## Subject Code: BRE212

**Level:** 2  
**Contact Hours:** Lect:21 LB/TU:21  
**Student Effort Hours:** 120  
**Assessment Method:** Coursework 30% Examination 70%  
**Credit Value:** 3  
**Pre-requisites:** Nil  
**Co-requisites:** Nil  
**Exclusions:** Nil  
**Subject Leader/Lecturer/Dept.:** W.F. Tsang (BRE)

### 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

Brief introduction of smart materials and innovative products and their possible use in buildings

**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:


