

## COURSE INFORMATION

<b>School/Faculty:</b>	Civil Engineering / Engineering	<b>Page:</b>	1 of 5
<b>Program name:</b>	Bachelor of Engineering (Civil)		
<b>Course code:</b>	SKAB 1713	<b>Academic Session/Semester:</b>	2018/19/01
<b>Course name:</b>	Soil Mechanics	<b>Pre/co requisite (course name and code, if applicable):</b>	NIL
<b>Credit hours:</b>	3		

<b>Course synopsis</b>	This subject is a compulsory subject for civil engineering students. The content of this subject will give a student basic understanding and exposure towards practical in Geotechnical Engineering. It will cover on basic soil properties which, consists of soil composition, soil classification and soil compaction. Besides that, it will also discuss on vertical stresses in soil due to overburden and external loading, water in soil and soil shear strength. The topic that will cover is important to civil engineers where most of problems occur at site will involve with geotechnical and soil mechanics. At the end of this subject, students will able to apply the knowledge on basic soil properties, soil classification and compaction properties, water in soil and shear strength parameters in the planning, analysis, design and supervision of related geotechnical works.			
<b>Course coordinator (if applicable)</b>	Dr. Nor Zurairahetty Binti Mohd Yunus			
<b>Course lecturer(s)</b>	<b>Name</b>	<b>Office</b>	<b>Contact no.</b>	<b>E-mail</b>
	Dr. Nor Zurairahetty Binti Mohd Yunus	M47-124	Ext 32446	<a href="mailto:nzurairahetty@utm.my">nzurairahetty@utm.my</a>
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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	Weight (%)	T & G Skills <sup>1</sup>	KP, CPS, CEA	T&L methods	Assessment methods <sup>2</sup>
CLO1	<b>Describe</b> composition and <b>solve</b> volume-mass relationship equations for soils.	PLO1		C3	WK1	Lecture, active learning	T, Asg, F
CLO2	<b>Classify</b> types of soils and <b>analyse</b> soil compaction works.	PLO1		C3	WK1	Project-based learning	T, Asg, F
Refer *Taxonomies of Learning and **UTM's Graduate Attributes, where applicable for measurement of outcomes achievement ***T – Test; Q – Quiz; HW – Homework; Asg – Assignment; PR – Project; Pr – Presentation; F – Final Exam etc.							

Prepared by: Name: NOR ZURAIRAHETTY MOHD YUNUS Signature: <i>Netty</i> Date: September 2018	Certified by: Name: PROF DR ROSLI HAININ Signature: Date:
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No.	CLO	PLO	Weight (%)	T & G Skills <sup>1</sup>	KP, CPS, CEA	T&L methods	Assessment methods <sup>2</sup>
CLO3	<b>Determine</b> vertical stresses and permeability and <b>solve</b> for flux and flow behaviour in soils.	PLO1	90	C4	WK2	Lecture, active learning	T, Asg, F
CLO4	<b>Explain</b> theory of shear strength and <b>analyse</b> for parameters of shear strength for direct shear, triaxial, and vane shear tests.	PLO1		C4	WK2	Project-based learning	Asg, F
CLO5	<b>Prepare</b> and <b>share</b> information for group project work using technical knowledge and teamworking conditions.	PLO9	10	A3 & CS1, CS3	WP, EA, WK7	Search, Write, and Share	Pr
<p>Refer <sup>1</sup>Taxonomies of Learning and UTM's Graduate Attributes, where applicable for measurement of outcomes achievement</p> <p><sup>2</sup>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.	Project-based learning	Conducted through design assignments. Students in a group of 3 are given 2 design projects that require power electronics solutions involving the design calculations and verification using MATLAB/Simulink. Compliance to the design specifications need to be given in the form of written reports.

