	Universitas Negeri Surabaya Faculty of Engineering, Building Engineering Education Undergraduate Study Program	Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
PHYSICAL PROPERTIES OF SOIL AND PRACTICAL	8320503283	Soil Mechanics	T=2	P=1	ECTS=4.77	2	April 27, 2023

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
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Learning model	**Case Studies**
Program Learning Outcomes (PLO)	**PLO study program that is charged to the course**
	Program Objectives (PO)
	PLO-PO Matrix

	P.O

PO Matrix at the end of each learning stage (Sub-PO)

P.O	Week															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Short Course Description	Study of the origin of soil and rocks, rock cycle, soil composition, relationship between soil parameters, soil consistency, soil classification using AASHTO and USCS methods, water flow in soil, flow net, lifting force calculations, safety against heave and the concept of effective stress , soil compaction, consolidation, and carrying out Soil Mechanics practicum
References	**Main :**

1. Braja M. Das. 1995. Mekanika Tanah Jilid I (Alih Bahasa Noor Endah dan Indrasurya). Jakarta: Erlangga.
2. Joseph E. Bowles. 1996. Sifat-sifat Fisis dan Geoteknis Tanah (Alih Bahasa Johan Kelanaputra H. Jakarta: Erlangga.

Supporters:

Supporting lecturer	Dra. Nur Andajani, M.T. Mochamad Firmansyah Sofianto, S.T., M.Sc., M.T.

Week-	Final abilities of each learning stage (Sub-PO)	Evaluation		Help Learning, Learning methods, Student Assignments, [Estimated time]		Learning materials [References]	Assessment Weight (%)
		Indicator	Criteria & Form	Offline (*offline*)	Online (*online*)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

1	able to understand the land	Explain the meaning of soil, the origin of soil, types of soil, soil particles and the behavior of clay minerals	**Criteria:** Full marks are obtained if you do all the questions correctly and the completeness of the report is correct	Lectures, discussions and questions and answers (2 x 50 minutes theory) (1x3x50 minutes practical)	Lectures, discussions, questions and answers and practical work in the laboratory (3 x 50 minutes theory)	**Material:** Definition of soil and rocks, origin of soil, types of soil, soil particles and clay minerals **Reference:** *Braja M. Das. 1995. Soil Mechanics Volume I (Translated by Noor Endah and Indrasurya). Jakarta: Erlangga.* **Material:** Carrying out volumetric gravimetry practicum, water content practicum and specific gravity practicum **Library:** *Andajani. Nur. 2023. Soil Mechanics Practical Instructions. Surabaya: Unipress Unesa* **Material:** Definition of soil and rocks, origin of soil, types of soil, soil particles and clay minerals **Reference:** *Braja M. Das. 1995. Soil Mechanics Volume I (Translated by Noor Endah and Indrasurya). Jakarta: Erlangga.*	0%

2	Students can calculate soil parameters	Determine the weight parameters of soil volume, water content and soil specific gravity. Calculate the parameters of pore number, degree of saturation, dry volume weight of soil, porosity	**Criteria:** If you can do all the questions given, the score is 100 **Form of Assessment** : Portfolio Assessment, Practical Assessment	Lectures, discussions and solving questions (2 x 50 minutes theory) (1x3x50 minutes practical)	Lectures, discussions, solving questions and doing practical work in the Soil Mechanics laboratory (3 x 50 minutes theory)	**Material:** Calculating the parameters of soil water content, soil volume and specific gravity (Gs), as well as other parameters for saturated soil conditions. **Reference:** *Braja M. Das. 1995. Soil Mechanics Volume I (Translated by Noor Endah and Indrasurya). Jakarta: Erlangga.* **Material:** Carrying out gravimetric volumetric practicum, soil water content practicum and specific gravity practicum. **Library:** *Andajani. Nur. 2023. Soil Mechanics Practical Instructions. Surabaya: Unipress Unesa*	0%
3	Students can calculate soil parameters for unsaturated soil conditions	Determine the weight parameters of soil volume, water content and soil specific gravity. Calculate the parameters of pore number, degree of saturation, dry volume weight of soil, porosity for unsaturated soil conditions	**Criteria:** If you can do all the questions given, the score is 100 **Form of Assessment** : Participatory Activities, Practical Assessment	Lectures, discussions and solving questions (2 x 50 minutes theory) (1x3x50 minutes practical)	(3 X 50 minutes theory)	**Material:** Calculating the parameters of soil water content, soil volume and specific gravity (Gs), as well as other parameters for unsaturated soil conditions. **Reference:** *Braja M. Das. 1995. Soil Mechanics Volume I (Translated by Noor Endah and Indrasurya). Jakarta: Erlangga.* **Material:** Carrying out gravimetric volumetric practicum, soil water content practicum and specific gravity practicum. **Library:** *Andajani. Nur. 2023. Soil Mechanics Practical Instructions. Surabaya: Unipress Unesa*	0%

