	Universitas Negeri Surabaya Faculty of Engineering Civil Engineering Undergraduate Study Program	Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Soil Mechanics	2220104146	Compulsory Study Program Subjects	T=3	P=1	ECTS=6.36	3	July 17, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
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Learning model	**Project Based Learning**	
Program Learning Outcomes (PLO)	**PLO study program which is charged to the course**	
	Program Objectives (PO)	
	PO - 1	Students have knowledge about the origin of soil, soil composition, soil consistency, AASHTO and USCS soil classification, water flow in soil, flow net, lifting force, safety against heave and the concept of effective stress.
	PO - 2	Students are able to determine soil parameters, soil consistency, AASHTO and USCS soil classification, water seepage coefficient in soil for homogeneous soil and layered soil, lifting force and safety against heave from dams.
	PO - 3	Students are able to carry out volumetrigravimetry practicums, soil consistency, granular gradation analysis and constant head and falling head water seepage, proctor and sand cone compaction in the field, carry out direct shear, consolidation and sondir practicums.
	PO - 4	Students are able to process data, analyze and draw conclusions from practicum results.

PLO-PO Matrix

P.O
PO-1
PO-2
PO-3
PO-4

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
PO-1																
PO-2																
PO-3																
PO-4																

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, lift force calculations, safety against heave, effective stress concept, standard proctor compaction, sandcone compaction, graphical and analytical soil shear strength, theory of consolidation, sondir and boring as well as soil mechanics practicum in the laboratory and in the field.	
References	**Main :**	

	1. ferensi : 2. Braja M. Das. 1995. Mekanika Tanah Jilid I dan II (Alih Bahasa Noor Endah dan Indrasurya). Jakarta: Erlangga. 3. Andayani Nur, 2010. Buku Petunjuk Praktik Mekanika Tanah II , Jurusan Teknik Sipil Unesa 4. Joseph E. Bowles. 1996. Sifat-sifat Fisis dan Geoteknis Tanah (Alih Bahasa Johan Kelanaputra H.). Jakarta: Erlangga. 5. Braja M. Das. 1998. Advanced Soil Mechanics . Singapore: McGraw-Hill. 6. Hardiyatmo Hary Christady. 2012. Mekanika Tanah I . Yogjakarta: Gadjah Mada University Press.
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 **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Practices / Performance	Online Google Meet/Zoom and Vinesa 4 X 50		**Material:** Definition of soil, origin of soil, types of soil, soil particles and behavior of clay minerals **Library:** *Hardiyatmo Hary Christady. 2012. Soil Mechanics I. Yogjakarta: Gadjah Mada University Press.*	4%
2	able to understand soil composition, analyze soil parameters, the relationship between soil parameters and relative soil density	Determine volumetric gravimetric soil parameters from theoretical and empirical data	**Criteria:** Full marks are obtained if you do all the questions correctly and the completeness of the report is correct **Form of Assessment** : Assessment of Project Results / Product Assessment, Practices / Performance	Online Google Meet/Zoom and Vinesa 4 X 50		**Material:** Volumetric gravimetric soil parameters from theoretical and empirical data. **Reference:** *Hardiyatmo Hary Christady. 2012. Soil Mechanics I. Yogjakarta: Gadjah Mada University Press.*	4%
3	able to analyze soil consistency	Determine the liquid limit, plastic limit, plastic index and shrinkage limit values from theoretical and empirical data	**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, Project Results Assessment / Product Assessment, Practices / Performance	Online Google Meet/Zoom and Vinesa 4 X 50		**Material:** values of liquid limit, plastic limit, plastic index and shrinkage limit from theoretical and empirical data. **Reference:** *Hardiyatmo Hary Christady. 2012. Soil Mechanics I. Yogjakarta: Gadjah Mada University Press.*	3%

4	Able to classify soil	Able to create grain size distribution curves, able to classify USCS and AASHTO soil systems from theoretical and empirical data	**Criteria:** Full marks are obtained if you do all the questions correctly **Form of Assessment** : Assessment of Project Results / Product Assessment, Practices / Performance	Online Google Meet/Zoom and Vinesa 4 X 50		**Material:** grain size distribution curve, able to classify USCS and AASHTO soil systems from theoretical and empirical data. **Library:** *Hardiyatmo Hary Christady. 2012. Soil Mechanics I. Yogjakarta: Gadjah Mada University Press.*	4%
5	Able to classify soil	Able to create grain size distribution curves, able to classify USCS and AASHTO soil systems from theoretical and empirical data	**Criteria:** Full marks are obtained if you do all the questions correctly **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Practices / Performance	Online Google Meet/Zoom and Vinesa 4 X 50			4%
6	Able to analyze soil consistency	Determine the liquid limit, plastic limit, plastic index and shrinkage limit values from theoretical and empirical data	**Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Practices / Performance	Online Google Meet/Zoom and Vinesa 4 X 50		**Material:** values of liquid limit, plastic limit, plastic index and shrinkage limit from theoretical and empirical data. **Reference:** *Hardiyatmo Hary Christady. 2012. Soil Mechanics I. Yogjakarta: Gadjah Mada University Press.*	4%
7	Able to understand ground stress	Can determine shear stress & normal stress analytically.	**Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Practices / Performance	Online Google Meet/Zoom and Vinesa 4 X 50		**Material:** Shear stress & normal stress analytically **Reference:** *Hardiyatmo Hary Christady. 2012. Soil Mechanics I. Yogjakarta: Gadjah Mada University Press.*	3%
8	U.S.S	UTS	**Form of Assessment** : Project Results Assessment / Product Assessment	Online Google Meet/Zoom and Vinesa 4 X 50			20%

