Course Specification
(Bachelor)

Course Title:	Reinforced Concrete Design (1)
Course Code:	CE 3105
Program:	Civil Engineering
Department:	Civil Engineering Department
College:	College of Engineering & Architecture
Institution:	Umm Al-Qura University
Version:	1
Last Revision Date:	31 January 2025

Table of Contents

A. General information about the course: 3

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4

C. Course Content 4

D. Students Assessment Activities 5

E. Learning Resources and Facilities 5

F. Assessment of Course Quality 5

G. Specification Approval 6

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 7 / 4th Year)					
4. Course General Description:					
The course presents the basics and principals of different design methods for reinforced concrete structures and introducing the behaviour and design of reinforced concrete elements subjected to different straining actions.					
5. Pre-requirements for this course (if any)**:**					
Theory of Structure, Concrete technology					
6. Co-requisites for this course (if any)**:**					
None					
7. Course Main Objective(s):					
The course aims to illustrate the principals and design rules according to the ACI design building code for load combination, properties, design of structural reinforced concrete elements subject to bending, shear, and axial stresses, and reinforcement detailing for serviceability.					

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	To demonstrate the different design methods applied in reinforced concrete structures taking economic considerations into account.	K1	Lectures, class work and in class discussions	Class tests and quizzes
1.2	To outline contemporary issues and ACI building design code in designing reinforced concrete elements subjected to bending moment, shear stresses, axial loads, and eccentric loads	K2	Lectures, class work and in class discussions	Class tests and quizzes
2.0	**Skills**			
2.1	To solve different reinforced concrete problems applying mathematics, theories and principles of reinforced concrete design.	S1	Lectures, class work and in class discussions	Homework and evaluation of individual and group tasks
2.2	To design optimum reinforced concrete	S3	Lectures, class	Homework and evaluation of

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	elements and frames using realistic constraints.		work and in class discussions	individual and group tasks
2.3	To analyze, assess, and compare the design alternatives of reinforced concrete elements in order to provide best cost effective alternative solutions.	S4	Lectures, class work and in class discussions	Homework and evaluation of individual and group tasks
3.0	**Values, autonomy, and responsibility**			
3.1	To ethically integrate in professional multidisciplinary teams	V1	English communications, ethics practice, and respecting deadlines.	Written exams and homework
3.2	To demonstrate ability of life-long learning and applying of official codes, specification and practices in different reinforced concrete problems.	V2	Applying reinforced concrete standards, codes and specifications	Written exams and homework
3.3	To use skills required for the real-life concrete projects serving society.	V3	Small group work and activities related to projects serving society.	Written exams and homework

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction and mechanical properties of concrete and reinforcing steel. Introduction to ACI-Code.	3
2.	Types of loads and their factors. Load combinations and reinforced concrete design methods.	3
3.	Behavior of reinforced concrete under flexure and shear and loads on Beams.	3
4.	Design of beams for flexure, design of singly reinforced rectangular section (1)	3
5.	Design of beams for flexure, design of singly reinforced rectangular section (2)	3
6.	Design of doubly reinforced rectangular section and flanged sections.	3
7.	Design of beams for shear.	3
8.	Bond strength, Development length, Cutoff points, splicing of reinforcement (1)	3

9.	Bond strength, Development length, Cutoff points, splicing of reinforcement (2)	3
10.	Calculation of deflections and control of cracking (1)	3
11.	Calculation of deflections and control of cracking (2)	3
12.	Columns behavior and design of short columns for axial loads and combined loads.	3
13.	Interaction diagram and design of columns for eccentric and combined loads.	3
14.	Design of long or slender columns (1)	3
15.	Design of long or slender columns (2)	3
Total		45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Class tests and quizzes	3, 5, 7, 11,13	20%
2.	Mid-Term Exam	8	30%
3.	Final Exam	16	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	• Building Code Requirement for Structural Concrete (ACI 318), 2019. • Charles, G.S. and Chu-Kia W., "Reinforced Concrete Design", Harper and Row, Pub. New York, 5th Edition, 1994. • El-Dakhakhni, W.M., "Modern Design of Reinforced Concrete", Parts I and 2, The Anglo Egyptian Bookshop. Egypt, 1990. • Macgregor, J.G., "Reinforced Concrete Mechanics and Design", Prentice Hall, 2nd Edition, 1992.
Supportive References	ACI CODE-318-19(22): Building Code Requirements for Structural Concrete and Commentary (Reapproved 2022)
Electronic Materials	http://www.sciencedirect.com http://ocw.mit.edu/
Other Learning Materials	ACI Journal. ASCE Journal.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	- Whiteboards - Chairs - Curtains
Technology equipment (projector, smart board, software)	- Controls for the data show
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	• Student's questioners at the end of the semester. • Analysis of student's feedback.
Effectiveness of Students assessment	Civil engineering Course coordinator	The faculty member would submit a course folder containing detailed information about the course, student's 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 recommendations are documented. An action plan would be made for improvement after the

Assessment Areas/Issues	Assessor	Assessment Methods
		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**

Course coordinator:

Prof. Hamdy Elgohary