Course Syllabus

1. **Course Title:** Prestressed Concrete STructures
2. **Course Code:** PCSD422317
3. **Credit Units:** 2 credits (2/0/4) (2 units of theory, 0 units of practice/4 units of self-study)
   Duration: 15 weeks (2 hours of theory + 0 hours of practice + 4 hours of self-study per week)
4. **Course Instructors:**
   1/ Dr. Phạm Đức Thiện
   2/ Dr. Lê Trung Kiên
   3/ Dr. Trần Tuấn Kiệt
5. **Course Requirements**
   Prerequisite course: None
   Previous course: Reinforced Concrete Structures (RCST240617)
   Parallel course: None
6. **Course Description**
   This is a fundamental engineering course belonging to a group of courses related reinforced concrete structures. The course introduces knowledge of prestressed concrete materials, calculation and design of basically prestressed concrete structural components subjected bending, shearing and tension/compression. In addition, the course also provides fundamental concepts of construction technology for pre-stressed concrete structures.

7. **Course Goals**

Goals	***Goal description***	**Programme ELOs**
G1	Core knowledge in the area of civil engineering such as reinforced concrete structures, prestressed concrete structures.	1.3
G2	Analysis and giving possible solutions for reinforced concrete problems.	2.1, 2.4
G3	Ability of group working as well as ability of reading and understanding basic English vocabularies	3.1, 3.3
G4	Ability of design prestressed concrete members.	4.3, 4.4

8. **Course Learning Outcomes**

CLOs		**CLO Description**	**Programme ELOs**
G1	**G1.1**	Demonstrate the basic concepts, terminologies, design principles of prestressed concrete structures.	1.3
G2	**G2.1**	Ability of calculation losses in prestress.	2.1
	G2.2	Ability of calculation the members using first and second limit	2.4

		state method	
G3	**G3.1**	Ability of group working for discussing and giving solutions of prestressed concrete problems.	3.1
	G3.2	Ability of reading and understanding basic English vocabularies.	3.3
G4	**G4.1**	Select appropriate solution for prestressed concrete structures	4.3
	G4.2	Ability of design a prestressed concrete member step by step.	4.4

9. Learning resourses

- Textbooks:

1. Bộ xây dựng, TCVN 5574:2012, Kết cấu bê tông và bê tông cốt thép – tiêu chuẩn thiết kế, Nhà xuất bản xây dựng, 2012.
2. Nguyễn Tiến Chương, Kết cấu bê tông ứng suất trước. Nhà XB Xây dựng, Hà Nội, 2010.
3. Lê Thanh Huấn (chủ biên), Nguyễn Hữu Việt, Nguyễn Tất Tâm, Kết cấu bê tông ứng lực trước căng sau trong nhà nhiều tầng, Nhà xuất bản xây dựng, 2010.
4. Đặng Đình Minh, Thi công cốt thép dự ứng lực (gia công và lắp đặt cốt thép dự ứng lực, Nhà xuất bản xây dựng, 2010.
5. V. Baikov, E. Sigalov, Reinforced concrete structures, Volume 1, 1981.

- References:

1. Nguyễn Tiến Chương, Kết cấu bê tông ứng suất trước - Chỉ dẫn thiết kế theo TCXDVN 356 : 2005. Nhà XB Xây dựng, Hà Nội, 2010.
2. Nguyễn Tiến Chương, Kết cấu bê tông ứng suất trước căng sau, Nhà xuất bản xây dựng, 2010.
3. Phan Quang Minh, Thiết kế sàn bê tông ứng lực trước, Hà Nội, 2007.
4. Edward G. Nawy, Prestressed concrete – A fundamental approach, 5th edition, Prentice Hall, 2010.
5. Antoine E. Naaman, Prestressed concrete analysis and design - Fundamentals, 2nd edition, Techno Press 3000, 2004.
6. T.Y. Lin, Ned H. Burns, Design of prestressed concrete structures, John Wiley & Sons, 1981.
7. Sami Khan, Martin Williams, Post-tensioned concrete floor, Butterworth – Heinemann, 1995.

