

# WM984-15 Systems Engineering and Functional Safety

**20/21**

**Department**

WMG

**Level**

Taught Postgraduate Level

**Module leader**

Husain Kanchwala

**Credit value**

15

**Module duration**

1 week

**Assessment**

90% coursework, 10% exam

**Study locations**

University of Warwick main campus, Coventry Primary

Distance or Online Delivery

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## Description

### Introductory description

The module details the fundamental principles pertinent to Systems Engineering, Systems thinking and Functional Safety. Beginning with Systems Engineering the module covers the principles and concepts of complexity and systems thinking, Lean engineering, system architecture and model based systems engineering. Moving on to functional safety, and incorporating the systems engineering principles the student covers the safety lifecycle, hazard and risk analysis, system/hardware/software development, and the associated processes including safety and change management, confidence levels and ultimately verification. Learning is reinforced via case studies and practical exercises.

### Module aims

The purpose of the module is to ensure the student is capable of both understanding and following the essential processes in developing complex automotive systems, from understanding the user cases, requirements, specifications through to validation and verification of functional and safe systems. Systems Engineering is the industrial framework for developing complex systems, and functional safety ensure they are safe to use.

## 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.

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## Learning outcomes

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

- Critically Evaluate the Systems Engineering approach and its practical application in Automotive Engineering
- Evaluate customer need and interpret requirements in advanced complex systems
- Systematically define, decompose and cascade requirements throughout complex systems
- Comprehensively apply functional safety principles in the design of complex automotive applications
- Critically evaluate the safety life cycle and it's application to automotive systems

## Indicative reading list

[View reading list on Talis Aspire](#)

## Subject specific skills

The student will be able to apply systems thinking to complex engineering problems, following a structured, methodical process. Gaining the ability to understand interactions and integration across multiple disciplines and across mechanical, electronic and software domains. The student will understand safety requirements, hazard and risk analysis and management processes in order to deliver safe, functional product that meets the customer requirements.

Core Skills:

| Understand systems architecture, design installations, including material applications and systems methodology as applicable |

| Understand the principles of risk management and how lessons learnt can be implemented to ensure project risk is recognised and minimised through the project life cycle |

| Gain an understanding of safe working practices, an understanding of technical governance and quality management |

| Gain an understanding of technical responsibility for complex engineering systems |

| Ability to validate that the design will satisfy the requirements of the product or service |

- | Ability to ensure that engineering integrity is achieved, engineering procedures are complied with
- | Ability to insure rigorous application of risk management and lessons learnt to ensure project risk is understood and minimised through the project life cycle |
- | Knowledge to ensure all internal process, regulatory and customer requirements are met |

## Transferable skills

The module develops problem solving and troubleshooting capabilities, in addition to team working and lateral thinking. The ability to get into the "customer mindset" and work through issues in a thorough and methodical manner whilst working with different teams is essential in today's work force.

### Core Behaviours

#### | Professional commitment

Demonstrating a personal, ethical and professional commitment to society, their profession and the environment, adopting a set of values and behaviours that will maintain and enhance the reputation of the profession as well as their organisation and fulfilling requirements with respect to maintenance of personal records for Professional Registration. |

## Study

### Study time

Type	Required
Lectures	13 sessions of 1 hour 30 minutes (13%)
Seminars	5 sessions of 1 hour 30 minutes (5%)
Supervised practical classes	7 sessions of 1 hour 30 minutes (7%)
Online learning (scheduled sessions)	2 sessions of 2 hours (3%)
Online learning (independent)	4 sessions of 2 hours (5%)
Other activity	30 minutes (0%)
Private study	10 hours (7%)
Assessment	90 hours (60%)
Total	150 hours

### Private study description

Self-study time for preparation for assessed tasks, including independent research activity.

### Other activity description

Introduction to PMA

## Costs

No further costs have been identified for this module.

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## Assessment

You must pass all assessment components to pass the module.

### Assessment group D

	<b>Weighting</b>	<b>Study time</b>
Post Module assignment: Systems Engineering and Functional Safety	70%	70 hours
Post Module assignment based on the intended learning outcomes of the module		
Video Presentation	20%	10 hours
Video presentation critical evaluating customer need and defining requirements		
In module online assessment tasks	10%	10 hours
Subject-specific in module online assessment prior to on-site teaching. Duration 15 minutes.		

### Feedback on assessment

Scaled ratings for Comprehension, Effort and Presentation. Individual written feedback and overall mark.

[Past exam papers for WM984](#)

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## Availability

### Courses

This module is Core optional for:

- Engineering Competence (Sustainable Automotive Electrification) [New Course]
- MSc in Sustainable Automotive Electrification (FT) [New Course]
- MSc in Sustainable Automotive Electrification (PT) [New Course]