TEACHING PLAN

BACHELOR OF EDUCATION IN BUILDING ENGINEERING (BE-BE) STUDY PROGRAM

DEPARTMENT OF CIVIL ENGINEERING, FACULTY OF ENGINEERING, UNIVERSITAS NEGERI PADANG

COURSE	CODE	COURSE CLUSTER	CREDITS		SEM	VERSION
			Theory	Practice		
Soil Mechanic and Foundation Engineering	SIP1.61.4302	Compulsory Courses	2	1	4	1
Lecturer in Charge	**Dr. Azwar Inra, M.Pd**		**Lecture in Charge** **Dr. Azwar Inra, M.Pd**			

Remakrs	**Dean of Faculty of Engineering**	**Head of Civil Engineering Department**	**Coordinator of BEVE**
	Dr. Fahmi Rizal, M.Pd., M.T NIP. 195912041985031004	Faisal Ashar, Ph.D. NIP. 19750103 200312 1001	Drs. Revian Body, MSA. NIP. 19600103 198503 1003

Program Learning Outcomes	**Program Learning Outcomes (PLO)**

By considering input from all stake holders and the minimum requirements set by ASIIN, the PLO's that must be possessed by graduates from the Bachelor of Education in Building Engineering Study Program are determined as follows:

1. Master *basic knowledge of science* (mathematics, natural sciences) and other scientific disciplines that form the basis of building engineering vocational education field for carrying out professional work *(Knowledge and Understanding).*
   1.1. Able to implement basic concepts of mathematics and physics to master subjects matter in the field of building engineering vocational education.
   1.2. Mastering Statics, Mechanics, Statistics, Technology Materials, and Engineering Drawings as the basic knowledge in the field of building engineering vocational education.

2. Able to identify, formulate, solve, and evaluate various technical problems of buildings as the basic ability for teaching in the field of building engineering vocational education *(Engineering analysis, investigation and assessment)* .
    2.1. Able to identify, formulate, solve, and evaluate technical problems in the field of geotechnical and transportation as the basic ability for teaching in the field of building engineering vocational education.
    2.2. Able to identify, formulate, solve, and evaluate technical problems in the field of structure and construction management as the basic ability for teaching in the field of building engineering vocational education.
    2.3. Able to identify, formulate, solve, and evaluate technical problems in the field of hydrology as the basic ability for teaching in the field of building engineering vocational education.
3. Possess the ability to design building by taking into account environmental, social, health and work safety issues as the basis for teaching in the field of building engineering vocational education *(Engineering design).*
    3.1. Able to make design programming by taking into account environmental, social, health and work safety issues, in cooperation with various party related.
    3.2. Able to analyze the design by taking into account environmental, social, health and work safety aspects.
    3.3. Able to produce design by taking into account environmental, social, health and work safety aspects.
4. Possess social, managerial, team work, and effective communication competencies, entrepreneurial character, environmental insight and life-long learning habits. *(Transferable and soft skills).*
    4.1. Possess religious character implemented in personal and professional activities.
    4.2. Possess the spirit of nationalism, social sensitivity and environmental insight
    4.3. Able to communicate effectively and work in a team.
    4.4. Able to transfer science and technology to the community to improve the quality of life
    4.5. Possess entrepreneurial character
5. Possess the ability to innovate and adapt to the development of science and technology, and implement it into the learning process of building engineering vocational education field by taking into account non-technical risks that may occur (ethical, ecological, commercial, and industrial impact) *(Engineering practice).*
    5.1. Able to innovate and use information technology (software) in the field of building engineering vocational education by taking into account the ethical, ecological, commercial and industrial impact.
    5.2. Able to use information technology-based equipment (hardware) in field of building engineering

vocational education.

6. Possess a good ability to design, implement and evaluate the learning process in the field of building engineering vocational education *(Educational design).*
   6.1. Able to design curriculum and learning process of building engineering vocational education.
   6.2. Able to implement, control, evaluate and improve the quality of learning process through research in the field of building engineering vocational education.
   6.3. Able to develop an effective, efficient, and attractive learning media in the field of building engineering vocational education.

