### Subject Code: BRE212

**Level:** 2  
**Contact Hours:** Lect:21 LB/TU:21  
**Student Effort Hours:** 120

<table>
<thead>
<tr>
<th>Assessment Method</th>
<th>Coursework 30%</th>
<th>Examination 70%</th>
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</thead>
<tbody>
<tr>
<td><strong>Credit Value</strong></td>
<td>3</td>
<td></td>
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<tr>
<td><strong>Pre-requisites</strong></td>
<td>Nil</td>
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<tr>
<td><strong>Co-requisites</strong></td>
<td>Nil</td>
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<tr>
<td><strong>Exclusions</strong></td>
<td>Nil</td>
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<tr>
<td><strong>Subject Leader/Lecturer/Dept.</strong></td>
<td>W.F. Tsang (BRE)</td>
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#### Subject Aim:

*This subject is intended to:*

1. Enable students to be conversant with the properties and behaviour of some common materials of building construction.
2. Develop the ability to test and select materials for such construction.

#### Learning Outcomes:

*Students will demonstrate their ability to:-*

1. Identify the properties of common construction materials and theoretical modeling of their behaviours under different environments, short- or long-term.
2. Appreciate different material, mechanical tests and quality control tests of steel and concrete.
3. Select appropriate materials for building construction.

#### Brief Syllabus Content:

**Metals:**
Structure of metals: Atomic bonding, crystal structures and crystal geometry, solid solutions and intermediate compounds, equilibrium diagrams.  
Deformation of metals: Elastic deformation, plastic flow, ideal strength, mechanisms of slip, origin of dislocations.  
Mechanical Testing: Tensile test, hardness test, impact test, fatigue test, creep test.

**Concrete:**
Constituent materials:  
Cements – chemical composition, fineness, hydration, setting and hardening. Types.  
Aggregates – physical properties, shapes and surface textures, grading. Types.  
Admixtures – types.  
Concrete mix design and quality control: required concrete properties, durability strength, workability, concrete mix design.  
Statistical quality control, Shewart control charts, Cumulative sum control charts.  
Testing of Concrete.

Timber, plastics, waterproofing materials and polymers, glazing materials

**Laboratory:**
Mechanical testing of metals. Non-destructive testing of concrete. Concrete mix design.

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*Teaching activities: Lecture (LT)/Tutorial (TU)/Seminar (SM)/Drawing (DW)/Laboratory or Practical (LB)/Studio (ST)/Workshop (WS)/Project (PJ)/Field Study (FS)/Guided Study (GS)/Visit (VS)*
**Learning and Teaching Approach** *(tasks and activities designed to achieve learning outcomes)*:

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 a range of different construction materials in particular: metals and concrete.

Visits to the foundry and metal casting, welding and plastics workshops and the University’s Industry Center.

Destructive and non-destructive testing of hardened concrete, metals, plastics, timber to be performed at the Building Diagnostics and Inspection Technology Laboratory.

**Assessment strategy** *(assessment of student performance resulting from learning tasks)*:

70% examination + 30% coursework. The coursework component will consist of tutorial problems and laboratory reports.

**Reading List:**

**Recommended:**


