Course Syllabus

1. **Course Title:** Soil Mechanics
2. **Course Code:** SOME240318
3. **Credit Units:** 4 (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. Nguyễn Minh Đức
   2/ Dr. Nguyễn Sỹ Hùng
   3/ Dr. Trần Văn Tiếng
   4/ MSc. Lê Phương Bình
5. **Course Requirements**
   Prerequisite courses: None
   Previous courses: Engineering Geology (ENGE220118)
   Parallel courses: None
6. **Course Description**
   The objectives of this course are: (1) to introduce the subject of soil mechanics to civil engineering students; (2) to introduce the basic physical and engineering properties of soil to students; (3) to teach students how to solve certain fundamental problems related to soil classification, permeability, consolidation, shear strength; (4) to familiarize students with relevant terms and soil tests so that they can work effectively with specialists in geotechnical engineering; and (4) to provide those students who will go on to take more geotechnical relevant courses with the background needed for further study.
   In this course, you will learn what soils are, how they are derived, and how they are identified and classified for engineering purpose. You will also learn the principles that govern flow of water in soils, deformation and shear strength of soils. We will discuss actual field problems during the semester and show you how the concepts that are taught in class can be applied to understand and solve real engineering problems.
7. **Course Goals**

Goals	Goal Description	Programme ELOs
G1	Are proficient in the general knowledge of engineering science, the fundamental and specialized knowledge of foundation engineering	1.2
G2	Grow professional knowledge by analyzing and solving problems of soil mechanics	2.1
G3	Adapt effectively in the professional environment, leadership and teamwork in the context of foundation engineering	3.1, 3.3

8. Course Learning Outcomes (CLOs)

CLOs		CLO Description	Programme ELOs
G1	**G1.2**	Analyze core fundamental knowledge of soil mechanics and foundation engineering.	1.2
G2	**G2.1**	Analyze and solve soil mechanics and foundation engineering problems.	2.1
G3	**G3.1**	Develop experience of collaborative group-working	3.1
	G3.2	Engage in reading soil mechanics and foundation engineering materials in English	3.3

9. Learning Resources

- Textbooks:

[1] Phan Hồng Quân**, Cơ học đất**, NXBGD, Hà Nội-2012

[2] Châu Ngọc Ẩn**, Cơ học đất,** NXB Đại học Quốc gia TP.HCM, 2010

[3] Muni Budhu, **Soil Mechanics and Foundations**

- References:

[4] Vũ Công Ngữ, Nguyễn Văn Dũng, **Cơ học đất**, NXBKHKT, Hà Nội – 1998

[5] R. Withlow, **Cơ học đất I và II**, NXBGD, Hà Nội – 1997

[6] Braja M.Das**, Principles of foundation Engineering**

10. Student Assessment

- Grading scale: **10**
- Assessment plan:

Type	Content	Timeline	Assessment method	CLOs	Rate (%)
Progress assessment					**30**
Problem#1	Analyze the roles of soil mechanics in civil engineering, foundation failures	1	Work in group	G1.2 G3.1	3
Problem #2	Analyze physical properties and soil classification	2	Assignment	G1.2	3
Problem #3	Water and water flow Analyze deep excavation stability against soil piping and heaving	3	Assignment	G1.2 G2.1	3
Problem #4	Analyze mechanical properties of soil evaluated from laboratory tests	4	Assignment in English	G1.2 G3.1 G3.2	3
Problem #5	Analyze geological condition survey of construction site for high-rise building	5	Work in group	G1.2 G3.1	3
Problem #6	Analyze vertcal stress of soil due to soil weight with and without the influence of pumping water ground for foundation design	6	Assignment	G2.1	3

Problem #7	Analyze vertical stress due to footing loads for foundation design	7	Assignment	G2.1	3
Progress examination					**20**
	Content coverage: Chapter 1-4 - Duration: 90 mins	8	Writing exam	G1.2 G2.1 G3.2	
Problem #8	Analyze foundation settlement due to footing loads for foundation design	10-11	Assignment	G2.1	3
Problem #9	Analyze foundation bearing capacity for foundation design	12-13	Assignment	G2.1 G3.1	3
Problem#10	Analyze external stability of retaining wall against overall shear failure	15	Assignment	G2.1	3
Final examination					**50**
	Content coverage: Chapter 1-7 - Duration: 90 mins		Writing exam	G1.2 G2.1 G3.2	