10. Assessement:

- Grading point: **10**
- Assessment plan:

Type	Content	Timeline	Assessment method	CLOs	Rate (%)
Attendance					**10**
Exam					**20**
E#1	Calculate losses in prestress.	Week 7		G1.1, G2.1	20

Type	Content	Timeline	Assessment method	CLOs	Rate (%)
E#2	Design bending member	Week 12		G1.1, G2.1, G2.2	
Project					**20**
P#1	Student could choose the suitable topic from instructor.	Week 5-15	Report	G1.1, G2.1, G2.2, G3.1	20
Final exam					**50**
	- The final exam covers some contents delivered in the course and CLOs - Duration: 90 minutes.		Paper assessment	G1.1, G2.1, G2.2	

11. Course Content:

Week	Content	CLOs
1	***Chapter 1: General of prestressed concrete (4/0/8)***	
	A/* Content and pedagogical methods in class: (2)* **Content:** 1.1 Introduction 1.2 Concepts of prestressed concrete structures **Pedagogical methods**: + Presentation and Explaination + Introduce sylabus and assessement method + Making groups for project	G1.1
	***B/* Self-study content**: *(4)* + Look up introduced references + Read the first chapter of textbook + Observe prestressed concrete structures	G1.1
2	***Chapter 1: General of prestressed concrete (continue) (4/0/8)***	
	A/* Content and pedagogical methods in class: (2)* **Content:** 1.3 Types of prestressed concrete 1.4 Types of prestressing 1.5 Anchorage of prestressed steel **Pedagogical methods**: + Presentation and Explaination	G1.1
	***B/* Self-study content**: *(4)* + Review the basic knowledges of reinforced concrete structures course + Make comparison between traditional reinforced concrete structures	G1.1

Week	Content	CLOs
	and prestressed concrete structures.	
3	***Chapter 2: Materials and details of prestressed concrete (4/0/8)***	
	A/* Content and pedagogical methods in class: (2)*** **Content:** 2.1 General of using materials 2.2 Concrete **Pedagogical methods**: + Explaination with illustraion examples. + Presentation	G1.1
	***B/* Self-study content**: *(4)* + Read table of material properties of concrete and steel using in prestressed concrete.	G1.1
4	***Chapter 2: Materials and details of prestressed concrete (continue) (4/0/8)***	
	A/* Content and pedagogical methods in class: (2)*** **Content:** 2.3 Steel 2.4 Details of prestressed concrete **Pedagogical methods**: + Explaination with illustraion examples. + Presentation	G1.1
	***B/* Self-study content**: *(4)* + Read principles of detail for prestressed concrete	G1.1
5	***Chapter 3: Prestress and losses in prestress (6/0/12)***	
	A/* Content and pedagogical methods in class: (2)*** **Content:** 3.1 General 3.2 Prestress in prestressed steel 3.3 Prestress in concrete **Pedagogical methods**: + Explaination with illustraion examples. + Presentation	G1.1
	***B/* Self-study content**: *(4)* + Review knowledges of strength of materials course. + Then systemize and sumarize the contents relating to geometrial charcteristics of section. + Prepare for group project	G1.1, G3.1
6	***Chapter 3: Prestress and losses in prestress (continue) (6/0/12)***	
	A/* Content and pedagogical methods in class: (2)*** **Content:** 3.4 Losses in prestress	G1.1

Week	Content	CLOs
	Pedagogical methods: + Explaination with illustraion examples. + Presentation	
	***B/* Self-study content**: *(4)* + Study and do examples relating to losses in prestress + Prepare group project + Prepare E#1	G1.1, G3.1
7	***Chapter 3: Ứng suất trước và tổn hao ứng suất trước (6/0/12)***	
	A/* Content and pedagogical methods in class: (2)* **Content:** 3.5 Examples 3.6 E#1 **Pedagogical methods**: + Explaination with illustraion examples. + Presentation	G1.1
	***B/* Self-study content**: *(4)* + Study and do examples relating to losses in prestress + Prepare group project	G1.1, G3.1
8	***Chapter 4: Limit state design of prestressed concrete structure (2/0/4)***	
	A/* Content and pedagogical methods in class: (2)* **Content:** 4.1 Stress-strain state of bending member 4.2 Limit state design 4.3 The first limit state design 4.4 The second limit state desgn **Pedagogical methods**: + Explaination with illustraion examples. + Presentation	G1.1, G2.1, G2.2, G4.2
	***B/* Self-study content**: *(4)* + Study design methods diferent from limit state design method. + Prepare group project	G1.1, G2.1, G2.2, G3.1, G4.1
9	***Chapter 5: Members in bending – normal-section strength analysis (6/0/12)***	
	A/* Content and pedagogical methods in class: (2)* **Content:** 5.1 Introduction 5.2 Plane bending member with symmetrical section **Pedagogical methods**: + Explaination with illustraion examples. + Presentation	G1.1, G2.1, G4.2

