

Engineering Gateways degrees

Bachelors and MSc Professional Engineering

A guide for Higher Education Institutions

*Flexible work-based pathways to being registered as a
professionally qualified engineer*

CONTENTS

1. INTRODUCTION

- 1.1 Engineering Council
- 1.2 Project aims and achievements
- 1.3 Documentation structure
- 1.4 Overview of the framework
- 1.5 Incorporated and Chartered Engineer status

2. WORK-BASED LEARNING & UK-SPEC

3. BACHELORS AND MSC PROFESSIONAL ENGINEERING DEGREES

- 3.1 Model
- 3.2 Framework
- 3.3 Entry and exit points
- 3.4 Learning contract
- 3.5 Registration

4. ACCREDITATION

5. THE LEARNING CONTRACT APPROACH TO WORK-BASED LEARNING

- 5.1 Key features and benefits
- 5.2 How does the learning contract work?
- 5.3 Review
- 5.4 Learning activities
- 5.5 Assessment

www.engc.org.uk/education--skills/engineering-gateways

This document contains material which is © copyright Engineering Council and Stage 1 Project Partners and may be reproduced free of charge, providing that the reproduction is accurate and the context not misleading.

First published August 2008. Last updated July 2014.

1. INTRODUCTION

1.1 Engineering Council

The Engineering Council is the UK regulatory body for the engineering profession and holds the national registers of Engineering Technicians (EngTech), Information and Communications Technology Technicians (ICTTech), Incorporated Engineers (IEng) and Chartered Engineers (CEng).

In addition, the Engineering Council sets and maintains the internationally recognised standards of professional competence and ethics that govern the award and retention of these titles. This ensures that employers, government and wider society - both in the UK and overseas - can have confidence in the knowledge, experience and commitment of registrants.

The Engineering Council works closely with employers and the education sector to ensure that the standards of competence needed to practise engineering are understood, and academic qualifications to underpin these are developed and, where possible, accredited. It works with 36 professional engineering institutions (PEIs), some of which it has licensed to assess candidates for inclusion on its Register of professional engineers and technicians, and to accredit academic programmes and professional development schemes.

The Engineering Gateways Professional Engineering degree framework was developed initially with the support of three PEIs and four universities, as part of a government-funded initiative, Gateways to the Professions¹. More universities and PEIs are now involved, and up-to-date lists of participants and employers are available on the website. Degrees designed according to this framework provide a pathway to registration through work-based learning.

This guide is aimed at principally at HE providers (HEIs) who wish to develop Engineering Gateways-type degrees that meet the UK Standard for Professional Engineering Competence (UK-SPEC). This guide forms part of the Engineering Gateways Toolkit available on the website² which focuses on how to go about developing such degrees, including exemplar materials, advice from existing providers and reference material.

1.2 Project aims and achievements

The award of funding to the Engineering Council was to develop a framework for flexible pathways into and through Higher Education, leading to the award of a degree as well as eligibility to be considered for the award of a professional engineering qualification. The project developed the existing successful work-based learning models run by Kingston University to provide routes to professional recognition. The work-based programmes were intended to appeal to working engineers who wish to become registered as Incorporated Engineer (IEng) or Chartered Engineer (CEng), including those working in smaller organisations, but are unwilling or unable to attend university-based higher education for various reasons, such as the prospect of time away from work and additional debt.

The lead partner for the work was the Engineering Council, with Kingston University being the lead academic partner. The other academic partners during the development phase were the University of Hertfordshire, Northumbria University and Staffordshire University. The Institution of Engineering & Technology (IET), the Institution of Mechanical Engineers (IMechE) and the Royal Aeronautical Society (RAeS) were the initial participating PEIs. PEIs are important stakeholders, in particular by supporting this approach and by advising individuals about their proposed learning and development plans at an early stage. A Steering Committee included representatives from HEIs, PEIs, employers and Sector Skills Councils.

¹ Gateways to the Professions, initially funded by DfES then DIUS, from 2006-2008. ² Available September 2012.