4	Students are able to classify the size of soil grains	Can depict sieve analysis graphs, determine uniformity coefficients D10, D30 and D60. Determine the percentage of gravel, sand and clay grains	**Criteria:** If you can do all the questions given, the score is 100 **Form of Assessment** : Participatory Activities, Portfolio Assessment	lecture, discussion, questions and answers and problem solving (2 x 50 minutes theory) (1x3x50 minutes practical)	lecture, discussion, question and answer and problem solving (3 x 50 minutes theory)	**Material:** Classification of soil grains, Drawing sieve analysis graphs and uniformity coefficients **Reference:** *Braja M. Das. 1995. Soil Mechanics Volume I (Translated by Noor Endah and Indrasurya). Jakarta: Erlangga.* **Material:** carrying out a sieve analysis test **Reader:** *Andajani. Nur. 2023. Practical Instructions for Soil Mechanics. Surabaya: Unipress Unesa* **Material:** Classification of soil grain size analysis **Reference:** *Braja M. Das. 1995. Soil Mechanics Volume I (Translated by Noor Endah and Indrasurya). Jakarta: Erlangga.*	0%
5	Analyzing the classification of soil grains using the AASHTO system	Determining soil classification using the AASHTO system	**Forms of Assessment** : Participatory Activities, Portfolio Assessment, Practical Assessment	lecture, discussion, questions and answers and problem solving (2 x 50 minutes theory) (1x3x50 minutes practical)	lecture, discussion, question and answer and problem solving (3 x 50 minutes theory)	**Material:** Soil classification using the AASHTO system **Reader:** *Braja M. Das. 1995. Soil Mechanics Volume I (Translated by Noor Endah and Indrasurya). Jakarta: Erlangga.* **Material:** Practicing sieve analysis **Reader:** *Andajani. Nur. 2023. Practical Instructions for Soil Mechanics. Surabaya: Unipress Unesa*	0%

6	Students can classify soil using the USCS system	1. 2.Determining soil classification using the USCS system	**Criteria:** Full marks are obtained if you do all the questions correctly and the completeness of the report is correct **Forms of Assessment** : Participatory Activities, Portfolio Assessment, Practical Assessment	Lectures, discussions, questions and answers, demonstrations and practicums in the laboratory 2 x 50 minutes theory) (1x3x50 minutes practicum)	Lectures, discussions, questions and answers, demonstrations and practical work in the laboratory (3 x 50 minutes theory)	**Material:** Soil classification using the USCS system **Reader:** *Braja M. Das. 1995. Soil Mechanics Volume I (Translated by Noor Endah and Indrasurya). Jakarta: Erlangga.* **Material:** Practicing sieve analysis **Reader:** *Andajani. Nur. 2023. Practical Instructions for Soil Mechanics. Surabaya: Unipress Unesa*	0%
7	able to analyze soil consistency	Determining the liquid limit of soil, plastic limit, plasticity index and shrinkage limit	**Criteria:** Full marks are obtained if you do all the questions correctly and the completeness of the report is correct **Forms of Assessment** : Participatory Activities, Portfolio Assessment, Practical Assessment	Lectures, discussions, questions and answers, demonstrations and practical work in the laboratory (2 x 50 minutes of theory) (1x3x50 minutes of practical work)	Lectures, discussions, questions and answers, demonstrations and practical work in the laboratory (3 x 50 minutes theory)	**Material:** Liquid Limit, Plastic Limit, Soil Plasticity Index and Wrinkle Limit/shrinkage limit **Reference:** *Braja M. Das. 1995. Soil Mechanics Volume I (Translated by Noor Endah and Indrasurya). Jakarta: Erlangga.* **Material:** Practicing soil consistency **Reader:** *Joseph E. Bowles. 1996. Physical and Geotechnical Properties of Soil (Translated by Johan Kelanaputra H. Jakarta: Erlangga.*	0%
8	UTS	can answer UTS questions	**Criteria:** Full marks are obtained if you do all the questions correctly **Form of Assessment** : Test	Answer/do questions in Essay 2 X 50	Answer/do questions in Essay 2 X 50	**Material:** UTS Material **Reader:** *Braja M. Das. 1995. Soil Mechanics Volume I (Translated by Noor Endah and Indrasurya). Jakarta: Erlangga.*	0%