Week	Content	CLOs
	***B/* Self-study content**: *(4)* + Do examples of bending memeber Làm bài tập về cấu kiện chịu uốn + Prepare group project	G1.1, G2.1, G3.1, G4.1
10	***Chapter 5: Members in bending – normal-section strength analysis (continue) (6/0/12)***	
	A/* Content and pedagogical methods in class: (2)* **Content:** 5.3 Bending member with rectangular section **Pedagogical methods**: + Explaination with illustraion examples. + Presentation	G1.1, G2.1, G4.2
	***B/* Self-study content**: *(4)* + Do examples of bending members + Prepare group project	G1.1, G2.1, G3.1, G4.1
11	***Chapter 5: Members in bending – normal-section strength analysis (continue) (6/0/12)***	
	A/* Content and pedagogical methods in class: (2)* **Content:** 5.4 Bending member with T and I sections 5.5 General case **Pedagogical methods**: + Explaination with illustraion examples. + Presentation	G1.1, G2.1, G4.2
	***B/* Self-study content**: *(4)* + Sumarize the content of chapter. + Prepare group project + Prepare E#2	G1.1, G2.1, G3.1, G4.1
12	***Chapter 6: Members in bending – inclined-section strength analysis (2/0/4)***	
	A/* Content and pedagogical methods in class: (2)* **Content:** 6.1 General 6.2 Inclined-section strength analysis 6.3 Examples 6.4 E#2 **Pedagogical methods**: + Presentation and Explaination + Group discussion + Finish name of topic project and name of group members.	G1.1, G2.1, G3.1, G4.1
	***B/* Self-study content**: *(4)* + Do examples relating contents of chapter.	G1.1, G2.1, G3.1

Week	Content	CLOs
	+ Do group project	
13	***Chapter 7: Crack resistance of prestressed concrete members (2/0/4)***	
	A/* Content and pedagogical methods in class: (2)*** **Content:** 7.1 General 7.2 Crack calculation 7.3 Examples **Pedagogical methods**: + Presentation and Explaination + Group discussion	G1.1, G2.2, G3.1, G4.2
	***B/* Self-study content**: *(4)* + Do exercise relating to chapter contents + Do group project	G1.1, G2.2, G3.1
14	***Chapter 8: Deflection of prestressed concrete members (4/0/8)***	
	A/* Content and pedagogical methods in class: (2)*** **Content:** 8.1 General 8.2 Curvature calculation 8.3 Deflection calculation **Pedagogical methods**: + Presentation and Explaination	G1.1, G2.2, G4.2
	***B/* Self-study content**: *(4)* + Do exercise relating to chapter contents + Do group project	G1.1, G2.2, G3.1
15	***Chapter 8: Deflection of prestressed concrete members (continue) (4/0/8)***	
	A/* Content and pedagogical methods in class: (2)*** **Content:** 8.4 Examples 8.5 All review **Pedagogical methods**: + Presentation project (presentation training) + Discussion between groups + Comments from instructors	G1.1, G3.1
	***B/* Self-study content**: *(4)* + Finish group project and submit	G3.1

12. Learning Ethics

Home assignments must be done by the students themselves. Plagiarism found in the assessments will get zero grade point.

13. Date of first approval: August 25th, 2015

14. Approval:

Dean	Head of Department	Instructuor
A/Prof. Dr. Nguyễn Trung Kiên	**MSc. Nguyễn Văn Hậu**	**Dr. Trần Tuấn Kiệt**

15. Date and Up-to-date content

1st time: Date:	Instructor Head of department: