

COURSE INFORMATION

School/Faculty:	Civil Engineering / Engineering	Page:	1 of 5
Program name:	Master of Engineering (MEng) (Geotechnics)		
Course code:	MKAJ 1013	Academic Session/Semester:	2019/20/01
Course name:	Advanced Soil Mechanics	Pre/co requisite (course name and code, if applicable):	NIL
Credit hours:	3		

Course synopsis	This subject is one of the core subjects offered by Department of Geotechnics and Transportation, which will provide: the advanced 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 and introduction of unsaturated Critical state soil mechanics.			
Course coordinator (if applicable)	Dr. Nor Zurairahetty Binti Mohd Yunus			
Course lecturer(s)	Name	Office	Contact no.	E-mail
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Mapping of the Course Learning Outcomes (CLO) to the Programme Learning Outcomes (PLO), Teaching & Learning (T&L) methods and Assessment methods:

No.	CLO	PLO (Code)	*Taxonomies and **generic skills	T&L methods	***Assessment methods
CLO1	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	C4	Lecture, active learning	F
CLO2	Apply principles of laboratory instrumentation with respect to loading, stress-strain, pore-water pressure and displacement and/or volume change	PLO1	C3	Lecture, active learning	T, F

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

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No.	CLO	PLO (Code)	*Taxonomies and **generic skills	T&L methods	***Assessment methods
CLO3	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	PLO2	C4	Lecture, active learning	T, F
CLO4	Analyse soil response through the Critical State Soil Mechanics and apply in various situation to create alternatives on the analysis of soil behaviour	PLO2	C6	Lecture, active learning	Asg, F
CLO5	Apply research skills through comprehensive literature review in solving Geotechnical Engineering project	PLO5	C3	cooperative learning	Pr
<p>Refer *Taxonomies of Learning and **UTM's Graduate Attributes, where applicable for measurement of outcomes achievement</p> <p>***T – Test; Q – Quiz; HW – Homework; Asg – Assignment; PR – Project; Pr – Presentation; F – Final Exam etc.</p>					

Details on Innovative T&L practices:

No.	Type	Implementation
1.	Active learning	Conducted through in-class activities
2.	cooperative learning	Conducted through in-class activities

Weekly Schedule:

Week 1	Revision on basic soil mechanics
Week 2	Analyse and apply the theory of shear strength response to the soil in terms of strength behavior of cohesionless and cohesive soils. Apply principles of laboratory instrumentation with respect to loading, stress-strain, pore-water pressure and displacement and/or volume change.
Week 3	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 4	Stress paths of isotropically consolidated drained triaxial test (CD) – 2D & 3D Stress paths of isotropically consolidated undrained triaxial test (CD) - 2D & 3D

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Week 5	Critical State Soil Mechanics (CSSM) - Normal Consolidation Line (NCL) & Determination of NCL Parameters
Week 6	Critical State Soil Mechanics (CSSM) - Critical State Line (CSL) & Determination of CSL Parameters
Week 7	Practical preparation for Laboratory Testing
Week 8	Mid-Semester Break
Week 9	Roscoe surface, Hvorslev surface, No-tension surface and overall Critical State Boundary Surface Relationship between simple soil tests, critical state parameters and soil strengths.
Week 10	Yielding of reconstituted and natural soils
Week 11	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 12	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 13	Introduction to Unsaturated Critical State Mechanics
Week 14	Introduction to advance soil testing (theory)
Week 15	Introduction to advance soil testing (application)

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

Team working
Written communication

Student learning time (SLT) details:

Distribution of student Learning Time (SLT) Course content outline					Teaching and Learning Activities			TOTAL SLT
	Guided Learning (Face to Face)				Guided Learning Non-Face to Face	Independent Learning Non-Face to face		
CLO	L	T	P	O				
CLO 1	10h	2h			2h	6h	20h	
CLO 2	11h	3h			2h	8h	24h	
CLO 3	13h	3h			2h	12h	30h	
CLO 4	8h	2h			2h	8h	20h	

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CLO 5					3h	10h	13h
Total SLT	42h	10h			11h	44h	107h

Continuous Assessment		PLO	Percentage	Total SLT
1	Assignment 1	PLO1	10	3h 30m
2	Test 1	PLO2	15	1h
3	Project (Group)	PLO5	25	6h m
Final Assessment			50	10h 30m
1	Final Examination	THI	50	2h 30m
Grand Total			100	120h

L: Lecture, T: Tutorial, P: Practical, O: Others

Special requirement to deliver the course (e.g: software, nursery, computer lab, simulation room):

Laboratory Demonstration

Learning resources:

Text book (if applicable)

NIL

Main references

1. Holtz and Kovacs (1981) Introduction to Geotechnical Engineering, Prentice Hall
2. Wood, D.M. (1992) Soil Behavior and Critical State Soil Mechanics, Cambridge University Press
3. Mitchell, J.K. (1993), "Fundamental of Soil Behaviour", John Wiley.
4. Smith and Smith (1998) Elements of Soil Mechanics Blackwell Science
5. Head, K.H. "Manual of Soil Laboratory Testing", Vol. 1, 2 & 3, Pentech Press.
6. Whitlow, R. "Basic Soil Mechanics", Prentice Hall
7. Atkinson J.H. "An Introduction to the Mechanics of Soil & Foundation through Critical State Soil Mechanics"
8. Budhu, M. "Soil Mechanics and Foundation", John Wiley & Sons.

Online

Relevant Journal Articles

Self-student effort

<http://elearning.utm.my>

Academic honesty and plagiarism: (Below is just a sample)

Assignments are individual tasks and NOT group activities (UNLESS EXPLICITLY INDICATED AS GROUP ACTIVITIES)

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Other additional information (Course policy, any specific instruction etc.):

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