

1. Course description: Reinforced Concrete Structures 2 is the follow-up to the Reinforced Concrete Structures module, following the Reinforced Concrete Structures 1 course, one of the core modules in all civil engineering training programs nowadays. Subject Reinforced Concrete Structures 2 consists of 3 chapters, in which chapter 1 presents reinforced concrete floor structure (RC), chapter 2 presents reinforced concrete frame, and chapter 3 presents basic contents of reinforced concrete foundation. In each respective chapter, the main knowledge is provided on structural solutions, calculation theory, and structure for typical beams, floors, columns, and shallow foundations in civil and industrial works in order to satisfy the calculation requirements for durability (ULS) and to meet normal usage conditions (SLS).

2. Requirements:

No.	Requirements	Code
1.	Pre-requisites: Not required	
2.	Preceding courses: Reinforced Concrete Structures 1	CENG1322
3.	Co-courses: Not required	

3. Course objectives

Course objectives	Description	Learning outcomes - PLOs
CO1	<ul style="list-style-type: none"> - Provide knowledge on design principles and structures of reinforced concrete structures (RC). - Provide knowledge on how to determine the calculation model, the types of impact loads on the structure and how to combine loads. - Provide methods of analysis, selection of options and design sequence of reinforced concrete structures (columns, beams, floors,...) according to Vietnamese standards. 	PLO4
CO2	Train students to design (calculate and make drawings) reinforced concrete structures (columns, beams, floors,...) according to Vietnamese design standards.	PLO5, PL06
CO3	Train students to be accurate, careful, scientific working style, and have a professional working attitude.	PLO8, PLO9

4. Course learning outcomes (CLOs)

Upon completion of this course, students will be able to:

Mục tiêu môn học/Course objectives	CDR môn học (CLO)	Mô tả CDR - Description
CO1	CLO1.1	<p>Áp dụng các nguyên tắc tính toán và cấu tạo cho kết cấu BTCT (cột, dầm, sàn, ...)</p> <p>Capable of applying the principles of calculation and structure to reinforced concrete structures (columns, beams, floors,...)</p>
	CLO1.2	<p>Phân tích các loại tải trọng tác động, tổ hợp tải trọng, sơ đồ tính, cũng như cách xác định nội lực cho công trình xây dựng dân dụng.</p> <p>Proper and complete analysis of types of impact loads, as well as how load combinations act on civil and industrial buildings.</p>
CO2	CLO2.1	<p>Có kỹ năng thiết kế kết cấu BTCT (cột, dầm, sàn, ...) theo tiêu chuẩn thiết kế của Việt Nam.</p> <p>Capable of designing reinforced concrete structures (making explanations and drawings) according to the design standards of Vietnam.</p>
CO3	CLO3.1	<p>Có năng lực làm việc độc lập và làm việc theo nhóm & Có khả năng nhận thức về trách nhiệm và đạo đức nghề nghiệp trong lĩnh vực xây dựng: khi thiết kế và thi công kết cấu bê tông cốt thép.</p> <p>Ability to organize and perform design-related work scientifically and honestly.</p>

The matrix integrates between the learning outcomes of the subject and training program (Only numbered from level 3 (average response) or higher)

CLOs	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9
CLO1.1				5					
CLO1.2				5					
CLO2.1					5	4			
CLO3.1								5	5

5. Textbooks and materials

a) Textbooks

[1] Võ Bá Tâm. *Kết cấu bê tông cốt thép tập 2*. NXB Đại học Quốc gia Thành phố Hồ Chí Minh, 2015. [48338].

[2] Nilson, A. H., Darwin, D and Dolan, C. W. *Design of Concrete Structures, 13th Edition*, McGraw-Hill, Boston, Massachusetts, 2004. [13353].

b) *Other materials*

[3] TCVN 2737: 1995. *Tải trọng và tác động: Tiêu chuẩn thiết kế*. Nhà xuất bản Xây dựng, Hà Nội, 2016. [50158]. Previous versions of this textbook is accepted.

