Course Syllabus

1. **Course Title:** Steel Building STructures
2. **Course Code:** SBST321617
3. **Credit Units:** 2 credits (2/0/4) (2 units of theory/ 0 unit of practice/ 4 units of self-study)
   Duration: 15 weeks (2 hours of theory+0 hours of practice, and 4 hours of self-study per week)
4. **Course Instructors**
   1/ Assoc. Prof. Dr. Nguyễn Trung Kiên
   2/ Dr. Lê Anh Thắng
5. **Course Requirements**
   Prerequisite courses: Structural Mechanics (STME240517)
   Previous courses: Steel Structures (STST240917)
   Parallel courses: None
6. **Course Description**
   This course aims to explore steel structures knowledge as a natural progression of the steel structures module from which the students will develop their knowledge on the design of simple steel building structures such as single-span steel portal frames, wide-span steel buildings and multi-storey steel buildings. Moreover, the students will show familiarity with the calculation of load and action from the current Vietnamese Standard. The course will be delivered through a series of main lectures. In addition, practical exercises and teamwork project will help students to consolidate and go deeper their knowledge and skills. This course also helps students to have basic knowledge and skills for carrying out the steel structures project.
   Student performance towards the course goals will be realized by formative assessments (50%) and final exam (50%). The formative assessment during the learning process is arranged by the mid-term exam, teamwork project and homework assignments. Coursework feedback will be formally carried out at the course end while the generic consideration of the student work and knowledge diagnostic of the students will be done throughout the formative assessments.
7. **Course Goals**

Goals	Goal Description	Programme ELOs
G1	Basic knowledge to calculate loads and actions on the steel buildings; to design the structural elements and connections of simple steel buildings including single-span steel portal frames, wide-span steel buildings and multi-storey steel buildings	1.3
G2	Analysis and selection of possible structural solutions of the simple steel buildings	2.1, 2.3
G3	Team working and presentation skills, understanding basically English vocabularies of the steel buildings structures	3.1, 3.3

8. Course Learning Outcomes (CLOs)

CLOs		CLO Description	Programme ELOs
G1	**G1.1**	Calculate loads and action on the steel buildings using currently Vietnamese specifications	1.3
	G1.2	Develop basic knowledge of steel structures to calculate structural elements, connections of the simple steel buildings	1.3
G2	**G2.1**	Model structural schemes and design structural elements of the simple steel buildings	2.1
	G2.2	Analyze and select a possible plane structural solution for the simple steel buildings	2.3
G3	**G3.1**	Organize and engage technical collaboration with team members in solving technical issues related to the steel building structures	3.1
	G3.2	Understand English vocabularies of structural members of the steel buildings	3.3

9. Learning resources

All following learning resources will be sent to student throughout learning management system (LMS) of the University.

- Textbooks:

1. Nguyen Trung Kien, Le Anh Thang, Lecture notes on Steel building structures, HCMC University of Technology and Education, 2016 (in English)

- References:

1. D. M. Koschmidder, D. G. Brown, Elastic design of single-span steel portal frame buildings to Eurocode 3, SCI, UK 2012 (in English).
2. T. J. MacGinley, Steel Structure – Practical design studies, E&FN SPON, 1998 (in English).
3. Building research Establishment, The Steel Construction and Ave Arup & Partners, Worked examples for the design of steel structures, SCI Publication, UK, 1994 (in English).
4. Pham Van Hoi, Nguyen Quang Vien, Pham Van Tu, Luu Van Tuong, Steel structures for civil and industrial buildings, Science and Engineering Press, 2006 (in Vietnamese).
5. Pham Van Hoi, Steel – reinforced concrete composite structures, Science and Engineering Press, 2006 (in Vietnamese).
6. TCVN 2737-1995 : Load and Action (in Vietnamese)
7. TCVN 9386-2012 : Design of structures for earthquake resistances (in Vietnamese)

10. Student assessment

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

Type	Content	Timeline	Assessment method	CLOs	Rate (%)
Exams					**30**
Exam 01	Following content is realized in the assessment:	Week 6	+ Individual paper assessment in class	G1.1, G2.1,	15

	- Arrange necessary bracing system, formulate structural schemes and design principles - Calculate loads on a single-span steel portal frame including static load, roof live load, wind load and crane load, and display them on corresponding structural schemes; Demonstrate possible load combinations within which the current Vietnamese specifications on load and action must be followed. - Comprehend some English vocabularies of structural elements of the building		+ Paper document available + Duration: 60 minutes + A feedback on the assessment will be carried out right after the exam.	G3.2	
Exam 02	Following content is realized in the assessment: - Calculate loads and actions on a simple multi-storey plane steel building including static load, live load, wind load, and seismic load; Demonstrate the possible load combinations - Present structural scheme of a secondary beam and its design principle The exam subject is partly delivered in English.	Week 14	+ Individual paper assessment + Paper document available + Duration: 60 minutes + A feedback on the assessment will be carried out right after the exam.	G1.1, G2.1, G3.2	15
Projects					**15**
Pro01	Given a single-span portal steel frame as one in Exam01, model and analyze the gable structures of single-span steel portal frame. The following information is required to present in this project: - Calculate loads on the gable and possible load combination - Model and analyze the gable structures	Week 7	+ Group students in teams maximum of 5 and have them work together on a project in class within which each team member is assigned a task. + Have them 35-minute duration to model and calculate the gable structures of single-span steel portal frame. + Have each group 3 minutes to present the	G1.1, G1.2, G2.1, G3.1	5