The five year project was funded for the first two years (2006-2008). The project's principal aims were to:

- develop and pilot a model pathway to professional registration of engineers in which higher education and professional development are combined through a work-based approach
- minimise the level of debt incurred by individuals whilst at the same time maximising their employment and earnings potential
- attract to the profession those who might not otherwise have aspired to professional status
- engage employers in the development of the profession

Since the project's inception, a framework for work-based degree programmes has been developed and is being implemented by a growing number of participating HEIs. There have been encouraging interim and five-year reviews of the engineering gateways initiative; graduates have successfully achieved professional registration; and a toolkit for HEIs interesting in adopting the practice has been published. Further details about all of these are available on the website.

The Engineering Council and the other participating organisations continue to support the engineering gateways framework.

1.3 Documentation structure

This guide describes the framework for the structure and organisation of the work-based Bachelors and MSc Professional Engineering degree programmes. HEIs delivering the programme must ratify a Protocol with the Engineering Council before starting to market the degree and adhere to the framework, whilst interpreting it for their own specific audiences and local needs. Each HEI will be responsible for developing its own operating manual that describes its processes in more detail.

The guide should be read as part of the Engineering Gateways Toolkit for Universities, developed by a Practice Transfer Partnership led by the Engineering Council and funded by the National HE STEM Programme.

1.4 Overview of the framework

The individually tailored and flexible work-based degree programmes are designed around the UK Standard for Professional Engineering Competence (UK-SPEC) and integrate learning in the workplace with supervised work-based professional development. www.engc.org.uk/professional-qualifications/standards/uk-spec

Each programme is designed to enable individuals to gain sufficient knowledge and understanding, at the appropriate Bachelors or Masters level, and concurrently to develop standards of competence for IEng or CEng registration, without the need to take significant time away from work.

The regulated and structured work-based learning and professional development elements mean that successful completion of the programme results in the award of a degree, and the individual should also be well prepared to undertake a professional review for IEng or CEng.

PEIs have been involved from the project's inception and an aspiration is for the degrees to be considered for accreditation once there is sufficient output.

The degree programme matches participants' learning to QAA Bachelors (Level 6) or Masters (Level 7) descriptors and the UK-SPEC degree learning outcomes, and participants' development

of competence to the UK-SPEC standard for IEng or CEng. Engineers enrolling on the programme agree a 'learning contract' with an academic supervisor from their university or college and their employer. This sets out an individual programme of learning and development of professional competence. Based around the engineer's work, it therefore also meets the needs of the employer. Individuals enrolling for the degree will need to join a relevant professional engineering institution (PEI). Participating PEIs have agreed to provide individuals with feedback about their proposed learning and competence development plans, and are listed on the website.

1.5 Incorporated and Chartered Engineer Status

In order to be registered as an Incorporated Engineer (IEng) or a Chartered Engineer (CEng), a candidate needs to demonstrate within a Professional Review and Interview undertaken by a licensed PEI that the UK-SPEC standards of competence and commitment have been met.

The competence and commitment standard for professional qualification is underpinned by knowledge and understanding. Information about the exemplifying academic qualifications for IEng and CEng is available on the Engineering Council's website:

<http://www.engc.org.uk/professional-qualifications/incorporated-engineer/about-incorporated-engineer>

<http://www.engc.org.uk/professional-qualifications/chartered-engineer/about-chartered-engineer>

It is important to check any claims for the accredited status of existing degree qualifications using the Engineering Council's searchable database ACAD www.engc.org.uk/courses. Note that the academic standard for CEng was raised to Masters level in 1999. Individuals aspiring to CEng who hold an accredited Bachelors degree from before this change do not require a Masters level qualification. Precise dates vary according to accreditation periods and the course record on ACAD will indicate if further learning to Masters level is required.

