

1.	Name of Course				Soil Mechanics II	
2.	Course Code				JSOM2233	
	JSOM = the first alphabet identify the faculty within which the subject is offered., JSOM = the remaining three alphabet identify the course that offers the subject, 2233 = the first digit identify level of study; in this case undergraduate level, 2233 = the second and third digits identify subject identity and 2233 = the fourth digit identify credit value or credit hours					
3.	Name(s) of academic staff				To be Assigned	
4.	Rationale for the inclusion of the course/module in the programme				This subject is a continuation of soil mechanics I. Students of civil engineering must have a sound knowledge and understanding of soil mechanics as all civil engineering structures rest on the ground.	
5.	Semester and Year offered				1/3	
6.	Total Student Learning Time (SLT)		Face to Face			Total Guided and Independent Learning
	L = Lecture T = Tutorial P = Practical S=Studio Works O= Others		L	T	P/S	O
			42	14	14	-
7.	Credit Value				3.0	
	Lecture (3 hours per week x 14 weeks) Tutorial (1hour per week x 14 weeks) Practical (2 hours fortnightly x 7 weeks)					
8.	Prerequisite (if any)				Soil Mechanics I (JSDM 2223)	
9.	Course Objectives 1. The objective of this course is to equip the students with the understanding and knowledge of two dimensional water flows in soil, shear strength of partly and saturated soils, critical state concept, design of retaining and sheet pile walls, stress, consolidation, settlement in soil and site investigation practice. Course Learning Outcomes (CLO) At the end of the semester students should be able to: CLO1: Understand and solved problems on two dimensional flow of water through soil. CLO2: Understand the principles of triaxial test both under drained and undrained conditions, behavior of saturated and unsaturated soils, pore pressure coefficients and critical state concept in soil. CLO3: Understand and solved problems related to retaining wall and sheet pile wall design. CLO4: Understand the concept of stress, preconsolidation, settlement in soil and able compute/determine stress, settlement, reconsolidation pressure, coefficient of consolidation and coefficient of volume compressibility. CLO5: Knowledge and understand the principles and methods in soil investigation.					
10.	Transferable Skills: This course is expected the development of the following transferable skills: a) Self-management – an ability to manage time and task b) Learning skills - An ability to learn both independently and co—operatively; - An ability to use library skills, to find and organize information ; - An ability to use a wide range of academic skills (research, analysis, synthesis etc.); - An ability to identify and evaluate personal learning strategies. c) Teamwork					

	▪ An ability to take responsibility and carry out agreed task; ▪ An ability to take initiative and lead other; ▪ An ability to identify and evaluate personal learning strategy. d) Problem solving ▪ An ability to analyse; ▪ An ability to think laterally about a problem; ▪ An ability to identify strategy options; ▪ An ability to solve the problems e) Information technologies ▪ An ability to use specialist software where relevant to the discipline.																
11.	Teaching-learning and assessment strategy A variety of teaching strategies are used throughout the course, including the following: • Classroom Lessons; Lecturer and power point presentations • Tutorial Session; • Student-Lecturer Discussion • Collaborative and Co-operative learn; • Independent study. Assessment: <table> <tr> <td>Course Work</td><td>40%</td></tr> <tr> <td>Assignment</td><td>5%</td></tr> <tr> <td>Tutorials /Quizzes</td><td>5%</td></tr> <tr> <td>Laboratory works</td><td>10%</td></tr> <tr> <td>Test</td><td>20%</td></tr> <tr> <td>Examination</td><td>60%</td></tr> <tr> <td colspan="2"> </td></tr> <tr> <td><u>Total</u></td><td><u>100%</u></td></tr> </table>	Course Work	40%	Assignment	5%	Tutorials /Quizzes	5%	Laboratory works	10%	Test	20%	Examination	60%			<u>Total</u>	<u>100%</u>
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Examination	60%																
<u>Total</u>	<u>100%</u>																
12.	Synopsis: This course cover topics on flow throw earth structure, strength of soil, earth retaining structure, stress, consolidation, settlement and site investigation.																
13.	Mode of Delivery: Lectures; Tutorials; Practical.																

