Module Specification

Fundamentals of Mechanical Principles

Version: 2023-24, v1.0, 26 Jun 2023

Contents

Part 1: Information

Module title: Fundamentals of Mechanical Principles

Module code: UFME3H-15-1

Level: Level 4

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: University Centre Weston

Field: Engineering, Design and Mathematics

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: This introductory module considers a range of engineering analyses of mechanical principles and solid structures. Examples are set in an industrial context where possible. Otherwise, key learning examples will be utilised. The module covers a range of theories and techniques that are central to the understanding of stress, kinematics and dynamics principles in an engineering context, as well as supporting the theoretical underpinning of mathematical modelling of engineering applications.

Features: Not applicable

Educational aims: The module explores how stress analysis is related to material properties and geometry. Mathematics and numerical modelling techniques are presented in an engineering context in order to build confidence when addressing future design and engineering challenges.

Outline syllabus: Introduction to statics; static equilibrium equations, reactions at supports, distributed and concentrated loading

Pin-jointed framework; compression and tension. Method of Joints; Method of sections. Frames and machines

Properties of materials, stress, strain, Young's Modulus

Shear Force & Bending Moment Theory and application.

Stresses in beams & Second Moment of Area, Parallel axis theorem

Combined bending and end load

Thermal Strain & Intro to 2D & 3D theory

Torsion, derivation of the engineering torsion formula and shear modulus.

Theory of kinematics and dynamics principles supporting engineering applications such as: displacement, velocity and acceleration extended to non-uniform acceleration incorporating numerical methods, projectile motion, tanks, missiles, Newton's laws, work and energy, momentum and force impulse, torque, cooling problems, and mechanical systems.

Part 3: Teaching and learning methods

Teaching and learning methods: Scheduled learning will typically include lectures, lectorials and tutorials intended to be delivered in an interactive way. Learning will be achieved through face-to-face, hybrid or fully virtual processes. Independent learning hours includes engagement with essential reading material and the working through of exercises.

Learning material will be delivered though a set of Lectures combined with Tutorials, where learners apply the knowledge gained. Lectorials will be naturally blended in with the lectures for learners to gain autonomy in the application of learning.

Structured laboratory exercises may be embedded to enhance learning. Students will start by benchmarking their starting point and progress to problem-based learning which will culminate in the design and implementation of a complete system. Accompanying lectures and tutorial sessions will present the formal aspects of the module.

In addition to lecture material, basic familiarisation with software and simulation of static and material science will be embedded in the programme.

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

MO1 Identify and explain the different fundamental static principles of common structures used in engineering.

MO2 Apply fundamental analytical principles and models to the solution of engineering problems.

MO3 Identify and explain the different fundamental dynamic principles of common systems used in engineering.

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/569E8F41-5F0F-2A65-54A4-E959CB40673F.html?lang=en&login=1

Part 4: Assessment

Assessment strategy: Students build confidence with applying the fundamental engineering principles of mechanical principles and structural analysis (statics) through an end of semester online exam (4 hour online examination).

Students will have the opportunity to take short practice tests throughout the semester. This component of assessment is designed to provide regular support and feedback to students as they develop their knowledge and skills in the use of fundamental principles.

The resit assessment has the same profile as the first sit assessment

Assessment tasks:

Examination (Online) (First Sit)
Description: 4 hour online examination
Weighting: 100 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2

Examination (Online) (Resit)
Description: 4 hour online examination
Weighting: 100 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Electro-mechanical Engineering {Apprenticeship-UCW}[UCW] BEng (Hons) 2023-24