


## COURSE OUTLINE

 <b>UTM</b> <small>UNIVERSITI TEKNOLOGI MALAYSIA</small>	<small>Faculty of Civil Engineering</small>	Page : 1 of 4
<b>REINFORCED CONCRETE DESIGN 1</b> <b>SKAA 3352</b>	<b>Revision</b> : G <b>Date of issue</b> : 15 <sup>th</sup> July 2010 <b>Last Amendment</b> : 14 Feb. 2013 <b>Edition</b> : 1 <b>Procedure No.</b> : FKA/PG/RK/SAB 3353	

<b>PRE-REQUISITE</b>	:	SKAA 2223 (Mechanics of Materials)	
<b>EQUIVALENCE</b>	:	SAB 3353	
<b>LECTURE HOURS</b>	:	2 Hours Lecture	
<b>LECTURERS</b>	<b>E-Mail</b>	<b>Room No.</b>	<b>Phone No.</b>
Ahmad Zaidon bin Rais	ahmadzaidon@utm.my	M46-335	31608
Dr. Zaiton Haron	zaitonharon@utm.my	M47-119	31537
Ir. Azhar Ahmad	azharahmad@utm.my	M46-359	31623

### SYNOPSIS

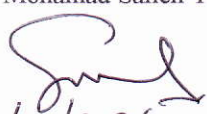
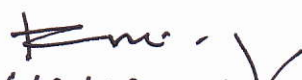
This is a core course which will provide an understanding and ability to analyze and design reinforced concrete structural elements. Among the topics discussed are reinforced concrete as a sustainable construction materials, objective and methods of design, code of practice, analysis and design of sections for moments and shear, checking for deflection and cracking, durability and detailing requirements, design of simply supported and continuous beams, design of one way and two way restrained and simply supported slab. Furthermore the students will be exposed to the concept of prestressed concrete which covers topics on principle and methods of prestressing, stress limit, losses and selection of section.

### COURSE LEARNING OUTCOMES


By the end of the course, students should be able to :

No.	Course Outcomes (CO)	Programme Outcomes (PO)	Complex Problems (CL)	Complex Activities (CA)	Knowledge Profiles (KP)	Bloom Taxonomy	Assessment
1.	<b>Define and describe</b> the concept, procedure and objective of structural design and <b>understand</b> the role of engineers in designing of sustainable concrete building.	PO3			KP4	C2	A, T, F
2.	<b>Analyze and design</b> of reinforced concrete beams and slabs, and produce detailing for the elements				KP4	C3	A, T, F
3.	<b>Apply</b> ethical standard in professional practice and social interactions for sustainable development.	PO10			KP7	A3	A, PR

Note : (A - Assignment; T – Test ; PR – Project ; Q – Quiz ; Pr – Presentation; F – Final Exam)

<p><b><u>PREPARED BY :</u></b></p> <p><b>Name</b> : Ir. Mohamad Salleh Yassin</p> <p><b>Signature</b> : </p> <p><b>Date</b> : 5/9/2016.</p>	<p><b><u>CERTIFIED BY :</u></b></p> <p><b>Name</b> : AP. Ir. Dr. Rosli Mohamad Zin Head, Dept. of Struc. &amp; Materials</p> <p><b>Signature</b> : </p> <p><b>Date</b> : 6/9/16</p>
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## COURSE OUTLINE

 <b style="font-size: 2em;">UTM</b> <small>UNIVERSITI TEKNOLOGI MALAYSIA</small> <small>Faculty of Civil Engineering</small>	Page : 2 of 4
<b>REINFORCED CONCRETE DESIGN 1</b> <b>SKAA 3352</b>	<b>Revision</b> : G <b>Date of issue</b> : 15 <sup>th</sup> July 2010 <b>Last Amendment</b> : 14 Feb. 2013 <b>Edition</b> : 1 <b>Procedure No.</b> : FKA/PG/RK/SAB 3353

### STUDENT LEARNING TIME

No.	Teaching and Learning Activities	Student Learning Time (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	28
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial /Practical	
	ii. Student-centered learning activities – Active Learning, Project Based Learning	
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	22
	b. Revision	14
	c. Assessment Preparations	10
3.	Formal Assessment	
	a. Continuous Assessment	4
	b. Final Exam	2
<b>Total (SLT)</b>		<b>80</b>

### TEACHING METHODOLOGY

1. Basic Design philosophies and the use of code of practice will be demonstrated.
2. Students will be required to write reports and/or discussed and on-going or completed design project.
3. Students are required to go through the given tutorials.
4. Students are required to produce design project in group.