	- Design the column basement connection		project using PowerPoint. + Score by rubric + Have them comments on the project works + A feedback on the assessment will be carried out right after the project.		
Pro02	Design the structure solutions for car parking shelters, fuel stations, stadium roof. The following information is required to present in this project: - Calculate loads on the structure and possible load combination - Model the structural scheme, Analyze and select a possible structural solution. - Design connections	Week 11	+ Group students in teams maximum of 5 and have them work together on projects at home in which each team member is assigned a task on each topic. + Have them duration of a week to propose a structural solution of car parking shelters, fuel stations or stadium roofs. + Presentation of the project is realized by Poster. _Each group is required to observe and share comments each others. _Score by rubric after each 3-minute presentation. + Have them comments on the project works and reward for the best group + A feedback on the assessment will be carried out right after the project.	G1.1, G1.2, G2.1, G2.2, G3.1	10
Homework assigments					**5**
Assig 01	Design the structures of a simple plane arch. The following information is required to present in this assigment: - Calculate loads on the structure and possible load combination - Model the structural scheme, analyze and select a possible structural solution, design the arch cross-section	Week 10	+ Individual assignment at home + Duration: a week + A feedback on the assessment will be carried out right after the assigment.	G1.1, G1.2, G2.1, G2.2	5
Final exam					**50**
Final	The final exam covers some	Univ.	+ Paper assessment	G1.1,	

exam	contents delivered in the course and CLOs.	timeline	+ Paper document available + Duration: 90 minutes	G1.2, G2.1, G2.2, G3.2	

11. Course Content

Week	Content	CLOs
1	***Chaper 0:*** **Overview on steel structures and application** *(2h,0,4h)*	
	A/ Content and pedagogical methods in class: *(2h)* **Content:** 0.1 Properties of steel structures 0.2 Applications 0.3 Structure steel design process **Pedagogical methods:** Traditional lectures using powerpoint to review basic knowledge of steel structures course; to demonstrate large applications of these structures in different kinds of buiding. A series of diagnostic questions will be also used to estimate students knowledges.	G1.1, G1.2
	B/ Self-study content: *(4h)* Review knowledges of steel structures course on the design of connections, steel beams, steel column, steel truss and composite structures.	G1.1, G1.2
2	***Chapter 1:*** **Single-span steel portal frames** *(12h,0,24h)*	
	A/ Content and pedagogical methods in class: *(2h)* **Content:** 1.1 Overview on steel industrial buildings 1.2 Architecture of a single-span steel portal frame 1.3 Column line grid and preliminary design of portal frame dimemsions 1.4 Bracing system **Pedagogical methods:** Series of lectures using powerpoint to disseminate the chapter content. Practical examples on column grid line and bracing systems help students to reinforce their knowledges.	G1.1, G2.1, G3.2
	B/ Self-study content: *(4h)* The students are required to explore knowledge of structural analysis to understand role of bracings system and to calculate roof and column bracing structures	
3	***Chapter 1:*** **Single-span steel portal frames (cont.)** *(12h,0,24h)*	
	A/ Content and pedagogical methods in class: *(2h)* **Content:** 1.5 Load and action **Pedagogical methods:** Series of lectures using powerpoint to disseminate the chapter content. Practical examples on the calculation of loads help students to reinforce their knowledges.	G1.1, G3.2

	B/ Self-study content: *(4h)* The students are required to explore references for comparision of wind load on the single-span steel portal frames between Vietnamese standard and foreign ones	
4	***Chapter 1:*** **Single-span steel portal frames (cont.)** *(12h,0,24h)*	
	A/ Content and pedagogical methods in class: *(2h)* **Content:** 1.6 Main frame design **Pedagogical methods:** Series of lectures using powerpoint to disseminate the chapter content (structural scheme, design structural components of main frame, connections). Practical examples help students to reinforce their knowledges.	G1.2, G2.1, G3.2
	B/ Self-study content: *(4h)* The students are required to explore FEM software to model and calculate single-span steel portal frames	
5	***Chapter 1:*** **Single-span steel portal frames (cont.)** *(12h,0,24h)*	
	A/ Content and pedagogical methods in class: *(2h)* **Content:** 1.7 Gable design 1.8 Other secondary structural components **Pedagogical methods:** Series of lectures using powerpoint to disseminate the chapter content. Practical examples help students to reinforce their knowledges	G1.1, G1.2, G2.1, G3.2
	B/ Self-study content: *(4h)* The students are required to explore references and FEM software to model and calculte gable structures	
6	***Chapter 1:*** **Single-span steel portal frames (cont.)** *(12h,0,24h)*	
	A/ Content and pedagogical methods in class: *(2h)* **Content:** 1.9 1st exam **Pedagogical method:** See Exam01, Have students solution of Exam01 and dicussion	G1.1, G2.1, G3.2
	B/ Self-study content: *(4h)* The students are required to explore references and textbook to reinforce required knowledge in Exam01.	
7	***Chapter 1:*** **Single-span steel portal frames (cont.)** *(12h,0,24h)*	
	A/ Content and pedagogical methods in class: *(2h)* **Content:** 1.10 Mini-project in class **Pedagogical methods:** See Pro01	G1.1, G1.2, G2.1, G3.1
	B/ Self-study content: *(4h)* The students are required to analyze effect of 3D model on resultants of	

