Module Specification

Engineering Dynamics

Version: 2024-25, v1.0, 26 Jun 2023

Contents

Part 1: Information

Module title: Engineering Dynamics

Module code: UFME5X-15-2

Level: Level 5

For implementation from: 2024-25

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: An understanding of dynamic behaviour is an essential key element in the makeup of a good Engineer.

This module seeks to instil a confident understanding of the discipline and will build upon the fundamentals of mechanical and mathematical modelling presented in Level 4, with the underpinning mathematical methods and software tools supporting the content being taught concurrently. The philosophy is to teach the mathematical

methods in an engineering context to increase motivation and confidence in application. The focus at this level is to use a variety of real-life authentic applications and problems as vehicles to support the delivery of the technical and mathematical content.

Reflective practice is encouraged throughout the module where students are working in groups to allow them to share and discuss any aspects or challenges that the module may bring to light. The module takes the students through a journey of examples and applications based around a single platform example, where learning is reinforced with numerical modelling, laboratory based activities and interactive quizzes, allowing the students to practise their mathematics and challenge their understanding.

Features: Not applicable

Educational aims: The aim of this module is to build on the technical knowledge and understanding of the dynamics within Mechanical Systems introduced at level 4, building on a wider range of engineering contexts to illustrate and motivate the engineering analysis.

Outline syllabus: Springs and Mechanical Oscillation: Natural vibrations, simple harmonic motion. Stiffness of springs, combined stiffness, oscillation of a spring. Oscillation of a pendulum, and introduction to damping and resonance.
Single degree of freedom (DOF) free vibration including mathematical topic of solving differential equations.
Single DOF forced vibration (steady-state): including mathematical topics of differential equation.
Damping and effect in single DOF systems.
Single DOF free damped vibration: including mathematical topics of differential equations of mixed order.
Single DOF forced damped vibration (steady-state): including mathematical topics of differential equations and phasors.
Transmissibility of forces through vibration.
2 DOF systems (natural frequencies, mode shapes) with reference to eigenvalues and eigenvectors (e.g. MATLAB "eig" function), matrices and matrix notation,

determinants.
Principles of Vibration measurement.

Part 3: Teaching and learning methods

Teaching and learning methods: Lectures supported by group tutorial/laboratory sessions where students work on design problems that link the abstract theoretical concepts and techniques to real engineering tasks. Lectures will be delivered in a flipped style supported by recorded and on-line materials to encourage active learning.

Study time outside of contact hours will be spent on going through exercises and example problems. Independent learning includes hours engaged with essential reading, assignment preparation and completion.

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

MO1 Provide a detailed explanation of the principles and methods used in the study and analysis of dynamic behaviour, mechanical vibrations and performance using analytical methods and modelling tools.

MO2 Select and apply appropriate theoretical and practical methods to the analysis and solution of laboratory based problems, making critical decisions and evaluations based on results obtained.

MO3 Model and apply mathematical analysis to real problems including those involving dynamic vibrations and systems.

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/ufmfl8-15-2.html

Part 4: Assessment

Assessment strategy: The module is assessed using two assessments.

The first assessment involves a group exercise resulting in a group presentation. The form of output has been chosen to encourage students to present the results of their study in a concise and clear manner and to develop their communication skills.

The final assessment involves an individual submission of reflecting and contrasting theory with practise to determine errors and uncertainties.

The resit assessment strategy is the same as the first sit profile for both tasks and will be comparable.

Assessment tasks:

Report (First Sit)
Description: Individual 1000 word report.
Weighting: 40 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO2

Presentation (First Sit)
Description: Group presentation of practical work (30 mins)
Weighting: 60 %
Final assessment: No
Group work: Yes
Learning outcomes tested: MO1, MO3

Report (Resit)
Description: Individual 1000 word report.
Weighting: 40 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO2

Presentation (Resit)
Description: Group presentation of practical work (30 mins)
Weighting: 60 %
Final assessment: No
Group work: Yes
Learning outcomes tested: MO1, MO3

Part 5: Contributes towards

This module contributes towards the following programmes of study:

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

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