



Module Specification

Structure 3

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Part 1: Information

Module title: Structure 3

Module code: UBPMQG-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 taught principles in design

Work with limited or contradictory information

Communicate effectively in a variety of formats

Work independently and in groups.

Features: Not applicable

Educational aims: This Module will enable students to obtain an introduction to the concepts of the design of concrete structures and the structural implications of design with the collective materials such as masonry, timber, steel, concrete and glass. This module will also enable students to understand the structural design principles and concepts of pre-fabricated and pre-stressed concrete structures, pre-engineered steel structures, large span structures, cantilever structures, tensile structures and surface/shell structures.

Outline syllabus: MAIN TOPIC 1

INTRODUCTION TO REINFORCED CONCRETE STRUCTURES (Term 1)

Structural Codes of Design

Stress – Strain Relationship of Concrete and Steel

Parabolic and simplified rectangular Stress Block of Concrete

Need for Reinforcing Steel in Concrete Elements

MAIN TOPIC 2

CONCRETE STRUCTURAL ELEMENTS

RCC FOUNDATIONS (Term 1)

Bearing Capacity of Soil, calculation of required footing area

Shallow Foundations and Deep Foundations

Individual Pad Footings, Combined Footings, Strapped Footings, Strip Foundations and Rafts

Typical arrangement of Reinforcement in the above foundations

Bored and In –situ cast Piles, Pre cast and Driven Piles, Pile Caps

Larger Diameter Caissons

Settlement of foundations

Underpinning of foundations

Shoring and de-watering in foundation

Ground supported slabs- Typical detail of ground supported slabs

RCC COLUMNS (Term 1)

Braced and Un Braced Columns

Short and Slender Columns

Axially Loaded Columns and Columns with Bending (uni – axial and bi- axial

bending)

Reinforcement arrangement

Maximum and Minimum Area of Reinforcements, stirrup sizes and spacing etc.

RETAINING WALLS (Term 1)

Reinforced Concrete Retaining Walls – “T”, “L” shaped and Counterfort retaining walls

Basement walls ,internal tanking

Shoring,de-watering, construction joints, water proofing

RCC BEAMS (Term 2)

Behaviour of Simply Supported, Fixed end, Continuous Beams and Cantilever beams

Singly Reinforced Beams – behaviour, stress diagrams, moment of resistance and limiting values

Doubly Reinforced Beams – stress diagrams and moment of resistance, discussion on the increased moment of resistance of doubly reinforced beams

Flanged Beams – stress diagrams and moment of resistance, discussion on the advantages

Shear in Beams – crack pattern and reinforcement

Torsion in Beams – reinforcement arrangement, shape of link

Reinforcement detailing rules

RCC SLABS (Term 2)

In situ, Pre cast and Composite slabs

Behaviour and deformed shapes of Cantilever, One way spanning and Two way spanning slabs

Stress Diagrams and moment of resistance of a rectangular section

Reinforcement arrangements in Simply Supported, Continuous Solid Slabs (one way and two way spanning) and Cantilever slabs

Reinforcement Detailing Rules – minimum and maximum amount of steel, bar spacing rules etc.

Discussion on Flat slabs, Voided Slabs, Ribbed Slabs and Waffle Slabs

Composite Slabs with pre cast concrete panels and permanent steel formworks

RCC STAIRCASES (Term 2)

Different arrangements of Staircases

Dog legged Stairs, Straight Flight Stairs, Cantilever Stairs, Longitudinally spanning Stairs and Cross Spanning

Stairs, Folded Plate Stairs and Suspended Stairs

Stairs with Stringer Beams

Stairs (dog legged) with un supported landings

Spiral Staircases

Reinforcement arrangement for the above

STRUCTURES WITH COLLECTIVE USE OF MATERIALS (Term 2)

Structural design and principles of structures with more than one material in collective use (masonry, timber, steel, concrete and glass)

Advantages and disadvantages

Thumb rules

Jointing details

MAIN TOPIC 3

INTRODUCTION TO PRE-FABRICATED & PRE-STRESSED CONCRETE STRUCTURES (Term 2)

Structural design principles of pre- fabricated and pre – stressed concrete structures

Pre and post tensioning, stress diagrams and load transfer, method of construction

Different structural elements – foundations, Load Bearing Walls, Column and Beam Frames, Portal Frames etc.

