Department/ Faculty:	DEPARTMENT GEOTECHNICS AND TRANSPORTATION, FACULTY OF CIVIL ENGINEERING	**Page:**	1 of 3
Course code:	MKAJ 1013	**Academic Session/Semester:**	20172018 / 02
Course name:	ADVANCED SOIL MECHANICS	**Pre/co requisite (course name and code, if applicable):**	
Credit hours:	3		

Lampiran 1

COURSE INFORMATION

Course synopsis	This subject is one of the core subjects offered by Department of Geotechnics and Transportation, which will provide: the knowledge on the application and principles of soil mechanics. It considers the following topics: soil and clay mineralogy, strength behaviour of cohesionless and cohesive soils. Mohr-Coulomb failure criterion, peak stresses, effective stress ratio, residual stress and critical state soil mechanics. Principles of the laboratory measurement. Consolidation theory and pore pressure parameters. Difference between 1-D and 3-D Consolidation theory. Field Settlement. Soil-water characteristic curve for unsaturated soils and its applications.			
Course coordinator (if applicable)	Dr. Nor Zurairahetty Binti Mohd Yunus			
Course lecturer(s)	**Name**	**Office**	**Contact no.**	**E-mail**
	Dr. Nor Zurairahetty Binti Mohd Yunus	M47-124	07-5532446	nzurairahetty@utm.my
	Datin Fauziah Binti Kasim	D04-119	07-5531586	fauziahkasim@utm.my

Mapping of the Course Learning Outcomes (CLO) to the Programme Learning Outcomes (PLO), Teaching & Learning (T&L) methods and Assessment methods:

No.	CLO	PLO (ICGPA CODE)	Weight (%)	*Taxonomies and **generic skills*	T&L methods	***Assessment methods
1	Students able to explain and analyse the response of soil in terms of stresses, deformation and settlement analysis, the consolidation theory and pore pressure parameters. Differences between 1-D and 3-D consolidation theories.	PLO1	25|%	C4	Lecture, Exercise and Problem Solving, Independent Study	PR, F
2	Students able to apply principles of laboratory instrumentation with respect to loading, stress-strain, pore-water pressure and displacement and/or volume change.	PLO1	25|%	C3	Lecture, Exercise and Problem Solving, Independent Study	T, F

3	Student able to analyse and apply the response of soil in terms of strength behavior of cohesionless and cohesive soils through Mohr-Coulomb failure criterion, peak stresses, effective stress ratio and residual stress.	PLO3	20|%	C4	Lecture, Case study, Exercise and Problem Solving, Independent Study	T, F
4	Students able to analyse soil response through the Critical State Soil Mechanics and apply in various situation to create alternatives on the analysis of soil behavior.	PLO3	20%	C6	Lecture, Project, Exercise and Problem Solving, Independent Study	PR, F
5	Students able to apply research skills through comprehensive literature review in solving Geotechnical Engineering project.	PLO2	10%	C3	Project, Exercise and Problem Solving, Independent Study	PR
Refer *Taxonomies of Learning and **UTM's Graduate Attributes, where applicable for measurement of outcomes achievement ***T – Test; Q – Quiz; HW – Homework; PR – Project; Pr – Presentation; F – Final Exam etc.						

Details on Innovative T&L practices:

No.	Type	Implementation
1.	Lecture,	Week 1 till Week 14
2.	Exercise and Problem Solving,	Week 1 till Week 7
3.	Independent Study	Week 1 till Week 15
4.	Project	Week 11

Weekly Schedule:

Week 1	Students able to explain and analyse the response of soil in terms of stresses, deformation and settlement analysis, the consolidation theory and pore pressure parameters. Review on Terzaghi's effective stress and 1-dimensional consolidation. Settlement (Immediate, Consolidation, Secondary Compression)
Week 2	Introduction to Multi-Dimensional Consolidation; Conservation Mass & Equilibrium of Energy; Changes of total stress with time.
Week 3	Difference between 1-D and 3-D consolidation theories. Parameters to be solved in 3-D consolidation. and Mandel-Crier effects in 3-D consolidation process. Relevant journal papers are discussed.

Week 4	Student able to analyse and apply the theory of shear strength response to the soil in terms of strength behavior of cohesionless and cohesive soils.
Week 5	Students able to apply principles of laboratory instrumentation with respect to loading, stress-strain, pore-water pressure and displacement and/or volume change.
Week 6	Student able to analyse and apply the principles of Mohr-Coulomb failure criterion, peak stresses, effective stress ratio, pore water pressure coefficient, back pressure, stress states and stress paths
Week 7	Continued WEEK 6 ***Test 1(15%)***
Week 8	Mid-Semester Break
Week 9	CRITICAL STATE SOIL MECHANICS : - Critical state soil mechanics (CSSM) theory, critical void ratio, Yield Surface - Isotropic consolidation vs 1-D consolidation; Normal Consolidation Line (NCL), Shrinkage Line (SL) & 1-D Consolidation line - Equivalent consolidation pressure
Week 10	CRITICAL STATE SOIL MECHANICS : - Stress paths of isotropically consolidated drained triaxial test (CD) – 2D & 3D - Stress paths of isotropically consolidated undrained triaxial tests (CU) – 2D & 3D - Critical State Line (CSL) & Determination of Critical State Parameters
Week 11	CRITICAL STATE SOIL MECHANICS : - Roscoe surface, Hvorslev surface, No-tension surface and overall Critical State Boundary Surface ***Group Project (20%)***
Week 12	CRITICAL STATE SOIL MECHANICS : - Relationship between simple soil tests, critical state parameters and soil strengths; examples of application
Week 13	CRITICAL STATE SOIL MECHANICS : - Application of CSSM with relevant case study; predicting undrained shear strength of normally consolidated and overconsolidated clay adjacent to excavation, behind retaining wall & at the slope, predicting soil response under a tank foundation, etc.
Week 14	Introduction to Unsaturated Soil Mechanics and its Importance Soil-Water Characteristic Curve (SWCC); Characterisation, Laboratory determination of SWCC SWCC Prediction based on grain size distribution
Week 15	Unsaturated Hydraulic conductivity: Steady state and transient boundary conditions and relevant examples

Transferable skills (generic skills learned in course of study which can be useful and utilised in other settings):

Department/ Faculty:	DEPARTMENT GEOTECHNICS AND TRANSPORTATION, FACULTY OF CIVIL ENGINEERING	**Page:**	1 of 3
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Student learning time (SLT) details:

Distribution of student Learning Time (SLT) Course content outline	Guided Learning (Face to Face)				Teaching and Learning Activities		TOTAL SLT
					Guided Learning Non-Face to Face	Independent Learning Non-Face to face	
CLO	**L**	**T**	**P**	**O**			
	39	3			22	42	
Total SLT	39	3			22	42	106

Continuous Assessment		PLO	Percentage	Total SLT
1	Test	1	15%	1
2	Assignment	3	15%	5
3	Project	2	20%	5
Final Assessment			Percentage	Total SLT
1	Final Exam	1 & 3	50%	3
Grand Total SLT				120

Prepared by:	Certified by:
Name:	Name:
Signature:	Signature:
Date:	Date:

Department/ Faculty:	DEPARTMENT GEOTECHNICS AND TRANSPORTATION, FACULTY OF CIVIL ENGINEERING	**Page:**	1 of 3	
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