Course Specification

(Bachelor)

Course Title:	Structural Analysis
Course Code:	CE 2104
Program:	Bachelor of Science in Civil Engineering
Department:	Civil Engineering Department
College:	College of Engineering and Architecture
Institution:	Umm Al-Qura University
Version:	1
Last Revision Date:	31 January 2025

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A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐ University	☐ College	☒ Department	☐ Track	☐ Others
B.	☒ Required		☐ Elective		
3. Level/year at which this course is offered: (Level 8/4th year)					
4. Course General Description:					
The course presents concept of analysis of indeterminate structures. It covers the analysis of main structures: beams, frames, and trusses. Slope deflection, moment distribution, stiffness and flexibility methods are all handled in the course. The principal of matrix algebra is also covered in the course. In addition, practicing problems using available computer software is introduced.					
5. Pre-requirements for this course (if any)**:**					
Theory of structures CE 2103					
6. Co-requisites for this course (if any)**:**					
7. Course Main Objective(s):					
To enable the students to acquire concepts of analysis of indeterminate structures using traditional methods and computer software programs.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Demonstrate knowledge of the traditional methods of analysis of indeterminate structures.	K1	Lectures and training tutorials, team work project.	Monthly exams Semester project Final exam
1.2	Demonstrate understanding of matrix algebra and phenomena such as flexibility and stiffness applying knowledge of available computer software.	K2	Lectures and training tutorials, team work project.	Monthly exams Semester project Final exam
2.0	**Skills**			
2.1	Analyze and sketch the internal loadings for statically	S1	Lectures and training tutorials, team work project.	Monthly exams Semester project Final exam

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	indeterminate beams and frames.			
2.2	Justify the appropriate method for computing and analysis of axial force, shear force, and bending moment for specific sections for indeterminate beams and frames.	S3	Lectures and training tutorials, team work project.	Monthly exams Semester project Final exam
2.3	Analyze different structure elements such as beams, trusses, and frames using advanced well-known computer software packages.	S4	Team work project.	Team work project report
3.0	**Values, autonomy, and responsibility**			
3.1	Integrate and communicate with group students for solving a particular problem.	V1	Team work project.	Team work project report

C. Course Content

No	List of Topics	Contact Hours
1.	**Slope deflection method**	**3**
2.	**Slope deflection method for beams**	**3**
3.	**Slope deflection method for frames**	**3**
4.	**Internal forces in beams due to support settlement and rotation**	**3**
5.	**Moment distribution method**	**3**
6.	**Moment distribution method for beams**	**3**
7.	**Moment distribution method for frames**	**3**
8.	**Direct Stiffness method**	**3**
9.	**Truss analysis using the direct stiffness method**	**3**
10.	**Beam analysis using the direct stiffness method**	**3**
11.	**Frame analysis using the direct stiffness method (1)**	**3**
12	**Frame analysis using the direct stiffness method (2)**	**3**

13.	Introduction to available computer program and its applications	3
14	Application of a computer program in analysis of beams, frames and trusses (1)	3
15	Application of a computer program in analysis of beams, frames and trusses (2)	3
Total		45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Exam 1	4	15%
2.	Exam 2	8	15%
3.	Home Work & Class Room Participation	2-13	10%
4.	Project report	13	10%
5.	Final Exam	14-15	50%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Hibbeler, R.C., “Structural Analysis”, Pearsons, 10th Edition, 2016.
Supportive References	Chajes, A., “Structural Analysis”, Prentice - Hall, 2nd Edition,1990. J.L Meriam, L.G. Kraige, "Engineering Mechanics", Volume One, 5th Edition, John, Wiley& Sons, Inc. 2002 Hsieh, Y., “Elementary Theory of Structures”, Prentice-Hall, 1970. Tartaglione, L.C., “Structural Analysis”, McGraw-Hill, 1991.
Electronic Materials	http://www.sciencedirect.com http://ocw.mit.edu/
Other Learning Materials	Tartaglione, L.C., “Structural Analysis”, McGraw-Hill, 1991.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms,	Class room White board

Items	Resources
simulation rooms, etc.)	
Technology equipment (projector, smart board, software)	• **Printers** • **laptop** • **Engineering Software** • **Projector**
Other equipment (depending on the nature of the specialty)	**International journal membership**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	**students**	• **Students questioners at the end of the semester.** • **Analysis of students feedback.**
Effectiveness of Students assessment	**Civil engineering Course coordinator**	**The faculty member would submit a course folder containing detailed information about the course, students achievements and feedback.**
Quality of learning resources	**The specialized committee in each civil engineering division.**	• **C.E program Assessment Committee analyzes the data collected through various sources, e.g., student feedback surveys, assignments grades, etc.** • **Periodical workshop may be conducted to improve quality.**
The extent to which CLOs have been achieved	**Done by the Assessment Committee during the Faculty Council meeting.**	**The results are discussed with the faculty (by The Assessment Committee) during the Faculty Council meeting. The recommendation are documented. An actionplan would be**

Assessment Areas/Issues	Assessor	Assessment Methods
		made for improvement after the approval of the Department Faculty Council and to be sent to The College Council for approval and implementation.
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	CIVIL ENGINEERING COUNCIL
REFERENCE NO.	THE FIFTEENTH SESSION OF THE ACADEMIC YEAR 1446
DATE	30 APRIL 2025

