

ES2D7-15 Systems and Software Engineering Principles

20/21

Department

School of Engineering

Level

Undergraduate Level 2

Module leader

Thomas Popham

Credit value

15

Module duration

10 weeks

Assessment

60% coursework, 40% exam

Study location

University of Warwick main campus, Coventry

Description

Introductory description

ES2D7-15 Systems and Software Engineering Principles

[Module web page](#)

Module aims

Introduce students to the concept of systems engineering and systems thinking. Guide students to expand their thinking about design to incorporate structured methods from Systems and Software Engineering including model based approaches. Ensure that students are able to consider functional and non-functional behaviour when creating requirements as well as predicting failure modes. Impress upon students the importance of correct and traceable requirements on product success as well as on safety and the environment. Exploit the synergies between Systems and Software Engineering processes to introduce formal software engineering to students.

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 concepts & systems thinking

System vee

Verification and Validation

Eliciting and recording user needs

Eliciting and writing requirements

Functional quality and failure

P diagrams, fishbone, is-isnot

QFD

Kano

State diagrams

Stateflow

Software and object oriented thinking

Objects and methods

Software testing techniques

Learning outcomes

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

- Explain overall concepts, process and need for a systems approach to engineering in various industries and applications
- Describe, using systems models and diagrams, systems from different perspectives and communicate behaviour
- Select and use tools to elicit needs and write requirements which cover functional and non-functional uses and behaviours including failure mode avoidance.
- Describe the difference between verification and validation, then specify and carry out suitable verification and validation methods
- Apply object-orientated techniques for solving programming problems

Indicative reading list

Blanchard, Benjamin S., and W. J. Fabrycky. *Systems Engineering and Analysis*. Harlow: Pearson Education Limited, 2014.. ISBN-13 978-1292025971

A. P. Sage, J. E. Armstrong. *Introduction to Systems Engineering*. Wiley Series in Systems Engineering. Wiley 2000 ISBN-13: 978-0471027669

A. Kossiakoff. "Systems Engineering Principles and Practice" Wiley Series in Systems Engineering. Wiley 2002 ISBN-13: 978-0470405482

Wasson, C., "System Analysis, Design, and Development: Concepts, Principles, and Practices." Wiley Series in Systems Engineering and Management. Wiley 2005. ISBN-13: 978-0471393337

PYSTER, A., OLWELL, D. H. *The Guide to the Systems Engineering Body of Knowledge (SEBoK)* – continuously updated WIKI

Subject specific skills

TBC

Transferable skills

TBC

Study

Study time

Type	Required
Lectures	11 sessions of 1 hour (7%)
Seminars	(0%)
Practical classes	9 sessions of 2 hours (12%)
Private study	121 hours (81%)
Total	150 hours

Private study description

121 self study (including project work and individual)

Costs

No further costs have been identified for this module.

Assessment

You must pass all assessment components to pass the module.

Assessment group D1

	Weighting	Study time	Eligible for self-certification
Assessment component			
Systems Assignment	30%		No
Systems Part			

Reassessment component is the same

	Weighting	Study time	Eligible for self-certification
Assessment component			
Software Assignment Software Part	30%		No

Reassessment component is the same

Assessment component

Online Examination QMP with text entry for some questions ~Platforms - QMP	40%		No
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- Online examination: No Answerbook required
 - Students may use a calculator
 - Engineering Data Book 8th Edition

Reassessment component is the same

Feedback on assessment

written exam: mark, assignment: mark and comments, mark and peer comments, cohort level feedback on examinations.

Written examination, group project and practical test must be passed with a mark of $\geq 30\%$.

[Past exam papers for ES2D7](#)

Availability

Courses

This module is Core for:

- Year 2 of UESA-H335 BEng Automotive Engineering
- Year 2 of UESA-H161 BEng Biomedical Systems Engineering
- Year 2 of UESA-H315 BEng Mechanical Engineering

- Year 2 of UESA-HH35 BEng Systems Engineering
- Year 2 of UESA-H336 MEng Automotive Engineering
- Year 2 of UESA-H163 MEng Biomedical Systems Engineering
- UESA-H316 MEng Mechanical Engineering
 - Year 2 of H315 Mechanical Engineering BEng
 - Year 2 of H316 Mechanical Engineering MEng
- UESA-HH31 MEng Systems Engineering
 - Year 2 of HH31 Systems Engineering
 - Year 2 of HH35 Systems Engineering

This module is Optional for:

- Year 2 of UESA-H605 Undergraduate Electrical and Electronic Engineering

This module is Option list A for:

- Year 2 of UESA-H216 BEng Civil Engineering
- Year 2 of UESA-H63W BEng Electronic Engineering
- Year 2 of UESA-H113 BEng Engineering
- Year 2 of UESA-H112 BSc Engineering
- Year 2 of UESA-HN11 BSc Engineering and Business Studies
- Year 2 of UESA-H217 MEng Civil Engineering
- Year 2 of UESA-H63X MEng Electronic Engineering
- Year 2 of UESA-H114 MEng Engineering
- Year 2 of UESA-H605 Undergraduate Electrical and Electronic Engineering
- Year 2 of UESA-H606 Undergraduate Electrical and Electronic Engineering MEng