1.1 SYSTEMS ENGINEERING MASTER'S DEGREE APPRENTICESHIP

What is a Master's Degree Apprenticeship?

Master's Degree Apprenticeships allow students to achieve a full master's degree whilst developing new skills with their employer. The programmes have been specifically developed by employers, universities, and professional bodies working in partnership in order to develop specific knowledge, skills and behaviours. The programme requirements are managed by the Intitute for Apprenticeships and Technical Eductaion (IFATE).

Who funds the Apprenticeship?

The fees for the degree programme (and associated apprenticeship End Point Assessment) are paid via the employer's Apprenticeship Levy. Smaller employers may be eligible for government funding. You can find more information on the GOV.UK 'Employing an Apprentice' page.

1.1.1 Overview

The Systems Engineering Master's Degree Apprenticeship (SE MDA) comprises Systems Engineering Management MSc and additional work-based learning.

1.1.2 What is the aim of this degree apprenticeship?

The Systems Engineering Management MSc has been specifically designed for the needs of engineering professionals working in the field of complex systems development. The programme encompasses not only the technical approaches needed to build success in this area, but also the management dimension of the relevant processes.

The course will enable you to develop a powerful set of competencies, including:

- Key skills fully aligned with INCOSE (International Council for Systems Engineering) core competencies and appropriate industry standards (e.g. ISO 15288)
- An integrated, interdisciplinary view of complex systems and an understanding of issues associated with their development, deployment, maintenance, upgrade and disposal
- An understanding of different systems' development lifecycle options and processes, and how to optimise these for a given project
- An awareness and understanding of the economic and organisational context within which systems are developed, including the limitations these can impose
- Necessary management skills and an understanding of the relationship between project management and systems development
- The ability to manage risk through an understanding of the ways in which systems, including projects, fail and the factors involved in the creation of reliable and resilient systems.

The specific Knowledge, Skills and Behaviours you will develop are defined in the Intitute for Apprenticeships and Technical Eductaion (IFATE) systems engineer apprenticeship standard available on the Institute for Apprentices website.

1.1.3 Modules in the Programme - MSc Systems Engineering Management

The Systems Engineering Master's Degree Apprenticeship (SE MDA) comprises a Systems Engineering Management MSc and additional work-based learning. The MSc comprises the following modules:

Taught Modules

SPCE0023	Systems Thinking and Engineering Management	15 credits
SPCE0024	Lifecycle Management	15 credits
SPCE0026	Systems Design	15 credits
SPCE0002	Business Environment	15 credits
SPCE0025	Risk, Reliability and Resilience	15 credits
SPCE0003	Project Management*	15 credits

Research Modules

SPCE0029	Systems Engineering in Practice	15 credits
SPCE0030	Systems Engineering Project Concept	15 credits
SPCE0031	Systems Engineering Research Project	60 Credits

*Students without significant project management experience would be expected to select Project Management as the optional module. Otherwise, other modules offered on the UCLse MSc programmes are available.

1.1.4 Programme Structure

A typical structure for the programme has been provided below. During the application process, the tutor and student will discuss any specific requirements or constraints and the structure adapted accordingly. This is a flexible programme with a maximum duration of 5 years, however most aim to complete the programme in 3 years. The typical programme structure is as follows:

Year 1: 3 x Taught Modules (3 x 15 credits)
Year 2: 3 x Taught Modules (3 x 15 credits) and Project Concept research module (15 credits)
Year 3: Systems Engineering in Practice (15 credits) and Research Project (60 credits)

1.1.5 Work-Based Learning

Throughout the programme, apprentices will undertake a number of work-based projects with their employer. These projects must go beyond the apprentice's usual roles and responsibilities, and expose them to new opportunitiers to learn. Apprentices will also develop a portfolio of evidence, capturing pieces of work which demonstrate the competencies they have developed.

It is a requirement of the programme that employers permit the student to spend an average of 6 hours per week undertaking training. The full funding rules can be viewed on the GOV.UK Funding Rules page.

1.1.6 End-Point Assessment (EPA)

The EPA process is fully described in the *End-point Assessment Plan for Systems Engineer Degree Apprenticeship Standard* (https://www.instituteforapprenticeships.org/media/6402/st0107_systems_engineer_degree_l7_ap_forpublication_21092022-edited.pdf)

The apprenticeship comprises three stages: "On programme", "EPA Gateway" and "EPA". These stages are summarised as follows:

On programme (typically 36 months)

"On programme" refers to the period when apprentices are developing the knowledge, skills, and behaviours (KSBs) identified systems engineer occupation standard (https://www.instituteforapprenticeships.org/apprenticeship-standards/systems-engineer-degree/).

During this period, apprentices will be studying towards a MSc Systems Engineering Management, compiling thier portfolio of evidence, and undertaking up to three work-based projects to develop their comptencies. Unless the student has evidence from prior learning (such as an applicable GCSE certificate, grade A-C), they will also be required to undergo training towards English and Mathematics level 2.

The portfolio and work-based projects are to demonstrate that the apprentice has achieved the requisite KSBs. The full requirements of the report and portfolio are identified in the EPA standard.

EPA Gateway
The EPA Gateway is achieved when the following have been completed:

- The employer is satisfied the apprentice is consistently working at, or above, the level of the systems engineer occupational standard.
- The apprentice has achieved a MSc Systems Engineering Management.
- The apprentice has completed up to three work-based projects.
- The apprentice has submitted a portfolio of evidence.
- The apprentice has achieved English and mathematics at Level 2 (as a minimum).

After successfully passing the EPA Gateway, the apprentice will produce a report details the work they undertook on their work-based projects.

EPA (maximum 4 months)
The EPA comprises the following:

- Apprentices must prepare and deliver a presentation on their work-based project(s). After the presentation there will be questions from an independent assessor to ensure the KSBs have been demonstrated.
- Apprentices must attend a professional discussion, underpinned by the portfolio of evidence. During the discussion, the independent assessor will ask open questions to address the applicable KSBs.
- Overall EPA/apprenticeship graded pass, distinction, fail.

Next Steps

If you are interested in joining the apprenticeship, the first step would be to liaise with your line manager and workplace apprenticeship manager, before contacting the programme leader at UCL. At this point the employer will then be asked to agree to UCL's apprenticeship contract (Framework Services Agreement).

Please see our website for further information on this:
https://www.ucl.ac.uk/systemsengineering/study/apprenticeships/systems-engineering-masters-degree-apprenticeship

If you have any further questions, please email: Giles Poulsom, Programme Leader, Systems Engineering Master's Degree Apprenticeship on g.poulsom@ucl.ac.uk.