

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	<p>Upon completion of the subject, students will be able to:</p> <ol style="list-style-type: none"> a. Able to critically analyze and interpret data collected from construction materials testing; b. Able to design and conduct construction materials experimental studies and relate their bearing on theoretical concepts; c. Able to draw on the properties and behaviour of common materials of civil engineering construction to evaluate and formulate the appropriate solutions; d. Able to communicate logically and lucidly through writing of laboratory and project reports; e. Able to function, take responsibility and lead effectively in group project work; and f. Able to recognize the need for, and to engage in life-long learning.
Subject Synopsis/ Indicative Syllabus	<ol style="list-style-type: none"> 1. <u>Concrete</u> (8 weeks) <ul style="list-style-type: none"> Cements - chemical composition, fineness, hydration, setting and hardening. Types. Aggregates - physical properties, shapes and surface texture, grading. Types. Admixtures - mineral and chemical admixtures types. Properties of fresh concrete - workability, factors affecting workability, stability. Properties of hardened concrete - strength, factors affecting strength. Influence of constituent materials, preparation, curing, test conditions, elastic behavior, creep. Durability - weathering, chemical attack, sulphate attack, alkali-aggregate reaction, volume changes, permeability and absorption, shrinkage. Concrete mix design and quality control - required concrete properties : workability, strength and durability, concrete mix design methods : DOE, ACI and absolute volume approach. Testing of Concrete.

	<p>2. <u>Steel</u> (5 weeks)</p> <p>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.</p> <p>Durability: corrosion and its prevention, performance at high temperature, fire protection.</p> <p>Mechanical Testing: Tensile test, hardness test, impact test, fatigue test, creep test.</p> <p>3. <u>Laboratory</u> Mechanical testing of concrete and steel, Non-destructive testing of concrete, concrete mix design.</p>																																						
Teaching/Learning Methodology	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. Laboratory works provide opportunities for testing of metals and concrete. Group project to enhance students' problem solving skills.																																						
Assessment Methods in Alignment with Intended Learning Outcomes	<table border="1" data-bbox="516 978 1372 1289"> <thead> <tr> <th rowspan="2">Specific assessment methods/tasks</th> <th rowspan="2">% weighting</th> <th colspan="6">Intended subject learning outcomes to be assessed (Please tick as appropriate)</th> </tr> <tr> <th>a</th> <th>b</th> <th>c</th> <th>d</th> <th>e</th> <th>f</th> </tr> </thead> <tbody> <tr> <td>Laboratory reports, project, quizzes</td> <td>30</td> <td>√</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> <td></td> </tr> <tr> <td>Total</td> <td>100 %</td> <td colspan="6"></td> </tr> </tbody> </table> <p>Students must attain at least grade D in both coursework and final examination (whenever applicable) in order to attain a passing grade in the overall result.</p>	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)						a	b	c	d	e	f	Laboratory reports, project, quizzes	30	√	√	√	√	√	√	Final Examination	70	√	√	√				Total	100 %						
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Reading List and References	<p><u>Essential Textbooks</u></p> <p>G.D. Taylor, Materials in Construction, An Introduction , Pearson, 2000.</p> <p>A.M. Neville & J.J. Brooks, “Concrete Technology 2nd Edition”, Prentice Hall, 2010.</p>																																						

	<p><u>Reference</u></p>
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A.M. Neville, "Properties of Concrete", 4th Edition, Longman Group Limited, 1995.