Subject Description Form

Subject Code	CSE20308
Subject Title	Construction Materials
Credit Value	3
Level	2
Exclusion	CSE308 Construction Materials
Objectives	To introduce the science of concrete and steel technologies commonly used in civil engineering construction.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Able to analyse and interpret different behaviours of construction materials subjected to a variety of environments/conditions; b. Able to design and conduct experimental studies of concrete and steel, and then relate their bearing on theoretical concepts; c. Able to draw on the properties and behaviour of common materials in construction to evaluate and formulate appropriate solutions; d. Able to communicate logically and lucidly through writing of essay and project reports; and e. Able to recognize the need for, and to engage in a life-long learning through lectures, on-line learning and seminars.
Subject Synopsis/ Indicative Syllabus	1. Concrete (8 weeks) Introduction- advantages of concrete, types of structural concrete, constituent materials of concrete and production of concrete. Cements - chemical composition, fineness, hydration, setting, hardening and types. Aggregates – types, physical properties, shapes, surface texture and grading. Admixtures – benefits, mineral and chemical admixtures. Properties of fresh concrete - workability, factors affecting workability and stability. Properties of hardened concrete - strength, factors affecting strength and control of strength. Concrete mix design - required concrete properties: workability, strength and durability, concrete mix design

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<tr><td></td><td>methods: DOE and absolute volume approach.

Durability – permeability, physical and chemical attacks, corrosion of reinforcement and fire resistance.

2. <u>Steel</u> (5 weeks)

Iron and Steel:
Manufacturing of steel, heat treatments of steel, cast iron.
Behaviour in Service:
Stress-strain curve, tensile and compressive strength, brittle and ductile fracture, creep, fatigue.

Durability: corrosion and its prevention, performance at high temperature, fire protection.

Mechanical Testing:
Tensile test, hardness test, impact test, fatigue test, creep test.

3. On-line laboratory sessions
Tests for properties of fresh concrete, Tests for properties of hardened concrete, Tests for mechanical properties of concrete, Non-destructive testing of concrete, Mechanical testing of steel.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>Basic knowledge of construction materials will be provided in lectures. Tutorials will be conducted mainly in the form of example class and problem-solving session to enhance students' understanding of the subject matter. On-line laboratory sessions provide information for performance testing of metals and concrete.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="5">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td></tr>
<tr><td>Coursework: Essays, seminar report and on-line lab quizzes</td><td>30</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>Final Examination</td><td>70</td><td>√</td><td>√</td><td>√</td><td></td><td></td></tr>
<tr><td>Total</td><td>100 %</td><td colspan="5"></td></tr>
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Students must pass the final examination and achieve a passing overall score/ grade to pass the subject.
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Student Study Effort Expected	Class contact:	Average hours per week
	▪ Lectures / Tutorials / Laboratory	3 Hrs.
	Other student study effort:	
	▪ Reading / Study / Reports / Seminar	6 Hrs.
	Total student study effort	9 Hrs.
Reading List and References	**<u>Essential Textbooks</u>** G.D. Taylor, Materials in Construction, An Introduction , Pearson, 2000. A.M. Neville & J.J. Brooks, "Concrete Technology 2nd Edition", Prentice Hall, 2010. **<u>Reference</u>** A.M. Neville, "Properties of Concrete", 4th Edition, Longman Group Limited, 1995.	