

**TISHK INTERNATIONAL UNIVERSITY  
FACULTY OF ENGINEERING  
Department of CIVIL ENGINEERING,  
2020-2021 Spring  
Course Information for CE 322 SOIL MECHANICS II**

|  |   |                    |                  |                |             |
|--|---|--------------------|------------------|----------------|-------------|
| <b>Course Name:</b>                              | SOIL MECHANICS II   |                    |                  |                |             |
| <b>Code</b>                                      | <b>Regular Semester</b>   | <b>Theoretical</b> | <b>Practical</b> | <b>Credits</b> | <b>ECTS</b> |
| CE 322   | 6   | 2                  | 2                | 3              |             |
| <b>Name of Lecturer(s)-<br/>Academic Title:</b>  | Yousif Abdulllah -  |                    |                  |                |             |
| <b>Teaching Assistant:</b>                       | Mr. Omar  |                    |                  |                |             |
| <b>Course Language:</b>                          | English   |                    |                  |                |             |
| <b>Course Type:</b>                              | Main  |                    |                  |                |             |
| <b>Office Hours</b>                              | Thursday (13:00 - 15:00)  |                    |                  |                |             |
| <b>Contact Email:</b>                            | yousif.abdullah@tiu.edu.iq  |                    |                  |                |             |
|  | Tel:07501380640   |                    |                  |                |             |
| <b>Teacher's academic<br/>profile:</b>           | Ph.D. in Geotechnical Engineering   |                    |                  |                |             |
| <b>Course Objectives:</b>                        | The objective of this course is to introduce students with the essential concepts of the physical properties of soils as a civil engineering material and the fundamental principles of soil mechanics. Upon completion of the course, students should: • Have an understanding of geostatic stresses and the effective stress of soil. • Have an understanding of the consolidation settlement of the clayey soils. • Also the students should be able to conduct laboratory tests and obtain soil properties and parameters from the test observations and results. |                    |                  |                |             |
| <b>Course Description<br/>(Course overview):</b> | Analysis and classification of soils, Clay minerals, Stress and strain behavior and relationship, stresses within a soil mass, Effective stress concept, Permeability and seepage, Compressibility and consolidation of soil, Shear strength of soil, Lateral earth pressure, Slope stability, Bearing capacity and settlement of foundations, The improvement of soil.   |                    |                  |                |             |

**COURSE CONTENT**

| Week | Hour | Date          | Topic   |
|------|------|---------------|---|
| 1    | 3    | 31/1-4/2/2021 | Situ Stresses, Geostatic Stresses, Total Stresses, Pore Water Pressure, and Effective Stresses, Examples  |
| 2    | 3    | 7-11/2/2021   | Effective Stress and Flow Conditions, Static Condition, Downward One Dimensional Flow, Upward One Dimensional Flow, Piping, Boiling, or Quick Sand Condition, Examples. |
| 3    | 3    | 14-18/2/2021  | Seepage and Flow Net, Seepage Force, Two Dimensional Flow, Flow Net Construction, Examples  |
| 4    | 3    | 21-25/2/2021  | Stresses within a Soil Mass, Stresses induced from external loadings, Examples  |
| 5    | 3    | 28/2-4/3/2021 | Approximate Method (2:1 method), Embankment Loaded Area, , Examples   |
| 6    | 3    | 7-11/3/2021   | Principal Stresses, Mohr Circle, Origin of Planes (OP), Examples.   |
| 7    | 3    | 28/3-1/4/2021 | Stress Path, P-q Diagrams, Examples.  |
| 8    | 3    | 4-8/4/2021    | Compressibility of Soil, Consolidation, Hydromechanical Analogy for Load-Sharing and Consolidation, Determination of Preconsolidation Pressure,                         |
| 9    | 3    | 11-15/4/2021  | Midterm Exam  |
| 10   | 3    | 18-22/4/2021  | Midterm Exam  |
| 11   | 3    | 25-29/4/2021  | Average Degree of Consolidation, Determination of the Coefficient of Consolidation (cv), Taylor's Method  |