Course Learning Outcome

Course Learning Outcomes (CLO) : Soil Mechanic and Fondation Engineering

Course LO	PLO
1. Able to understand the USCS and AASTHO classification systems	1.1; 1.2; 4.1; 4.2; 4.3; 5.2;
2. Able to know the relationship between volume, weight and weight and volume	1.1; 1.2; 4.1; 4.2; 4.3; 5.2;
3. Able to understand the concept of total and effective pressure	1.1; 1.2; 4.1; 4.2; 4.3; 5.2;
4. Able to understand the concept of pressure due to load	1.1; 1.2; 4.1; 4.2; 4.3; 5.2;
5. Able to understand the concept of consolidation	1.1; 1.2; 4.1; 4.2; 4.3; 5.2;
6. Able to understand the concept of shear stress	1.1; 1.2; 4.1; 4.2; 4.3; 5.2;
7. Able to understand shallow foundation calculations	1.1; 1.2; 4.1; 4.2; 4.3; 5.2;

	8. Able to understand the calculation of the deep foundation	1.1; 1.2; 5.2; 6.1;6.2;6.3
Course Description	This course provides knowledge about the physical and mechanical properties of soil as well as foundation design based on the nature and magnitude of the load and subgrade conditions.	
Literature	**Main :**	
	1. Das, B.M. (1999). *Shallow foundations: bearing capacity and settlement*. Washington: CRC Press 2. ----------. (2007).*Principles of foundation engineering* .Toronto: Nelson 3. Funmia,B.C.(1981).*Soil mechanics and foundations*. Delhi: Standard Book House 4. Liu, C., Evett, J.B. (1992).*Soil and foundations*. New Jersey: Prentice Hall Inc 5. Medzvieckas,J., Sližytė,D.,Stragys,V.(2004). *Soil mechanics. laboratory testing manual*. Vilnius: Technica 6. Murthy, V.N. S. (2003). *Geotechnical engineering*. New York: Marcel Dekker	
	Supporting :	
	1. Hary Christiady Hardiyatmo.(1996). *Teknik Pondasi I*. Jakarta: Gramedia 2. SNI 4153.(2008). *Cara uji penetrasi lapangan dengan SPT*.	
Teaching Media	**Software:**	**Hardware:**
		Computer, LCD Projector and White Board
Team Teaching		
Assessment	Mid-Semester Exam, Final Exam, Individual and Group Assignment, Group Presentation	
Prerequisite	N/A	

TEACHING MATERIAL

Week	Expected Competency	Study Material	Teaching Method and Strategy	Assigment	Assessment Criteria/ Indicator	Reference
(1)	**CLO 1: [PLO 1.1; 1.2; 5.2; 6.1;6.2;6.3]** Able to understand the USCS classification systems	1. Sieve analysis 2. Plasticity chart 3. The coefficient of concave (Cc) 4. Uniformity coefficient (Cu)	1. Expository Strategy, Contextual and Affective 2. Discourse method 3. Discussion, question and answer method	1. Draw the curve of the sieve analysis results 2. Read a Plasticity chart 3. Calculating Cc and Cu 4. USCS classification	1. Be able to describe the curve of the sieve analysis results 2. Able to read Plasticity charts 3. Able to calculate the price of Cc 4. Able to calculate the price of Cu 5. Able to classify soils according to the USCS system	Main 5 Main 6
(2)	**CLO 1: [PLO 1.1; 1.2; 5.2; 6.1;6.2;6.3]** Able to understand the AASTHO classification systems	1. Group Index (GI) 2. AASTHO classification	1. Expository Strategy, Contextual and Affective 2. Discourse method 3. Discussion, question and answer method	1. Calculating GI 2. AASTHO classification	1. Able to calculate group index (GI) 2. Able to classify soil according to the ASHTO system	Main 5 Main 6
(3)	**CLO-2: [PLO-1.1; 1.2; 5.2; 6.1;6.2;6.3]** Able to calculate	1. Weight Relations 2. Volume Relations	1. Expository Strategy, Contextual and Affective	1. Calculating Water Content 2. Calculating the	1. Able to calculate water content	Main 3 Main 4

