



## **Module Specification**

### **Materials and Construction 3**

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#### **Contents**

<b>Module Specification .....</b>	<b>1</b>
<b>Part 1: Information .....</b>	<b>2</b>
<b>Part 2: Description .....</b>	<b>2</b>
<b>Part 3: Teaching and learning methods .....</b>	<b>8</b>
<b>Part 4: Assessment.....</b>	<b>11</b>
<b>Part 5: Contributes towards .....</b>	<b>15</b>

## Part 1: Information

**Module title:** Materials and Construction 3

**Module code:** UBPMQX-5-3

**Level:** Level 6

**For implementation from:** 2023-24

**UWE credit rating:** 5

**ECTS credit rating:** 2.5

**College:** Faculty of Environment & Technology

**School:** FET Dept of Architecture & Built Environ

**Partner institutions:** City School of Architecture Sri Lanka

**Field:** Planning and Architecture

**Module type:** Module

**Pre-requisites:** None

**Excluded combinations:** None

**Co-requisites:** None

**Continuing professional development:** No

**Professional, statutory or regulatory body requirements:** None

## Part 2: Description

**Overview:** Transferable Skills:

Collect, analyse and manage data from a wide variety of sources.

Critical thinking, creative interpretation of subject taught in design

Competency in technical drawings

Work with limited or contradictory information

Communicate effectively in a variety of formats

Work independently and in groups.

**Features:** Not applicable

**Educational aims: MATERIALS**

This Module will enable students to be introduced the collective use of basic materials (Concrete, Steel, Glass, Timber and Masonry) and manufactured materials such as roofing materials, finishing materials, insulation materials, water proofing materials, protective coatings, fixing & jointing materials and how these materials could be effectively used in design and construction - by studying their properties, performance at site and durability; identifying the reasons for their destruction and how the life performance of these materials could be enhanced through effective methods of treatment and protection. This module will also expose students to the contractual implications of use of materials – writing and interpreting of specifications, referring and interpreting manufacturer's data and catalogues, applicable standards and testing procedures, samples, and life cycle cost implications on the choice and application of materials.

Students will also be introduced to the use of sustainable building materials and related technologies as applicable in building construction.

**BUILDING CONSTRUCTION**

This Module will enable students to be introduced to the stages of on-site construction and to look at innovative technologies and construction methodologies that are used by the industry locally and internationally.

**Outline syllabus:** The module will contribute to students' knowledge and understanding of:

**MATERIALS**

**MAIN TOPIC 1**

**COLLECTIVE USE OF BASIC MATERIALS (Term 1)**

Understanding the properties (physical, chemical, structural, aesthetic) and behaviour (structural, constructional and environmental) of basic materials such as concrete, steel, glass, timber and masonry in collective use with reference to their interfaces and applicability in different building elements.

**MAIN TOPIC 2**

## MANUFACTURED MATERIALS (Term 1)

Understanding of the properties, durability, destruction and protection of Manufactured Materials necessary for the construction of buildings during design, construction and storage at site.

Roofing Materials

Finishing Materials

Insulation Materials

Water proofing materials

Protective Coatings

Fixing & Jointing materials

### Properties of Materials

Physical Properties – weight, density, thermal expansion, conductivity, permeability, fire resistance, acoustical values.

Chemical Properties (mix proportions) – insitu and pre-mix

Structural Properties – compression, stress, strength, stiffness, rigidity, elasticity, BS Standards, tests

Properties that affect application

Aesthetic or visual properties – colour, pattern, texture

co-ordination in construction – dimensions, construction method

environmental considerations –sun,wind,rain,pollution,corrosion caused by moisture and chemical action

performance- physical abrasion and ware during construction and in storage

### Durability and Performance

Factors that affect the performance during construction and in storage.

Necessity to enhance the life performance of building materials

### Destruction

Agents of destruction understanding the causes of destruction during construction and in storage in different environmental and situational conditions.

### Protection

Protective measures, protective treatments, testing and certification during const

### MAIN TOPIC 3

#### CONTRACTUAL IMPLICATIONS OF USE OF MATERIALS (Term 2)

life cycle cost implications on the choice and application of materials.

writing and interpreting specifications in contract documents (drawings and specifications)

referring and interpreting manufacturer's data and catalogues

applicable standards and testing procedures

Samples

#### CLASSIFICATION OF MANUFACTURED MATERIALS

##### Roofing Materials

(roofing tiles – calicut, half round, flat/raja tiles; asbestos roofing sheets, zincalume and other metal roofing sheets- tin, copper; polycarbonate roofing sheets; toughened glass, canvas, GRP, PTFE)

##### Finishing Materials

(plasters and renderings; tiles – ceramic, homogenous, mosaics, paving stones/tiles; stones- rough and finished/cut; natural or re-constituted timber, veneers; vinyls and carpets)

##### Insulation Materials

(polystyrene/styrofoam; aluminium foil; glass wool)

##### Water Proofing Materials

(asphaltic membranes; PVC membranes; water proofing admixtures; cementitious coatings)

##### Protective Coatings

(paints, epoxies, varnishes, sealers)

##### Fixing and Jointing Materials

(Nails, screws, raul plugs, bolts, anchor bolts, chemical bolts; welds and rivets; adhesives, structural adhesives- UV resistant silicon, epoxy resins to bond old and new structures)

Fixing devices and equipment, types of fixings – concealed, exposed.