14.	Performance Criteria :						
	CLO-PLO	Assessment Tool	1	2	3	4	5
	Marks		0-39	40-49	50-59	60-74	75-100
	Grade		(F)	(D,D+)	(C-,C,C+)	(B-,B,B+)	(A-,A,A+)
	CLO1: Understand and solved problems on two dimensional flow of water through soil.	Assignment Tutorial Quizzes Laboratory work Test Examination	Fail to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Poor to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Satisfactory to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Good to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Excellent to: • To: Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task
	CLO2: Understand the principles of triaxial test both under drained and undrained conditions, behavior of saturated and unsaturated soils, pore pressure coefficients and critical state concept in soil.	Assignment Tutorial Quizzes Laboratory work Test Examination	Fail to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Poor to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Satisfactory to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and	Good to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test	Excellent to: • To: Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and

					task	• Manage time and task	task
	CLO3: Understand and solved problems related to retaining wall and sheet pile wall design.	Assignment Tutorial Quizzes Laboratory work Test Examination	Fail to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Poor to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Satisfactory to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Good to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Excellent to: • To: Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task
	CLO4: Understand the concept of stress, consolidation, settlement in soil and able compute/determine stress, settlement, preconsolidation pressure, coefficient of consolidation and coefficient of volume compressibility.	Assignment Tutorial Quizzes Laboratory work Test Examination	Fail to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Poor to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Satisfactory to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Good to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Excellent to: • To: Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task

	CLO5: Knowledge and understand the principles and methods in soil investigation.	Assignment Tutorial Quizzes Laboratory work Test Examination	Fail to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Poor to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Satisfactory to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Good to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Excellent to: • To: Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task
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15.	Mapping of the Programme Objectives to the Programme Learning Outcomes											
Programme Learning Outcomes (PLO) Programme Objectives (PO)		PLO1: Ability to acquire and apply knowledge of science and engineering fundamentals;	PLO2: Acquired in-depth technical competence in civil engineering discipline;	PLO3: Ability to undertake problem identification, formulation and solution;	PLO4: Ability to utilize systems approach to design and evaluate operational performance;	PLO5: Understanding of the principles of design for sustainable development;	PLO6: Understanding of professional ethics, Islamic values, social, cultural, global and environmental responsibilities of a professional engineer and commitment to them;	PLO7: Ability to communicate effectively, not only with engineers but also with the community at large;	PLO8: ability to function effectively as an individual;	PLO9: Ability to function effectively in group with the capacity to be a leader or manager;	PLO10: Recognizing the need to undertake lifelong learning, and possessing /acquiring the capacity to do so;	PLO11: ability to become Entrepreneur;
PEO1: To produce graduates with proficient knowledge and competency in various areas in Civil/ Electrical/ Mechanical Engineering		✓	✓	✓								
PEO2: To produce graduates with professional, generic attributes to meet the present and future global demands.					✓	✓	✓			✓	✓	
PEO3: To produce graduates with Islamic humanistic values and reinvention skills to meet the requirement of a dynamic environment. These skills include Civil Intelligence, Moral Intelligence, Self-Reliance and Communication Skills								✓	✓	✓		✓

16.	Mapping of the course Learning Outcome to the Programme Outcome										
Programme Learning Outcomes (PLO) Course Learning Outcome (CLO)	PLO1: Ability to acquire and apply knowledge of science and engineering fundamentals;	PLO2: Acquired in-depth technical competence in civil engineering discipline;	PLO3: Ability to undertake problem identification, formulation and solution;	PLO4: Ability to utilise systems approach to design and evaluate operational performance;	PLO5: Understanding of the principles of design for sustainable development;	PLO6: Understanding of professional ethics, Islamic values, social, cultural, global and environmental responsibilities of a professional engineer and commitment to them;	PLO7: Ability to communicate effectively, not only with engineers but also with the community at large;	PLO8: ability to function effectively as an individual;	PLO9: Ability to function effectively in group with the capacity to be a leader or manager;	PLO10: Recognising the need to undertake lifelong learning, and possessing /acquiring the capacity to do so;	PLO11: ability to become Entrepreneur;
	CLO1: Understand and solved problems on two dimensional flow of water through soil.	✓									
	CLO2: Understand the principles of triaxial test both under drained and undrained conditions, behavior of saturated and unsaturated soils, pore pressure coefficients and critical state concept in soil.	✓									
	CLO3: Understand and solved problems related to retaining wall and sheet pile wall design.	✓	✓	✓							

