

WM988-15 System Engineering, Safety and Automotive Standards

21/22

Department

WMG

Level

Taught Postgraduate Level

Module leader

Valentina Donzella

Credit value

15

Module duration

2 weeks

Assessment

Multiple

Study locations

University of Warwick main campus, Coventry Primary

Industry On site

Description

Introductory description

The module details the fundamental principles pertinent to Systems Engineering, Systems thinking, Functional Safety new safety analysis techniques and standards (e.g. SoTIF, BSI PAS:1880, BSI PAS:1883, etc.) . Beginning with Systems Engineering the module covers the principles and concepts of complexity and systems thinking, Lean engineering, and system architecture. 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.

The module details the fundamental principles pertinent to Systems Engineering, Systems thinking and Functional Safety and to Related Safety standards . Beginning with Systems Engineering the module covers the principles and concepts of complexity and systems thinking, Lean engineering, and system architecture. 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.

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
- Demonstrate the ability to independently evaluate customer needs and interpret requirements in advanced complex systems
- Comprehensively apply safety principles in the design of complex automotive applications
- Demonstrate the ability to apply knowledge from relevant automotive standards to critique designs, test techniques, etc.

Indicative reading list

A variety of up-to-date sources including:

Latest government / UK Automotive Council roadmaps for autonomous vehicles

Latest automotive legislation and standards

Current academic research in the field of smart connected and autonomous vehicles.

System Engineering Management, Fifth Edition

Author(s): Benjamin S. Blanchard John E. Blyler

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Interdisciplinary

The knowledge acquired in the module can be applied to any other fields related to complex systems, even though standards and case studies discussed during the module are specific to Smart Connected and Autonomous Vehicles.

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.

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 mind-set" 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	25 sessions of 1 hour (17%)
Supervised practical classes	6 sessions of 1 hour (4%)
Other activity	42 hours (28%)
Assessment	77 hours (51%)
Total	150 hours

Private study description

No private study requirements defined for this module.

Other activity description

8hr Seminars or group activities.
1hr intro to PMA.

33 hr of self-directed study to prepare for the IMAs. Guidance on topics to be studied is provided during lectures (with some extra contents on moodle) and IMA instructions.

Costs

No further costs have been identified for this module.

Assessment

You do not need to pass all assessment components to pass the module.

Assessment group A

	Weighting	Study time
Post Module Assignment	70%	77 hours
Post Module assignment based on the intended learning outcomes of the module		
In module assessment	30%	
Based on self-directed study as described in section 5		

Assessment group R

	Weighting	Study time
Post Module assignment: Human Technology Interaction	100%	
Post Module assignment based on the intended learning outcomes of the module		

Feedback on assessment

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

Availability

Courses

This module is Core optional for:

- Year 1 of TESS-SP Short Programme