|    |   |               |   |
|----|---|---------------|---|
|    |   |               | (Square Root Time Method), Casagrande's Method (Log Time Method), Examples.   |
| 12 | 3 | 2-6/5/2021    | Shear Strength of Soil, Mohr–Coulomb theory, Shear strength in terms of Principal Stresses, Determination of Shear Strength Parameters, Direct Shear Test, Triaxial Compression Test. |
| 13 | 3 | 9-13/5/2021   | Advantages of Direct Shear Tests, Disadvantages of Direct Shear Tests, Advantages of Triaxial Compression Test, Unconfined Compression Test,  |
| 14 | 3 | 16-20/5/2021  | Examples in Shear Strength of Soils.  |
| 15 | 3 | 23-27/5/2021  | Lateral Earth Pressure, Lateral Earth Pressure for at Rest Condition  |
| 16 | 3 | 30/5-3/6/2021 | Examples in Lateral Earth Pressure.   |
| 17 | 3 | 6-10/6/2021   | Final Exam  |
| 18 | 3 | 13-17/6/2021  | Final Exam  |

**COURSE/STUDENT LEARNING OUTCOMES**

- 1 Have an understanding of the importance of water in the soil and the effective stress principle,
- 2 • Have an understanding of the consolidation settlement of the clayey soils.
- 3 Have an understanding about how to calculate the lateral earth pressure on any retaining structures.
- 4 Have an understanding about how to calculate the lateral earth pressure on any retaining structures.

**COURSE'S CONTRIBUTION TO PROGRAM OUTCOMES**

(Blank : no contribution, I: Introduction, P: Proficient, A: Advanced )

| <b>Program Learning Outcomes</b>  | <b>Cont.</b> |
|---|--------------|
| 1 Apply principles of mathematics, science, and engineering   | P            |
| 2 Design and conduct experiments, as well as analyze and interpret data accurately.   | P            |
| 3 Design an engineering system, component, or process to meet desired industrial needs.   | P            |
| 4 Identify, formulate and solve complex engineering problems  | P            |
| 5 Apply, in design and construction, the most modern design codes, standards and specifications such as; AISC, ACI, ASCE 7, IBC, etc.                           | P            |
| 6 Use the techniques, skills, and modern engineering tools, such as surveying instruments, and designing software that are necessary for engineering practices. | P            |
| 7 Apply knowledge and skills in construction project management and recognition of international standards and methodologies                                    | P            |
| 8 Manage to work with multi-disciplinary teams and communicate effectively.   | P            |
| 9 Identify the moral values that ought to guide the Civil Engineering profession and resolve the moral issues in the profession.                                | P            |
| 10 Apply the principles of sustainable development in their professional duties which go in line with the paramount safety, health and welfare of the public.   | P            |
| 11 Analyze the impact of engineering solutions in a global and social context   |              |
| 12 Identify the need and have the ability to engage in lifelong learning and knowledge of contemporary issues.  |              |

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|--|--|-------------|---------------|----------------------------------|
| <b>Prerequisites (Course Reading List and References):</b> | 1- Fluid mechanics 2-Basics of Mathematics |             |               |                                  |
| <b>Student's obligation (Special Requirements):</b>        | Lecture Notes, Scientific Calculator.      |             |               |                                  |
| <b>Weekly Laboratory/Practice Plan:</b>                    | <b>Week</b>                                | <b>Hour</b> | <b>Date</b>   | <b>Topics</b>                    |
|  | 1  | 2           | 31/1-4/2/2021 |                                  |
|  | 2  | 2           | 7-11/2/2021   | Standard compaction test of soil |
|  | 3  | 2           | 14-18/2/2021  |                                  |
|  | 4  | 2           | 21-25/2/2021  | Modified compaction test of soil |