To check the IEng-related status of particular academic qualifications, please check the Engineering Council's website as some are date-specific. <http://www.engc.org.uk/professional-qualifications/incorporated-engineer/about-incorporated-engineer>

2. WORK-BASED LEARNING & UK-SPEC

- 2.1** Work-based learning can provide a means of concurrently acquiring and utilising underpinning knowledge, understanding and skill-sets in order to demonstrate competence.
- 2.2** It is a common mis-understanding that work-based learning contributes first to an individuals' education and then to professional development. Under UK-SPEC, the order is not prescribed; education and professional development may occur concurrently.
- 2.3** Where an engineering gateway work-based degree is validated by a university as meeting its academic requirements for the award of a degree, then once there is sufficient output, that programme may be considered by a PEI for accreditation for the purposes of IEng or CEng registration. This is explained in the Protocol for Registration between an individual PEI and the Engineering Council. Note that a PEI may include specific conditions.
- 2.4** MSc participants will usually hold an accredited BEng degree and through this programme, they may achieve the necessary further learning to Masters level. Potential participants without such an initial qualification may participate subject to an assessment of their existing academic qualification(s) by the PEI of which they are a member.
- 2.5** Individuals must be a member at the appropriate grade (such as graduate) of a PEI relevant to their discipline and areas of work. This opens the way for them to seek advice and guidance from their PEI, should they wish to. A PEI may be able to put an individual in

touch with a mentor to assist them through the process and help them identify where their competence requires development.

- 2.6** In some cases employers may use occupational standards or competence frameworks in determining job descriptions and staff development, which may assist in developing a competence profile. These methods alone, however, do not normally lead to an academic award.

3. BACHELORS AND MSC PROFESSIONAL ENGINEERING DEGREES

3.1 Model

- Learning and professional development are integrated and rooted in workplace activity development
- The individual is enrolled on an engineering gateways Bachelors or MSc Professional Engineering degree offered by a participating university
- An initial audit of qualification and experience is undertaken
- Negotiated learning, a learning contract or agreement and a development plan are key elements of the individual's programme
- The individual is supported by an academic supervisor and a workplace mentor and may call on the PEI of which they are a member for advice and support
- The employer has direct input to the individuals' further learning and professional development towards IEng or CEng

Further guidance on mentoring and assessment is available at

www.engc.org.uk/media/48077/120404mentoringassessmentguidancerevised.pdf

3.2 Framework

The principles associated with the degree are:

- This does not replace other pathways to IEng or CEng – it is an additional pathway
- The HEI ratifies a Protocol with the Engineering Council that sets out in broad terms roles and responsibilities
- Work-based learning: the programme provides the individual with the opportunity to acquire the underpinning knowledge, understanding and skills necessary to demonstrate the UK-SPEC thresholds, without the need to attend a formal full-time taught programme.
- There is no change in the required standard (UK-SPEC) or rigour that is expected of other programmes and pathways
- The employer must be supportive and be able to provide the individual (employee) with work at the appropriate level to enable development of knowledge and understanding to the appropriate level and demonstration of competence to IEng or CEng standard

- The award of CEng status depends on the usual procedure – professional review and interview – and individuals must not assume that it is guaranteed solely on the basis of the award of the degree
- Engineering Council regulations allow for flexible provision
- The intention is for the pathway to fit with existing processes as far as possible
- The individual must be prepared to play a key role in their learning, and the development and design of their programme
- The programme conforms with QAA Level 6 (Bachelors) or Level 7 (Masters) descriptors and the relevant UK-SPEC learning outcomes www.engc.org.uk/ahep
- Each programme will be validated by its delivering HEI and will be subject to all of that HEI's quality assurance processes
- Accreditation of degrees is outcomes-based and therefore accreditation may be considered once there is an output, though this is not guaranteed and individuals should not assume this.

3.3 Entry and exit points

The programme is for those already in employment in the engineering profession, in a role providing appropriate opportunities to develop the necessary knowledge, understanding, skills and standards of competence.

Entry gateway: with the assistance of the academic supervisor and workplace mentor, each individual undertakes a Professional Development Audit (PDA). This PDA is a reflective examination and assessment of the individual's education, qualifications, experience and competence upon enrolment. This is then used to:

- undertake a competence mapping exercise to determine the goals needed to address the difference in current competence and IEng or CEng standards set out in UK-SPEC
- define the scope of their Bachelors or MSc Learning Contract or Agreement
- provide a record of how the individual intends to meet the required standards of knowledge, understanding and professional competence.

