Module (Course Syllabus) Catalogue

2022-2023

College/ Institute	Erbil Polytechnic University	
Department	Highway Engineering Technique Department	
Module Name	Reinforced Concrete Design – II	
Module Code	RCD601	
Degree	Technical Diploma ☐ Bachelor ✓ High Diploma ☐ Master ☐ PhD ☐	
Semester	6th	
Qualification	M.Sc. Structural Engineering	
Scientific Title	Assistant Lecturer	
ECTS (Credits)	6	
Module type	Prerequisite ☐ Core ✓ Assist. ☐	
Weekly hours	4 hours	
Weekly hours (Theory)	(4) hr Class	(108) Total hrs Workload
Weekly hours (Practical)	(None)hr Class	(None)Total hrs Workload
Number of Weeks	15	
Lecturer (Theory)	Ali J. Nouri Al – Barazanchi	
E-Mail & Mobile NO.	ali.nouri@epu.edu.iq – 07706416969	
Lecturer (Practical)	None	
E-Mail & Mobile NO.		
Websites		

Course Book

Course Description	Increase student knowledge and learn the principles and practices for the analyses, design, contracting, and construction of structural concrete elements. After attending this course, student shall have a firm grasp of the background and design specifics necessary to compete in this industry, including industry-leading information on the principles and practices of structural concrete members design for buildings, infrastructure, utilities, and industrial facilities. Understand practical emerging technologies including advanced design techniques for specific structural elements.
Course objectives	• Understand the importance of basic principles of reinforced concrete design for certain structural elements. • Apply analytical skills to solving problems in reinforced concrete design. • Understand the basic requirements of international codes for reinforced concrete design. • Appreciate the interaction between the structural analysis, strength of material, mechanics of structural and the reinforced concrete design. • Identify the key mechanical and structural issues in reinforced concrete design. • Appreciate the range of structural elements types available and their application. • Select an appropriate reinforced concrete system for a structure • Appreciate the practical problems of design and detailing for reinforced concrete structures, buildings and facilities. • Introduce the student to certain case studies
Student's obligation	a. To attend the classes regularly with minimum absence. b. To participate actively in the class discussion and Q&A session. c. Study on daily basis to digest the class material d. To write note off-handouts e. Prepared for sudden Quizzes f. Vet through the references provided by the lecturer and to solve as much as possible of homework and exercises for the subjective materials. g. Prepare the assignment and the seminar as instructed by the lecture. h. Solve and submit the home works on time. i. Prepare and submit the requested scientific reports on time to the standards set by the lecturer. j. Prepare and present seminars in the number required for the titled assigned by the lecturer. k. Prepare for and attend the mid – terms exam l. Prepare for and attend the final – exam

<table>
<tr><td>Required Learning Materials</td><td colspan="5">Students at this stage with the workload assigned technical for the subject are not required to scatter their attention with bunch of sources. Students are encouraged to thoroughly study the refence given by the lecturer and to vet through available cyber data related to the subject and this shall include the concrete technology worked examples and all those are support with construction site visit for the students to appreciate and monitor closely the application of the theoretical concept in construction.</td></tr>
<tr><td rowspan="11">Evaluation</td><td colspan="2">Task</td><td>Weight (Marks)</td><td>Due Week</td><td>Relevant Learning Outcome</td></tr>
<tr><td colspan="2">Paper Review</td><td colspan="3">None for B.SC.</td></tr>
<tr><td rowspan="5">Assignments</td><td>Homework</td><td>10</td><td>Weekly</td><td>Application for subject by subject</td></tr>
<tr><td>Class Activity</td><td>2</td><td>Weekly</td><td>Participate in syllabus learning</td></tr>
<tr><td>Report</td><td>8</td><td>4th & 8th</td><td>Concentrate on certain subject of the module and cover its technical aspects</td></tr>
<tr><td>Seminar</td><td>8</td><td>6th & 10th</td><td>Individual or in group for subjects within the module but out of the syllabus</td></tr>
<tr><td>Essay</td><td></td><td></td><td></td></tr>
<tr><td>Project</td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Quiz</td><td>8</td><td></td><td></td></tr>
<tr><td colspan="2">Lab.</td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Midterm Exam</td><td>24</td><td>7th</td><td></td></tr>
<tr><td colspan="2">Final Exam</td><td>40</td><td>14th & 15th</td><td></td></tr>
<tr><td colspan="2">Total</td><td>100</td><td></td><td></td></tr>
<tr><td>Specific learning outcome:</td><td colspan="5">1- The analysis and design of two – way slabs
2- The analysis and design of various R.C columns design
3- The analysis and design of stair case of various types
4- Get familiar with various types of retaining structures, their analysis and design
5- Attend construction sites for the elements above
6- Interaction between various RC elements through the courses of RC I, RC II and Prestress Concrete in Reinforced Concrete Bridge Design Module on 7th semester
7 – Vet through the available topics related to the course syllabus published up to date.
8 – As the module time line is relatively short, the student shall be able to study on his/her own further subjects in RC module
9 – introduce the recipient to available software to analysis and design the RC structural elements individually or in whole.</td></tr>
</table>