|   |   |   |                 |                                       |                       |
|---|---|---|-----------------|---------------------------------------|-----------------------|
|   | 5   | 2 | 28/2-4/3/2021   |                                       |                       |
|   | 6   | 2 | 7-11/3/2021     | Sand Cone Test                        |                       |
|   | 7   | 2 | 28/3-1/4/2021   | Holiday                               |                       |
|   | 8   | 2 | 4-8/4/2021      | Core Cutter Test                      |                       |
|   | 9   | 2 | 11-15/4/2021    |                                       |                       |
|   | 10  | 2 | 18-22/4/2021    | Mid Term Exam                         |                       |
|   | 11  | 2 | 25-29/4/2021    |                                       |                       |
|   | 12  | 2 | 2-6/5/2021      | Organic Test                          |                       |
|   | 13  | 2 | 9-13/5/2021     |                                       |                       |
|   | 14  | 2 | 16-20/5/2021    | Consolidation Test                    |                       |
|   | 15  | 2 | 23-27/5/2021    |                                       |                       |
|   | 16  | 2 | 30/5-3/6/2021   | Direct Shear Test                     |                       |
|   | 17  | 2 | 6-10/6/2021     | Final Exam                            |                       |
|   | 18  | 2 | 13-17/6/2021    |                                       |                       |
| <b>Course Book/Textbook:</b>  | Braja M. Das "Principles of Geotechnical Engineering" 5Th Edition (2001)  |   |                 |                                       |                       |
| <b>Other Course Materials/References:</b>                               | 1)V.N.S. Murthy, "Geotechnical Engineering: Principles and Practices of Soil Mechanics and Foundation Engineering"(2002) 2)Craig, R.F., "Soil Mechanics" 7th edition, (2004). 3)T. William Lambe & Robert V. Whitman "Soil Mechanics" 3rd edition (1979). |   |                 |                                       |                       |
| <b>Teaching Methods (Forms of Teaching):</b>                            | Lectures, Practical Sessions, Excercises, Presentation, Assignments   |   |                 |                                       |                       |
| <b>COURSE EVALUATION CRITERIA</b>                                       |   |   |                 |                                       |                       |
| <b>Method</b>   |   |   | <b>Quantity</b> | <b>Percentage (%)</b>                 |                       |
| Quiz  |   |   | 2               | 5                                     |                       |
| Homework  |   |   | 2               | 2.5                                   |                       |
| Midterm Exam(s)   |   |   | 1               | 30                                    |                       |
| Laboratory  |   |   | 1               | 5                                     |                       |
| Lab/Practical Exam(s)   |   |   | 1               | 10                                    |                       |
| Final Exam  |   |   | 1               | 40                                    |                       |
| <b>Total</b>  |   |   |                 | <b>100</b>                            |                       |
| <b>Examinations:</b> Essay Questions, Fill in the Blanks, Short Answers |   |   |                 |                                       |                       |
| <b>Extra Notes:</b>   |   |   |                 |                                       |                       |
| <b>ECTS (ALLOCATED BASED ON STUDENT) WORKLOAD</b>                       |   |   |                 |                                       |                       |
| <b>Activities</b>   |   |   | <b>Quantity</b> | <b>Workload Hours for 1 quantity*</b> | <b>Total Workload</b> |
| Theoretical Hours   |   |   | 18              | 2                                     | 36                    |
| Practical Hours   |   |   | 18              | 2                                     | 18                    |
| Final Exam  |   |   | 1               | 18                                    | 18                    |
| Quiz  |   |   | 2               | 10                                    | 20                    |
| Homework  |   |   | 2               | 7                                     | 14                    |
| Midterm Exam(s)   |   |   | 1               | 18                                    | 18                    |
| Laboratory  |   |   | 1               | 2                                     | 2                     |
| Lab/Practical Exam(s)   |   |   | 1               | 5                                     | 5                     |

|  |             |
|--|-------------|
| <b>Total Workload</b>                  | <b>131</b>  |
| <b>ECTS Credit (Total workload/25)</b> | <b>5.24</b> |

**Peer review**

Signature:

Name:

Lecturer

Signature:

Name:

Head of Department

Signature:

Name:

Dean