[4] TCVN 5574: 2018. *Kết cấu bê tông và bê tông cốt thép: Tiêu chuẩn thiết kế*. Nhà xuất bản Xây dựng, Hà Nội, 2021. [56988]

[5] Wight, James K. *Reinforced Concrete: Mechanics and Design, 7th Edition*, Global Edition, Horlow Essex: Pearson Education, 2016. [48819].

c) *Software: ...*

6. Student assessment

Type of assessment	Assessment methods	Assessment time	CLOs	Weight %
(1)	(2)	(3)	(4)	
A1. Formative assessment	A.1.1. Attendance, exercises	Regulatory lecturer	CLO1.1, CLO1.2, CLO1.3, CLO2.1, CLO3.1	50%
	Total			50%
A2. End-of-course assessment	A.2.1. Essay exam	End of semester	CLO1.1, CLO1.2, CLO1.3, CLO2.1, CLO3.1	50%
	Total			50%
Total				100%

Note: A minimum of 2 columns of progress and final grades is required and ensures all course outcomes are assessed.

7. Teaching schedule:

Week Section	Content	CLOs	Teaching and learning										Student assessment	Textbooks and materials
			Self-study		FTF				Online (if any)					
					Theory		Practice		Theory		Practice			
			Activity	Hour	Activity	Periods	Activity	Periods	Activity	Periods	Activity	Periods		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)					
Session 1	Introduction to the subject - Instructor information. - Subject-related issues. - Course content. - References - Instructions on how to study, detail how to evaluate the subject. Chapter 1: Reinforced concrete floor 1.1. Concepts and classifications 1.2. One-way slabs <i>1.2.1. Description</i> <i>1.2.2. Model of calculation</i> <i>1.2.3. Calculation and arrangement of slab reinforcement</i> <i>1.2.4. Calculation and arrangement of reinforcement for secondary</i>	- CLO1.1: Understand and classify common types of reinforced concrete floors; master the structure of reinforced concrete floor; - CLO1.2: Identify and analyze the calculation diagram of the slab. - CLO2.1: Able to calculate and arrange reinforcement for the primary and secondary beams. - CLO3.1: Perform work accurately, reason closely.	At home: review, do the exercises for session 1 (if any), pre-reading the content of session 2, 3	10	➤ Lecturer: - Self-introduce. - Summary list of individuals/groups. - Introduction of course outline, details of regulations, documents... - Explain individual activities. - Lectures combine giving examples for students to perform in class. ➤ Students: In class: self-introduction; listen to lectures; answer and do examples given by the teacher (if any).	5							- In class: interaction between students and lecturers through examples. - Homework #1: Determine the calculation diagram of the one-way slabs (if any). - Homework #2: calculate and arrange reinforcement for slab and/or secondary beams (if any).	[1], [2], [3], [4], [5] & Lecture Slides

Week Section	Content	CLOs	Teaching and learning										Student assessment	Textbooks and materials
			Self-study		FTF				Online (if any)					
					Theory		Practice		Theory		Practice			
			Activity	Hour	Activity	Periods	Activity	Periods	Activity	Periods	Activity	Periods		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)					
	<i>beams</i>													
Session 2	Chapter 1 (cont'd): Reinforced concrete floor <i>1.2.5. Calculation and arrangement of reinforcement for secondary beams (cont'd)</i> <i>1.2.6. Calculation and arrangement of reinforcement for primary beams</i> 1.3. Two-way slabs <i>1.3.1. Description</i> <i>1.3.2. Working of two-way slabs</i> <i>1.3.3. Calculate internal force of two-way slabs</i> <i>1.3.4. Calculation and arrangement of reinforcement for two-way slabs</i> <i>1.3.5. Calculation and arrangement of reinforcement for beams of two-way slabs</i>	- CLO1.2: Identify and analyze the calculation diagram of the primary and secondary beams. - CLO1.3: Able to analyze and determine the internal forces of the primary and secondary beams. - CLO2.1: Able to calculate and arrange reinforcement for the primary and secondary beams. - CLO3.1: Perform work accurately, reason closely.	At home: review, do the exercises for session 3 (if any), pre-reading the content of session 4.	10	➤ Lecturer: - Lectures combine giving examples for students to perform in class. ➤ Students: - In class: listen to lectures; answer and do examples given by the teacher (if any).	5							- In class: interaction between students and lecturers through examples. - Homework #3: calculate and arrange reinforcement for primary beams (if any). - Homework #4: calculate and arrange reinforcement for slab and/or beams of two-way slabs (if any). -	[1], [3], [4] & Lecture Slides
Session 3	Chapter 1 (cont'd):	- CLO1.1: Understand and	At home: review, do the	10	➤ Lecturer:	5							- In class: interaction between	[1], [3], [4] & Lecture

