# Course Syllabus

1. **Course Title:** Foundation Engineering Project (FENP)
2. **Course Code:** FENP310618
3. **Credit Units:** 1 (1/0/2) (1 units of theory/ 0 unit of practice/ 2 units of self-study)
   Duration: 15 weeks (1 hours of theory + 0 hours of practice, and 2 hours of self-study per week)
4. **Course Instructors**
   1/ MSc. Le Phuong
   2/ Dr. Tran Van Tieng
   3/ Dr. Nguyen Sy Hung
   4/ Dr. Le Phuong Binh
   5/ Dr. Nguyen Tong
   6/ Dr. Nguyen Minh Duc
5. **Course Requirements**
   Prerequisite courses: None
   Previous courses: Soil Mechanics (SOME240318)
   Parallel courses: Foundation Engineering (FOEN330518)
6. **Course Description**
   This project helps students systematize the knowledge of the previous geology subjects such as Engineering Geology, Soil Mechanics, and Foundation Engineering and helps them apply this knowledge to design the actual foundation. This project represents notes with calculations and drawings and comprising the foundations of the two main types: shallow foundation and pile foundation. The designed components are required to prepare and present in compliance with the national regulations in the field of soil mechanics and foundation engineering.
7. **Course Goals.**

| Goals | Goal Description | Programme ELOs |
|---|---|---|
| **G1** | Determine the geological parameters used in foundation design using statistical methods. | 1.3 |
| **G2** | Calculation, draw and manage the foundation drawings in accordance with current design standards and ensure carrying out the project as scheduled professionally and faithfully. | 2.1, 2.4, 2.5 |
| **G3** | Using major English in drawing notes and applying the communication skills in interpreting and defending design plans. | 3.2, 3.3 |
| **G4** | Design plans of foundation from the actual ground conditions according to current design standards; evaluating and selecting the appropriate analytical models for actual ground conditions. | 4.3, 4.4 |

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

| CLOs | CLO Description | Programme |
|---|---|---|

| | | | ELOs |
|---|---|---|---|
| **G1** | **G1.1** | Determine the geological parameters used in foundation design using statistical methods. | 1.3 |
| **G2** | **G2.1** | Calculate shallow foundation, deep foundation. | 2.1 |
| | **G2.2** | Applying principle calculations or FEM software (SAP, ETABS...) in the foundation design. | 2.1, 2.4 |
| | **G2.3** | Draw and layout the drawing completely adequate to technical requirements and in accordance with the actual foundation structures. | 2.4, 2.5 |
| | **G2.4** | Be able to read and comprehend the foundation design materials, domestic and foreign design standards. | 2.4 |
| **G3** | **G3.1** | Achieving reasoning skills and defending the executed project | 3.2 |
| | **G3.2** | Drawings presented in English | 3.3 |
| **G4** | **G4.1** | Selecting a suitable soil model or methods for analysis the behavior of the ground and the actual foundation structure | 4.3 |
| | **G4.2** | Designing the plans of foundation from the actual ground conditions according to current design standards; | 4.4 |

## 9. Learning Resources

- Textbooks:
  1. Chau Ngoc An, Foundation Engineering, Publisher National University HCMCM.
  2. Chau Ngoc An, Soil Mechanics, Publisher National University HCMCM.
  3. TCVN 10304-2012, Pile Foundation Design Standard.
- References:
  1. Guidelines foundation projects – Department of Geotechnical Engineering.
  2. Joseph E. Bowles, Foundationg analysis and design, The McGraw-Hill Companies, Inc
  3. Vo Phan, Foundation analysis and design, Publisher National University HCMCM.

