal forces in truss members.

d- General and transferable skills:

By the end of this course the student should be able to:

- d1. Work within constraints of time.
- d2. Managing time and meeting deadlines.

4- Course ILOs versus Program ILOs relation

See Appendix, table [1]

5- Course Contents:

Topic	Lec	Tut	Tot
Introduction to structural analysis. Types of structures and members.	2	2	4
Equations of equilibrium. Application on simple and continuous beams.	2	2	4
Application of the equations of equilibrium on frames.	2	2	4
Stability and determinacy.	2	2	4
Internal forces in simple beam.	4	4	8
Internal forces in continuous beam.	4	4	8
Internal forces in frames I.	4	4	8
Internal forces in frames II.	4	4	8
Internal forces in inclined members under uniform and triangular distributed loads.	2	2	4
Analysis of truss structures I.	2	2	4
Analysis of truss structures II.	2	2	4
TOTAL	30.	30	60.

For the relation between the course contents and "Intended Learning Outcomes" (ILOs) see Appendix, table [2]

6- learning/teaching methods:

See Appendix, table [3]

7- ILOs Teaching & Assessment Method

See Appendix, table [4]

8- Weighting of assessments

- Final exam:.....40%
- Year work:.....50%
 - Assignments.....20%
 - mid-terms.....30%
- Performance & Participation.....10%

9- List of references:

1. **Text Book:**
Structural Analysis, R. C. Hibbeler, Pearson Education, 2014.
2. Handouts, prepared by the instructor.

10- Facilities required for teaching and learning:

- White board
- Computer with a Data show for presentations

Course coordinator:

Head of Department: Prof. Dr. Samir Sadek Hosny

Date: November 2017

Course Instructor:

Appendix (1)

Table [1]: Course ILOs/ Program ILOs Matrix

		Program ILOs							
		A01	A06	B02	B08	B11	C02	D05	D09
Course ILOs	a1.		●						
	a2.	●							
	a3.		●						
	a4.	●							
	b1.				●				
	b2.					●			
	b3.			●					
	b4.					●			
	c1.						●		
	c2.						●		
	c3.						●		
	c4.						●		
	d1.								●
	d2.							●	

Table [2]: Course Content/ILO Matrix

Topic	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	c3	c4	d1	d2
Introduction to structural analysis. Types of structures and members.	●												●	●
Equations of equilibrium.				●	●				●				●	●
Application of the equations of equilibrium on frames.				●	●				●				●	●
Stability and determinacy.		●	●			●	●						●	●
Internal forces in simple beam.				●	●			●	●	●	●		●	●
Internal forces in continuous beam.				●	●			●	●	●	●		●	●
Internal forces in frames I.				●	●			●	●	●	●		●	●
Internal forces in frames II.				●	●			●	●	●	●		●	●
Internal forces in inclined members under uniform and triangular distributed loads.				●	●			●	●	●	●		●	●
Analysis of truss structures I.					●								●	●
Analysis of truss structures II.					●				●				●	●

Table [3]: Learning Method/ILO Matrix

Learning Method	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	c3	c4	d1	d2
Lecture	●	●	●	●	●	●	●	●	●	●	●	●		
Class Work	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Table [4]: Assessment Method/ILO Matrix

Assessment Method	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	c3	c4	d1	d2
Assignment	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Midterm & Final Exam	●	●	●	●	●	●	●	●	●	●	●	●	●	●