[illegible]

17.	Content outline of the course/module and the SLT per topic							
		Details	SLT (Hours)					
			L	T	P	IS	Total	
	Topic 1	Seepage through earth structures • Principle of 2-D flow through soil medium • Method of flow analysis. • Seepage through isotropic and anistropic soil • Quantity of seepage discharge through earth dam or under concrete or sheet pile dam. • Piping problem. • Filter design	6	2	-	8	16	
		Topic 2	Strength Behaviour of Soils • Test for shear strength of soils Triaxial test (drained and undrained test). • Behaviour on saturated and partly saturated clays and sands. Drained and undrained behaviour. Skempton's pore pressure coefficient. Introduction to Critical State Concepts and stress paths p-q diagrams.	6	2	-	8	16
			Topic 3	Earth Retaining Structure • Retaining walls - types, analysis and design. Broken back walls. Analysis of rigid walls - bridge abutments and basement wall. Influence oaf compacted backfill. • Sheet pile walls - types. Cantilever, Anchored sheet pile. Method of analysis - free and fixed earth support Rowe's moment reduction. Heaving of braced cuts in clays.	9	3	-	12
Topic 4				Stress, Consolidation and Settlement • Stress distribution - Boussines and Westergard's methods; Fadum and Newmark's Chart. • Immediate settlement for cohesive and cohensionless soils based in Terzaghi, Skempton, Steinbrenner, Jambu, Schmertmann and De Beer method's. • Consolidation of soils - Consolidation test, Preconsolidation pressure, Normal consolidation and Over consolidation. Prediction of field consolidation curves. Determination of Coefficient of Consolidation(C_v) and coefficient of volume compressibility(M_v).	12	4	-	16

	Topic 5	Site Investigation - Objectives and general procedures - Planning site investigation - Boring methods, number of borings, spacing, and depth - Type of sample, schedule of laboratory and field tests - Sampling Methods - Insitu Tests - Correlations between insitu test results and soil engineering properties.	9	3	-	12	24
	Practical	Practical - Seepage through earth dam - Unconfined compression test and Unconsolidated undrained triaxial test - Consolidated undrained/drained triaxial test - One dimensional consolidation (oedometer) test - JKR probe test and shear vane test	-	-	14		14
	Total(Hours)		42	14	14	56	126
18.	Main references supporting the course D. F. McCarthy's Essentials of Soil Mechanics and Foundations 7th (Seventh) edition(Essentials of Soil Mechanics and Foundations: Basic Geotechnics (7th Edition) [Hardcover])(2006) by D. F. McCarthy (2006) Additional references supporting the course - Sowers & Sowers - 'Introductory Soil Mechanics & Foundations' 3rd Ed. Mac Millan Pub. Co. N.Y., 1970. - Perloff W.H. & Barron W - 'Soil Mechanics - Principles and Applications' John Wiley & Sons, 1976. - Terzaghi K., R.B. Peck - 'Soil Mechanics in Engineering Practice', 2nd. Ed. John Wiley & Sons Inc., N.Y. 1967. - Dunn 15, Anderson L.R. Kiefer F.K. - 'Fundamentals of Geotechnical Analysis', John Wiley & Sons, N.Y. 1980. - Holtz R.D & Kovacs W.D. - 'An Introduction to Geotechnical Engineering' Practice-Hall Civil Engineering & Engineering Mechanical Series 1983.						
19.	Other additional information All materials will be available to the students in the library.						