Course Syllabus

1. **Course Title:** STructural MEchanics
2. **Course Code:** STME240517
3. **Credit Units:** 4 credits (4/0/8) (4 units of theory/ 0 unit of practice/8 units of self-study)
   Duration: 15 weeks (4 hours of theory+0 hours of practice, and 8 hours of self-study per week)
4. **Course Instructors:**
   1/ Dr. Lê Trung Kiên
   2/ Dr. Châu Đình Thành
   3/ Dr. Trần Tuấn Kiệt
5. **Course Requirements**
   Prerequisite courses: Fundamentals of Mechanics (FUME130221)
   Previous courses: Strength of Materials (STMA240121)
   Parallel courses: None
6. **Course Description**
   This is a fundamental one among a group of basic engineering courses which provides knowledge and skills for calculating internal forces and displacements of statically determinate and indeterminate structures. Additionally, the course also introduces the fundamental knowledge of matrix method to enhance the ability of using structural analysis software (ETABS, SAP 2000, SAFE...).
7. **Course Goals**

Goals	Goal description	Programme ELOs
G1	Core knowlegement of structure: rules of forming structure, internal forces, strain and displacement of structure.	1.2
G2	Analysis and giving possible solutions for structure.	2.1; 2.4
G3	Ability of group working as well as ability of reading and understanding basic English vocabularies in the area of anzlyzing structure.	3.1; 3.2; 3.3

8. **Course Learning Outcomes (CLOs)**

CLOs		CLO Description	Programme ELOs
G1	**G1.1**	Demonstrate the basic concepts of a structural system: geometrically stable system, geometrically unstable system, instantaneously unstable system, rigid plate, conditions of a geometrically stable system, loading, internal and external forces, idealized structure, displacement, strain, structural rigidity.	1.2
G2	**G2.1**	Ability of analyzing kinematic for a structure.	2.1, 2.4
	G2.2	Ability of determination of internal force and displacement for statically determinate and statically indeterminate structures.	2.1, 2.4

	G2.3	Ability of drawing influence line for beam, truss under moving load condition.	2.1, 2.4
	G2.4	Ability of determination of displacement for a plane system.	2.1, 2.4
G3	**G3.1**	Ability of group working for discussing and giving solutions of structural problems.	3.1, 3.2
	G3.2	Understanding English vocabularies in the area of analyzie structure.	3.3

9. Learning resourses

- Textbooks:

1. R.C. Hibbeler, *Structural analysis,* 8th ed., Pearson Prentice Hall, 2012.
2. Lều Thọ Trình, *Cơ học kết cấu – Tập 1 Hệ tĩnh định,* NXB KH&KT, 2010.
3. Lều Thọ Trình, *Cơ học kết cấu – Tập 2 Hệ siêu tĩnh,* NXB KH&KT, 2010.

- References:

1. Lều Thọ Trình và Nguyễn Mạnh Yên, *Bài tập Cơ học kết cấu – Tập 1 Hệ tĩnh định*, NXB KH&KT, 2010.
2. Lều Thọ Trình và Nguyễn Mạnh Yên, *Bài tập Cơ học kết cấu – Tập 2 Hệ siêu tĩnh*, NXB KH&KT, 2010.
3. Đặng việt Cường, *Cơ học kết cấu*, NXB KH&KT, 2005
4. A. Darkov & V. Kuzhetsove, *Structural mechanics,* Mir Pubishers Moscow, 1969.

10. Assessment:

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

Type	Content	Timeline	Assessment method	CLOs	Rate (%)
Attendance					**10**
Project					**10**
P#1	Group project: 1) Calculate internal force and displacement of structural systems 2) Using softwares to analyzing structures..	Week 8-15	Presentation	G1.1, G2.2, G2.4, G3.1, G3.2	10
Exams					**30**
E#1	Analysis of statically determinate structures.	Week 6	- Individual paper - Duration: 45‘	G1.1; G2.1; G2.2	15
E#2	Analysis of statically indeterminate structures.	Week 11	- Individual paper - Duration: 45‘	G2.2, G2.3, G2.4	15
Final exam					**50**
	- Analysis of statically determinate		- Paper assessment	G2.1, G2.2,	

	and indeterminate structures.		- Duration: 90‘	G2.4	

11. Course contents:

Week	Content	CLOs
1	***Chapter 1: Types of structures and loads***	
	A/* Content and pedagogical methods in class: (4)* **Content:** 1.1 Introduction 1.2 Types of structures 1.3 Types of loads 1.4 Structural design **Pedagogical methods**: + Presentation and Explanation + Group discussion	G1.1
	***B/* Self-study content**: *(8)* Review the knowledge of Strength of materials course.	G1.1
2	***Chapter 2: Geometrical stability of a plane structure.***	
	A/* Content and pedagogical methods in class: (4)* **Content:** 2.1 Idealized structure 2.2 Principle of superposition 2.3 Equations of equilibrium 2.4 Geometrical stability of a plane structure **Pedagogical methods**: + Presentation and Explanation	G1.1, G2.1, G3.1
	***B/* Self-study content**: *(8)* - Geometrical stability of a plane structure - Idealizing a real structure	G2.1
3	***Chapter 3: Analysis of statically determinate structures under fixing load***	
	A/* Content and pedagogical methods in class: (4)* **Content:** 3.1 Analysis of statically determinate trusses **Pedagogical methods**: + Presentation and Explanation	G2.2, G3.1, G3.2
	***B/* Self-study content**: *(8)* - Do homeworks in reference books.	G2.2
4	***Chapter 3: Analysis of statically determinate structures under fixing load** (continue)*	
	A/* Content and pedagogical methods in class: (4)* **Content:** 3.2 Analysis of statically determinate frames	G2.2, G3.1, G3.2

