



## 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>	SEAA 2832	<b>Academic Session/Semester:</b>	202021/1
<b>Course name:</b>	Highway Engineering	<b>Pre/co requisite (course name and code, if applicable):</b>	Soil Mechanics, SKAB 1023
<b>Credit hours:</b>	2		

<b>Course synopsis</b>	This is one of the compulsory courses which will expose students to the fundamental theory of highway engineering. Topics covered are highway materials and evaluations, premix plants, construction techniques and plants, mix designs, quality controls and testing, pavement structural thickness design, highway drainage, pavement visual assessment, maintenance and rehabilitation.			
<b>Course coordinator</b>	Dr Norhidayah Binti Abdul Hassan			
<b>Course lecturer(s)</b>	<b>Name</b>	<b>Office</b>	<b>Contact no.</b>	<b>E-mail</b>
	Ts. Dr Norhidayah Abdul Hassan	M47-120	Ext 32516	hnorhidayah@utm.my
	Ts. Dr Haryati Yaacob	M50-234	Ext 38666	haryatiyaacob@utm.my
	Dr Muhammad Naquiddin Mohd Warid	M46-341	Ext 31678	naquiddin@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)	Weightage (%)	*Taxonomies and **generic skills	CP/CA/KP	T&L methods	***Assessment methods
CLO1	<b>Identify</b> materials, type of tests, construction methods and plants in highway construction and able to carry out and <b>evaluate/solve</b> on-site construction and materials quality control requirements.	PLO2 (THPA)	39	C3		Lecture	T, A, F
CLO2	<b>Identify</b> and <b>differentiate</b> types of HMA gradation, mix design methods, and <b>design/evaluate</b> HMA mix using Marshall method.	PLO2 (THPA)	18	C4	WKS	Lecture	T, A, F

<b>Prepared by:</b>	<b>Certified by:</b>
Name: Dr Norhidayah Bt Abdul Hassan	Name: Prof Dr Mohd Rosli B Hainin
Signature: 	Signature: 
Date: 1/8/2018	Date: 8/8/2018

<b>School/ Faculty:</b>	Civil Engineering/Engineering	<b>Page:</b>	2 of 5
<b>Program Name:</b>	Bachelor of Engineering (Civil)		
<b>Course code:</b>	SKAB 2832	<b>Academic Session/Semester:</b>	201819/1
<b>Course name:</b>	Highway Engineering	<b>Pre/co requisite (course name and code, if applicable):</b>	Soil Mechanics, SKAB 1023
<b>Credit hours:</b>	2		

CLO3	<b>Analyze and design</b> pavement structures and maintenance program.	PLO2 (THPA)	33	C5	WP3, WK5	Lecture	T, A, F
CLO4	Perpetually seek and acquire contemporary technological changes in highway engineering.	PLO11 (SC)	10	SC1, SC2		Lecture	A
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:

##### Lecture

##### Weekly Schedule:

Week 1	Explanation of syllabus and course outline, introduction to highway engineering <b>Topic 1: Highway Materials</b> Introduction, type of pavements, Malaysian road system, Pavement layers and materials
Week 2	<b>Topic 1: Highway Materials (cont.)</b> Compaction and California Bearing Ratio tests
Week 3	<b>Topic 1: Highway Materials (cont.)</b> Highway materials – aggregate Origin, production, physical properties, tests
Week 4	<b>Topic 1: Highway Materials (cont.)</b> Highway materials - bitumen Origin, physical properties, grading system, tests Assignment #1
Week 5	<b>Topic 2: Hot Mix Asphalt Design</b> Introduction, HMA Gradations, Aggregate blending, and Volumetric properties
Week 6	<b>Topic 2: Hot Mix Asphalt Design (cont.)</b> HMA mix designs, Marshall Mix design, HMA mixing plants
Week 7	<b>Topic 3: Highway Construction</b> Site clearing, earthworks and drainage works In-situ quality tests <b>TEST #1</b>
Week 8	<b>MID SEMESTER BREAK</b>

<b>School/ Faculty:</b>	Civil Engineering/Engineering	<b>Page:</b>	3 of 5
<b>Program Name:</b>	Bachelor of Engineering (Civil)		
<b>Course code:</b>	SKAB 2832	<b>Academic Session/Semester:</b>	201819/1
<b>Course name:</b>	Highway Engineering	<b>Pre/co requisite (course name and code, if applicable):</b>	Soil Mechanics, SKAB 1023
<b>Credit hours:</b>	2		