A record of the individual's Learning Contract/Professional Development Audit (PDA), or an equivalent Entry Gateway record, is kept. Once this initial documentation is complete, the HEI notifies the appropriate PEI that its member is a participant on the Bachelors or MSc Professional Engineering programme and provides evidence such as the Learning Contract and the PDA to demonstrate how the individual proposes to meet the UK-SPEC threshold competences. The PEI will review the documentation and provide a broad overview of whether the proposals appear appropriate and look likely to meet the PEIs' requirements. The PEI may suggest modifications or request clarification.

The individual then works to achieve the learning and competence-building goals, knowing that the completion of the Learning Contract is likely to meet the UK-SPEC thresholds. Some PEIs have published frameworks for recording the development of professional competence and these can be completed alongside the Learning Contract.

Exit gateway. The programme finishes with an exit gateway. This is an overall evaluation of the individual's achievement of their learning goals and includes a UK-SPEC competence analysis.

3.4 Learning Contract

The Learning Contract (or equivalent document) is a work plan of how an individual can gain knowledge and competence whilst meeting company objectives. It is written in the form of a sequenced professional development plan linked to the company's activities.

The Learning Contract is designed to provide goals whereby the individual may demonstrate the required levels of underpinning knowledge, understanding and skills, as mapped against UK-SPEC. It also ensures that individuals, assessors and reviewers understand:

- what additional learning takes place and what credits are awarded
- how it is to be achieved and assessed
- how the activities meet the competence statements, and
- the estimated date of achievement when the participant can reasonably expect to be successful, subject to completion of the intended learning outcomes.

Alongside the Learning Contract, there should be completion of a competence mapping document and/or completion of any PEI-specific professional development records. Some HEIs may include a requirement for a reflective c.v. The participant should also be made aware of any specific additional requirements of their intended PEI, know how to achieve registration and know that step-by-step help is available.

Part of the requirement for participation is employer support, which usually includes a named company mentor. Further details about the Learning Contract are given in Section 5.

3.5 Registration

After being awarded the Bachelors or MSc Professional Engineering, and only when ready, the participant is eligible to apply for professional registration. The advice of a mentor is key to deciding when an individual is ready. The normal PEI process of Professional Review and Interview takes place. The work-based Learning Contract and its associated evidence of learning and professional development form the basis of a submission to the PEI's Professional Review.

It is important to emphasise that, as for all candidates for professional review, there is no guarantee of professional registration, even for those awarded an engineering gateways degree. What the programme does offer however is a process of committed, step-by-step help throughout, a work-friendly means of achieving additional learning and a way of having competences assessed *en route* to the participants' Professional Review and Interview.

The Protocol that is signed between participating PEIs and the Engineering Council provides assurance to the individual that by following this model of integrated education and supervised work-based professional development, they will not be precluded from applying for Professional Review via the Individual Route. Once sufficient participant output is available, the PEI will review this and consider conferring accreditation on the Professional Engineering programme.

The protocol is available on the website. www.engc.org.uk/engineering-gateways/learning-framework/registration-protocol

The pathway depends on the degree in Professional Engineering running alongside the PEI process. A process map including roles and responsibilities is available at <http://www.engc.org.uk/engineering-gateways/learning-framework/process-map>.

4. ACCREDITATION

In conventional taught programmes, the academic content in the form of general and specific learning outcomes, is assessed against UK-SPEC and may be subsequently accredited by a PEI. As ratified in the Protocol signed between each PEI and the Engineering Council, once sufficient participant output is available, the PEI will review this and consider conferring accreditation on the Professional Engineering programme.

The key reference points are:

- the learning outcomes for Bachelors and Masters degrees published by the Engineering Council
- the relevant QAA's level descriptors

It may also be useful to refer to the IEng or CEng standards of competence.

The HEI uses a Learning Contract and mapping mechanism to ensure that every individually designed Learning Contract goal or specified module maps against the accredited learning outcomes and hence UK-SPEC.

It is the learning outcomes shown in the individual HEI's operating manual that are validated by the HEI and may be accredited by a PEI.