	portal frames.	
8	***Chapter 2:*** **Wide-span steel buildings** *(8h,0,16h)*	
	A/ Content and pedagogical methods in class: *(2h)* **Content:** 2.1 Overview on wide-span steel buildings 2.2 Structures of wide-span steel buildings **Pedagogical methods:** Series of lectures using powerpoint to disseminate the chapter content. Practical examples help students to reinforce their knowledges.	G2.2, G3.2
	B/ Self-study content: *(4h)* The students are required to analyze and select plane structures for simple wide-span buildings.	
9	***Chapter 2:*** **Wide-span steel buildings (cont.)** *(8h,0,16h)*	
	A/ Content and pedagogical methods in class: *(2h)* **Content:** 2.3 Load and action on wide-span steel buildings **Pedagogical methods:** Series of lectures using powerpoint to disseminate the chapter content. Practical examples help students to reinforce their knowledges.	G1.1, G3.2
	B/ Self-study content: *(4h)* The students are required to explore references for well understanding the calculation of the load & action as well as possible load combinations on the wide-span steel buildings	
10	***Chapter 2:*** **Wide-span steel buildings (cont.)** *(8h,0,16h)*	
	A/ Content and pedagogical methods in class: *(2h)* **Content:** 2.4 Design structures of wide-span steel buildings **Pedagogical methods:** Series of lectures using powerpoint to disseminate the chapter content. Practical examples help students to reinforce their knowledges.	G1.2, G2.1, G2.2, G3.2
	B/ Self-study content: *(4h)* The students are required to explore references and FEM software to model and calculate structural components of simple wide-span steel buildings	
11	***Chapter 2:*** **Wide-span steel buildings (cont.)** *(8h,0,16h)*	
	A/ Content and pedagogical methods in class: *(2h)* **Content:** 2.5 Mini-project of designing specialty building structures **Pedagogical methods:** See Pro02	G1.1, G1.2, G2.1, G2.2, G3.1
	B/ Self-study content: *(4h)* The students are required to explore by themselves references and FEM software to go deeper design of specialty building structures	

12	***Chapter 3:*** **Multi-storey steel buildings** *(8h,0,16h)*	
	A/ Content and pedagogical methods in class: *(2h)* **Content:** 2.1 Overview on multi-storey steel buildings 2.2 Structures of multi-storey steel buildings 2.3 Load and action on multi-storey steel buildings **Pedagogical methods:** Series of lectures using powerpoint to disseminate the chapter content. Practical examples help students to reinforce their knowledges.	G1.1, G2.1, G3.2
	B/ Self-study content: *(4h)* The students are required to calculate seismic load using FEM software	
13	***Chapter 3:*** **Multi-storey steel buildings (cont.)** *(8h,0,16h)*	
	A/ Content and pedagogical methods in class: *(2h)* **Content:** 2.4 Design structures of multi-storey steel buildings **Pedagogical methods:** Series of lectures using powerpoint to disseminate the chapter content. Practical examples help students to reinforce their knowledges.	G1.2, G2.1, G3.2
	B/ Self-study content: *(4h)* The students are required to explore references to reinforce their knowledges of connections, structural components of the building.	
14	***Chapter 3:*** **Multi-storey steel buildings (cont.)** *(8h,0,16h)*	
	A/ Content and pedagogical methods in class: *(2h)* **Content:** 2.5 Example on designing a simple multi-storey steel building **Pedagogical methods:** A practical example on design of a simple multi-storey steel building helps student to reinforce their knowledges.	G1.1, G1.2, G2.1, G3.2
	B/ Self-study content: *(4h)* The students are required to explore FEM software to model and calculate the presented multi-storey steel building	
15	***Chapter 3:*** **Multi-storey steel buildings (cont.)** *(8h,0,16h)*	
	A/ Content and pedagogical methods in class: *(2h)* **Content:** 2.6 2rd exam **Pedagogical methods:** See Exam02, have students solution of Exam02 and discussion. A course feedback will be done at the end.	G1.1, G1.2, G2.1, G3.2
	B/ Self-study content: *(4h)* The students are required to explore references and textbook to reinforce required knowledge in Exam02	

12. Learning Ethics

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

13. Date of first approval: August 1st, 2012

14. Approved by:

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

15. Date and Up-to-date content

1st time: Date: -	Instructor: Head of Department: