WM190-15 Introduction to Programming and System Modelling

24/25

Department
WMG
Level
Undergraduate Level 1
Module leader
Freeha Azmat
Credit value
15
Module duration
14 weeks
Assessment
60% coursework, 40% exam
Study locations
University of Warwick main campus, Coventry Primary
Distance or Online Delivery

Description

Introductory description

This module provides the fundamental knowledge in electrical and electronic engineering, relevant to Degree
Apprenticeship Standards ST0023, ST0024, ST0025 and ST0027. As the digital revolution is already transforming many aspects of business and even whole industries. So this module covers how systems are modelled and programmed and how can we debug the errors to deliver fault-free systems.

This module is linked with C1, C3, C10 and C13 of the AHEP 4
LO1 : C3 ,C10
LO2 : C1, C3, C13
LO3: C13
LO4: C3

Module web page

Module aims

This module aims to give acquaintance to students about high level programming language relevant to different areas of engineering. The fundamental concepts about programming including loops, decision structures and functions will be taught using high level programming language (MATLAB). Furthermore, the simulation and modelling techniques will be covered using built-in MATLAB toolboxes and Simulink features.

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 Programming
Matlab

- Introduction to Matlab
- Introduction to Matrices and Arrays
- Decision Structures
- Loops
- Operators and Expression
- Functions
- Manipulating Files
- Data manipulation
  Simulink
- Simulink - basic modelling techniques
- Modelling continuous-time systems

Learning outcomes

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

- Use the programming logic fundamentals of high level language in different scenarios [AHEP:4- C3, C10]
- Demonstrate an understanding of SIMULINK functions and tools to create simulation models of dynamical systems [AHEP4:- C1, C3, C10]
- Derive transfer function of electrical and mechanical dynamic systems to be used in simulations [AHEP:4- C13].
- Solve well-defined and some broadly defined problems using Matlab loops and decision structures [AHEP:4- C3]

Indicative reading list

1. B. D. Hahn, Essential MATLAB for engineers and scientists, Cambridge; Academic Press/ Elsevier Science,
   9780081029978, Oct 2019.
2. S. Attaway, MATLAB: a practical introduction to programming and problem solving, 0128045256, Elsevier 2017.
3. S. Lynch: Dynamical systems with applications using MATLAB, Boston: Birkhäuser, 2014.

ISBN: 9783319068206 (e-book)
4. D.G. Duffy: Advanced engineering mathematics with MATLAB, CRC Press, 2016. ISBN: 9781498739672
5. Learning MATLAB: a problem solving approach, Springer 2015, ISBN: 9783319253268

View reading list on Talis Aspire

Subject specific skills

- Translate conceptual ideas or technical requirements into developmental outcomes or operational designs or specifications for systems or components to solve manufacturing challenges such as compliance, technology, technical or physical challenges (S1 in all standards)
- Collate and use a range of data sources and supporting documentation to support projects (S3 in all standards)
- Observe, record and draw accurate and auditable conclusions from data and/or developmental or test evidence (S5 in all standards)
- Identify resources, such as digital tools or technologies, human, equipment, materials or data, to complete design and development projects or programmes of work (S8 in ST0027 and ST0023, S9 in ST0024 and ST0025)

Transferable skills

- Digital Literacy: Has the capabilities that enable living, learning and working in a digital society; Comfortable with using digital media to communicate, solve problems, manage information, collaborate, create and share content.
- Critical thinking: Make informed decisions on the value of a range of sources allowing an evidence based conclusion based on this analysis.
- Communication: - Written: Present arguments, knowledge and ideas, in a range of formats; Active listening: questioning, reflecting, summarising.
- Problem Solving: Use rational and logical reasoning to deduce appropriate and well-reasoned conclusions; Retain an open mind, optimistic of finding solutions, thinking laterally and creatively to look beyond the obvious; Knows how to learn from failure.

Study

Study time

Type	Required
Lectures	6 sessions of 1 hour (4%)
Seminars	5 sessions of 1 hour (3%)
Practical classes	4 sessions of 1 hour (3%)
Total	150 hours

Type	Required
Online learning (scheduled sessions)	15 sessions of 1 hour (10%)
Online learning (independent)	10 sessions of 1 hour (7%)
Other activity	5 hours (3%)
Private study	45 hours (30%)
Assessment	60 hours (40%)
Total	150 hours

Private study description

Self-guided study: revision on module contents, solution of additional seminar-type questions, video tutorials and supplementary materials.
Study and use of simulation software.
Online forum and discussion (asynchronous).

Other activity description

Mock test.
On-line support / consultancy before assessments.

Costs

No further costs have been identified for this module.

Assessment

You must pass all assessment components to pass the module.

Assessment group D

	Weighting	Study time	Eligible for self-certification
Dynamic systems modelling	60%	36 hours	Yes (extension)
A written individual report demonstrating the modelling and simulation of a well-defined engineering system.			
Matlab programming	40%	24 hours	No
Computer-based test including programming broadly defined problems to be solved.			

Feedback on assessment

Formative feedback

- Individual, verbal formative feedback on problem sets given during seminar/tutorial sessions

throughout the course

Summative feedback

- written cohort-level feedback on the exam,
- written individual feedback on the assignment

Past exam papers for WM190

Availability

Courses

This module is Core for:

- Year 1 of UWMS-H7C3 Undergraduate Applied Professional Engineering (Control/Technical Support Engineer)
- Year 1 of DWMS-H7C7 Undergraduate Applied Professional Engineering (Control/Technical Support Engineer) (Degree Apprenticeship)
- Year 1 of UWMS-H7C2 Undergraduate Applied Professional Engineering (Electrical/Electronic Support Engineer)
- Year 1 of DWMS-H7C6 Undergraduate Applied Professional Engineering (Electrical/Electronic Support Engineer) (Degree Apprenticeship)
- Year 1 of UWMS-H7C1 Undergraduate Applied Professional Engineering (Manufacturing Engineer)
- Year 1 of DWMS-H7C5 Undergraduate Applied Professional Engineering (Manufacturing Engineer) (Degree Apprenticeship)
- Year 1 of UWMS-H7C4 Undergraduate Applied Professional Engineering (Product Design and Development Engineer)
- Year 1 of DWMS-H7C8 Undergraduate Applied Professional Engineering (Product Design and Development Engineer) (Degree Apprenticeship)