Examples

Advantages and disadvantages

Ensuring structural Integrity and Stability

Typical Joints between Elements

Case studies

MAIN TOPIC 4

INTRODUCTION TO PRE-ENGINEERED STEEL STRUCTURES (Term 2)

Structural design principles of pre – engineered steel structures

Different structural elements

Advantages and disadvantages

Ensuring structural Integrity and Stability

Typical Joints between Elements

Case Studies

MAIN TOPIC 5

INTRODUCTION TO STRUCTURAL PRINCIPLES OF LARGE SPAN STRUCTURES, CANTILEVERED STRUCTURES, TENSILE STRUCTURES, SURFACE / SHELL STRUCTURES (Term 2)

Structural design principles of large span, cantilevered, tensile, surface/shell structures

Different structural elements

Advantages and disadvantages

Ensuring structural Integrity and Stability

Typical Joints between Elements

Case Studies

Part 3: Teaching and learning methods

Teaching and learning methods: The delivery of this Module will be through: Lectures, Visual Presentations, Individual/Group Seminars, Individual/Group Projects, Tutorials, Field Visits

Suggested Projects

Seminars on Case Studies on Concrete Structures and Structures with Collective use of materials.

Site Visits

To building sites of concrete structures at different stages of construction.

To building sites of structures made of collective use of materials.

To building sites and manufacturing yards of pre-fabricated components

Contact Hours:

Lectures: 32

Practicals (Guest Lectures): 6

Seminars: 4

Tutorials: 4

Independent Learning: 10

Assessment: 4

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 Knowledge of the structural properties of concrete and the collective use of masonry, timber, steel, concrete and glass as structural materials in buildings.

MO2 Knowledge of the innovative concepts of structural design as applicable to concrete, steel, timber, glass and synthetic polymers .

MO3 Understanding of structural design principles of concrete structures and related thumb rules and basic structural calculations to determine structural sizes of elements.

MO4 Understanding of the structural implications in designing structures with collective materials such as masonry, timber, steel, concrete and glass and related thumb rules and details.

MO5 Understanding of the structural design principles of pre –fabricated and pre-stressed concrete structures

MO6 Understanding of the structural design principles of pre-engineered steel structures.

MO7 Ability to integrate structural principles and thumb rules in design, to 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 = 10 hours

Face-to-face learning = 60 hours

Total = 70

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

Part 4: Assessment

Assessment strategy: Seminars, Tutorials, Yearend written Examination

Week 1Week 10

Type: Seminar 1 Concrete Structures

Instructions / Descriptions:Discussions

Review– Power Point Presentation, Written Submission

02 Contact Hours

Weighting:15 % of total 40%

Week 5Week 5

Type: Field Visit 1 Concrete Structures

Instructions / Descriptions:Discussions

Review– Photographic records

02 Contact Hours

Weighting:2.5 % of total 40%

Week 10Week 10

Type: Tutorial 1 Concrete Structures

Instructions / Descriptions:Written Submission

02 Contact Hours

Weighting: 2.5 % of total 40%

Week 11Week 20

Type: Seminar 2 Innovative Structures

Instructions / Descriptions: Discussions

Review– Power Point Presentation, Written Submission

02 Contact Hours

Weighting: 15 % of total 40%

Week 15 Week 15

Type: Field Visit 2 Concrete Structures

Instructions / Descriptions: Discussions

Review– Photographic records

02 Contact Hours

Weighting: 2.5 % of total 40%

Week 20 Week 20 Tutorial 2 Concrete Structures & Structures with Collective Materials

Instructions / Descriptions: Written Submission

02 Contact Hours

Weighting: 2.5 % of total 40%

July

Type: Year-end written examination

Instructions / Descriptions: Structures Question Paper

4 Questions to be answered from a choice of 6 Questions.

Descriptive Questions, Questions based on Structural Principles, Questions based on the Application of Structural Principles in Design Weighting: 60%

Assessment tasks:

Examination (First Sit)

Description: Written Examination

Weighting: 60 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO4, MO5, MO6, MO7

Written Assignment (First Sit)

Description: Tutorials/ Assignments

Weighting: 40 %

Final assessment: No

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO4, MO5, MO6, MO7

Examination (Resit)

Description: Written Examination

Weighting: 60 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO4, MO5, MO6, MO7

Written Assignment (Resit)

Description: Resubmission of Tutorials/ Assignments for failed element or previous years mark for passed element

Weighting: 40 %

Final assessment: No

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO4, MO5, MO6, MO7

Part 5: Contributes towards

This module contributes towards the following programmes of study:

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