9	Able to analyze soil shear strength	1. Can determine shear stress & normal stress graphically using Mohr's Circle & Pole Method. 2. Can determine shear strength parameters: cohesion and shear angle	**Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Practices / Performance	Online Google Meet/Zoom and Vinesa 4 X 50		**Material:** Shear stress & normal stress graphically using Mohr's circle & polar method. **Reader:** *Hardiyatmo Hary Christady. 2012. Soil Mechanics I. Yogjakarta: Gadjah Mada University Press.*	4%
10	Able to analyze water seepage in the ground	Determine water volume, elevation head, pressure head, total head. Determine the seepage coefficient from practical data	**Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Practices / Performance	Online Google Meet/Zoom and Vinesa 4 X 50		**Material:** water volume, elevation head, pressure head, total head. Determining the seepage coefficient from practicum data. **Library:** *Hardiyatmo Hary Christady. 2012. Soil Mechanics I. Yogjakarta: Gadjah Mada University Press.*	3%
11	Able to analyze the lifting force under the dam and effective stress	Determine the lifting force under the dam, total stress, water, effective and exit gradients as well as safety against heave	**Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Practices / Performance	Online Google Meet/Zoom and Vinesa 4 X 50		**Material:** lifting force under the dam, total stress, water, effective and exit gradients and safety against heave **Library:** *Hardiyatmo Hary Christady. 2012. Soil Mechanics I. Yogjakarta: Gadjah Mada University Press.*	4%

12	Able to understand soil compaction	Able to explain the meaning & function of soil compaction - Able to draw. proctor compaction graph. - Can specify. price of max soil density (gdmax) & optimum water content (wcopt). -Able to calculate and draw the gdZAV curve. - Able to explain the meaning of compaction in the field. - Can determine the price of lap density. - Determine the relative density, dry set and wet set water content.	**Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Practical Assessment, Practical / Performance	Online Google Meet/Zoom and Vinesa 4 X 50		**Material:** understanding & function of soil compaction - Be able to draw. proctor compaction charts; price of max soil density (gdmax) & optimum water content (wcopt); relative density, dry set and wet set water content. **Reader:** *Hardiyatmo Hary Christady. 2012. Soil Mechanics I. Yogjakarta: Gadjah Mada University Press.*	3%
13	Students are able to understand soil compression	- Can explain about the compression that occurred in the year. - Can explain things. NC clay & OC Soil. - can be decisive. land overburden. - can be determined. pre-consolidation tag, Cc lap and Cs from e Vs log s graph for NC & OC Soil. can determine the decrease that occurs in NC clay & OC Soil	**Form of Assessment** : Assessment of Project Results / Product Assessment, Practices / Performance	Online Google Meet/Zoom and Vinesa 4 X 50		**Material:** NC clay & OC Soil; tag. land overburden; pre-consolidation tags **Reader:** *Hardiyatmo Hary Christady. 2012. Soil Mechanics I. Yogjakarta: Gadjah Mada University Press.*	4%
14	Students are able to understand perhit. Soil compression time	- Students can register. consolidation time through t50. - Students can determine the consolidation coefficient. Students can determine. consolidation time through t90.	**Form of Assessment** : Assessment of Project Results / Product Assessment, Practices / Performance	Online Google Meet/Zoom and Vinesa 4 X 50		**Material:** Consolidation time through t50; consolidation coefficient; consolidation time via t90 **Reader:** *Hardiyatmo Hary Christady. 2012. Soil Mechanics I. Yogjakarta: Gadjah Mada University Press.*	3%

15	Able to understand Sondir, Boring & SPT	- Can explain conus and biconus values from the Sondir test - Can determine the JHP value from Sondir test data - Can analyze NSPT values from SPT / empirical data - Can analyze Borlog from SPT / empirical data	**Form of Assessment** : Assessment of Project Results / Product Assessment, Practices / Performance	Online Google Meet/Zoom and Vinesa 4 X 50		**Material:** Conus and biconus values from the Sondir Test; JHP value from Sondir test data; NSPT value from SPT / empirical data; Borlog from SPT / empirical data **Reference:** *Hardiyatmo Hary Christady. 2012. Soil Mechanics I. Yogjakarta: Gadjah Mada University Press.*	3%
16			**Form of Assessment** : Project Results Assessment / Product Assessment				30%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	10.4%
2.	Project Results Assessment / Product Assessment	69.4%
3.	Practical Assessment	0.75%
4.	Practice / Performance	19.4%
		99.95%

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** abilities in the process and student learning outcomes are specific and measurable statements that identify the abilities 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.