### WEEKLY SCHEDULE

WEEK	LECTURE	TOPIC / CONTENT
1	1	<b>Introduction</b> - Objective, method and process of design, code of practice, loading and material strength, partial safety factor. - Stress strain relationships, behavior of beam under flexure, stress strain distribution of a section, types of section failure.
	2	
2	3	<b>Analysis and design of section.</b> - Singly reinforced rectangular sections. - Doubly reinforced rectangular sections, design formulae.
	4	
3	5	- Flange section-effective width of flange beam, neutral axis in the flange. - Flange sections- neutral axis below the flange, design formulae
	6	

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**UTM**  
UNIVERSITI TEKNOLOGI MALAYSIA

Faculty of  
Civil Engineering


Page : 3 of 4

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WEEK	LECTURE	TOPIC / CONTENT
4	7	<b>Shear, deflection and cracking</b> - Shear, mode of failure, design procedure and examples. - Deflection and cracking, theory, checking procedure and examples
	8	
5	9	<b>Durability and detailing requirements</b> - Concrete cover, minimum and maximum areas of steel, bar anchorage, curtailment and laps. <b>Beam design</b> - Determination of size, simply supported beams, examples
	10	
6	11	- Distribution of slab loading to beams, simply supported beams, related examples. <b>TEST 1</b>
	12	
7	13	- Continuous beam, loading arrangement methods of analysis, application of shear and moment coefficient, examples. - Elastic analysis using moment distribution methods, examples., moment redistribution, examples
	14	
8		<b>MID SEMESTER BREAK</b>
9	15	<b>Sustainability and Professional Ethics</b> - Concrete as sustainable materials, good design process, economic benefits - Professional ethics: Definition, legal standard, code of ethic, Integrity
	16	
10	17	<b>Slab Design</b> - Introduction, types of slab, method of analysis. - Simply supported one-way slab, example
	18	
11	19	- Continuous one way slab, example. - Simply supported two way slab, example
	20	
12	21	- Restrained two way slab : design rules. - Restrained two way slab : example
	22	
13	23	- Restrained two way slab : detailing - <b>TEST 2</b>
	24	
14	25	<b>Introduction to Prestressed Concrete</b> - Introduction, prestressing methods, advantages, materials, prestressing systems, equipments and usage, design considerations, stress limits, loss of prestress. - Design procedure, basic theory, derivation of basic equations
	26	
15	27	- Checking of stress limits, example - Selection of section
	28	
<b>REVISION WEEK AND FINAL EXAMINATION</b>		

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 <b style="font-size: 24pt;">UTM</b> <small>UNIVERSITI TEKNOLOGI MALAYSIA</small> <small>Faculty of Civil Engineering</small>	Page : 4 of 4
<b>REINFORCED CONCRETE DESIGN 1</b> <b>SKAA 3352</b>	<b>Revision</b> : G <b>Date of issue</b> : 15 <sup>th</sup> July 2010 <b>Last Amendment</b> : 14 Feb. 2013 <b>Edition</b> : 1 <b>Procedure No.</b> : FKA/PG/RK/SAB 3353

### REFERENCES

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 1a. *Malaysia National Annex to Eurocode*. MS, 2010
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 2a. *Malaysia National Annex to Eurocode 1*. MS, 2010
3. STANDARDS MALAYSIA. MS EN 1992: *Eurocode 2-Part 1-1: Design of concrete structures- General rules and rules for buildings*, MS, 2010  
 3a. *Malaysia National Annex to Eurocode 2*. MS, 2010
4. Mosley, B., Bungey, J. & Hulse, R. *Reinforced Concrete Design to Eurocode 2*, 7<sup>th</sup>. Edition. Palgrave McMillan, 2012
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10. Reynold, CE. & Steedman, JC. & Threlfall, A, J., *Reinforced Concrete Designer's Handbook*, 11<sup>th</sup>.Ed., Taylor & Francis, 2007
11. Laws of Malaysia, *Uniform Building By-Laws 1984*, International Law Book Services. 2003
12. Bhatt, P., MacGinley, T.J., & Choo, B.S., *Reinforced concrete, design theory and examples*, 3<sup>rd</sup>. Edition, Taylor & Francis, 2006

### GRADING

No.	Assessment	Number	% each	% total	Dates
1.	Assignments	5	2	10	
2	Mini Project	1	10	10	
3.	Test	2	15	30	
4.	Final Exam	1	50	50	
<b>Overall Total</b>				<b>100</b>	

### ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :-

1. Student must attend not less than 80% of lecture hours as required for the subject.
2. The student will be prohibited from attending any lecture and assessment activities upon failure to comply the above requirement. Zero mark will be given to the subject.