#### MAIN TOPIC 4

#### SUSTAINABLE/ECO-FRIENDLY/RE-USABLE/RE-CYCLABLE MATERIALS

(Term 2)

Introduction to sustainable, eco-friendly, re-usable, re-cyclable materials as applicable in building construction

Introduction to sustainable and low energy technologies (wind, solar power) in the manufacture, transport and use of materials during construction and in operation, understanding the embodied energy in materials.

Understanding the properties (physical, chemical, structural, aesthetic), behaviour (structural, constructional and environmental), manufacture, applicable construction techniques, advantages and disadvantages of:

Rammed earth and earth based products

Timber (re-cycled)

Glass (re-cycled)

Steel (re-cycled)

Agriculture based by products – eg: bale technology as sustainable/eco-friendly building materials.

#### CONSTRUCTION

#### MAIN TOPIC 1

#### THE CONSTRUCTION PROCESS ON SITE (Term 1)

Introduction to the construction process and operations on-site.

Preparing for construction on-site

construction documents, award of contract, mobilization

the Construction Team

the Construction Site and preparatory works

fencing, hoarding, name boards, lighting, security, handling existing services-overhead and below ground (electrical, services and telecommunication), liaising with local authorities, demarcation of street & building lines and other reservations, obtaining temporary services.

the Site Office

construction of site office, facilities required, personnel at the site office and duties  
Workers Facilities

construction of workers' accommodation and sanitary facilities, workers' insurance

#### Storage of Materials

proper storage of materials, the delivery of materials and accountability

#### Construction Plant and Machinery

simple hand tools, powered tools, plant and machinery for earth excavation, steel and concrete construction,

handling and lifting of materials, testing and for finishes

the Setting out of the building

proper setting out of building, establishing floor levels, methods used, tools and personnel required

#### Construction at site

conducting progress review meetings, recording of minutes, quality checks, issue of details at site, interim payments

co-ordination of contractors, nominated sub-contractors, suppliers

correspondence

#### Maintenance of records

worker attendance, weather conditions, samples of materials and works, testing and approving

Completion of site works and handing over

Defects liability and maintenance

## MAIN TOPIC 2

### CONSTRUCTION METHODOLOGIES & TECHNOLOGIES (Term 2)

Introduction to the different methodologies and technologies available for assembly of components of a building, at site with reference to multi-level low rise buildings

Outline principles looking at local and international case studies

In situ construction

Modular/precast construction and assembly at site using pre and post –tensioned concrete construction technologies

the fabrication yard, handling components at site, erection and assembly with special emphasis on jointing modular co-ordination, integration of services

Steel Building Erection and fast tracking of the construction process

Sustainable methods of construction re-cycling of materials, use of local material & labour, use of low cost energy in construction, the concept of re-use, eco- friendly processes, lean technologies

### **Part 3: Teaching and learning methods**

**Teaching and learning methods:** The delivery of this Module will be through:

Lectures, Visual Presentations, Guest presentations from Industry/Trade (Manufacturers & Suppliers), Individual/Group Seminars & Projects, Tutorials, Field Visits to Manufacturers & Suppliers.

Contact Hours:

#### **MATERIALS**

Lectures: 34

Practicals(Field Visits): 8

Seminars: 10

Tutorials: 4

Independent Learning: 10

Assessment: 4

Directed Learning: none

Notional Student Effort: 60 contact hours

#### **CONSTRUCTION**

Lectures: 44

Practicals(Field Visits): none

Seminars: none

Tutorials: 8

Independent Learning: 10



Assessment: 8

Directed Learning: none

Notional Student Effort: 60 contact hours

**Module Learning outcomes:** On successful completion of this module students will achieve the following learning outcomes.

**MO1 MATERIALS**

On successful completion of this module students would have developed:

Knowledge:

of the properties and behaviour of the basic materials - concrete, steel, glass, timber and masonry in collective use, properties and behaviour of manufactured materials such as: roofing materials, finishing materials, insulation materials, water proofing materials, protective coatings and fixing and jointing materials.

of the advantages and disadvantages of the properties of these materials as applicable to different environmental/situational conditions

durability of these materials and their performance at site

agents of destruction – at site and in storage

protection and treatment at site and in storage

contractual implications of use of materials

of sustainable, eco- friendly, re-usable and re-cyclable materials as applicable in building construction.

of sustainable, low energy technologies (solar, wind power etc.) and concepts applicable to the production/manufacture of building materials, transport of materials, construction/assembly of materials on site, material life in the use of the building.