11. Course Content:

Week	Content	CLOs
1	***Chapter 1:*** **Introduction to soil mechanics and foundations** *(4h,0,8h)*	
	A/ Content and pedagogical methods in class*: (4h)* **Content:** Introduce the course's goals, CLOs, content, pedagogical and assessment methods 1.1 Introduction to geotechnical engineering 1.2 Geotechnical Engineering - A Historical Perspective 1.3 Geotechnical Lessons from Failures 1.4 Course introduction, syllabus 1.4.1 Expected learning outcomes (ELOs) 1.4.2 Programme specification 1.4.3 Programme structure and content **Pedagogical methods**: + Presentation of lecture + Group discussion	G3.1
	B/ Self-study content: *(8h)* + Analyze the roles of soil mechanics in civil engineering, foundation failures , Problem#1 ***Studying materials*** [1], [2], [3], [4], [5], [6]	G3.2
2	***Chapter 2:*** **Physical soil states and soil classification** *(4h,0,8h)*	

	A/ Content and pedagogical methods in class*: (4h)* **Content:** 2.1 Basic Geology 2.2 Composition of Soils 2.3 Determination of Particle Size of Soils **Pedagogical methods**: + Presentation of lecture	G1.2 G3.2
	B/ Self-study content: *(8h)* + Analyze physical properties, Problem#2 ***Studying materials:*** + [1], [2], [3], [4], [5], [6]	G1.2 G3.2
3	***Chapter 2:*** **Physical soil states and soil classification (cont.)** *(2h,0,4h)*	
	A/ Content and pedagogical methods in class*: (2h)* **Content:** 2.4 Physical States and Index Properties of soil 2.5 Soil Classification Schemes **Pedagogical methods**: + Presentation of lecture	G1.2 G3.2
	B/ Self-study content: *(4h)* + Analyze soil classification, Problem#3 ***Studying materials:*** + [1], [2], [3], [4], [5], [6]	G1.2 G3.2
	Chapter 3: **Mechanical properties of soil** *(2h,0,4h*	
	A/ Content and pedagogical methods in class*: (2h)* **Content:** 3.1 Water and water flow **Pedagogical methods**: + Presentation of lecture	G1.2 G2.1 G3.2
	B/ Self-study content: *(4h)* +Analyze deep excavation stability against soil piping and heaving, Problem#3 ***Studying materials:*** + [1], [2], [3], [4], [5], [6]	G1.2 G2.1 G3.2
4	***Chapter 3:*** **Mechanical properties of soil (cont.)** *(4h,0h,8h)*	
	A/ Content and pedagogical methods in class*: (4h)* **Content:** 3.2 One dimensional consolidation properties of soil 3.3 Shear strength of soil **Pedagogical methods**: + Presentation of lecture	G1.2 G2.1 G3.2
	B/ Self-study content: *(8h)* + Analyze mechanical properties of soil evaluated from laboratory tests,	G1.2 G2.1

	Problem#4 ***Studying materials:*** + [1], [2], [3], [4], [5] , [6]	G3.2
5	***Chapter 3:*** **Mechanical properties of soil (cont.)** *(4h,0h,8h)*	
	A/ Content and pedagogical methods in class*: (4h)* **Content:** 3.5 Soil compaction 3.6 Soils investigation **Pedagogical methods**: + Presentation of lecture + Group discussion	G1.2 G3.1 G3.2
	B/ Self-study content: *(8h)* + Analyze geological survey and investigation, Problem#5 ***Studying materials:*** + [1], [2], [3], [4], [5], [6]	G1.2 G3.1 G3.2
6	***Chapter 4:*** **Stress - Pressure in soil** *(4h,0h,8h)*	
	A/ Content and pedagogical methods in class*: (4h)* **Content:** 4.1 Introduction 4.2 Stresses in Soil from Soil weight **Pedagogical methods**: + Presentation of lecture	G2.1, G3.2
	B/ Self-study content: *(4h)* + Analyze vertcal stress of soil due to soil weight with and without the influence of pumping water ground for foundation design, Problem #6 ***Studying materials:*** + [1], [2], [3], [4], [5], [6]	G2.1, G3.2
7	***Chapter 4:*** **Stress - Pressure in soil (cont.)** *(4h,0h,8h)*	
	A/ Content and pedagogical methods in class*: (4h)* **Content:** 4.3 Stresses in Soil from Surface Loads 4.4 Stresses from footing load **Pedagogical methods**: + Presentation of lecture	G2.1, G3.2
	B/ Self-study content: *(4h)* + Analyze vertcal stress of soil due to soil weight with and without the influence of pumping water ground for foundation design, Problem #7 ***Studying materials:*** + [1], [2], [3], [4], [5], [6]	G2.1, G3.2
8	***Progress Examination (4h)***	

