Module Specification

Dynamics

Version: 2021-22, v4.0, 26 Apr 2022

Contents

Part 1: Information

Module title: Dynamics

Module code: UFMFL8-15-2

Level: Level 5

For implementation from: 2021-22

UWE credit rating: 15

ECTS credit rating: 7.5

Faculty: Faculty of Environment & Technology

Department: FET Dept of Engineering Design & Mathematics

Partner institutions: None

Delivery locations: Auston Institute of Management Singapore, Auston Institute of Management Sri Lanka, British Institute of Engineering and Technology Sri Lanka, Frenchay Campus, Global College of Engineering and Technology (GCET), Gloucestershire College, University Centre Somerset, University Centre Weston

Field: Engineering, Design and Mathematics

Module type: Standard

Pre-requisites: Dynamics Modelling and Simulation 2020-21

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 dynamics and 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 dynamics introduced at level 4 and introduce 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: Large group lecture supported by small 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.

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

MO4 Make critical decisions and evaluations based on results obtained from a systematic investigation

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 components.

Component B 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. Students will undertake a peer review of the group work exercise in accordance with the Department Group Work Policy which may result in students from the same group receiving different marks.

In Component A students will take an end of module assessment involving set exercises based on the problems encountered during the course. The exam will test students' individual understanding of dynamics principles under both idealised and real-world scenarios.

The resit assessment strategy is the same as the first sit profile for Component A but for Component B, the presentation is replaced by an individual lab report that assesses the same learning outcomes as the group presentation.

Assessment components:

Set Exercise - Component A (First Sit)
Description: End of semester assessment (5 hours) Time constrained task
Weighting: 75 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO4

Presentation - Component B (First Sit)

Description: Assessment of practical work

Weighting: 25 %

Final assessment: No

Group work: Yes

Learning outcomes tested: MO2, MO3, MO4

Set Exercise - Component A (Resit)

Description: Assessment (5 hours) Time constrained task

Weighting: 75 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO4

Laboratory Report - Component B (Resit)

Description: assessment of simulated practical work

Weighting: 25 %

Final assessment: No

Group work: No

Learning outcomes tested: MO2, MO3, MO4

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Mechanical Engineering (Mechatronics) [Feb][FT][BIET][12months] BEng (Hons) 2021-22

Mechanical Engineering (Manufacturing) [May][FT][BIET][12months] BEng (Hons) 2021-22

Mechanical Engineering (Manufacturing) [Sep][FT][AustonSingapore][12months] BEng (Hons) 2021-22

Mechanical Engineering (Mechatronics) [Feb][FT][AustonSingapore][12months] BEng (Hons) 2021-22

Mechanical Engineering (Mechatronics) [May][FT][AustonSingapore][12months] BEng (Hons) 2021-22

Mechanical Engineering (Mechatronics) [May][PT][AustonSingapore][16months] BEng (Hons) 2021-22

Mechanical Engineering (Mechatronics) [Feb][FT][AustonSriLanka][12months] - Not running BEng (Hons) 2021-22

Mechanical Engineering (Mechatronics) [Sep][PT][AustonSingapore][16months] BEng (Hons) 2021-22

Mechanical Engineering (Mechatronics) [Sep][FT][AustonSriLanka][12months] - Not Running BEng (Hons) 2021-22

Mechanical Engineering (Mechatronics) [Feb][PT][AustonSriLanka][16months] - Not running BEng (Hons) 2021-22

Mechanical Engineering (Mechatronics) [Sep][FT][AustonSingapore][12months] BEng (Hons) 2021-22

Mechanical Engineering (Mechatronics) [Feb][PT][AustonSingapore][16months] BEng (Hons) 2021-22

Mechanical Engineering (Mechatronics) [May][FT][AustonSriLanka][12months] - Not Running BEng (Hons) 2021-22

Mechanical Engineering (Mechatronics) [Sep][PT][AustonSriLanka][16months] - Not Running BEng (Hons) 2021-22

Mechanical Engineering (Mechatronics) [May][PT][AustonSriLanka][16months] - Not Running BEng (Hons) 2021-22

Mechanical Engineering (Manufacturing) [Feb][FT][BIET][12months] BEng (Hons) 2021-22

Mechanical Engineering (Manufacturing) [Feb][FT][AustonSingapore][12months] BEng (Hons) 2021-22

Mechanical Engineering (Manufacturing) [May][FT][AustonSingapore][12months] BEng (Hons) 2021-22

Mechanical Engineering (Mechatronics) [Feb][PT][BIET][16months] BEng (Hons) 2021-22

Mechanical Engineering (Mechatronics) [May][FT][BIET][12months] BEng (Hons) 2021-22

Mechanical Engineering (Mechatronics) [May][PT][BIET][16months] BEng (Hons) 2021-22

Mechanical Engineering (Mechatronics) [Sep][FT][BIET][12months] BEng (Hons) 2021-22

Mechanical Engineering (Mechatronics) [Sep][PT][BIET][16months] BEng (Hons) 2021-22

Automotive Engineering [Sep][SW][Frenchay][4yrs] BEng (Hons) 2020-21

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

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

Mechanical Engineering [Sep][SW][Frenchay][5yrs] MEng 2020-21

Mechanical Engineering [Sep][FT][Frenchay][3yrs] BEng (Hons) 2020-21

Mechanical Engineering [Sep][SW][Frenchay][4yrs] BEng (Hons) 2020-21

Automotive Engineering [Sep][SW][Frenchay][5yrs] MEng 2020-21

Automotive Engineering [Sep][FT][Frenchay][3yrs] BEng (Hons) 2020-21

Mechanical Engineering {Apprenticeship-GlosColl} [Sep][FT][GlosColl][3yrs] FdSc 2020-21

Mechanical Engineering [Sep][FT][UCS][2yrs] FdSc 2020-21

Mechanical Engineering [Sep][PT][Gloscoll][3yrs] FdSc 2019-20

Mechanical Engineering {Apprenticeship-UCW} [Sep][FT][UCW][3yrs] FdSc 2019-20

Mechanical Engineering {Apprenticeship-UCS} [Sep][FT][UCS][3yrs] FdSc 2019-20

Mechanical Engineering and Vehicle Technology {Foundation} [Feb][FT][GCET][4yrs] BEng (Hons) 2019-20

Mechanical Engineering and Vehicle Technology {Foundation} [Oct][FT][GCET][4yrs] BEng (Hons) 2019-20