

WM9D6-15 Systems Engineering

21/22

Department

WMG

Level

Taught Postgraduate Level

Module leader

Angela Clarke

Credit value

15

Module duration

5 days

Assessment

100% coursework

Study location

University of Warwick main campus, Coventry

Description

Introductory description

The Systems Engineering module aims to provide the students with an understanding of systems thinking and systems engineering in complex automotive engineering programmes.

Module aims

To establish an understanding of the concepts, key principles and methods associated with systems thinking to enable students to address complex problems. To provide students with an understanding of the implications of system design and engineering on the the whole product lifecycle from concept formulation, design, manufacture, in-service use and support through to decommissioning. To provide an awareness and appreciation of the major systems engineering management tools and processes to design and deliver complex programmes, with a focus their application in the automotive engineering industry.

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.

Systems thinking and systems engineering concepts & tools
Linking vision, outcomes and goals

Prioritising goals, stakeholders and needs
Developing rich pictures and high level Concept of Operations (Conops)
System development lifecycles and architectural frameworks
Systems engineering processes and competencies for successful outcomes
Systems Engineering developments for future enterprises and product service systems
Mars Habitation Group Exercise
Automotive Engineering case studies

Learning outcomes

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

- Critically evaluate the role of Systems Thinking and Systems Engineering methodology to design complex, multi-stakeholder systems
- Apply Systems Engineering methodology to create more effective and sustainable development, delivery, in-service support and end-of-life in Automotive Engineering.
- Evaluate systems engineering development processes, including the analysis of systems needs and translate into appropriate requirements.
- Comprehensively apply systems engineering principles in the design of complex automotive applications, considering the complete life cycle of a vehicle.
- Evaluate appropriate architectural frameworks and apply tools to support the prioritisation of goals and stakeholders.

Indicative reading list

Thinking in Systems – A Primer, D. Meadows. Chelsea Green Publishing, 2008. ISBN: 9781603580557.

Designing Complex Products with System Engineering Processes and Techniques, V.D. Bhise. CRC Press, 2014. ISBN: 9781466507036

System Engineering Management, B.S. Blanchard. Wiley, 2008. ISBN: 9780470167359
2015 ISO Standard, 'ISO/IEC/IEEE 15288:2015, Systems and software engineering -- System life cycle processes', 2015.

Systems Engineering: A 21st Century Systems Methodology, D.K. Hitchins. Wiley-Blackwell, 2007
ISBN: 9780470058565

Subject specific skills

Systems Thinking, Systems Development Lifecycle vs Programme Lifecycles, Risk Management, Systems Engineering Processes

Transferable skills

Systems Thinking, Collaborative working, Critical thinking and analysis, Academic writing skills, Compliance with legislation and codes, Technical responsibility for complex engineering systems

Study

Study time

Type	Required
Lectures	25 sessions of 1 hour (17%)
Seminars	6 sessions of 1 hour (4%)
Tutorials	5 sessions of 1 hour (3%)
Supervised practical classes	5 sessions of 1 hour (3%)
Online learning (scheduled sessions)	10 sessions of 1 hour (7%)
Online learning (independent)	20 sessions of 1 hour (13%)
Assessment	79 hours (53%)
Total	150 hours

Private study description

No private study requirements defined for this module.

Costs

No further costs have been identified for this module.

Assessment

You must pass all assessment components to pass the module.

Assessment group A

	Weighting	Study time
Post-module Assessment	70%	60 hours

A written report in which a systems engineering analysis is conducted upon an existing automotive engineering system, with an emphasis on sustainability. The essay will cover evaluation of systems engineering development processes and associated competencies, including the capture, analysis of customer, social and legislative needs needs for sustainability and translation into technical/engineering requirements and systematic alignment of the design of complex, sustainable systems. The students will finally make a decision as to whether any improvements or changes have been made to the system through their analysis.

Self guided learning assessment	10%	9 hours
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2 elements - a pre-module multiple choice test worth 10%, and completion of a workbook assignment Pass/Fail)

Weighting**Study time**

Mars Habitation Group Presentation 20%

10 hours

Group tutor-directed and self-guided activities, culminating in a group presentation.

Feedback on assessment

Written feedback on the PMA, of approximately 300 - 400 words, will be provided 4 weeks after the date of submission. The feedback will be focussed on the strengths and weaknesses of the work with regards to the module learning objectives and the post module assessment marking guidelines. Suggestions for improvement will also be provided. The marksheet will also include feedback on the IMA , although feedback will also be given during the module.

Availability

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