

WM984-15 Systems Engineering and Functional Safety

27/28

Department

WMG

Level

Taught Postgraduate Level

Module leader

Morteza Soleimani

Credit value

15

Module duration

4 weeks

Assessment

100% coursework

Study locations

University of Warwick main campus, Coventry Primary

Distance or Online Delivery

Description

Introductory description

The Systems Engineering and Functional Safety module covers the key parameters of system engineering and functional safety, design, test and evaluate the robustness of the intelligent automotive systems.

Topics are introduced from a practical viewpoint thus allowing the students to critically and independently apply the learning to design, assess and test a wide variety of intelligent automotive systems.

When this module is delivered on Degree Apprenticeship Programmes, it is delivered in a 1-week block rather than over 4 weeks

Module aims

The Systems Engineering and Functional Safety aims to provide the students with a comprehensive knowledge of: System engineering, and the robustness of systems in the context of intelligent automotive systems. The module aims to systematically analyse industry motivations, legislations, roadmaps and customer requirements related to intelligent automotive systems.

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 systems, complex systems, and system of systems; System Complexity, Assembly and Testing; Overview of robustness, designing robust systems, including covering aspects such as testing, faults/failures, and safety related to intelligent automotive systems; Model-Based Systems Engineering; Models for developing complex systems (Verification and Validation) using V-model and Model-Based Design (MBD). Critically understanding requirements capture, focusing on semi-formal requirements; General approaches to testing and Design of Experiment (DoE); Functional safety, focusing on ISO 26262; Engineering design, functional analysis and Risk assessment; System-Theoretic Process Analysis,

Learning outcomes

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

- Critically evaluate and apply the principles of ISO 26262 to ensure functional safety in automotive complex systems [AHEP:4-M2, M16, M17]
- Critically analyse system engineering requirements, complexity, assembly, and testing using systems engineering tools [AHEP:4-M2, M4, M5]
- Develop and apply verification and validation strategies for system modelling, simulation, and testing [AHEP:4-M2, M3, M5]
- Utilise robust engineering design principles, functional analysis and risk assessment techniques to enhance system safety [AHEP:4-M1, M2, M3, M7]

Indicative reading list

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

[Specific reading list for the module](#)

Subject specific skills

Intelligent automotive systems, system robustness, requirements, safety standards, V and V models, Model-based development and testing, Model-Based Systems Engineering,

Transferable skills

Teamwork; Work effectively in a group or team to achieve goals; Personal Motivation, Organisation and Time Management skills; Research and Analytical Skills; presentation skills; Oral and written communication skills

Study

Study time

Type	Required
Lectures	20 sessions of 1 hour (13%)
Seminars	(0%)
Tutorials	10 sessions of 1 hour (7%)
Online learning (independent)	10 sessions of 1 hour (7%)
Private study	50 hours (33%)
Assessment	60 hours (40%)
Total	150 hours

Private study description

Familiarising with system engineering tools

Review of Automotive Guidelines

Review of the prerequisite of pre-readings and familiarising with MDSE, MBD, and other teaching materials

Costs

No further costs have been identified for this module.

Assessment

You must pass all assessment components to pass the module.

Assessment group A3

Assessment component	Weighting	Study time	Eligible for self-certification
Final Assessment	70%	42 hours	Yes (extension)
Problem set to be solved and justified (Word count 2800 $\pm$ 10%)			

Reassessment component

	Weighting	Study time	Eligible for self-certification
Final Assessment			No
Problem set to be solved and justified (Word count 2800 $\pm$ 10%)			
Assessment component			
System engineering of an autonomous electric vehicle	30%	18 hours	Yes (extension)
A case study analysis, focusing on developing an automated electric vehicle's assembly and test procedures.			

Reassessment component

System engineering of an autonomous electric vehicle			No
A case study analysis, focusing on developing an automated electric vehicle's assembly and test procedures.			

Feedback on assessment

Individual written feedback and overall mark.

Availability

There is currently no information about the courses for which this module is core or optional.