Module Specification

Mechanics of Composites

Version: 2023-24, v4.0, 02 Feb 2023

Contents

Part 1: Information

Module title: Mechanics of Composites

Module code: UFMFVL-15-M

Level: Level 7

For implementation from: 2023-24

UWE credit rating: 15

ECTS credit rating: 7.5

Faculty: Faculty of Environment & Technology

Department: FET Dept of Engineering Design & Mathematics

Partner institutions: None

Field: Engineering, Design and Mathematics

Module type: Module

Pre-requisites: Structural Mechanics 2021-22

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: Students studying this module will cover advanced methods of structural analysis involving composite materials with strong reference to issues that arise in real engineering applications such as failure modes and impact of different environmental conditions.

Appropriate to the consideration of real engineering contexts for advanced methods of structural analysis is the use of finite element analysis techniques. The module

builds upon the material covered in the level 5 core programme and covers more complex problems. As a result of studying this module students students will have the confidence and ability to set up and implement computational models for advanced analysis and application.

Features: Not applicable

Educational aims: The aim of this module is to provide students with advanced and detailed knowledge of the theory and application of structural analysis techniques used in industry for the analysis of structures involving composite materials.

Outline syllabus: Introduction to micro/macro mechanics of composite materials

Classical laminate theory

Strength of laminates

Failure criterions for laminates

Stability of composites (buckling)

Environmental effects (temperature and moisture)

Finite Element Analysis: overview of FEA applications, nodes, elements, meshes, stiffness matrix, and boundary conditions - loads and restraints.

Practical Composite FE modelling techniques: e.g.: Planning, pre-processing, model solution, post processing, symmetry, convergence tests, boundary conditions, element types/selection, co-ordinate systems, mesh creation.

Part 3: Teaching and learning methods

Teaching and learning methods: The material setting out the advanced techniques covered in this module will delivered using lectures to ensure that students

understand the scope of a topic. Consolidation and depth of understanding will be achieved in tutorials and computer practical sessions as appropriate.

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

MO1 Design and undertake substantial investigations to address significant areas of theory and practice in structural modelling

MO2 Select appropriate advanced methodological approaches and critically evaluate their effectiveness

MO3 Apply appropriate theoretical and practical methods to the analysis and solution of engineering problems

MO4 Demonstrate and critically evaluate current theoretical and methodological approaches through use of professional literature

MO5 Act with initiative in decision-making within professional or given guidelines

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://uwe.rl.talis.com/modules/ufmfvl-15-m.html

Part 4: Assessment

Assessment strategy: The module is assessed using a technical report covering both theoretical concepts and practical implementation of finite element methods to engineering structural analysis problems.

The coursework is designed to assess modelling of Composite material using

commercial software packages as well as numerical calculation. There is a great emphasis in critically evaluating and analysing results and comparison between computational and theoretical methods. The output of this coursework will be a report in the style of a 10 page conference paper. A template will be provided to help students structure the report appropriately.

The referred coursework will involve a reworking of the first sit submission taking into account feedback to improve the quality of the work. In the event of any non-submission of coursework a new but equivalent task will be published.

Assessment tasks:

Report (First Sit)
Description: The referred coursework will involve a reworking of the first sit submission taking into account feedback to improve the quality of the work. In the event of any non-submission of coursework a new but equivalent task will be published.

The output will be a report in the style of a 10 page conference paper (about 3000 words) . A template will be provided to help students structure the report appropriately.
Weighting: 100 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO4, MO5

Report (Resit)
Description: The referred coursework will involve a reworking of the first sit submission taking into account feedback to improve the quality of the work. In the event of any non-submission of coursework a new but equivalent task will be published.

The output will be a report in the style of a 10 page conference paper (about 3000

words) . A template will be provided to help students structure the report appropriately.
Weighting: 100 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO4, MO5

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Automotive Engineering [Sep][FT][Frenchay][4yrs] - Not Running MEng 2020-21

Automotive Engineering [Sep][SW][Frenchay][5yrs] MEng 2019-20

Automotive Engineering {Foundation} [Sep][FT][Frenchay][5yrs] MEng 2019-20

Automotive Engineering {Foundation} [Sep][SW][Frenchay][6yrs] MEng 2018-19

Mechanical Engineering [Sep][PT][Frenchay][2yrs] - Not Running MSc 2022-23

Mechanical Engineering [Sep][FT][Frenchay][4yrs] MEng 2020-21

Automotive Engineering [Sep][FT][Frenchay][4yrs] MEng 2020-21

Mechanical Engineering {Foundation} [Sep][SW][Frenchay][6yrs] MEng 2018-19