Course Syllabus

1. **Course Title:** High-rise Building Structures
2. **Course Code:** HRBS421217
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. Ngô Việt Dũng
   2/ MSc. Nguyễn Văn Hậu
   3/ MSc. Đoàn Ngọc Tịnh Nghiêm
5. **Course Requirements**
   Prerequisite courses: Reinforced Concrete Building Structures (RCBS320817)
   Previous courses: Dynamics of Structures (DYST321917), Steel Building Structures (SBST321617)
   Parallel courses: None
6. **Course Description**

   The course is the extension and enhancement of courses related to reinforced concrete structures. The course provides professional knowledge of reinforced concrete high-rise building structures. Normal and special loadings acting on high-rise buildings are introduced and estimated and the structures of the high-rise buildings are calculated and examined to resist those loadings. Moreover, analytical skills in order to select appropriate structural design also are one of important targets of this course.

7. **Course Goals**

Goals	Goal description	Programme ELOs
G1	Core knowledge in the area of high-rise building structures such as Flat plate, rigid-frame, shear wall, cores structures…	1.3
G2	Analysis and giving possible solutions for high-rise building structures.	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, simulation high-rise building members.	4.3, 4.4

8. **Course Learning Outcomes**

CLOs		CLO Description	Programme ELOs
G1	**G1.1**	Ability of calculation an approximate computing models and Precise Computing Models	1.3

	G1.2	Ability of calculation the members inertia forces and combinations of loading.	1.3
G2	**G2.1**	Ability to calculate and design the high-rise building structures.	2.1
	G2.2	Self study and engage in long-life learning.	2.4
G3	**G3.1**	Ability of group working for discussing and giving solutions of high-rise building problems.	3.1
	G3.2	Ability of reading and understanding basic English vocabularies.	3.3
G4	**G4.1**	Ability of design a high-rise building member step by step.	4.3
	G4.2	Ability of calculation the members inner forces, reinforcements and rational reinforcement construction for high-rise building structures.	4.4

9. Learning resourses

- Textbooks:

1. Nguyễn Tiến Chương, *Phân tích kết cấu nhà nhiều tầng*, NXB Xây dựng 2015

- References:

1. Bryan Stafford Smith and Alex Coul, *Tall building structures: analysis and design*, Willey interscience publication 1991
2. Kenneth M. Leet, *Reinforced concrete design*, McGraw Hill 1997
3. Khandzi. *Tính toán và thiết kế nhà khung BTCT nhiều tầng*, NXB Xây dựng
4. Lê Thanh Huấn, *Kết cấu nhà cao tầng bê tông cốt thép*, NXB Xây dựng 2007
5. Lê Văn Quí & Lều thọ Trình, *Động lực học công trình,* NXB ĐH & THCN Hà Nội, 1979
6. Ngô Thế Phong, Lý Trần Cường, [Trịnh Kim Đạm], Nguyễn Lê Ninh, *Kết cấu bê tông cốt thép – Phần kết cấu nhà cửa*, NXB Khoa học & Kỹ thuật
7. W. SULLƠ, *Kết cấu nhà cao tầng*, NXB Xây dựng
8. Triệu Tây An và nhóm tác giả, *Hỏi – đáp thiết kế và thi công kết cấu nhà cao tầng (Tập 1 và 2)*, NXB Xây dựng
9. TCXDVN 323: 2004, *Nhà ở cao tầng – tiêu chuẩn thiết kế*
10. TCXD 198: 1997, *Nhà cao tầng – thiết kế, cấu tạo BTCT toàn khối*
11. TCXDVN 5574: 2012, *Kết cấu bê tông và bê tông cốt thép – tiêu chuẩn thiết kế*
12. TCXD 229: 1999. *Tính toán thành phần động của tải trọng gió*
13. TCVN 9386: 2012. *Thiết kế công trình chịu động đất*
14. QCVN 3: 2012/BXD. *Quy chuẩn kỹ thuật quốc gia về nguyên tắc phân loại, phân cấp công trình dân dụng, công nghiệp và hạ tầng kỹ thuật đô thị*

10. Assessement:

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

Type	Content	Timeline	Assessment method	CLOs	Rate (%)
Exam + Diligence					**20**
BT#1	1-2 other exams for a semeter	Week 9-13	+ Individual paper assessment	G2.1, G4.2	20