	Pedagogical methods: + Explaination	
	***B/* Self-study content**: *(8)* - Do homeworks in reference books.	G2.2
5	***Chapter 3: Analysis of statically determinate structures under fixing load*** *(continue)*	
	A/* Content and pedagogical methods in class: (4)*** **Content:** 3.3 Cables and Arches. **Pedagogical methods**: + Presentation and Explaination + Group discussion	G2.2, G3.1
	***B/* Self-study content**: *(8)* - Do homeworks in reference books.	G2.2
6	***Chapter 4: Analysis of statically determinate structures under moving load***	
	A/* Content and pedagogical methods in class: (4)*** **Content:** 4.1 Introduction of influence line 4.2 Influence line of beam **----------** - Exam #1 **Pedagogical methods**: + Presentation and Explaination	G2.3, G3.1, G3.2
	***B/* Self-study content**: *(8)* - Do homeworks in reference books.	G2.3
7	***Chapter 4: Analysis of statically determinate structures under moving load*** *(continue)*	
	A/* Content and pedagogical methods in class: (4)*** **Content:** 4.3 Influence of truss **Pedagogical methods**: + Explaination	G2.3, G3.1, G3.2
	***B/* Self-study content**: *(8)* - Determine the displacement of statically determinate structures under moving load - Do homeworks in reference books.	G2.3
8	***Chapter 5: Displacement***	
	A/* Content and pedagogical methods in class: (4)*** **Content:** 5.1 Elastic curve	G2.4, G3.1, G3.2

	5.2 The double integration method 5.3 Conjugate-beam method 5.4 Energy method 5.5 Verechtchaguine method **Pedagogical methods**: + Presentation and Explaination	
	***B/* Self-study content**: *(8)* - Do homeworks in reference books.	G2.4
9	***Chapter 6: Analysis of statically in determinate structures using force method***	
	A/* Content and pedagogical methods in class: (4)* **Content:** 6.1 Concepts. 6.2 Force method. 6.3 Application **Pedagogical methods**: + Presentation and Explaination	G2.2, G3.1, G3.2
	***B/* Self-study content**: *(8)* - Method of result checking - Do homeworks in reference books. - Do project	G2.2
10	***Chapter 7: Analysis of statically in determinate structures using displacement method***	
	A/* Content and pedagogical methods in class: (4)* **Content:** 7.1 Concepts 7.2 Displacement method 7.3 Application **Pedagogical methods**: + Presentation and Explaination	G2.2, G3.1, G3.2
	***B/* Self-study content**: *(8)* - Do homeworks in reference books. - Do project	G2.2
11	***Chapter 8: Analysis of statically in determinate structures using slope-deflection equations***	
	A/* Content and pedagogical methods in class: (4)* **Content:** 8.1 Slope-deflection equations 8.2 Analysis of beams 8.3 Analysis of frames **----------** - Exam #2	G2.2, G3.1, G3.2

	Pedagogical methods: + Presentation and Explaination + Group discussion	
	***B/* Self-study content**: *(8)* - Do homeworks in reference books. - Do project	G2.2
12	***Chapter 9: Analysis of statically in determinate structures using moment distribution***	
	A/* Content and pedagogical methods in class: (4)* **Content:** 9.1 General principles and definitions 9.2 Moment distribution for beams 9.3 Moment distribution for frames **Pedagogical methods**: + Presentation and Explaination	G2.2, G3.1, G3.2
	***B/* Self-study content**: *(8)* - Do homeworks in reference books. - Do project	G2.2
13	***Chapter 10: Analysis of statically in determinate structures using the stiffness method***	
	A/* Content and pedagogical methods in class: (4)* **Content:** 10.1 Fundamentals of the stiffness method 10.2 Analysis of trusses **Pedagogical methods**: + Presentation and Explaination	G2.2, G3.1, G3.2
	***B/* Self-study content**: *(8)* - Do homeworks in reference books. - Do project	G2.2
14	***Chapter 10: Analysis of statically in determinate structures using the stiffness method** (continue)*	
	A/* Content and pedagogical methods in class: (4)* **Content:** 10.3 Analysis of beams **Pedagogical methods**: + Presentation and Explaination	G2.2, G3.1, G3.2
	***B/* Self-study content**: *(8)* - Do homeworks in reference books. - Do project - Hoàn thành báo cáo bài tập lớn chun bị báo cáo	G2.2
15	***Chapter 10: Analysis of statically in determinate structures using the stiffness method** (continue)*	

	A/* Content and pedagogical methods in class: (4)* **Content:** 10.4 Analysis of frames **Pedagogical methods**: + Explaination + Group discussion	G2.2, G3.1, G3.2
	***B/* Self-study content**: *(8)* - All review	G2.2

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	**M.S. Nguyễn Văn Hậu**	**Dr. Lê Trung Kiên**

15. Date and Up-to-date content

1st time: Date:	Instructor Head of department: