Phụ lục 4
ĐỀ CƯƠNG MÔN HỌC

SYLLABUS

I.   General Information

1.   Course tittle in Vietnamese: Cơ học Kết cấu (CENG1421)

2.   Course tittle: Mechanics of Structures

3.   Knowledge/Skill block :

☒   General Knowledge   ☐   Specialized Knowledge

☒   Fundamental knowledge   ☐   Supplementary Knowledge

☐   Course project / Graduation project

4.   Number of Credits

Total	Theory	Practice	Self-study
4 (3,1,7)	3	1	7

5.   Responsible for the course

a.   Faculty: Faculty of Civil Engineering

b.   Lecturer: A/Prof. Nguyen Trong Phuoc

c.   Email: phuoc.nguyen@ou.edu.vn

d.   Work place: Room.705, Faculty of Civil Engineering

II.   Course Information

1.   Course Description and Course Outline

The subject provides the fundamental concepts in structural analysis as structural modelisation, classification of structures and causes applied on structures... The knowlegde of geometric stability enables to analyse and propose structural models. The subject presents analysis methods for statically determinate planar structures under the action of static loads. Furthermore, the subject provides the knowlegde: the method of virtual work for determination of structural displacements, the force method for analysis of statically indeterminate structures, the displacement method for analysis of kinematically indeterminate structures, the combined method. The subject lays the basis for Finite Element Method, and other professional courses.

The subject of this course is organized in 7 chapters. Chapter 1 aims to equip the students with fundamental concepts as structural modelisation, classification of structures, causes applied on structures, basic assumptions and the principle of superposition. Before starting the force analysis of a structures, it is necessary to establish the properties of the structure. The concepts of degree of freedom of structures, and geometric stability included stable or unstable are given in chapter 2. Chapter 3 presents analysis methods for various types of statically determinate planar structures such as beams, frames, trusses, three-hinged structrures and complex structures under the action of static loads. Chapter 4 provides the concepts of external work, strain energy and the principle of work and energy and the principle of virtual work for determination of structural displacements of statically determinate and indeterminate structures due to load, temperature change and support subsidence. The force method for analysis of statically indeterminate structures due to load, temperature change and support subsidence is presented in chapter 5. Chapter 6 covers the analysis of kinematically indeterminate structures using the displacement method, and the combined method for analysis of structures is given in chapter 7.

2. Course Conditions

No.	Course Conditions	Course Code
1.	Pre-requisites subject	
	None	
2.	Prior-subject	
	Mechanics of Materials 1	Click here to enter text.
3.	Parallel subject	
	None	

3. Course objectives

At the conclusion of the couse, students should be able to:

Course Objectives	Description	Programme learning Outcomes (PLOs) compactible to the course
CO1	*Knowledge:* - To identify and analyse of internal and external forces, distinguish actual and calculated model, classify loads and involved factors, and understand fundamental assumptions. - To analyze geometric stability of planar structures. - To analyze the internal forces and displacement of statically determinate structures to static loads. - To analyze internal forces of statically indeterminate structures using the force method and displacement method.	PLO3, PLO4, PLO7, PLO10
CO2	*Skill:* Using the mathematical to describe geometrics, vectors, diffentials and integrals.	PLO10, PLO11, PLO12
CO3	*Attitude:* Exact, serious and careful in mechanics of materials and various codes	PLO14, PLO16

4. Course Learning Outcomes (CLOs)

Course Objectives	Course learning Outcome	Discription of CLO
CO	CLO1.1	To identify of analytical model and analyse of geometric stability of planar structures.
	CLO1.2	To analyze the internal forces and displacement of statically determinate structures to static loads.
	CLO1.3	To analyze internal forces of statically indeterminate structures using the force method and displacement method.
CO	CLO2.1	Using the mathematical to describe geometrics, vectors, diffentials and integrals.
CO	CLO3.1	Exact, serious and careful in mechanics of materials and various codes.

Integrated matrix between Course learning Outcomes (CLOs) and Programme Learning Outcomes (PLOs)

CLOs	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12	PLO 13	PLO 14	PLO 15	PLO 16
1.1			4													
1.2			4				3			4						
1.3			5	4			4			3						
2.1										5	3	3				
3.1														3		4

5.   Learning Materials

a.   Textbook

[1] Lều Thọ Trình, (2014). ***Cơ học kết cấu***, Tập 1, 2, NXB Khoa học và kỹ thuật hoặc bản tái bản mới 2020.

[2] Lều Thọ Trình, Nguyễn Mạnh Yên, (2014). ***Bài tập Cơ học kết cấu***, Tập 1, 2, NXB Khoa học và kỹ thuật hoặc các bản tái bản.

b. Additional readings

[3] Gambhir M.L., Fundamentals of structural mechanics and analysis, New Delhi, India: PHI Learning Private Limited, 2011

6.   Course Assessment

Assessment Components	Assessment Contents	Time	CLO	Weight (%)
(1)	(2)	(3)	(4)	
A1.Formative assessment	2 Problems of chapters 3, 5	End of Chapter 5	CLO1.1 CLO1.2 CLO1.3 CLO2.1 CLO3.1	50%
A2. Final assessment	Problems	End of Course	CLO1.1 CLO1.2 CLO1.3 CLO2.1 CLO3.1	50%
Total				100%

7.   The detail content Schedule

Week/ Session	Contents	CLOs	Activities of teaching and learning	Evaluation categories	Learning Materials
1/1	***Introduction (1.0 unit)*** - Lecturer informations - Related issues - Course outline - References - Learning and assessment methods	CLO1.1	**Lecturer:** Teach in classroom **Student:** + Class: listen and do the examples. + Home: review knowledge and read	Problem #1: Reaction?	[1], [3]

	Chapter 1: Introduction (3.5 units) - General concepts - Fundamental assumptions, external forces, restraints, support reactions		books (5 hours)		
2 /2	**Chapter 2. Geometric Stability of Planar Structures** - General concepts - Types of restrains - Reaction forces - Necessary condition	CLO1.1.1 CLO1.1.2	**Lecturer:** Teach in classroom **Student:** + Class: listen and do the examples. + Home: review knowledge and read books and problems (5 hours)	Problem #2: Geometric Stability? In midterm test or final examination	[1], [2]
3 /2	**Chapter 2. (cont.)** - Sufficient condition - Examples - Problems of chapter 2	CLO1.1.1 CLO1.1.2 CLO1.1.3 CLO3.1	**Lecturer:** Teach in classroom **Student:** + Class: listen and do the examples. + Home: review knowledge and read books and problems (10 hours)	Problem #3: Geometric Stability? In midterm test or final examination	[1], [2], [3]
4 /3	**Chapter 3. Statically Determinate Structures Subjected to Static Loads** - General concepts - Simple Beams: Internal forces, Sign Convention, Examples	CLO1.2 CLO1.2.1 CLO1.2.2 CLO2.1. CLO3.1.	**Lecturer:** Teach in classroom **Student:** + Class: listen and do the examples. + Home: review knowledge and read books and problems [2] (10 hours)	Problem #4: Internal forces diagrams? In midterm test or final examination	[1], [2]
5,6 /3	**Chapter 3. (cont.)** - Frame: Example - Three-hinged frame: General concepts, analysis methods, examples - The combined structures: General concepts, internal forces, analysis methods, example **Classrom: 4.5 units** **LMS: 4.5 units**	CLO1.2 CLO1.2.1 CLO1.2.3 CLO2.1 CLO3.1	**Lecturer:** Teach in classroom **Student:** + Class: listen and do the examples. + Home: review knowledge and read books and problems [2] (10 hours) + LMS: Problems	Problem #5: Internal forces diagrams? In midterm test or final examination	[1], [2]
7 /3	**Chapter 3. (cont.)** Truss: General concepts, geometric stability, loads, restrains, internal forces, analysis methods, example	CLO1.1 CLO1.2 CLO1.2.4 CLO1.2.5 CLO2.1 CLO3.1	**Lecturer:** Teach in classroom **Student:** + Class: listen and do the examples. + Home: review knowledge and read books and problems [2] (10 hours)	Problem #6: Internal forces of bars? In midterm test or final examination	[1], [2]
8 /3	**Chapter 3. (cont.)** Truss – Frame structures: General concepts, geometric stability, loads, restrains, internal forces, analysis methods, example **LMS: 4.5 units**	CLO1.1 CLO1.2 CLO1.2.6 CLO1.2.5. CLO2.1 CLO3.1	**Lecturer:** Teach in classroom **Student:** + Class: listen and do the examples. + Home: review knowledge and read books and problems [2] (10 hours) + LMS: Problems	Problem #7: Internal forces of bars? In midterm test or final examination	[1], [2]

9, 10 /4	**Chapter 4. Displacement of Statically Determinate Structures** - General concepts - The principle of virtual work - Reciprocity theorems - Mohr formula - State of "K" when calculating displacements - Calculate displacements using the Veresaghin Method - Examples - Structure subjected to load, temperature… - Problems of Chapter 4	CLO1.2.7 CLO2.1 CLO3.1	**Lecturer:** Teach in classroom **Student:** + Class: listen and do the examples. + Home: review knowledge and read books and problems [2] (20 hours) + LMS: Problems	Problem #8: Displacement of Statically Determinate Structures? In midterm test or final examination	[1], [2]
11, 12 /5	***Chapter 5. The Force Method*** - General concepts - The statically indeterminate structures: the degree of freedom, canonical equations, the flexibility matrix, analysis method, internal forces. - Examples - The statically indeterminate structures subjected to temperature, displacements: Analysis method, examples.	CLO1.3 CLO1.3.1 CLO1.3.2 CLO1.3.3 CLO2.1 CLO3.1	**Lecturer:** Teach in classroom **Student:** + Class: listen and do the examples. + Home: review knowledge and read books and problems [2] (20 hours) + LMS: Problems	Problem #9: Force method? In midterm test or final examination	[1], [2]
13, 14, 15 /6	***Chapter 6. The Displacement Method*** - General concepts - The kinematically indeterminate structures: the degree of freedom, canonical equations, the stiffness matrix, analysis method, internal forces. - Examples - The statically indeterminate structures subjected to displacements: Analysis method, examples. **Classroom: 9 units** **LMS: 4.5 units**	CLO1.3 CLO1.3.4 CLO1.3.5 CLO2.1 CLO3.1	**Lecturer:** Teach in classroom **Student:** + Class: listen and do the examples. + Home: review knowledge and read books and problems [2] (20 hours) + LMS: Problems	Problem #10: Displacement method? In midterm test or final examination	[1], [2]
16, 17/7	***Chapter 7. The Combined Method*** - General concepts - Analysis method - Examples **Classroom 6.0 units** **LMS: 1.5 units**	CLO1.3 CLO1.3.6 CLO3.1	**Lecturer:** Teach in classroom **Student:** + Class: listen and do the examples. + Home: review knowledge and read books and problems [2] (20 hours) + LMS: Problems		[1], [2]
14 Weeks	**Classroom: 60 units** **LMS: 15 units**				

8. Notes

- The materials are updated in LMS and students are responsible for downloading, printing to study in class and at home.