

ES2F7-15 Mechatronics and Systems Control

26/27

Department

School of Engineering

Level

Undergraduate Level 2

Module leader

Matt Sokola

Credit value

15

Module duration

10 weeks

Assessment

100% coursework

Study locations

University of Warwick main campus, Coventry Primary

Distance or Online Delivery

Description

Introductory description

The module aims to provide the students with fundamental concepts and tools for understanding mechatronic systems and principal control design methodologies in modern industry.

Module aims

This module aims to provide the students with an understanding of key concepts and elements of modern mechatronic systems found in a range of engineering applications. Building on several Y2 subjects, it equips students with knowledge and skills to perform mathematical modelling and simulation analyses of subsystems and overall mechatronic systems.

Examples, case studies and simulation work will span a number of system-oriented disciplines within the engineering sector.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be

covered. Actual sessions held may differ.

- Introduction to mechatronics
- Signal conditioning, data presentation and display systems
- Mechanical and electrical actuation systems
- Embedded systems
- System models, dynamic responses of systems
- Closed-loop control systems, application of controllers
- Analysis of a robot as a mechatronic system

Learning outcomes

By the end of the module, students should be able to:

- Demonstrate knowledge and understanding of various mechatronics-based embedded systems, with respect to functionality, performance, power level, power medium and automation level.
- Examine the relationship of physical parameters and model parameters.
- Apply mathematical and analytical skills to analyse, model and simulate mechatronic systems and their closed-loop performance

Indicative reading list

[Reading lists can be found in Talis](#)

[Specific reading list for the module](#)

Subject specific skills

- Communicate technical information with others at all levels, including technical reports and the use of digital tools: using simulation - SIMULINK.
- Follow a methodical approach to engineering problem solving: Mathematical modelling of linear models.
- Model real-world mechanical systems efficiently: Modelling of mass-spring-damper systems.
- Select the design solution for a given electro-mechanical engineering application and environment using data to inform their decisions: Choosing a suitable controller for a robotic arm.
- Comply with statutory and organisational safety requirements: Within practical demonstrations/exercises.

Transferable skills

- Hold paramount the health and safety of themselves and others, and model health and safety conscious behaviour: Within practical demonstrations/exercises.
- Communicate confidently to create and maintain working relationships. Be respectful: Write the IMA and PMA reports.
- Work collaboratively as a team player. Able to work effectively within a team and interact

with /help others when required: Teamwork when solving the problems in the in-module assignment.

- Adjust to different conditions, technologies, situations and environments and to new and emerging technologies: Using Matlab/Simulink to validate systems' performance, problem solving,

Study

Study time

Type	Required
Lectures	15 sessions of 1 hour (11%)
Seminars	4 sessions of 1 hour (3%)
Demonstrations	(0%)
Practical classes	8 sessions of 1 hour (6%)
Work-based learning	35 sessions of 1 hour (26%)
Online learning (scheduled sessions)	5 sessions of 1 hour (4%)
Online learning (independent)	(0%)
Private study	70 hours (51%)
Total	137 hours

Private study description

20 hours guided independent learning (including VLE use).

- Pre-module reading list given on Moodle to encourage flipped learning approach,
 - Online forum for discussing queries with course peers and tutor ((asynchronous),
 - Online consulting session for providing one to one support to help students while completing post-module assignment (synchronous),
 - Distance learning support using technology enhanced learning.
 - Self-study: reading around the materials that will support the post-module assignment
- 50 hours for work on assessments

Costs

No further costs have been identified for this module.

Assessment

You must pass all assessment components to pass the module.

Assessment group A2

	Weighting	Study time	Eligible for self-certification
Assessment component			
Assignment	100%		Yes (extension)
An individual report on modelling, simulating and analysing a mechatronic system.			

Reassessment component is the same

Feedback on assessment

Feedback will be given as appropriate to the assessment type:

- individual verbal formative feedback on seminars and presentations,
- individual written summative feedback on the assignment.

Availability

Courses

This module is Core for:

- Year 3 of DESA-H360 Undergraduate Electromechanical Engineering (Degree Apprenticeship)