			+ Paper document available + Duration: 50 minutes		
Project (1st Semeter)					**40**
BL#1	Apply the design of the 10-storey buildings by Etabs or SAP 2000.	Week 11	Model files	G2.1, G4.2	40
Or Presentation (2nd Semeter)					**40**
	Student could choose the suitable topic from instructor.	Week 3-15	Report	G2.4, G3.1	**40**
Final exam					**40**
	- The final exam covers some contents delivered in the course and CLOs - Duration: 90 minutes.		Paper assessment	G1.2, G2.2, G3.2, G4.2	

11. Course Content:

Week	Content	CLOs
1	***Chapter 1:*** **Bearing-load high-rise structures system**	
	A/ **Content and pedagogical methods in class:** *(2)* **Content:** 1.1 Definitions and Categorizes of HRBS 1.2 Main Characteristics of Designing **Pedagogical methods**: + Presentation and Explaination + Group discussion	G1.1, G3.2
	B/ **Self-study content**: *(4)* Analysis of Bearing-load high-rise structures system	G2.2
2	***Chapter 1:*** **Bearing-load high-rise structures system** *(cont)*	
	A/ **Content and pedagogical methods in class:** *(2)* **Content:** 1.3 Bearing-load Structure 1.4 Distribution of Bearing-load **Pedagogical methods**: + Presentation and Explaination + Group discussion	G1.1, G3.2
	B/ **Self-study content**: *(4)* Analysis of Bearing-load high-rise structures system	G2.2
3	***Chapter 2*****: Designing principles and computing models**	

	***A/* Content and pedagogical methods in class:** *(2)* **Content:** 2.1. Design Process. 2.2. Basic Principles in HRBS Design 2.3. Computing Assumptions 2.4. HRBS Properties 2.5. Approximate Computing Models 2.6. Precise Computing Models **Pedagogical methods**: + Presentation and Explaination + Group discussion	G1.2, G3.1
	***B/ /* Self-study content**: *(4)* So sánh các mô hình gần đúng và chính xác	G2.2, G3.1
4	***Chapter 2*: Designing principles and computing models** *(cont)*	
	***A/* Content and pedagogical methods in class:** *(2)* **Content:** 2.7. Design Process 2.8. P – Δ Effect Computing Models 2.9. 3D Bearing-load Computing Models 2.10. 2D Bearing-load Computing Models. **Pedagogical methods**: + Presentation and Explaination + Group discussion	G1.2, G3.1
	***B/ /* Self-study content**: *(4)* 2.11. Models of Large Cross Section Beam and Column.	G2.2, G3.1
5	***Chapter 3:* Loading and impacts**	
	***A/* Content and pedagogical methods in class:** *(2)* **Content:** 3.1. Vertical Load 3.2. Wind Load 3.3. Earthquake Load **Pedagogical methods**: + Presentation and Explaination + Group discussion	G1.1, G2.2, G3.1, G4.2
	***B/ /* Self-study content**: *(4)* 3.4. Load Combination	G2.2, G3.1
6	***Chapter 3:* Loading and impacts** *(cont)*	

	***A/* Content and pedagogical methods in class:** *(2)* **Content:** 3.5. Horizontal Load Distribution to Vertical Bearing-load Structures **Pedagogical methods**: + Presentation and Explaination + Group discussion	G1.1, G2.2, G3.1, G4.2
	***B/ /* Self-study content**: *(4)* 3.6. Geometry Properties	G2.2, G3.1
7	***Chapter 4*: Rigid-frame structures**	
	***A/* Content and pedagogical methods in class:** *(2)* **Content:** 4.1. Design Process 4.2. Rigid-Frame 4.3. Approximate Determination of Member Forces Caused by Gravity Loading **Pedagogical methods**: + Presentation and Explaination + Group discussion	G1.2, G2.2, G3.1, G4.2
	***B/ /* Self-study content**: *(4)* Study the application of Approximate Determination of Member Forces Caused by Gravity Loading	G2.2, G3.1, G4.1
8	***Chapter 4*: Rigid-frame structures** *(cont)*	
	***A/* Content and pedagogical methods in class:** *(2)* **Content:** 4.1. Approximate Determination of Member Forces Caused by Horizontal Loading 4.2. Approximate Analysis For Drift 4.3. Computer Analysis of Rigid-Frame **Pedagogical methods**: + Presentation and Explaination + Group discussion	G1.2, G2.2, G3.1, G4.2
	***B/ /* Self-study content**: *(4)* Study the application of Approximate Determination of Member Forces Caused by Horizontal Loading	G2.2, G3.1, G4.1
9	***Chapter 4*: Rigid-frame structures** *(cont)*	
	***A/* Content and pedagogical methods in class:** *(2)* **Content:** 4.1. Flat Plate Structure	G1.2, G2.2, G3.1, G4.2

