<table>
<tr><td>1.</td><td colspan="5">Name of Course</td><td>Civil Engineering Materials</td></tr>
<tr><td>2.</td><td colspan="5">Course Code</td><td>JCEM1033</td></tr>
<tr><td></td><td colspan="6">JCEM = the first alphabet identify the faculty within which the subject is offered., JCEM = the remaining three alphabet identify the course that offers the subject, 1033 = the first digit identify level of study; in this case undergraduate level, 1033 = the second and third digits identify subject identity and 1033 = the fourth digit identify credit value or credit hours</td></tr>
<tr><td>3.</td><td colspan="5">Name(s) of academic staff</td><td>To be Assigned</td></tr>
<tr><td>4.</td><td colspan="5">Rationale for the inclusion of the course/module in the programme</td><td>Knowledge of basic engineering materials is essential in civil engineering. Moreover, acquiring knowledge in properties of engineering materials enable engineer to design structure.</td></tr>
<tr><td>5.</td><td colspan="5">Semester and Year offered</td><td>2/2</td></tr>
<tr><td rowspan="3">6.</td><td colspan="2" rowspan="3">Total Student Learning Time (SLT)
L = Lecture T = Tutorial
P = Practical S=Studio Works
O= Others</td><td colspan="4">Face to Face</td><td rowspan="3">Total Guided and Independent Learning
Independent Study(IS)= 70
Total = 126</td></tr>
<tr><td>L</td><td>T</td><td>P/S</td><td>O</td></tr>
<tr><td>42</td><td>-</td><td>14</td><td>-</td></tr>
<tr><td>7.</td><td colspan="5">Credit Value</td><td>3.0</td></tr>
<tr><td></td><td colspan="6">Lecture: 3 hours per week x 14 weeks
Practical: 2 hours fortnightly x 7 weeks</td></tr>
<tr><td>8.</td><td colspan="5">Prerequisite (if any)</td><td>None</td></tr>
<tr><td>9.</td><td colspan="6">Course Objectives
1. To introduce the engineering materials;
2. To equip the students with the knowledge of the engineering materials and its properties.

Course Learning Outcomes (CLO)
At the end of the semester students should be able to:

CLO1: To introduce the engineering materials ant its types;
CLO2: To understand the properties of concrete in its fresh and hardened form;
CLO3: To understand the types and properties of engineering materials includes steel, timber, bitumen and bricks;
CLO4: To understand materials affected by the environment and how to reduce the effects;
CLO5: To understand the materials related to civil engineering work and their applications.</td></tr>
<tr><td>10.</td><td colspan="6">Transferable Skills:
This course is expected the development of the following transferable skills:
▪ An ability to manage time and task
▪ An ability to learn both independently and co—operatively;
▪ An ability to take responsibility and carry out laboratory test;
▪ An ability to take initiative and lead other;
An ability to use software where relevant to the subject.</td></tr>
<tr><td>11.</td><td colspan="6">Teaching-learning and assessment strategy
A variety of leaching 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.</td></tr>
</table>

	Assessment: **Coursework** **40%** Assignment 5% Quizzes 5% Laboratory work 10% Test 20% **Examination** **60%** **Total** **100%**
12.	**Synopsis:** This course is very important course in the field of civil engineering. The objective of course is to introduce students to the engineering materials and its properties. The course covers the introduction and types of engineering materials. Properties of concrete and its main component, properties of steel, timber, bitumen and bricks as well as other related materials that are related to civil engineering field.
13.	**Mode of Delivery:** Lectures Tutorials Laboratory Work

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 introduce the engineering materials ant its types	**Assignment** **Quizzes** **Laboratory work** **Test** **Examination**	**Fail to:** • Learn both independent and cooperatively • Use library skills, to find and organize information • Use wide range of academic skills (research, analysis, synthesis etc.)	**Poor to:** • Learn both independent and cooperatively • Use library skills, to find and organize information • Use wide range of academic skills (research, analysis, synthesis etc.)	**Satisfactory to:** • Learn both independent and cooperatively • Use library skills, to find and organize information • Use wide range of academic skills (research, analysis, synthesis etc.)	**Good to:** • Learn both independent and cooperatively • Use library skills, to find and organize information • Use wide range of academic skills (research, analysis, synthesis etc.)	**Excellent to:** • Learn both independent and cooperatively • Use library skills, to find and organize information • Use wide range of academic skills (research, analysis, synthesis etc.)
	CLO2: To understand the properties of concrete in its fresh and hardened form	**Assignment** **Quizzes** **Laboratory work** **Test** **Examination**	Fail to: • Learn both independent and cooperatively • Use library skills, to find and organize	Poor to: • Learn both independent and cooperatively • Use library skills, to find and organize	Satisfactory to: • Learn both independent and cooperatively • Use library skills, to find and organize	Good to: • Learn both independent and cooperatively • Use library skills, to find and organize	Excellent to: • Learn both independent and cooperatively • Use library skills, to find and organize

			information • Manage time and task	information • Manage time and task	information • Manage time and task	information • Manage time and task	information • Manage time and task
	CLO3: To understand the types and properties of engineering materials includes steel, timber, bitumen and bricks	**Assignment** **Quizzes** **Laboratory work** **Test** **Examination**	Fail to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Manage time and task	Poor to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Manage time and task	Satisfactory to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Manage time and task	Good to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Manage time and task	Excellent to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Manage time and task
	CLO4: To understand materials affected by the environment and how to reduce the effects	**Assignment** **Quizzes** **Laboratory work** **Test** **Examination**	Fail to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Manage time and task	Poor to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Manage time and task	Satisfactory to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Manage time and task	Good to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Manage time and task	Excellent to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Manage time and task