	Writing Exam Content coverage: Chapter 1-4 + Duration: 90 mins	G1.2 G2.1 G3.2
9	***Chapter 5:*** **Settlement of foundation** *(4h,0h,8h)*	
	A/ Content and pedagogical methods in class*: (4h)* **Content:** 5.1 Introduction 5.2 Immediate Settlement **Pedagogical methods**: Presentation of lecture Students present and Q&A ***Studying materials:*** + [1], [2], [3], [4], [5], [6]	G2.1 G3.2
	B/ Self-study content: *(8h)* Analyze foundation settlement due to footing loads	G2.1 G3.2
10	***Chapter 5:*** **Settlement of foundation (cont.)** *(4h,0h,8h)*	
	A/ Content and pedagogical methods in class*: (4h)* **Content:** 5.3 Primary Consolidation Settlement **Pedagogical methods**: + Presentation of lecture	G2.1 G3.2
	B/ Self-study content: *(8h)* Analyze foundation settlement due to footing loads for foundation design, Problem #8 ***Studying materials:*** + [1], [2], [3], [4], [5], [6]	G2.1 G3.2
11	***Chapter 5:*** **Settlement of foundation (cont.)** *(4h,0h,8h)*	
	A/ Content and pedagogical methods in class*: (4h)* **Content:** 5.4 One dimensional consolidation theory for settlement vs. time evaluation **Pedagogical methods**: + Presentation of lecture	G2.1 G3.2
	B/ Self-study content: *(8h)* Analyze foundation settlement due to footing loads for foundation design, Problem #8 ***Studying materials:*** + [1], [2], [3], [4], [5] , [6]	G2.1 G3.2
12	***Chapter 6:*** **Bearing capacity of soil** *(4h,0h,8h)*	
	A/ Content and pedagogical methods in class*: (4h)* **Content:** 6.1 Introduction	G2.1 G3.2

	6.2 Collapse Load Using the Limit Equilibrium Method **Pedagogical methods**: + Presentation of lecture	
	B/ Self-study content: *(8h)* + Analyze foundation bearing capacity for foundation design, Problem # 9 ***Studying materials:*** + [1], [2], [3], [4], [5], [6]	G2.1 G3.2
13	***Chapter 6:*** **Bearing capacity of soil (cont.)** *(4h,0h,8h)*	
	A/ Content and pedagogical methods in class*: (4h)* **Content:** 6.3 Soil Response to a Loaded Footing 6.4 Building Codes Bearing Capacity Values (Vietnam standard) **Pedagogical methods**: + Presentation of lecture	G2.1 G3.2
	B/ Self-study content: *(8h)* + Analyze foundation bearing capacity for foundation design, Problem # 9 ***Studying materials:*** + [1], [2], [3], [4], [5], [6]	G2.1 G3.3
14	***Chapter 7:*** **Lateral earth pressure and retaining wall** *(4h,0h,8h)*	
	A/ Content and pedagogical methods in class*: (4h)* **Content:** 7.1 Introduce 7.2 Lateral earth pressure at rest **Pedagogical methods**: + Presentation of lecture	G2.1 G3.2
	B/ Self-study content: *(4h)* + Analyze earth pressure acting on retaining wall ***Studying materials:*** + [1], [2], [3], [4], [5], [6]	G2.1 G3.2
15	***Chapter 7:*** **Lateral earth pressure and retaining wall (cont.)** *(4h,0h,8h)*	
	A/ Content and pedagogical methods in class*: (4h)* **Content:** 7.3 Active and passive earth pressure 7.4 Stability of retaining wall and the influence of ground water level **Pedagogical methods**: + Presentation of lecture	G2.1 G3.2
	B/ Self-study content: *(4h)* + Analyze external stability of retaining wall against overall shear failure, Problem #10	G2.1 G3.2

12. Learning Ethics:

Students must do homework by themselves. If plagiarism is found, students 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	**Dr. Trần Văn Tiếng**	**Dr. Nguyễn Minh Đức**

15. Date and Up-to-date content

1st time: Date: August 25th, 2015 - Increase to 4 credits to reinforce contents	Instructor: Head of Department: