Module Specification

Foundations of Systems Engineering

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Contents

Part 1: Information

Module title: Foundations of Systems Engineering

Module code: UFMFNB-15-M

Level: Level 7

For implementation from: 2023-24

UWE credit rating: 15

ECTS credit rating: 7.5

Faculty: Faculty of Environment & Technology

Department: FET Dept of Engineering Design & Mathematics

Partner institutions: None

Field: Engineering, Design and Mathematics

Module type: Module

Pre-requisites: None

Excluded combinations: None

Co-requisites: None

Continuing professional development: Yes

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: This is the introductory module in a suite of systems engineering modules which include in-depth modules on requirements engineering and project management.

Features: Not applicable

Educational aims: See Learning Outcomes.

Outline syllabus: Issues and problems in current engineering practice: Successes and failures in large engineering projects; cost and timescale overrun and quality shortfall; team structures; communities of practice in engineering; scope and use of development and management methodologies.

Organisational context: engineering socio-technical systems; strategies for process improvement; the role of standard process models; human factors in the adoption of new techniques; organisational models and architectures; managing change.

Holistic systems engineering: scope of systems from engineering artefacts to human activity systems and complex socio-technical domains; systems thinking principles; lifecycle from problem formulation through design and manufacturing to maintenance and disposal; problem domain analysis; soft systems methods; systems dynamics.

Systematic systems engineering: user requirements elicitation; requirements validation and verification, derived and system requirements; system modelling and system modelling languages; model-driven development; risk analysis; validation and verification tools; configuration management; system integration; modelling and engineering organisational work structures and flows.

Part 3: Teaching and learning methods

Teaching and learning methods: Scheduled learning
A typical schedule would be five days of lectures / tutorials / workshops, split 3 and 2, with a reflective period out of academia in between. The theory will be immediately applied and assessed in a project assignment, based in the student's own organisation. Teaching will use a mixture of lecture, invited industrial speaker, discussion groups and student presentations. The format may be modified as appropriate to the learners' needs.

Independent learning
There will be pre-work to familiarise students with the concepts to be taught. The

post module assignment will require further independent learning within the workplace.

Module Learning outcomes: On successful completion of this module students will achieve the following learning outcomes.

MO1 Understand issues and problems in current engineering practice

MO2 Build a detailed knowledge of the holistic approach to systems engineering

MO3 Understand the issues surrounding the embedding of systems engineering in an organisation

MO4 Demonstrate the ability to audit current engineering practice

MO5 Identify and implement areas for the application of systems engineering, and select the required methods and tools of systems engineering

MO6 Demonstrate skills to analyse and critique engineering practices

MO7 Show understanding of and the ability to implement the processes and practices of systematic systems engineering

MO8 Be able to scope and represent a problem domain within a wider context

Hours to be allocated: 150

Contact hours:

Independent study/self-guided study = 115 hours

Face-to-face learning = 35 hours

Total = 150

Reading list: The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link

https://uwe.rl.talis.com/modules/UFMFNB-15-M.html

Part 4: Assessment

Assessment strategy: As a short, intensive module, the single assessment will be a project assignment to be submitted after approximately 8 weeks. The assignment

will require demonstration of independent learning of theory and critical reflection of the student's work both in the classroom and during the assignment period outside the classroom. A mix of general and individual written feedback will be provided. The word-length of the assessment is not relevant as the its content will be judged on quality of content and conciseness of expression in order to maximise communication effectiveness and avoid reproduction of taught material, but will normally be expected to be around 3000 to 5000 words.

Assessment tasks:

Final Project (First Sit)

Description: The assignment will require demonstration of independent learning of theory and critical reflection of the student's work both in the classroom and during the assignment period outside the classroom. A mix of general and individual written feedback will be provided.

Weighting: 100 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO4, MO5, MO6, MO7, MO8

Final Project (Resit)

Description: The assignment will require demonstration of independent learning of theory and critical reflection of the student's work both in the classroom and during the assignment period outside the classroom. A mix of general and individual written feedback will be provided.

Weighting: 100 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO4, MO5, MO6, MO7, MO8

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Digital Electronic Systems Engineering {Apprenticeship-UWE} [Frenchay] - Suspended MSc 2023-24

Engineering Competence {Apprenticeship-UWE} [Frenchay] PGDip 2023-24

Engineering Competence {Apprenticeship-UWE} [Frenchay] PGDip 2022-23