**Weekly Schedule:**

Week 9	<b>Topic 3: Highway Construction (cont.)</b> Pavement works – sub-base, road base, and surfacing Quality control and tests
Week 10	<b>Topic 3: Highway Construction (cont.)</b> Finishing works Highway plants
Week 11	<b>Topic 4: Pavement Structure Thickness Design</b> Fundamental theory – factors considered in design Methods of design for new pavement, design process Design methods - ATJ 5/85 Assignment #2
Week 12	<b>Topic 4: Pavement Structure Thickness Design (cont.)</b> Design methods - Road Note 31 & JKR revision 2013
Week 13	<b>Topic 5: Highway Drainage &amp; Maintenance</b> Highway drainage system
Week 14	<b>Topic 5: Highway Drainage &amp; Maintenance (cont.)</b> Highway maintenance Highway rehabilitation <b>TEST # 2</b>
Week 15	<b>Topic 5: Highway Drainage &amp; Maintenance (cont.)</b> Pavement distress Review Assignment #3
Week 16-18	<b>REVISION WEEK AND FINAL EXAMINATION</b>

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

Life Long Learning
--------------------

**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				
CLO1	14h	7h			3h		7h	31h
CLO2	4h	2h			2h		3h	11h
CLO3	8h	4h			3h		5h	20h
CLO4	2h				2h		2h	6h
<b>Total SLT</b>	<b>28h</b>	<b>13h</b>			<b>10h</b>		<b>17h</b>	<b>68h</b>

<b>School/ Faculty:</b>	Civil Engineering/Engineering	<b>Page:</b>	4 of 5
<b>Program Name:</b>	Bachelor of Engineering (Civil)		
<b>Course code:</b>	SKAB 2832	<b>Academic Session/Semester:</b>	201819/1
<b>Course name:</b>	Highway Engineering	<b>Pre/co requisite (course name and code, if applicable):</b>	Soil Mechanics, SKAB 1023
<b>Credit hours:</b>	2		

Continuous Assessment		CLO (Code)	Percentage	Total SLT
1	Assignment 1	CLO1	10	<b>2h</b>
2	Assignment 2	CLO3	10	<b>2h</b>
3	Assignment 3	CLO4	10	<b>4h</b>
4	Test 1	CLO1, CLO2	15	<b>1h</b>
5	Test 2	CLO1, CLO3	15	<b>1h</b>
Final Assessment			Percentage	Total SLT
1	Final Examination	CLO1, CLO2, CLO3	40	<b>2h</b>
<b>Grand Total</b>			<b>100</b>	<b>80h</b>

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

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

None

**Learning resources:**

**Text book and Standards**

Atkins, H.A., HIGHWAY MATERIALS, SOILS, AND CONCRETES, Prentice Hall, 2003.  
Garber, N.J., Hoel, L.A., TRAFFIC AND HIGHWAY ENGINEERING, West Publishing Co., 1999.  
Oglesby, C.H., Hicks, R.G., HIGHWAY ENGINEERING, John Wiley & Sons, 1982.  
Roberts *et. al.*, HOT MIX ASPHALT MATERIALS, MIXTURE DESIGN AND CONSTRUCTION, NAPA, 1991.  
Wignall, A., Kendrick, P.S., Ancill, R., ROADWORK : Theory and Practice, Newnes, 1991.  
Wright, P.H., HIGHWAY ENGINEERING, John Wiley & Sons, 1996.  
Jabatan Kerja Raya Malaysia, SPESIFIKASI PEMBINAAN JALAN RAYA, JKR/SPJ/1988, 2008  
Jabatan Kerja Raya Malaysia, ARAHAN TEKNIK JALAN 5/85.  
Transport Research Laboratory, OVERSEAS ROAD NOTE 31, 1993.  
Jabatan Kerja Raya Malaysia, DESIGN OF FLEXIBLE PAVEMENT STRUCTURES, 2006  
Standards - BS, MS, ASTM, AASHTO.

**Online**

<https://www.openlearning.com>

<http://elearning.utm.my>

<b>School/ Faculty:</b>	Civil Engineering/Engineering	<b>Page:</b>	5 of 5
<b>Program Name:</b>	Bachelor of Engineering (Civil)		
<b>Course code:</b>	SKAB 2832	<b>Academic Session/Semester:</b>	201819/1
<b>Course name:</b>	Highway Engineering	<b>Pre/co requisite (course name and code, if applicable):</b>	Soil Mechanics, SKAB 1023
<b>Credit hours:</b>	2		

**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.):**

-

**Disclaimer:**

All teaching and learning materials associated with this course are for personal use only. The materials are intended for educational purposes only. Reproduction of the materials in any form for any purposes other than what it is intended for is prohibited.  
While every effort has been made to ensure the accuracy of the information supplied herein, Universiti Teknologi Malaysia cannot be held responsible for any errors or omissions.