Individual HEI's Operating Manuals and any further documents that demonstrate compliance with the principles of this Guide and UK-SPEC may form part of the evidence submitted for accreditation. Conferring accreditation on the programme would then enable those graduates who met in total the exemplifying academic qualifications for IEng or CEng to be dealt with via the standard route. It is important that individuals enrolling on the degree programmes are given accurate information about accredited status.

5. THE LEARNING CONTRACT APPROACH TO WORK-BASED LEARNING

The purpose of a Learning Contract is to set out what learning goals are to be achieved and/or modules are to be successfully completed as a result of work-based activities, and the evidence that will demonstrate the required standard of competence. It is developed together by the employee, an academic supervisor and professional mentor/advisor. Involvement of the employer is key as they need to confirm that they will be able to provide the participant with appropriate and sufficient experience.

The work-based learning approach generates company-specific knowledge, experience and responsibility that provide additional learning, knowledge application and skills. It enhances underpinning knowledge and competences for the individual. The Learning Contract provides a framework that enables the learning experience to be tailored specifically around work and the requirements of a PEI. A company-critical work programme is set out in the form of learning objectives and project milestones. This may consist entirely of individual learning goals, based on current and future work activities, or it may include some taught modules. It may also be possible to gain credit from courses attended in the past, as well as previous work-based activities, provided they meet the requisite QAA level descriptor.

5.1 Key Features & Benefits

Key features/benefits of the work-based Learning Contract are:

- flexible, individually designed programmes, unique to each participant's needs and situation
- recognition and accreditation of appropriate previous learning
- option to attend taught modules
- access to university learning resources
- supervisor support throughout the programme

For the individual, the Learning Contract offers a mechanism that allows an organisation's workplace activity to be used to improve his or her skills and knowledge in order to complete a degree programme and potentially meet PEI requirements.

An additional potential benefit is knowledge exchange. Companies need to innovate, but often cannot afford the necessary specialist skills or resources. This programme creates the means by which knowledge can be exchanged between HEIs and industry.

The learning outcomes, the activities that enable them to be achieved, the method of demonstrating that additional learning has taken place and the method of assessment are defined at the outset in the Learning Contract, thus giving the individual a clear indication of what has to be achieved. Assessment is on-going and formative, thereby giving the candidate vital feedback on progress.

5.2 How does the Learning Contract work?

The academic supervisor normally works with the employer and individual to review competence and achievements to date and identify and define suitably challenging opportunities, through which the individual will gain sufficient learning at the appropriate level to achieve a degree.

Together they agree the Learning Contract and ensure that it meets the individual's needs, the QAA level requirements and any necessary regulatory requirements. Under agreed supervision, the candidate completes the work-based tasks.

The goal evidence or module is assessed, all evidence of learning is assembled, a reflective summary is written and presented and, based on this evidence, decisions are made as to the academic quality of the work.

Details of each HEI-specific Learning Contract are included in its Operating Manual.

5.3 Review

Within a work-based Learning Contract, the learning outcomes record is crucial. It defines the outcomes to be met, the activities required to meet them and what assessment criteria and mode of assessment will be used.

To ensure confidence, the Learning Contract is usually reviewed by a subject expert. An independent briefer may also be involved and there may be a rigorous approval process operated by the HEI's Board of Study. The candidate then knows at the outset what is required during the programme.

5.4 Learning activities

As well as structured learning through work, these could include validated university examined Bachelors or Masters level modules, company courses, validated professional courses, company projects, learned papers and a reflective summary.

5.5 Assessment

The aim, where possible, is to use evidence of learning generated in the workplace to confirm that sufficient additional learning to Bachelors or Masters level has taken place and been applied. University module examinations show the acquisition of knowledge but authenticated work outcomes show application. Potentially this may lead to fulfilment of PEI requirements in regard to both underpinning knowledge and understanding and competence.

Achievement is assessed by the supervisor (and usually the second assessor), according to the university's regulations. An external examiner is in place for each award. The programme concludes with examiners reviewing the further learning portfolio and summary, establishing authenticity and ensuring fluency in the studied field.

Participants will be eligible to apply for a Professional Review once they have completed their work-based programme according to their individual Learning Contract, and are able to demonstrate their IEng or CEng competence.