	4.2. Reinforced Formation In Flat Plate Structure 4.3. Design of Flat Plate Structure for shear 4.4. Design of Flat Plate Structure by analogous rigid frame **Pedagogical methods**: + Presentation and Explaination + Group discussion	
	***B/ /* Self-study content**: *(4)* 4.5. Calculation of Rigid-frame structures by FE	G2.2, G3.1, G4.1
10	***Chapter 5:* Shear wall structures**	
	***A/* Content and pedagogical methods in class:** *(2)* **Content:** 5.1. Behavior of Shear Wall Structures. 5.2. Analysis of Proportionate Wall Systems **Pedagogical methods**: + Presentation and Explaination + Group discussion	G1.2, G2.2, G3.1, G4.2
	***B/ /* Self-study content**: *(4)* Analysis of Behavior of Shear Wall Structures, Choose a model calculation.	G2.2, G3.1, G4.1
11	***Chapter 5:* Shear wall structures** *(cont)*	
	***A/* Content and pedagogical methods in class:** *(2)* **Content:** 5.3. Determination of inner forces in shear wall structures 5.4. Calculation of bending reinforcement in shear wall structures **Pedagogical methods**: + Presentation and Explaination + Group discussion	G1.2, G2.2, G3.1, G4.2
	***B/ /* Self-study content**: *(4)* Calculate and design bending reinforcement in shear wall structures	G2.2, G3.1, G4.1
12	***Chapter 5:* Shear wall structures** *(cont)*	
	***A/* Content and pedagogical methods in class:** *(2)* **Content:** 5.5. Calculation of shear reinforcement in shear wall structures 5.6. Modelling for Shear wall structures in Etabs **Pedagogical methods**:	G1.2, G2.2, G3.1, G4.2

	+ Presentation and Explaination + Group discussion	
	***B/ /* Self-study content**: *(4)* Study the application of modelling for Shear wall structures in Etabs	G2.3, G3.1, G4.1
13	***Chapter 6:* Wall-frame structures**	
	***A/* Content and pedagogical methods in class:** *(2)* **Content:** 6.1. Introduction. 6.2. Shear Wall and Frame Behavior 6.3. Shear Wall and Frame Interaction **Pedagogical methods**: + Presentation and Explaination + Group discussion	G1.2, G2.2, G3.1, G4.2
	***B/ /* Self-study content**: *(4)* Distinct Frame, Shear wall and wall-frame structures behavior	G2.2, G3.1, G4.1
14	***Chapter 6:* Wall-frame structures** *(cont)*	
	***A/* Content and pedagogical methods in class:** *(2)* **Content:** 6.4. Approximate Theory For Wall-Frame **Pedagogical methods**: + Presentation and Explaination + Group discussion	G1.2, G2.2, G3.1, G4.2
	***B/ /* Self-study content**: *(4)* Study the application of calculation of wall-frame structures methods	G2.2, G3.1, G4.1
15	***Chapter 7: Stability of high-rise buildings***	
	***A/* Content and pedagogical methods in class:** *(2)* **Content:** 7.1. Overall Buckling Analysis of Frame. 7.2. Overall Buckling Analysis of Wall-Frame 7.3. P-Δ Analysis 7.4. Out Of Plumb Effects 7.5. Stiffness of Members in Stability Calculations **Pedagogical methods**: + Presentation and Explaination + Group discussion	G1.2, G3.1
	***B/ /* Self-study content**: *(4)* 7.6. Effects of Foundation Rotation	G2.2, 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 1st, 2012

14. Approval:

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

15. Date and Up-to-date content

1st time: Date:	Instructor Head of department: