



## Course Specifications

<b>Course Title:</b>	Reinforced Concrete II
<b>Course Code:</b>	CE 423
<b>Program:</b>	B.Sc. in Civil Engineering
<b>Department:</b>	Civil Engineering
<b>College:</b>	Jubail University College
<b>Institution:</b>	Jubail University College

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## A. Course Identification

<b>1. Credit hours:</b>	3
<b>2. Course type</b>	
a.	University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b.	Required <input type="checkbox"/> Elective <input checked="" type="checkbox"/>
<b>3. Level/year at which this course is offered:</b>	Level 6, Third Year, Level 7, Fourth Year
<b>4. Pre-requisites for this course (if any):</b>	CE 312 Reinforced Concrete I
<b>5. Co-requisites for this course (if any):</b>	None

### 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	✓	100
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

### 7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
<b>Contact Hours</b>		
1	Lecture	30
2	Laboratory/Studio	45
3	Tutorial	-
4	Others (specify)	-
	<b>Total</b>	<b>75</b>

## B. Course Objectives and Learning Outcomes

### 1. Course Description

**CE 423 Reinforced Concrete II (2-3-3)**

**Prerequisite: CE 312**

*Behavior and design of columns under axial load and bending including slenderness effects; design of wall footings; design of combined footings; ACI Code provisions for serviceability requirements; deflection of flexural members; design of two-way slabs on beams using the ACI Direct Design Method; analysis and design of frames and continuous beams; design of one-way joist floor system; design of beam column joints; design of stairs behavior and design of retaining walls; introduction to pre-stressed concrete; design project of multistory building with two-way flooring system which integrates the design of different structural components; computer application in interactive design.*

## 2. Course Main Objective

The main purpose of this course is to provide the knowledge and skills for analysis and design of reinforced concrete members (columns subjected to eccentric loads, two-way slabs, beam column joints, stairs, foundation and retaining walls) as per standard code of practice.

## 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge and Understanding</b>	
	N/A	
2	<b>Skills</b>	
2.1	Analyze reinforced concrete sections for the capacity and suitability	1
2.2	Design reinforced concrete components of structure as per the standard codes of practice	2
2.3	Use computer software to analyze Structural Components	2
2.4	Communicate the design details effectively	3
3	<b>Values</b>	
	N/A	

## C. Course Content

No	List of Topics	Contact Hours
1	<b><u>Unit 1. Columns under Axial load and bending</u></b> 1.1 Behavior of columns under axial load and bending 1.2 Use of Interaction Diagrams, Design of columns under axial load and bending including slenderness effects;	5
2	<b><u>Unit 2. Design of Footing for axial load and moments</u></b> 2.1 Design of wall footings 2.2 Design of combined footings 2.3 Footings subjected to axial load and moments	10
3	<b><u>Unit 3. Serviceability requirements</u></b> 3.1 ACI Code provisions for serviceability requirements; 3.2 Deflection of flexural members; 3.3 Control of Flexural Cracks	10
4	<b><u>Unit 4. Two-way slab design</u></b> 4.1 Two-way slab behavior 4.2 Analysis of Two-Way Slabs 4.3 Column and Middle Strips 4.4 Design of two-way slabs on beams using the ACI Direct Design Method 4.5 Limitations of Direct Design Method	10

5	<b><u>Unit 5. Design of frames</u></b> 5.1 Analysis and design of frames 5.2 Analysis and Design of continuous beams. 5.3 Lateral Bracing for Buildings 5.4 Development Length for Continuous Members	15
6	<b><u>Unit 6. Joist floor system</u></b> 6.1 Load distribution in one-way joist floor system 6.2 Requirements of joist floor construction, 6.3 Design of one-way joist floor system; 6.4 Design of beam column joints. 6.5 Joint transverse reinforcement	10
7	<b><u>Unit 7. Stairs and retaining walls</u></b> 7.1 Different types of stairs 7.2 Design of stairs 7.3 Behavior and design of retaining walls. 7.4 Design Procedure for Cantilever Retaining Walls	10
8	<b><u>Unit 8. Pre-stressed concrete</u></b> 8.1 Introduction to Pre-stressed Concrete 8.2 Advantages and Disadvantages of Pre-stressed Concrete, 8.3 Pre-tensioning and Post-tensioning 8.4 Materials Used for Pre-stressed Concrete	5
<b>Total</b>		75

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge and Understanding</b>		
	N/A		
2.0	<b>Skills</b>		
2.1	Analyze reinforced concrete sections for the capacity and suitability	Interactive learning Collaborative learning Self-Directed Learning	Quizzes, Midterm, Assignments, Final
2.2	Design reinforced concrete components of structure as per the standard codes of practice		Quizzes, Midterm, Assignment, Final, Project
2.3	Use computer software to analyze Structural Components		Project
2.4	Communicate the design details effectively		Project Presentation
3.0	<b>Values</b>		
	N/A		