Week Section	Content	CLOs	Teaching and learning										Student assessment	Textbooks and materials
			Self-study		FTF				Online (if any)					
					Theory		Practice		Theory		Practice			
			Activity	Hour	Activity	Periods	Activity	Periods	Activity	Periods	Activity	Periods		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)					
	Reinforced concrete floor 1.4. Floors with orthogonal beams <i>1.4.1. Concept</i> <i>1.4.2. Calculation diagram</i> 1.5. Flat-slab construction (floor without beam, flat floor) <i>1.5.1. Concept</i> <i>1.5.2. Classify</i> <i>1.5.3. Structure of flat-slab</i> <i>1.5.4. Punching Shear Check</i> <i>1.5.5. Internal force distribution in the flat-slab (direct method)</i>	master structural features and classify floors with orthogonal beams and flat floors. - CLO1.2: Identify and analyze the working of floors with orthogonal beams and flat floors. - CLO2.1: It is possible to calculate and arrange reinforcement for floors with orthogonal beams and flat floors. CLO3.1: Do the job correctly, reason closely.	exercises for session 5 (if any), pre-reading the content of session 6.		- Lectures combine giving examples for students to perform in class. ➤ Students: - In class: listen to lectures; answer and do examples given by the teacher (if any).							students and lecturers through examples. - Homework #5: Calculation calculate and arrange reinforcement for slab with orthogonal beams and/or flat slab (if any).	Slides	
Session 4	Chapter 1 (cont'd): Reinforced concrete floor <i>1.5.5. Internal force distribution in the flat-slab (direct method) (cont'd)</i> 1.6. Panel slab <i>1.6.1. Structure and classification</i>	- CLO1.1: Understand and master structural features and classify flat floors and panel floors. - CLO1.2: Identify and analyze the working of flat floors and panel floors. - CLO2.1: It is	At home: review, do the exercises for session 6 (if any), pre-reading the content of session 7.	10					➤ Lecturer: - Lectures combine giving examples for students to	5		- In class: interaction between students and lecturers through examples. - Homework #6: Calculation calculate and arrange reinforcement for flat slab or/and panel slab (if any).	[1], [3], [4] & Lecture Slides	

Week Section	Content	CLOs	Teaching and learning										Student assessment	Textbooks and materials
			Self-study		FTF				Online (if any)					
					Theory		Practice		Theory		Practice			
			Activity	Hour	Activity	Periods	Activity	Periods	Activity	Periods	Activity	Periods		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)					
	<i>1.6.2. Calculation of panel floor</i>	possible to calculate and arrange reinforcement for flat floors and panel floors. CLO3.1: Do the job correctly, reason closely.												
Session 5	Chapter 2: Reinforced concrete frame 2.1. Concept of frame 2.2. Structure of frame 2.3. Calculation diagram 2.4. Preliminary select the section size of frame	- CLO1.1: Understand the concepts, master the structure and classify the reinforced concrete frame - CLO1.2: Identify and analyze the calculation diagram of the reinforced	At home: review, do the exercises for session 7 (if any), pre-reading the content of session 8.	15	➤ Lecturer: - Lectures combine giving examples for students to perform in class. ➤ Students: - In class: listen to lectures;	5							- In class: interaction between students and lecturers through examples. - Homework #7: Preliminary select the section size of columns, beams and floors for a specific building	[1], [3], [4] & Lecture Slides

8. Course policy

- Regulations on submission of assignments and tests: Students who do not submit or submit assignments at the wrong time or are absent from the class that does assignments without permission will get "Zero" mark for this assignment..
- Class regulations: follow the regulations of Open University of Ho Chi Minh City.

DEAN OF THE FACULTY

ACADEMICS

Nguyen Trong Phuoc