Week	Expected Competency	Study Material	Teaching Method and Strategy	Assigment	Assessment Criteria/ Indicator	Reference
	various forms of weight relations and volume relationships,		2. Discourse method 3. Discussion, question and answer method	density	2. Able to calculate specific gravity	
(4)	**CLO-3 : [PLO 1.1; 1.2; 5.2; 6.1;6.2;6.3]** Able to calculate the weight and volume relationship and measure the weight and density of soil	1. Weight and volume relationship	1. Expository Strategy, Contextual and Affective 2. Discourse method 3. Discussion, question and answer method	1. Calculate the weight of the contents, number of pores, porosity and degree of saturation	1. Able to calculate content weight 2. Able to calculate pore numbers 3. Be able to calculate porosity 4. Able to calculate the degree of saturation	Main 3 Main 4
(5)	**CLO-4: [PLO 1.1; 1.2; 5.2; 6.1;6.2;6.3]** 1. Able to calculate the amount of total and effective soil pressure in accordance with the conditions and depth being reviewed 2. Able to calculate pressure due to load	1. Total Pressure (σ) 2. Pore water pressure (U) 3. Effective Pressure (σ ^ -) 1. Pressure due to load	1. Expository Strategy, Contextual and Affective 2. Discourse method 3. Discussion, question and answer method	1. Calculates the total pressure, calculates the pore pressure, calculates the effective pressure 1. Calculating the pressure due to load with the	1. Able to calculate total pressure 2. Able to calculate pore water 3. Able to calculate effective pressure 4. Able to calculate	Main 2 Main 6 Main 3

Week	Expected Competency	Study Material	Teaching Method and Strategy	Assigment	Assessment Criteria/ Indicator	Reference
				Boussinesq method	strength due to load 5. with the Boussinesq method	
(6)	**CLO-5: [PLO 1.1; 1.2; 5.2; 6.1;6.2;6.3]** Able to understand the concept of consolidation	1. Consolidation 2. Consolidation Decline 3. Consolidation Time	1. Expository Strategy, Contextual and Affective 2. Discourse method 3. Discussion, question and answer method	1.Calculating consolidation decline 2.Calculating the time of consoidation	1. Able to calculate the amount of consolidation decline 2. Able to calculate consolidation time	Main 4
(7)	**CLO-6: [PLO 1.1; 1.2; 5.2; 6.1;6.2;6.3]** Able to explain the basic concepts of shear resistance and testing procedures	Shear resistance	1. Expository Strategy, Contextual and Affective 2. Discourse method 3. Discussion, question and answer method	1. Drawing a shear stress diagram	1. Able to describe the shear stress diagram a.Consolidated – drained test (CD test) b. Consolidated – Undrained test (CU test) c.Unconsolidated – Undrained test (UU test).	Main 6 Main 2

