The LSCITS Engineering Doctorate (EngD) Programme requires students (Research Engineers, REs) to successfully complete a number of optional (elective) taught modules. A wide range of optional modules are available, designed and delivered by senior faculty from the LSCITS Consortium universities of Bristol, Leeds, Oxford, St Andrews and York. This flyer explains the taught credit requirements of the EngD, lists the options available, and then gives three illustrative pathways through the EngD programme.

**Taught Credit Requirements**

Research Engineers (REs) pursuing the LSCITS Engineering Doctorate (EngD) programme are required to successfully complete the taught component of the programme, partly before and partly alongside the main doctoral research work. The taught component comprises modules worth 120 credits overall, consisting of the six compulsory core modules each worth ten credits, and then the student’s choice of optional modules worth another 60 credits in total. Each student is also required to complete a compulsory individual project worth 60 credits, which serves as the literature review and research plan for the student’s doctoral research activity.

**Optional Modules**

The optional modules are structured into two strands: (I) Foundations, Systems and Software Engineering; and (II) Management, Commercial and Business Issues. All LSCITS EngD students are required to take a minimum of 20 credits from Strand II. All optional modules count for 10 credits, except those offered by The University of St Andrews, where all modules are worth 20 credits. The University of York offers LSCITS EngD modules both from its Department of Computer Science (CS) and also from its Management School (MS).

**Optional Modules: Strand I**

- Advanced Concurrency Tools (Oxford)
- Advanced Networks and Distributed Systems (St Andrews)
- Advanced Software Engineering (St Andrews)
- Concurrency and Distributed Systems (Oxford)
- Critical Systems Engineering (St Andrews)
- Design for Security (Oxford)
- Distributed Systems Architectures (St Andrews)
- Foundations of System Safety Engineering (York CS)
- Mathematics for Systems (Bristol)
- Mobile & Multimedia Systems (St Andrews)
- Performance Modelling (Oxford)
- Security Principles (Oxford)
- Software Architecture (St Andrews)
- Software Engineering Mathematics (Oxford)
- Software Implementation (York CS)
- Systems Engineering 1 (York CS)
- Systems Engineering 2 (York CS)
- Software Requirements and Architectures (York CS)
- Software Testing (Oxford)
- Web Services (Oxford)

**Optional Modules: Strand II**

- Advanced Systems Engineering (Bristol)
- Financial Management (York MS)
- Human Resource Management (York MS)
- Management of Risk and Quality (Oxford)
- Process Quality and Improvement (Oxford)
- Software Development Management (Oxford)
- Safety Critical Project Management (York CS)
- Strategic Human Resource Management (York MS)
- Strategic Management & Organisational Change (York MS)
- Operations and Project Management (York MS)
- Organisational Analysis (York MS)

*Notes: certain modules listed here have prerequisite modules elsewhere in the lists; some pairs of modules are mutually exclusive choices; some modules may not be offered in a particular year if demand is inadequate; course regulations and module availability are subject to change.*
Pathway Examples

Fictional accounts of three possible case-history “pathways” through the LSCITS EngD are given here, to illustrate likely scenarios for Research Engineers.

Pathway 1: The BigCo Employee. Jane has worked for BigCo, a large engineering company, for seven years. She joined BigCo straight after leaving college with a Bachelor of Science degree in Physics, and works on developing new IT services and solutions for various key aspects of BigCo’s business. Jane’s managers are keen to retain her as an employee, and appreciate her need for career development, so they pay for her to take part in the LSCITS EngD while keeping her on payroll as a BigCo employee. In the first three years of her time on the EngD, Jane spends a total of twelve weeks attending one-week taught modules: an average of one week every three months (the rest of the time, Jane remains at her BigCo office). After studying the core modules taught at York, Jane finds that she is most motivated by issues in software engineering, and so she completes her EngD tuition by choosing the Oxford Software Development Management and Process Quality and Improvement modules; the St Andrews Software Architecture double module; and the York modules Software Development Management and Systems Engineering. Jane pursues all her doctoral research on-site at BigCo, developing valuable new tools and practices for BigCo. After her EngD studies are concluded, Jane remains with BigCo and increasingly finds herself in leadership roles within the company. In a quite remarkable coincidence, Jane’s brother John also successfully completed the LSCITS EngD, having previously worked for several years as a government employee. Like Jane, John stayed on salary throughout his EngD studies, and remained with his public-sector organisation after he graduated from the EngD.

Pathway 2: The Continuing Student. Anil has greatly enjoyed his undergraduate degree in Computer Science. He is keen to study for a doctoral-level degree, but has little interest in pursuing an academic research career, and so would like an alternative to a traditional academic PhD programme. Anil’s ultimate aim is to work in a management position in a company where technology innovation plays an important role. Attracted by the industrial focus of the LSCITS EngD, Anil successfully applies for an EPSRC-funded LSCITS EngD studentship, working with an industrial sponsor called SME.com, a medium-sized software systems consultancy company. Anil is able to take all the core modules in his first year on the EngD, and he elects to concentrate in his second year on non-technical optional modules, taking four courses offered by York Management School: Strategic Management and Organisational Change; Operations and Project Management; Organisational Analysis; and Human Resource Management. He also takes the Oxford Software Development Management module and the Bristol Advanced Systems Engineering module. For his doctoral research, he spends almost all of his time working alongside a team at SME.com, and interacting with SME’s clients. Anil’s doctoral research project explores the interplay between social network dynamics in multi-organisation project teams and the design and maintenance of LSCITS. Anil’s industrial collaborators at SME.com value his participation in their team, and when Anil graduates with an EngD after four years, they decide to offer him a position on their staff.

Pathway 3: A Change of Career. Siu-Ming studied Business Computing as an undergraduate and then moved straight into an MBA. For the last four years he has worked for a major management consultancy company, mainly on public-sector IT projects. For various reasons, he has decided that the time has come for a change of career path. He resigns from his old job to take up an EPSRC-funded studentship on the LSCITS EngD, and through his professional contacts he negotiates a new industrial sponsor: a major IT consultancy company involved in introducing advanced IT systems into public-funded provision of health and social care. After completing the six core modules, Siu-Ming selects the two Oxford modules Process Quality and Improvement and Management of Risk and Quality; the St Andrews module on Critical Systems Engineering, and the two York modules Safety-Critical Project Management and Software Testing for Safety Critical Systems. His doctoral thesis is a portfolio of related papers addressing issues in the adoption, use, and extension of high-integrity software engineering methods in large-scale health and social care IT applications. Upon completion of his thesis Siu-Ming and two fellow LSCITS EngD students establish a start-up company, offering specialised technology development and consultancy in safety-critical public-sector IT systems.

For further details see the website at: www.lscits.org
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