#### Weekly Schedule:

Week 1	INTRODUCTION: Introduction to subject matter and testing conducted in laboratory  WEIGHT-VOLUME RELATIONSHIP OF SOILS: Introduction on soil composition and volume mass relationship. Derivation of equation base three phase soil models
Week 2	Determination/Application of physical/index properties based on three-phase diagram  <b>SOIL CLASSIFICATION:</b> Introduction of sieve analyses, hydrometer test and particle size distribution.
Week 3	Atterberg limits, USCS and/or BSCS and AASHTO soil classification

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Week 4	<b>Soil compaction:</b> Introduction, definition, compaction theory, soil densification method and compaction effort. Comparison between Standard Proctor and Modified Proctor. Relationship between dry density and moisture content, air void and degree of saturation for compacted fines soil.
Week 5	Test 1 (15%); Introduction on compaction on site and effect on different type of soils Dry density versus moisture content for clay and effect on different type soils.
Week 6	Relative Density. <b>WATER IN SOIL</b> - Introduction of water in soil; Total stress due to overburden pressure, pore pressure and effective stress; Total stress, pore water pressure and effective stress- hydrostatic, capillary forces, artesian pressure and quick sand (zero effective stress)
Week 7	Vertical stress due to external loading such as loading from building, and pavement; Boussinesq theory and Fadum Chart; Pressure bulb chart for stress from footings; Additional stress due to Embankment loading using Osterberg Chart.
Week 8	<b>Mid-Semester Break</b>
Week 9	Coefficient of permeability ; Darcy's Law; Capillary, pore pressure in capillary zone
Week 10	Introduction on flow net, boiling and Concrete dam and sheet pile seepage analysis (isotropic) piping;
Week 11	Earth dam seepage analysis ; Filtered and Unfiltered dam seepage analysis;
Week 12	Test 2 (15%); <b>SHEAR STRENGTH OF SOILS;</b> Introduction of Shear strength ; Mohr Circle
Week 13	Methods to determine shear strength via laboratory test data. (1). Direct shear test to determine shear strength; in-class example of plotting
Week 14	(2) Triaxial test to determine shear strength (UU, CU, CD) – in-class example of plotting; (3) Unconsolidated Unconfined and Vane Shear
Week 15	Self-work for project assignment; Presentation of poster

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

Team working Written communication
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**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		
<b>CLO</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>O</b>				
CLO 1	10h	2h			2h	6h	<b>20h</b>	
CLO 2	11h	3h			2h	8h	<b>24h</b>	
CLO 3	13h	3h			2h	12h	<b>30h</b>	
CLO 4	8h	2h			2h	8h	<b>20h</b>	
CLO 5					3h	10h	<b>13h</b>	
<b>Total SLT</b>	<b>42h</b>	<b>10h</b>			<b>11h</b>	<b>44h</b>	<b>107h</b>	

Continuous Assessment		PLO	Percentage	Total SLT
1	Assignment 1	PLO1 (THI)	2.5	<b>2h</b>
2	Assignment 2	PLO1 (THI)	2.5	<b>2h</b>
3	Assignment 3	PLO1 (THI)	2.5	<b>2h</b>
4	Assignment 4	PLO1 (THI)	2.5	<b>2h</b>
5	Test 1	PLO1 (THI)	15	<b>1h</b>
6	Test 2	PLO1 (THI)	15	<b>1h 30m</b>
7	Project Assignment	PLO9 (CS)	10	As in CLO 5 (13h)
Final Assessment			Percentage	Total SLT
1	Final Examination	THI	50	<b>2h 30m</b>
<b>Grand Total</b>			<b>100</b>	<b>120h</b>

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

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

Laboratory Demonstration

**Learning resources:**

**Text book (if applicable)**

Prescribed Text-extract from Liu and Evett or Teaching Module SKAB 1713

**Main references**

B.M Das, Principles of Geotechnical Engineering , 5<sup>th</sup> Edition,2004, Brooks and Cole **Additional references**

**Other References**

Roy Whitlow, Basic Soil Mechanics, 3<sup>rd</sup> Edition, 1999, Prentice Hall

GN Smith, UNSUR MEKANIK TANAH, Edisi Pertama, Terjemahan oleh Abdul Rahman

Mohamood, 1990, Dewan Bahasa dan Pustaka.

Murthy, V. K. S. (2010), Textbook for Soil Mechanics and Foundation Engineering, CMS Publisher, New Delhi, India, 1040 pp.

**Online**

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) Copying of work (texts, simulation results etc.) from other students/groups or from other sources is not allowed. Brief quotations are allowed and then only if indicated as such. Existing texts should be reformulated with your own words used to explain what you have read. It is not acceptable to retype existing texts and just acknowledge the source as a reference. Be warned: students who submit copied work will obtain a mark of **zero** for the assignment and disciplinary steps may be taken by the Faculty. It is also unacceptable to do somebody else's work, to lend your work to them or to make your work available to them to copy.

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

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**Disclaimer:**

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