

Structural Design I
MEDIU MQA
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Abstract: Core subject for civil engineering, students must understand and able to carry out design work.

Contents

1.	Name of Course				Structural Design I			
2.	Course Code				JSTD1083			
	JSTD= the first alphabet identify the faculty within which the subject is offered., JSTD= the remaining three alphabet identify the course that offers the subject, 1083 = the first digit identify level of study; in this case undergraduate level, 1083 = the second and third digits identify subject identity and 1083 = the fourth digit identify credit value or credit hours							
3.	Name(s) of academic staff				To be Assigned			
4.	Rationale for the inclusion of the course/module in the programme				Core subject for civil engineering, students must understand and able to carry out design work.			
5.	Semester and Year offered				1/2			
6.	Total Student Learning Time (SLT)			Face to Face			Total Guided and Independent Learning	
	L = Lecture T = Tutorial P = Practical S=Studio Works O= Others			L	T	P/S	O	Independent Study(IS)= 70 Total =126
				28	14	14	-	
7.	Credit Value				3.0			
	Lecture (2 hours per week x 14 weeks) Tutorial (1 hour per week x 14 weeks) Studio (2 hours fortnightly x 7 weeks)							
8.	Prerequisite (if any)				Strength of material(ISTM 1203)			
9.	Course Objectives 1. The objective of this course is to equip the students with methods of analysis and design of reinforced concrete structures accordance with relevant code of practice. Course Learning Outcomes (CLO) At the end of the semester students should be able to: CLO1: To design reinforced concrete beam and detailing CLO2: To design reinforced concrete slab and detailing CLO3: To design axially loaded reinforced concrete column and detailing CLO4: To design axially loaded reinforced concrete footing and detailing							
10.	Transferable Skills: This course is expected the development of the following transferable skills: a) Self-management – an ability to manage time and task b) Learning skills - An ability to learn both independently and co—operatively; - An ability to use library skills, to find and organize information ; - An ability to use a wide range of academic skills (research, analysis, synthesis etc.); - An ability to identify and evaluate personal learning strategies.							

	c) Teamwork ▪ An ability to take responsibility and carry out agreed task; ▪ An ability to take initiative and lead other; ▪ An ability to identify and evaluate personal learning strategy. d) Problem solving ▪ An ability to analyse; ▪ An ability to think laterally about a problem; ▪ An ability to identify strategy options; ▪ An ability to solve the problems e) Information technologies ▪ An ability to use specialist software where relevant to the discipline.														
11.	Teaching-learning and assessment strategy A variety of teaching strategies are used throughout the course, including the following: • Classroom Lessons; Lecturer and power point presentations • Tutorial Session; • Student-Lecturer Discussion • Collaborative and Co-operative learn; • Independent study. Assessment: <table> <tr> <td>Course Work</td><td>40%</td></tr> <tr> <td>Assignment</td><td>5%</td></tr> <tr> <td>Tutorials /Quizzes</td><td>5%</td></tr> <tr> <td>Studio works</td><td>10%</td></tr> <tr> <td>Test</td><td>20%</td></tr> <tr> <td>Examination</td><td>60%</td></tr> <tr> <td>Total</td><td>100%</td></tr> </table>	Course Work	40%	Assignment	5%	Tutorials /Quizzes	5%	Studio works	10%	Test	20%	Examination	60%	Total	100%
Course Work	40%														
Assignment	5%														
Tutorials /Quizzes	5%														
Studio works	10%														
Test	20%														
Examination	60%														
Total	100%														
12.	Synopsis: The course deal with methods of analysis and design of reinforced concrete structures accordance with relevant code of practice.														
13.	Mode of Delivery: Lectures; Tutorials; Studio.														

14.	Performance Criteria :						
	CLO-PLO	Assessment Tool	1	2	3	4	5
	Marks		0-39	40-49	50-59	60-74	75-100
	Grade		(F)	(D,D+)	(C-,C,C+)	(B-,B,B+)	(A-,A,A+)
	CLO1: To design reinforced concrete beam and detailing	Assignment Tutorials Quizzes Studio works Test Examination	Fail to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Poor to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Satisfactory to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Good to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Excellent to: • To: Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task
	CLO2: To design reinforced concrete slab and detailing.	Assignment Tutorials Quizzes Studio works Test Examination	Fail to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Poor to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Satisfactory to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and	Good to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test	Excellent to: • To: Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and

					task	• Manage time and task	task
	CLO3: To design axially loaded reinforced concrete column and detailing.	Assignment Tutorials Quizzes Studio works Test Examination	Fail to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Poor to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Satisfactory to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Good to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Excellent to: • To: Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task
	CLO4: To design axially loaded reinforced concrete footing and detailing.	Assignment Tutorials Quizzes Studio works Test Examination	Fail to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Poor to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Satisfactory to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Good to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Excellent to: • To: Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task