Week	Expected Competency	Study Material	Teaching Method and Strategy	Assigment	Assessment Criteria/ Indicator	Reference
(8)	**Mid Semester Exam**					
(9)	**CLO-7: [PLO 1.1; 1.2; 5.2; 6.1;6.2;6.3]** 1. Able to distinguish various types of shallow foundations 2. Able to calculate the capacity of the shallow foundation bearing capacity	1. Types of shallow foundations 2. Shallow foundation bearing capacity	1. Expository Strategy, Contextual and Affective 2. Discourse method 3. Discussion, question and answer method	1. Calculating the carrying capacity	1. Able to calculate the bearing capacity of the shallow foundation	Main 4 Main 1 Supp 1
(10)	**CLO-7: [PLO 1.1; 1.2; 5.2; 6.1;6.2;6.3]** Able to calculate the bearing capacity of the shallow foundation which is influenced by the groundwater level; that accepts tilting loads; and that has an eccentricity	1. Effect of groundwater levels 2. Influence of inclined load 3. Effect of load with eccentricity	1. Expository Strategy, Contextual and Affective 2. Discourse method 3. Discussion, question and answer method	1. Calculating the bearing capacity due to the effect of tilt loads, effect of load with eccentricity	Able to calculate the bearing capacity of the shallow foundation: a. Due to the influence of the ground water level b. As a result of tilt loads c. Due to the eccentricity	Main 4 Main 1 Supp 1
(11)	**CLO-7: [PLO 1.1; 1.2; 5.2; 6.1;6.2;6.3]** Able to determine the size of the shallow foundation related to the load to be carried	1. Shallow Foundation Size	1. Expository Strategy, Contextual and Affective 2. Discourse method 3. Discussion, question	1. Calculating the size of the foundation	1. Able to calculate shallow foundation size	Main 4 Main 1 Supp 1

Week	Expected Competency	Study Material	Teaching Method and Strategy	Assigment	Assessment Criteria/ Indicator	Reference
	and the condition of the subgrade		and answer method			
(12)	**CLO-8 : [PLO 1.1; 1.2; 5.2; 6.1;6.2;6.3]** 1. Able to distinguish the types of deep foundations 2. Able to calculate the bearing capacity of the pile foundation based on the static method	1. Types of deep foundation types 2. Static Method	1. Expository Strategy, Contextual and Affective 2. Discourse method 3. Discussion, question and answer method	1. Calculating the bearing capacity of the deep foundation based on the static method	1. Able to calculate the bearing capacity of the pile foundation based on the static method	Main 2 Main 6
(13)	**CLO-8 : [PLO 1.1; 1.2; 5.2; 6.1;6.2;6.3]** Able to calculate the bearing capacity of the pile foundation based on dynamic methods	1. Dynamic method	1. Expository Strategy, Contextual and Affective 2. Discourse method 3. Discussion, question and answer method	1. Calculating the bearing capacity of the deep foundation Based on dynamic methods	1. Able to calculate the bearing capacity of the pile foundation based on dynamic methods	Main 4 Main 2 Supp 2
(14)	**CLO-8: [PLO 1.1; 1.2; 5.2; 6.1;6.2;6.3]** Able to calculate the bearing capacity of the pile group	1. Pole group bearing capacity	1. Expository Strategy, Contextual and Affective 2. Discourse method 3. Discussion, question and answer method	1. Calculating the bearing capacity of the pile group	1. Able to calculate the carrying capacity of the pile group	Main 4
(15)	**CLO-8: [PLO 1.1; 1.2; 5.2; 6.1;6.2;6.3]**	1. Load Spread	1. Expository Strategy, Contextual and	1. Calculating the spread of the load	1. Able to calculate the	Main 4

Week	Expected Competency	Study Material	Teaching Method and Strategy	Assigment	Assessment Criteria/ Indicator	Reference
	Able to calculate the distribution of loads on the pile group		Affective 2. Discourse method 3. Discussion, question and answer method		distribution of the load on the pile group	
(16)	**Final Exam**					

Notes :

Correlation between CLO, PLO and Assessment Methods

	Assesment	Bobot (%)	PLO-1			PLO-2				PLO-3				PLO-4			PLO-5			PLO-6		
			1	2	3	1	2	3	4	1	2	3	4	1	2	3	1	2	3	1	2	3
CLO 1	Assigment 1	10																				
CLO 2	Assigment 2	20																				
CLO 3	Assigment 3	5																				
CLO 4	Assigment 4	5																				
CLO 5	Assigment 5	10																				
CLO 6	Assigment 6	10																				
CLO 7	Assigment 7	10																				
CLO 8	Assigment 8	20																				
Kehadiran		10																				