**Understanding:**

of the collective application of basic building materials, and manufactured materials such as: roofing materials, finishing materials, insulation materials, water proofing materials, protective coatings and fixing and jointing materials in different environmental/situational conditions.

of specifying materials, the methodology of reference to trade literature and procedures to be adopted to ensure correct choice and use of materials for design projects.

of the properties, behavior, energy implications (embodied energy), manufacture, applicable construction techniques, advantages and disadvantages of sustainable/eco- friendly/re-usable/re-cyclable materials such as earth, timber, glass, steel and agriculture based by products as applicable to different environmental/situational conditions.

**Ability:**

to integrate sustainable building materials and technologies in design.

**MO2 CONSTRUCTION****Knowledge :**

of the construction process and operations on-site.

**Understanding:**

of the different methodologies and technologies available for assembly of components of a building, at site, for multi-level low rise buildings – looking at local and international case studies.

**Ability:**

to integrate and show an understanding of the technical aspects of construction and process of assembly of buildings.

**Hours to be allocated: 50**

**Contact hours:**

Independent study/self-guided study = 20 hours

Face-to-face learning = 120 hours

Total = 140

**Reading list:** The reading list for this module can be accessed at [readinglists.uwe.ac.uk](https://uwe.rl.talis.com/modules/ubpmqx-5-3.html) via the following link <https://uwe.rl.talis.com/modules/ubpmqx-5-3.html>

## Part 4: Assessment

**Assessment strategy:** Component A – Material  
Component B - Construction

Seminars, Tutorials, Year-end written Examination

### MATERIALS

Week 1Week 20

Type: Seminar 1 Materials Palette Source Book

Instructions / Descriptions: Discussions

Review of Material Palette Source Book – Presentation

04 Contact Hours

Weighting:30 % of total 40%

Week 5Week 5

Type: Field Visit 1 Manufactured Materials

Instructions / Descriptions:Class Discussion

Review– Written Submission & Photographic Records

02 Contact Hours

Weighting: 2.5 % of total 40%

Week 10Week 10

Type: Tutorial 1

Manufactured Materials

Instructions / Descriptions: Written Submission

02 Contact Hours

Weighting: 2.5 % of total 40%

Week 15 Week 15

Type: Field Visit 2 Sustainable Materials

Instructions / Descriptions: Class Discussion

Review– Written Submission & Photographic Records

02 Contact Hours

Weighting: 2.5 % of total 40%

Week 20 Week 20

Type: Tutorial 2

Contractual Implications in the Selection of Materials

Instructions / Descriptions: Discussions

Review and photographic record

02 Contact Hours

Weighting: 2.5 % of total 40%

July

Type: Year-end written examination

Materials Paper

Instructions / Descriptions: 4 Questions to be answered from a choice of 6 Questions.

Descriptive Questions, Questions based on Short Notes (compare & contrast),

Questions based on Application in Design

Weighting: 60%

**Assessment tasks:**

**Examination (First Sit)**

Description: Material

1. Written Examination

Weighting: 30 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO2

**Written Assignment (First Sit)**

Description: Material

2. Coursework

Weighting: 20 %

Final assessment: No

Group work: No

Learning outcomes tested: MO1, MO2

**Written Assignment (First Sit)**

Description: Construction

2. Coursework

Weighting: 20 %

Final assessment: No

Group work: No

Learning outcomes tested: MO1, MO2

**Examination (First Sit)**

Description: Construction

1. Written Examination

Weighting: 30 %

Final assessment: No

Group work: No

Learning outcomes tested: MO1, MO2

**Examination (Resit)**

Description: Material

1. Written Examination

Weighting: 30 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO2

**Written Assignment (Resit)**

Description: Construction

2. Resubmission of Coursework for failed element or previous years mark for passed element

Weighting: 20 %

Final assessment: No

Group work: No

Learning outcomes tested: MO1, MO2

**Written Assignment (Resit)**

Description: Material

2. Resubmission of Coursework for failed element or previous years mark for passed element

Weighting: 20 %

Final assessment: No

Group work: No

Learning outcomes tested: MO1, MO2

**Examination (Resit)**

Description: Construction

1. Written Examination

Weighting: 30 %

Final assessment: No

Group work: No

Learning outcomes tested: MO1, MO2

### **Part 5: Contributes towards**

This module contributes towards the following programmes of study:

Architecture [Oct][FT][SriLanka][3yrs] BArch (Hons) 2021-22