9	able to understand soil compaction in the laboratory	Able to create soil compaction graphs, determine maximum dry volume weight and optimum water content, determine zero air void volume weight	**Criteria:** Full marks are obtained if you do all the questions correctly and the completeness of the report is correct **Form of Assessment** : Participatory Activities, Portfolio Assessment	Lectures, discussions, questions and answers, demonstrations and practical work in the laboratory (2 x 50 minutes of theory) (1x3x50 minutes of practical work)	Lecture, discussion, question and answer (3 x 50 minutes theory)	**Material:** Soil compaction Laboratory **Reference:** *Braja M. Das. 1995. Soil Mechanics Volume I (Translated by Noor Endah and Indrasurya). Jakarta: Erlangga.*	0%
10		Able to determine field dry volume weight and relative density	**Form of Assessment** : Participatory Activities, Practical Assessment	Lectures, discussions, questions and answers, demonstrations (2 x 50 minutes theory) (1x3x50 minutes practical)	Lecture, discussion, question and answer, demonstration (3 x 50 minutes theory)	**Material:** Field Compaction (Sand Cone) **Reference:** *Braja M. Das. 1995. Soil Mechanics Volume I (Translated by Noor Endah and Indrasurya). Jakarta: Erlangga.*	0%
11		Determine the soil shear strength parameters, determine the friction angle and soil cohesion, depict the Mohr's Circle graph	**Criteria:** Given 4 questions each with a weight of 25% **Forms of Assessment** : Participatory Activities, Portfolio Assessment, Practical Assessment	Lectures, discussions, questions and answers, demonstrations (2 x 50 minutes theory) (1x3x50 minutes practical)	Lecture, discussion, question and answer (3 x 50 minutes theory)		0%
12	Students are able to understand Soil Shear Strength	Determine the soil shear strength parameters, determine the friction angle and soil cohesion, depict the Mohr's Circle graph	**Criteria:** Full marks are obtained if you do all the questions correctly and the completeness of the report is correct **Forms of Assessment** : Participatory Activities, Portfolio Assessment, Practical Assessment	Lectures, discussions, questions and answers, demonstrations and practical work in the laboratory (2 x 50 minutes of theory) (1x3x50 minutes of practical work)	Lecture, discussion, question and answer (3 x 50 minutes theory)	**Material:** Shear Strength of Soil, Unconfined Practicum and Direct Shear Practicum **Literature:**	0%
13	Students are able to understand groundwater seepage	Determine water volume, elevation head, pressure head, total head. Determines the soil seepage coefficient, determines the amount of lifting force, and safety against heave	**Criteria:** If you can do all the questions given, the score is 100 **Forms of Assessment** : Participatory Activities, Portfolio Assessment, Practical Assessment	Lectures, discussions, questions and answers, demonstrations and practical work in the laboratory (2 x 50 minutes of theory) (1x3x50 minutes of practical work)	Lecture, discussion, question and answer (3 x 50 minutes theory)	**Material:** Groundwater seepage for homogeneous and layered soil, effective stress and net flow. **Reference:** *Braja M. Das. 1995. Soil Mechanics Volume I (Translated by Noor Endah and Indrasurya). Jakarta: Erlangga.*	0%
14	Students are able to understand the material of soil compression or subsidence that occurs in the soil	determine the field compression coefficient, swelling coefficient, consolidation coefficient and determine soil settlement and the length of time for the consolidation process to occur	**Criteria:** Full marks are obtained if you do all the questions correctly and the completeness of the report is correct **Forms of Assessment** : Participatory Activities, Portfolio Assessment, Practical Assessment	Lectures, discussions, questions and answers, demonstrations and practical work in the laboratory (2 x 50 minutes of theory) (1x3x50 minutes of practical work)	Lectures, discussions, questions and answers, doing assignments (3 x 50 minutes theory)	**Material:** Consolidated material **Reader:** *Braja M. Das. 1995. Soil Mechanics Volume I (Translated by Noor Endah and Indrasurya). Jakarta: Erlangga.*	0%