TOTAL		100																			

Assesment Components

Mid Semester Exam : 30 %

Final Exam : 40 %

Assigment : 20 %

Presence : 10 %

Total : 100 %

Description of Assessment Level

Indicator	**Excellent**	**Good**	**Satisfy**	**Fail**
Drawing	The drawing is in accordance with the data, the scale used is correct, it can be read, and the shape of the drawing is in accordance with the standard drawing	The drawing is in accordance with the data, the scale used is correct, it can be read, but not according to the standard	The drawing is in accordance with the data, the scale used is not correct, cannot be read, and does not comply with the standard	The drawing does not match with the data, the scale used is not correct, cannot be read, and does not comply with the standard
Reading	Could read the drawing without being guided	Could read the drawing with a little guidance	Could read the drawing with full guidance	Couldn't read drawing even with guidance
Computing	Able to calculate correctly	Able to calculate correctly	Able to count but less	Not able to count

	and completely	but not complete	clear and incomplete	

Assessment System

Score Range	Grade Letter	Grade Point	Notes	Score Range	Grade Letter	Grade Point	Notes
85 – 100	A	4.0	Exceptional	55 – 59	C	2.0	Quite Satisfactory
80 – 84	A-	3.6	Excellent	50 – 54	C-	1.6	Poor
75 – 79	B+	3.3	Very Good	40 – 49	D	1.0	Very Poor
70 – 74	B	3.0	Good	≤ 39	E	0.0	Fail
65 – 69	B-	2.6	Fairly Good	-	T	-	Delayed
60 – 64	C+	2.3	Satisfactory				

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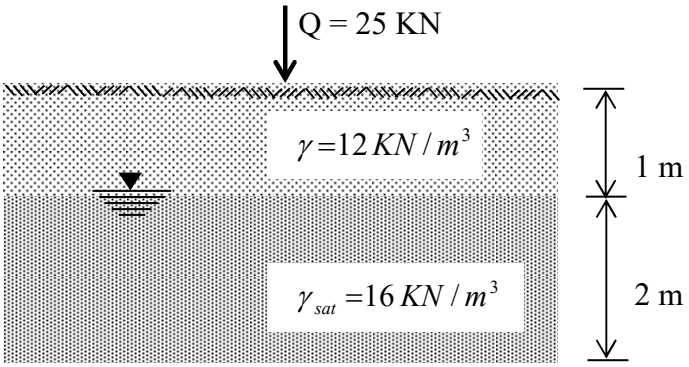
MID-SEMESTER EXAM

Course : Soil Mechaning and Foundation Engineering
Code / Credit : SIP1.61.4302 / 3
Test Method : Buka Buku
Lecturer : DR. Azwar Inra, M.Pd
Time Alocation : 120 minutes
Maximum Grade : 100

No	Question	Grade
1	In a soil classification, the following data are obtained. Determine the type of soil. based on the USCS and AASHTO systems	20

Sieve number	4	10	20	40	60	100	200	Cc	Cu	LL	PL
Percentage of passes	80	76	67	65	63	61	45	2	5	55%	30%

2	In testing a soil type, it was found that n = 30%; Gs = 2.65. Determine the price of e; ɤd; and ɤsat	25
3	In the consolidation test carried out on a soil sample, it was found that e0 = 1.50; LL = 60%. If the sample comes from clay with a thickness of 2 m, which is loaded with a load of 25 KN, calculate how much loss of consolidation the soil can experience.	40



4 The following data is the result of direct shear testing. Graph shear stress (τ) vs normal stress (σ), if the diameter of the specimen = 6 cm 15

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Pengujian	N (kN)	F (kN)
1	30	10
2	60	15
3	120	20

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FINAL EXAM

Course	:
Code / Credit	:
Test Method	:
Lecturer	:
Time Alocation	:
Maximum Grade	:

No	Question	Grade

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ASSIGMENT

Course	:
Code / Credit	:
Test Method	:
Lecturer	:
Time Alocation	:
Maximum Grade	:

Group	Question	Grade