Course References:	1 - 318-19: Building Code Requirements for Structural Concrete and Commentary. 2 - Reinforced Concrete: Mechanics and Design, by James K. Wight | Jun 22, 2021. 3 - Reinforced Concrete Buildings: Behaviour and Design by Ahmad A. Hamid | Jan 19, 2021. 4 - Design of Concrete Structures by David Darwin and Charles Dolan | Jul 6, 2020. 5 - Structural Concrete: Theory and Design by M. Nadim Hassoun and Akthem Al-Manaseer | Mar 10, 2020. 6 - Reinforced Concrete Design by Abi O. Aghayere and Jason Vigil | Mar 16, 2018.

Course topics (Theory)	Weeks	Learning Outcome
Design of Two-Way Slabs		
1. Introduction	1st	Under this subject the student shall be introduced to the slabs as structural elements in various structures. The student shall learn the analysis and design of the RC slabs through various up to date methods and shall be attending various home works and solved examples enabling the student to design and detail such elements individually or in bunch.
2. Types of Two – Way Slabs	1st	
3. Design Concepts	1st	
4. Column & Middle Strips	1st	
5. Minimum Slab Thickness to Control Deflection	2nd	
6. Shear Strength of Slabs	2nd	
7. Analysis of Two – Way Slabs by the Direct Design Method	2nd	
8. Design Moments in Columns	2nd	
9. Solved Examples	3rd & 4th	
10. Transfer of Unbalanced Moments to Columns	4th	
11. Equivalent Frame Method	4th	
Reinforced Concrete Columns		
1. Introduction to Axially Loaded Columns	5th	Under this subject, the student shall be introduced to almost all types of columns including the short and long columns covering the slenderness art of it and those subjected to pure axial load or the eccentric loaded columns that subject them to uniaxial and/or biaxial moments. The students by end of the subject shall be able to design various types of square, rectangular and circular columns.
2. Types of Columns	5th	
3. ACI Code Limitations	5th	
4. Spiral Reinforcement	5th	
5. Design Equations	6th	
6. Solved Examples	6th	
7. Introduction to Columns in Compression & Bending	8th	
8. Design Assumptions	8th	
9. Load – Moment Interaction Diagrams	8th	
10. Analysis and Design of Columns using Charts	8th	
11. Design of Columns under Eccentric Loading	9th	
12. Square and Rectangular Columns under Biaxial Bending	9th	
13. Solve Examples	9th	

Retaining Walls		
1. Introduction & Types of Retaining Walls	10th	Under this subject, students shall be introduced to the earth retaining structures which they are part of the highway and building constructions. They shall be able to recognize typical types of the retaining walls and the forced imposed to such structures and ultimately, to analysis, design and detailing of the cantilever retaining wall which is the common type in application.
2. Forces on Retaining Walls	10th	
3. Active & Passive Soil Pressure	10th	
4. Friction of the Retaining Walls Base	10th	
5. Stability against Overturning	10th	
6. Proportions of Retaining Walls	10th	
7. Design Requirements & Equations	11th	
8. Drainage	11th	
9. Solved Examples for Cantilever Retaining Walls	11th	
Staircases		
1. Introduction	12th	Under this subject, the student shall be able to analyse and design simply supported RC Staircases
2. Types of Stairs, their Analyses & Design	12th & 13th	
3. Solved Examples	13th	

Questions Example Design

First year teaching, no questions example yet

Extra notes:

None so far

External Evaluator