15	Students are able to understand the material of soil compression or subsidence that occurs in the soil	determine the field compression coefficient, swelling coefficient, consolidation coefficient and determine soil settlement and the length of time for the consolidation process to occur	**Criteria:** Full marks are obtained if you do all the questions correctly and the completeness of the report is correct **Forms of Assessment** : Participatory Activities, Portfolio Assessment, Practical Assessment	Lectures, discussions, questions and answers, demonstrations and practical work in the laboratory (2 x 50 minutes of theory) (1x3x50 minutes of practical work)	Lectures, discussions, questions and answers, doing assignments (3 x 50 minutes theory)	**Material:** Land consolidation material **Reference:** *Braja M. Das. 1995. Soil Mechanics Volume I (Translated by Noor Endah and Indrasurya). Jakarta: Erlangga.*	0%
16	Final Semester Examination (UAS)	Can answer UAS questions	**Form of Assessment** : Test	Work on essay questions (2 x 50 minutes theory)	Work on essay questions (2 x 50 minutes theory)	**Material:** UAS Material **Reader:** *Braja M. Das. 1995. Soil Mechanics Volume I (Translated by Noor Endah and Indrasurya). Jakarta: Erlangga.*	0%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
		0%

Notes

1. **Learning Outcomes of Study Program Graduates (PLO - Study Program)** are the abilities possessed by each Study Program graduate which are the internalization of attitudes, mastery of knowledge and skills according to the level of their study program obtained through the learning process.
2. **The PLO imposed on courses** are several learning outcomes of study program graduates (CPL-Study Program) which are used for the formation/development of a course consisting of aspects of attitude, general skills, special skills and knowledge.
3. **Program Objectives (PO)** are abilities that are specifically described from the PLO assigned to a course, and are specific to the study material or learning materials for that course.
4. **Subject Sub-PO (Sub-PO)** is a capability that is specifically described from the PO that can be measured or observed and is the final ability that is planned at each learning stage, and is specific to the learning material of the course.
5. **Indicators for assessing** ability in the process and student learning outcomes are specific and measurable statements that identify the ability or performance of student learning outcomes accompanied by evidence.
6. **Assessment Criteria** are benchmarks used as a measure or measure of learning achievement in assessments based on predetermined indicators. Assessment criteria are guidelines for assessors so that assessments are consistent and unbiased. Criteria can be quantitative or qualitative.
7. **Forms of assessment:** test and non-test.
8. **Forms of learning:** Lecture, Response, Tutorial, Seminar or equivalent, Practicum, Studio Practice, Workshop Practice, Field Practice, Research, Community Service and/or other equivalent forms of learning.
9. **Learning Methods:** Small Group Discussion, Role-Play & Simulation, Discovery Learning, Self-Directed Learning, Cooperative Learning, Collaborative Learning, Contextual Learning, Project Based Learning, and other equivalent methods.
10. **Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
11. **The assessment weight** is the percentage of assessment of each sub-PO achievement whose size is proportional to the level of difficulty of achieving that sub-PO, and the total is 100%.
12. TM=Face to face, PT=Structured assignments, BM=Independent study.