	CLO5: To understand the materials related to civil engineering work and their applications.	**Assignment** **Quizzes** **Laboratory work** **Test** **Examination**	Fail to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Manage time and task	Poor to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Manage time and task	Satisfactory to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Manage time and task	Good to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Manage time and task	Excellent to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Manage time and task

15. **Mapping of the Programme Objectives to the Programme Learning Outcomes**

Programme Learning Outcomes (PLO) / Programme Objectives (PO)	**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**

Programme Learning Outcomes (PLO) / Course Learning Outcome (CLO)	**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 utilise 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:** Recognising the need to undertake lifelong learning, and possessing /acquiring the capacity to do so;	**PLO11**: ability to become Entrepreneur;
CLO1: To introduce the engineering materials and its types.	✓										
CLO2: To understand the properties of concrete in its fresh and hardened form.	✓	✓	✓								
CLO3: To understand the types and properties of engineering materials includes steel, timber, bitumen and bricks	✓	✓	✓								
CLO4: To understand materials affected by the environment and how to reduce the effects	✓	✓	✓								

	CLO5: To understand the materials related to civil engineering work and their applications.	✓	✓	✓								

17.	Content outline of the course/module and the SLT per topic						
		Details	**SLT (Hour)**				
			L	**T**	**P**	**IS**	**Total**
	Topic 1	**INTRODUCTION TO ENGINEERING MATERIALS** • Types of Engineering Materials • Mechanical testing and selection of engineering materials • Fracture toughness and fatigue of engineering materials • Electrical and magnetic properties of engineering materials	3	-	-	5	**8**
	Topic 2	**CEMENT CONCRETE** • Classification of concrete • Properties of concrete • Advantages and disadvantages of concrete **CEMENT** • Manufacturing of cement • Types of cement • Properties of cement • Factor affecting properties of cement • Hydration process of cement	3	-	-	5	**8**
	Topic 3	**AGGREGATE** • General classification • Characteristic and properties aggregates for making concrete • Grading of aggregates • Bulk density, durability of aggregates • Deleterious substance in aggregates	3	-	-	5	**8**
	Topic 4	**WATER USED FOR MAKING CONCRETE** • Properties of water • Impurities in water • Suitability of water **ADMIXTURES** • Types of admixture • Function • Properties of admixture	3	-	-	5	**8**
	Topic 5	**FRESH CONCRETE** • Properties of fresh concrete • Factor affecting properties of fresh concrete	3	-	-	5	**8**

	Topic 6	**HARDENED CONCRETE** • Properties of hardened concrete • Factor affecting properties of hardened concrete • Concreting in different environment • Influence of technical factors • Design of Concrete Mix	6	-	-	10	**16**
	Topic 7	**METALLIC MATERIALS** • Type of steel • Manufacturing of steel • Steel products • Connections • Categories of steel • Advantages and disadvantages of steel • Properties of steel • Corrosion of steel and protection	6	-	-	10	**16**
	Topic 8	**TIMBER** • Structure of wood • Species of wood • Strength classes • Grading of timber • Defects • Factor affecting strength • Timber as structural material • Wood product • Preservation of timber	6	-	-	10	**16**
	Topic 9	**BRICKS AND BLOCKS** • Type of bricks • Manufacturing process • Type of concrete blocks	3	-	-	5	**8**
	Topic 10	**BITUMINOUS MATERIALS** • Types of bitumen • Modified bitumen • Characterization of Tar **ADVANCE MATERIALS IN CONSTRUCTION** • FRP • COMPOSITE	6	-	-	10	**16**

	Practical	**Practical** 1. FINENESS OF CEMENT 2. PARTICLE SIZE DISTRIBUTION OF FINE AND COARSE AGGREGATES 3. WORKABILITY TEST 4. COMPRESSION STRENGTH TEST OF CONCRETE 5. CASTING AND CURING OF CONCRETE CUBES AND BEAMS 6. TENSION TEST 7. FLEXURAL TEST 8. THE MIX DESIGN PROCESS	-	-	14	-	**14**
	Total (Hour)		**42**	**-**	**14**	**70**	**126**
18.	**Main references supporting the course** 1. G. T. Murray, C. V. White, Wolfgang L. Weise. (2008). Introduction to engineering materials. CRC Press, 2008. ISBN 1574446835, 9781574446838. 2. Civil Engineering Materials by Neil Jackson and Ravindra K. Dhir (Oct 1996)						
	Additional references supporting the course 1. Materials for Civil and Construction Engineers (3rd Edition) (Alternative eText Formats) by Michael S. Mamlouk and John P. Zaniewski (Feb 27, 2010)						
19	**Other additional information** All materials will be available to the students in the library.						