Module Specification

Structural Monitoring and Rehabilitation

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Contents

Part 1: Information

Module title: Structural Monitoring and Rehabilitation

Module code: UBGL3U-15-M

Level: Level 7

For implementation from: 2027-28

UWE credit rating: 15

ECTS credit rating: 7.5

College: College of Arts, Technology and Environment

School: CATE School of Architecture and Environment

Partner institutions: None

Field:

Module type:

Pre-requisites: None

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: This module offers students a comprehensive understanding of theoretical concepts and practical tools related to the inspection, diagnosis, monitoring, and repair of existing structures. Through a blend of theory and application, students engage in experiential learning to develop a broad skill set in this field.

The module covers various aspects, including inspection and diagnosis

methodologies, documentation of existing structures, in situ and laboratory testing of timber, steel, and concrete structures, non-destructive techniques (NDTs), and the application of structural health monitoring tools to different types of structural systems. Additionally, students explore the complexity of repairing and strengthening existing structures.

Students participate in a group project where they collaboratively characterise an existing building, employing traditional and digital building surveying techniques, NDTs, and numerical analyses. This project assesses their ability to work collaboratively, apply theoretical knowledge, and deliver a comprehensive group report. In addition, students are required to write an individual report proposing a rehabilitation strategy and a monitoring plan for the building assessed by their group. This individual report evaluates their independent thinking, critical analysis, and the feasibility of their proposed strategies.

Throughout the module, laboratory classes reinforce theoretical principles and encourage a scientific approach to practical investigative work. Students gain hands-on experience, developing skills that prepare them to tackle real-world challenges in inspecting, diagnosing, monitoring, and repairing and/or retrofit existing structures.

Features: Not applicable

Educational aims: This module aims to provide the students through experiential learning with a broad understanding of the chief theoretical concepts and practical tools related to the inspection, diagnosis, monitoring and repairing of existing structures. This includes inspection, diagnosis and documentation methodologies, in situ and laboratory tests, non-destructive techniques (NDTs), structural health monitoring applications, and repair and strengthening of concrete, timber and masonry structures. The role of aleatoric and epistemic uncertainties in the selection of material properties, loadings and boundary conditions will also be addressed in this module.

Outline syllabus: 1. Inspection and diagnosis methodologies
2. Documentation of existing structures, typical damage and visual inspection
3. In situ and laboratory testing of timber, steel and concrete structures
4. Investigation and use of NDTs

5. Structural health monitoring applied to different types of structural systems

7. Repair and strengthening of existing structures

Part 3: Teaching and learning methods

Teaching and learning methods: This module is delivered in a blend of theory and application (tutorial and laboratory classes) in the context of a project-led education. Laboratory classes are used to reinforce principles, engender a scientific approach to practical investigative work, and give students an appreciation of the role of experimentation in the practice, theory, and research applied to the topics of inspection, diagnosis, monitoring and repairing of existing structures.

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

MO1 Attain knowledge of building materials and causes of deterioration in real-world applications

MO2 Assess distressed structures by in situ and laboratory tests and non-destructive techniques (NDTs)

MO3 Apply different rehabilitation and strengthening techniques for different structural systems

MO4 Develop monitoring strategies to assess the condition of ageing structures

Hours to be allocated: 150

Contact hours:

Independent study/self-guided study = 114 hours

Face-to-face learning = 36 hours

Total = 150

Reading list: The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link https://rl.talis.com/3/uwe/lists/6D31FD57-BA92-A567-52F8-9D16346A28D4.html?lang=en&login=1

Part 4: Assessment

Assessment strategy: The assessment for this module is composed of two assessment tasks:

1. Group Report

Working in teams, students perform a thorough characterisation of an existing building using traditional and digital building surveying techniques, non-destructive testing (NDT), and numerical analyses. The group project assesses students' ability to work collaboratively and apply the theoretical and practical knowledge gained in the module. The deliverable for the group project is a 2000-word group report, which should demonstrate the quality of data collection, analysis, and the application of theoretical knowledge to a real-world problem.

2. Individual Report

Each student proposes and discusses a rehabilitation strategy for the building assessed by their group in the group project. The individual report aims to assess the student's ability to independently apply the knowledge gained in the module. The report should include a rehabilitation strategy proposal for the building analysed in the group work and a monitoring plan. The individual report should be approximately 1000 words and will be assessed based on the student's ability to think critically, analyse effectively, and present an original and technically feasible rehabilitation strategy.

By splitting the assessment into a group project and an individual report, students have the opportunity to collaborate on a comprehensive building characterisation while also showcasing their individual understanding and application of the module's concepts and techniques.

The resit follows the same scheme of the summative assessment.

Assessment tasks:

Report (First Sit)

Description: 2000-word group report to demonstrate the quality of data collection, analysis, and the application of theoretical knowledge to a real-world problem.

Working in teams, students perform a thorough characterisation of an existing building using traditional and digital building surveying techniques, non-destructive testing (NDT), and numerical analyses. The group project assesses students' ability to work collaboratively and apply the theoretical and practical knowledge gained in the module.

Weighting: 65 %

Final assessment: No

Group work: Yes

Learning outcomes tested: MO1, MO2

Report (First Sit)

Description: Individual report (1000 words). This will be assessed based on the student's ability to think critically, analyse effectively, and present an original and technically feasible rehabilitation strategy.

Each student proposes and discusses a rehabilitation strategy for the building assessed by their group in the group project. The individual report aims to assess the student's ability to independently apply the knowledge gained in the module. The report should include a rehabilitation strategy proposal for the building analysed in the group work and a monitoring plan.

Weighting: 35 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO3, MO4

Report (Resit)

Description: 2000-word group report to demonstrate the quality of data collection, analysis, and the application of theoretical knowledge to a real-world problem.

Working in teams, students perform a thorough characterisation of an existing building using traditional and digital building surveying techniques, non-destructive

testing (NDT), and numerical analyses. The group project assesses students' ability to work collaboratively and apply the theoretical and practical knowledge gained in the module.

Weighting: 65 %

Final assessment: No

Group work: Yes

Learning outcomes tested: MO1, MO2

Report (Resit)

Description: Individual report (1000 words). This will be assessed based on the student's ability to think critically, analyse effectively, and present an original and technically feasible rehabilitation strategy.

Each student proposes and discusses a rehabilitation strategy for the building assessed by their group in the group project. The individual report aims to assess the student's ability to independently apply the knowledge gained in the module. The report should include a rehabilitation strategy proposal for the building analysed in the group work and a monitoring plan.

Weighting: 35 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO3, MO4

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Civil Engineering [Frenchay] MEng 2024-25