15.	Mapping of the Programme Objectives to the Programme Learning Outcomes											
Programme Objectives (PO)	Programme Learning Outcomes (PLO) PLO1: Ability to acquire and apply knowledge of science and engineering fundamentals; PLO2: Acquired in-depth technical competence in civil engineering discipline; PLO3: Ability to undertake problem identification, formulation and solution; PLO4: Ability to utilize systems approach to design and evaluate operational performance; PLO5: Understanding of the principles of design for sustainable development; PLO6: Understanding of professional ethics, Islamic values, social, cultural, global and environmental responsibilities of a professional engineer and commitment to them; PLO7: Ability to communicate effectively, not only with engineers but also with the community at large; PLO8: ability to function effectively as an individual; PLO9: Ability to function effectively in group with the capacity to be a leader or manager; PLO10: Recognizing the need to undertake lifelong learning, and possessing /acquiring the capacity to do so; PLO11: ability to become Entrepreneur;											
	PEO1: To produce graduates with proficient knowledge and competency in various areas in Civil/Electrical/Mechanical Engineering	✓	✓	✓								
	PEO2: To produce graduates with professional, generic attributes to meet the present and future global demands.				✓	✓	✓			✓	✓	
	PEO3: To produce graduates with Islamic humanistic values and reinvention skills to meet the requirement of a dynamic environment. These skills include Civil Intelligence, Moral Intelligence, Self-Reliance and Communication Skills							✓	✓	✓		✓

16.	Mapping of the course Learning Outcome to the Programme Outcome										
Course Learning Outcome (CLO) Programme Learning Outcomes (PLO)	PLO1: Ability to acquire and apply knowledge of science and engineering fundamentals;	PLO2: Acquired in-depth technical competence in civil engineering discipline;	PLO3: Ability to undertake problem identification, formulation and solution;	PLO4: Ability to utilize systems approach to design and evaluate operational performance;	PLO5: Understanding of the principles of design for sustainable development;	PLO6: Understanding of professional ethics, Islamic values, social, cultural, global and environmental responsibilities of a professional engineer and commitment to them;	PLO7: Ability to communicate effectively, not only with engineers but also with the community at large;	PLO8: ability to function effectively as an individual;	PLO9: Ability to function effectively in group with the capacity to be a leader or manager;	PLO10: Recognizing the need to undertake lifelong learning, and possessing /acquiring the capacity to do so;	PLO11: ability to become Entrepreneur;
	CLO1: To design reinforced concrete beam and detailing	✓									
	CLO2: To design reinforced concrete slab and detailing	✓									
	CLO3: To design axially loaded reinforced concrete column and detailing	✓	✓	✓							
	CLO4: To design axially loaded reinforced concrete footing and detailing	✓	✓	✓							

17.	Content outline of the course/module and the SLT per topic						
		Details	SLT(Hour)				
			L	T	P	IS	Total
	Topic 1	Introduction to the design process Structural mechanics and material properties in the design process	2	1	-	4	7
	Topic 2	Introduction to Limit State Concepts in design Overview of code of practice in design (British Code, Euro Code and Malaysian Code)	4	2	-	10	16
	Topic 3	Analysis of Sections - Relationship between stress-strain; ultimate movement of resistance; design; under reinforced, over reinforced and balanced; failure criteria. - Behaviour of RC beams in shear - Behaviour of RC beams in torsions - Singly reinforced beams and slabs - Doubly reinforced beams and slabs	6	3	-	16	25
	Topic 4	Structural Design - Design for bending - Rectangular and Flanged section - Single and double reinforced section. - Design for shear, Local bond and anchorage. - Reinforced requirement and check for serviceability limit states. - Design for torsion - Solid Slabs - One-way and two-way spanning slabs; - Design for bending; Torsion and shear check for cracking. - Column - Axially loaded short and slender columns - Foundations - Axially loaded reinforced pad footings. - Reinforcement details - Cutting and bending. - Detailing of slabs, beams column and concrete footing	16	8	14	40	78
	Total(Hour)		28	14	14	70	126
18.	Main references supporting the course - Reinforced Concrete Design by Chu-Kia Wang, Charles G. Salmon and José A. Pincheira (Jul 28, 2006) - Reinforced Concrete Design (7th Edition) by George F. Limbrunner and Abi O. Aghayere (Jan 26, 2009) - Reinforced Concrete: Mechanics and Design (5th Edition) by James K. Wight and James G. MacGregor (Jun 27, 2008) - Structural Concrete: Theory and Design by M. Nadim Hassoun and Akthem Al-Manaseer (Aug 11, 2008)						

	Additional references supporting the course 1. BS 8110, Part 1: 1985, The Structural Use of Concrete. Code of practice for design and construction. 2. Standard Method of Detailing Reinforced Concrete, the Concrete Society; The Institution of Structural Engineers UK. 3. Higgins and Rogers B.R 1986" design and detailed Bs8110. 1985 British cement Association
19.	Other additional information All materials will be available to the students in the library.

References:

1. Reinforced Concrete Design by Chu-Kia Wang, Charles G. Salmon and José A. Pincheira (Jul 28, 2006)
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