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quiz 1	4	5%
2	Assignment 1	6	5%
3	Mid-term LT	8	20%
4	Mid-term LB	9	5%
5	Quiz 2	12	5%
6	Assignment 2	14	5%
7	Project	15	5%
8	Performance Lab	15	10%
9	Final Exam LB	16	10%
10	Final Exam LT	17-19	30%

\*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

## E. Student Academic Counseling and Support

**Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :**

- Office hours 3 hr/week; students can go in times of office hours for teacher to explain what could not be understood from the lesson.
- Students can communicate with a staff member outside the official working hours by email.
- Students are also encouraged to visit their academic advisors.

## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	Wang, C. K., Salmon, . C. G. and Pincheira, J. A. (2007), <i>Reinforced Concrete Design</i> , USA:, John Willey and Sons.
<b>Essential References Materials</b>	<ul style="list-style-type: none"> <li>• Nawy, E.G. (2008), <i>Reinforced Concrete: A fundamental Approach</i>, USA: Prentice Hall Publishing.</li> <li>• Wight, J. K. (2015), <i>Reinforced Concrete: Mechanics and Design</i>, USA: Prentice Hall Publishing.</li> </ul>
<b>Electronic Materials</b>	<ul style="list-style-type: none"> <li>• Online RC Calculators <a href="http://civilengineer.webinfo.com/design/beamanalysis.htm">http://civilengineer.webinfo.com/design/beamanalysis.htm</a></li> <li>• Civil Engineering Resources <a href="https://twitter.com/civilweb">https://twitter.com/civilweb</a></li> <li>• Civil Engineering Calculators <a href="https://facebook.com/CivilEngineeringCalculators">https://facebook.com/CivilEngineeringCalculators</a></li> </ul>
<b>Other Learning Materials</b>	ACI-318: <i>Building Code Requirements for Structural Concrete Software for Structural Analysis and Design</i> (STAAD Pro ,ETABS, SAFE, etc)

## 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	Lecture rooms with a capacity of at least 25 students and fitted with multimedia projector and a computer.
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	<i>Software for Structural Analysis and Design (STAAD Pro, ETABS, SAFE, etc.)</i>
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	None

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment as per QMS-Policy-006 Feedback Survey, QMS-QAP-116 Monitoring Students' Satisfaction	Students	Indirect: Analyzing the results of the following surveys Course Evaluation Survey (CES), Program Evaluation Survey (PES), Student Experience Survey (SES)
Quality of Exam papers and Verifying Standards of Student Achievement as per QMS-Policy-004 Policy for Examinations and Marking, QMS-ACP-102 Procedure for Marking Examinations	Examination Committee	Direct: Peer review of examination papers and review or double check a minimum of three or 10% of answer papers. Verifying the entries in the Activity Mark Sheet.
Achievement of learning outcomes as per QMS-Policy-001 Course Review, QMS-CDP-106, QMS-CDP-112 Curriculum Review	Faculty	Direct: Course Report (Section B-3)
Implementation of the action plans based on previous semester as per QMS-Policy-001 Course Review, QMS-CDP-106 Procedure for Course Review, QMS-CDP-112 Procedure for Curriculum Review	Faculty	Direct and Indirect: Course report (Section G-1, G-2)
Monitoring Teaching and Learning as per QMS-Policy-005 Monitoring of Teaching and Learning	Chairperson/Program Director/Course Director	Indirect: Feedback by Chairperson/Program director/Course director. Program Delivery Record.
Effectiveness of planned Teaching Strategies QMS-Policy-001 Course Review	Faculty	Indirect: Course Report (Section B-4)

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course effectiveness and planning for improvement as per QMS-Policy-001 Course Review, QMS-CDP-106 Procedure for Course Review, QMS- CDP-112 Procedure for Curriculum Review	Faculty	Direct and Indirect: Course report (Section G-3)
Verifying Standards of Student Achievement and Quality of Exam papers as per QMS-ACP-119 External Assessment Review	Assessment External Reviewer	Direct: Report of assessment external reviewer. Review of sample of ten or 10% of student's assessments and coursework scripts.

**Evaluation areas** (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

**Evaluators** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

**Assessment Methods** (Direct, Indirect)

## H. Specification Approval Data

<b>Council / Committee</b>	Civil Engineering Department Council
<b>Reference No.</b>	REG MIN-CED-10
<b>Date</b>	27-04-2020

## Appendix A Revision Details

Revision no.	DESCRIPTION	Reference MoMs			
		DC		CDC	
		Sem	#	Sem	#
1	Revision of Course Teaching Strategies and action verbs based on the comments of NCAAA reviewer	392	4	392	4
2	Course Specification Template 2018	402			