## 10. Student Assessment

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

| Type | Content | Timeline | Assessment method | CLOs | Rate (%) |
|---|---|---|---|---|---|
| **Review Approval** | | | | | **50** |
| RA#1 | Geological statistics | Week 3 | Oral questions | G1.1. | 10 |
| RA#2 | Calculation sheet & Drawing of Pad Foundation | Week 6 | Oral questions | G2.1, G2.2, G2.3, G3.1, G4.1, G4.2 | 10 |
| RA#3 | Calculation sheet & Drawing of trip Foundation | Week 10 | Oral questions | G2.1, G2.2, G2.3, G3.1, G4.1, G4.2. | 10 |
| RA#4 | Calculation sheet & Drawing of Pile | Week 14 | Oral | G2.1, G2.2, G2.3, G3.1, | 10 |

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| | Foundation | | questions | G4.1, G4.2 | |
| RA#5 | Calculation sheet & Drawing of The Project. | Week 15 | Oral questions | G2.1, G2.2, G2.3, G3.1, G3.2, G4.1, G4.2 | 10 |
| DEFENSE OF PROJECT | | | | | **50** |
| | Final Report:<br>+ Students receive 3 questions in the exam. Answer the questions based on what was done in the project.<br>+ Reply to the orther oral questions that the examiner set out. | Week 16 | Oral questions. | G1.1, G2.1, G2.2, G2.3, G3.1, G3.2, G4.1, G4.2 | |

**11. Course Content**

| Week | Content | CLOs |
|---|---|---|
| 1 | **Chapter 1:** Geological statistics *( 3*/0/6*)* | |
| | ***A/* Content and pedagogical methods in class:** (1)<br>**Content**<br>- Assigning topic, instructions the tasks and requirements of project.<br>**Pedagogical methods***:*<br>- Discussion | G1.1. |
| | ***B/* Self-study content:** (2)<br>- Synthesis of geological statistics theory<br>- Applying the statistical method for assinged geological data of student.<br>***The learning materials***<br>- [1] | G1.1. |
| 2 | **Chapter 1:** Geological statistics *( 3*/0/6*) (cont).* | |
| | ***A/* Content and pedagogical methods in class:** (1)<br>**Content**<br>- Guiding to get all of the data subject: the internal forces and geology data, the required of plan foundation of the project.<br>**Pedagogical methods***:*<br>- Discussion | G1.1 |
| | ***B/* Self-study content:** (2)<br>- Applying the statistical method for assinged geological data of student.<br>***The learning materials***<br>- [1] | G1.1, G2.4 |
| 3 | **Chapter 1:** Geological statistics *(3*/0/6*) (cont)* | |
| | ***A/* Content and pedagogical methods in class:** (1)<br>**Content**<br>- Guiding to get all of the data subject: the internal forces and geology data, the required of plan foundation of the project.<br>- Checking geological statistics results of students | G1.1, G3.1. |

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| | **Pedagogical methods***:*<br>- Discussion | |
| | ***B/* Self-study content:** (2)<br>- Applying the statistical method for assinged geological data of student.<br>- Editing the project according to the lecturer comments<br>***The learning materials***<br>- [1] | G1.1, G2.4 |
| 4 | **Chapter 2: Pad Foundation Analysis and Design ( 3/0/6)** | |
| | ***A/* Content and pedagogical methods in class:** (1)<br>**Content**<br>- Choosing the foundation depth.<br>- Determining the size of the foundation<br>o Checking the size of the chosen foundation according to the following conditions:<br>o Stable condition and capacity of the ground.<br>o Conditions of deformation and settlement.<br>**Pedagogical methods***:*<br>- Discussion, suggestions | G1.1, G2.1, G2.4 |
| | ***B/* Self-study content:** (2)<br>- Choosing the foundation depth.<br>- Determining the size of the foundation<br>***The learning materials***<br>- [1]; [2]; [3]; [4]; [5] | G2.1, G2.2, G2.4 |
| 5 | **Chapter 2: Pad Foundation Analysis and Design ( 3/0/6) (cont)** | |
| | ***A/* Content and pedagogical methods in class:** (1)<br>**Content**<br>- Determine the height foundation: Check conditions penetrated (illustration)<br>- Calculating reinforcing rebar of the foundation:<br>o Calculation diagram.<br>o Moment diagram<br>o Calculating reinforced rebar area.<br>**Pedagogical methods***:*<br>- Discussion, suggestions | G1.1, G2.1, G2.4, G4.2 |
| | ***B/* Self-study content:** (2)<br>- Determine the height foundation<br>- Calculating reinforcing rebar of the foundation.<br>***The learning materials***<br>- [1]; [2]; [3]; [4]; [5] | G2.1, G2.2, G2.4, G4.2 |
| 6 | **Chapter 2: Pad Foundation Analysis and Design ( 3/0/6) (cont)** | |

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| | ***A/* Content and pedagogical methods in class:** (1)<br>**Content**<br>- Pad Foundation drawing.<br>- Checking pad foundation design results of students<br>**Pedagogical methods***:*<br>- Discussion, suggestions | G3.1, G3.2 |
| | ***B/* Self-study content:** (2)<br>- Pad Foundation drawing.<br>- Editing the project according to the lecturer comments<br>***The learning materials***<br>- [1]; [2]; [3]; [4]; [5] | G2.2, G3.1 |
| 7 | **Chapter 3: Trip Foundation Analysis and Design ( 4/0/8) (cont)** | |
| | ***A/* Content and pedagogical methods in class:** (1)<br>**Content**<br>- Choosing the foundation depth.<br>- Choosing the height of foundation beam h, the two extended section La, Lb of the beam (based on structural conditions that center of loadings are overlapped the center foundation). Then determine the length of foundation L.<br>- Checking the size of the chosen foundation.<br>**Pedagogical methods***:*<br>- Discussion, suggestions | G1.1, G2.1, G2.4 |
| | ***B/* Self-study content:** (2)<br>- Choosing the foundation depth.<br>- Determining the size of the foundation<br>***The learning materials***<br>- [1]; [2]; [3]; [4]; [5] | G1.1, G2.1, G2.4 |
| 8 | **Chapter 3: Trip Foundation Analysis and Design ( 4/0/8) (cont)** | |
| | ***A/* Content and pedagogical methods in class:** (1)<br>**Content**<br>- Determine the horizon cross section of the foundation cross, test the shear capacity of the foundation flange<br>- Calculating reinforcing rebar of the foundation:<br>o Calculation diagram.<br>o Moment diagram, shear forces.<br>o Calculating longitudinal reinforcement, stirrup rebar, checking shear capacity of the foundation beam.<br>**Pedagogical methods***:*<br>- Discussion, suggestions | G1.1, G2.1, G2.4, G4.2 |
| | ***B/* Self-study content:** (2) | G2.1, G2.4 |

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| | - Determine the height foundation<br>- Calculate flange foundation.<br>- Calculating reinforcing rebar of the foundation.<br>***The learning materials***<br>- [1]; [2]; [3]; [4]; [5] | |
| 9 | **Chapter 3: Trip Foundation Analysis and Design ( 4/0/8) (cont)** | |
| | ***A/* Content and pedagogical methods in class:** (1)<br>**Content**<br>- Calculation of the background factors (k-Winler spring) in the foundation beam calculation by FEM software.<br>**Pedagogical methods***:*<br>- Discussion, suggestions | G2.2, G2.4, G4.1. |
| | ***B/* Self-study content:** (2)<br>- Applying ETABS (SAP) softwares in design foundation beam<br>***The learning materials***<br>- [1]; [2]; [3]; [4]; [5] | G2.2, G2.4, G4.1. |
| 10 | **Chapter 3: Trip Foundation Analysis and Design ( 4/0/8) (cont)** | |
| | ***A/* Content and pedagogical methods in class:** (1)<br>**Content**<br>- Trip Foundation drawing.<br>- Checking trip foundation design results of students<br>**Pedagogical methods***:*<br>- Discussion, suggestions | G2.2, G3.1, G3.2 |
| | ***B/* Self-study content:** (2)<br>- Trip Foundation drawing.<br>- Editing the project according to the lecturer comments<br>***The learning materials***<br>- [1]; [2]; [3]; [4]; [5] | G2.2, G3.1 |
| 11 | **Chapter 4: Pile Foundation Analysis And Design ( 5/0/10)** | |
| | ***A/* Content and pedagogical methods in class:** (1)<br>**Content**<br>- The input parameters:<br>o Forces and standards<br>o The basic geological parameters.<br>o Materials: Concrete, rebar<br>- Determining the capacity of pile<br>o Material capacity<br>o Pile capacity base on physical parameter of soils.<br>o Pile capacity base on strength parameter of soils<br>o Pile capacity base on standard penetration test<br>**Pedagogical methods***:*<br>- Discussion, suggestions. | G1.1, G2.1, G2.4, G4.2 |

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| | ***B/* Self-study content:** (2)<br>- Determining the capacity of pile<br>o Material capacity<br>o Pile capacity base on physical parameter of soils.<br>o Pile capacity base on strength parameter of soils<br>o Pile capacity base on standard penetration test<br>***The learning materials***<br>- [1]; [2]; [3]; [4]; [5]; [6] | G1.1, G2.1, G2.4, G4.2 |
| 12 | **Chapter 4: Pile Foundation Analysis And Design ( 5/0/10) (cont)** | |
| | ***A/* Content and pedagogical methods in class:** (1)<br>**Content**<br>- Specify depth of foundation (figure)<br>- Check conditions of transportation and mounted cranes<br>- Specify number of pile, pile foundation size<br>- Check loading on the pile: Single pile and pile group<br>**Pedagogical methods***:*<br>- Discussion, suggestions. | G2.1, G2.4, G4.2 |
| | ***B/* Self-study content:** (2)<br>- Check conditions of transportation and mounted cranes<br>- Specify number of pile, pile foundation size<br>- Check loading on the pile: Single pile and pile group<br>***The learning materials***<br>- [1]; [2]; [3]; [4]; [5]; [6] | G2.1, G2.4, G4.2 |
| 13 | **Chapter 4: Pile Foundation Analysis And Design ( 5/0/10) (cont)** | |
| | ***A/* Content and pedagogical methods in class:** (1)<br>**Content**<br>- Checking the pressure of conventional foundation block and checking settlement of piles<br>- Pile Cap Design<br>o Specify the height of Pile cap: check punching shear design<br>o Design rebar for Pile cap:…Moment diagram and rebar area<br>- Applying ETABS (SAP) softwares in design the pile cap<br>- Calculating reinforcing rebar of the pile foundation.<br>**Pedagogical methods***:*<br>- Discussion, suggestions. | G2.1, G2.2 G2.4, G4.1, G4.2 |
| | ***B/* Self-study content:** (2)<br>- Checking the pressure of conventional foundation block and checking settlement of piles<br>- Pile Cap Design<br>- Applying ETABS (SAP) softwares in design the pile cap<br>***The learning materials***<br>- [1]; [2]; [3]; [4]; [5]; [6] | G2.1, G2.2 G2.4, G4.1, G4.2 |

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| 14 | **Chapter 4: Pile Foundation Analysis And Design ( 5/0/10) (cont)** | |
| | ***A/* Content and pedagogical methods in class:** (1)<br>**Content**<br>- Pile Foundation drawing.<br>- Checking pile foundation design results of students<br>**Pedagogical methods***:*<br>- Discussion, suggestions. | G2.3, G3.1, G3.2 |
| | ***B/* Self-study content:** (2)<br>- Trip Foundation drawing.<br>- Editing the project according to the lecturer comments<br>***The learning materials***<br>- [1]; [2]; [3]; [4]; [5]; [6] | G2.3, G3.2 |
| 15 | **Chapter 5: Synthesis and Report.( 1/0/2)** | |
| | ***A/* Content and pedagogical methods in class:** (1)<br>**Content**<br>- Guiding for synthesis and presenting A1 drawing size 3 designed foundation methods.<br>**Pedagogical methods***:*<br>- Discussion, suggestions. | G3.1, G3.2, G4.1 |
| | ***B/* Self-study content:** (2)<br>- Presenting A1 drawing size 3 designed foundation methods<br>- Editing the project according to the lecturer comments<br>***The learning materials***<br>- [1]; [2]; [3]; [4]; [5]; [6] | G2.3, G3.2 |

**12. Learning Ethics**

Student does not make enough only one of the following tasks will be banned:

- Having at least 3 times review approval, including once general approval: calculation sheet + drawing.

- Review the project as schedule with specified in the assignment. If students have two times late, they will not be executed for the next foundation (be banned).

- The Project must be completely finished.

The Project must be performed by the student. The student will receive 0 points if there are signs of copying.

The calculation results have to ensure rationality.

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

**14. Approved by**

| Dean | Head of Department | Instructor |
|---|---|---|
| **A/Prof. Dr. Nguyễn Trung Kiên** | **Dr. Tran Van Tieng** | **MSc. Le Phuong** |

**15. Date and Up-to-date content**

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| **1st time:** Date: | Instructor:<br><br>Head of Department: |