

Next Generation Higher National Unit Specification

Engineering Project Management (SCQF level 8)

Unit code: J7BS 48
SCQF level: 8 (16 SCQF credit points)
Valid from: session 2023–24

Prototype unit specification for use in pilot delivery only (version 1.0) November 2023

This unit specification provides detailed information about the unit to ensure consistent and transparent assessment year on year.

This unit specification is for teachers and lecturers and contains all the mandatory information required to deliver and assess the unit.

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Unit purpose

This unit provides learners with the broader skills they need to be successful in engineering workplaces. This includes developing knowledge of effective management techniques and personnel supervision. Learners also develop project management skills, tools and techniques — attributes that are often identified as skills gaps in engineering and engineering services companies.

Learners develop their ability to self-manage and hone their skills in creative problem solving as they identify solutions to real-world problems.

The unit introduces learners to a variety of management and project management topics, such as:

- ◆ management styles and approaches
- ◆ common business functional areas
- ◆ operations management
- ◆ continuous improvement processes
- ◆ the iron triangle of project management
- ◆ risk and risk management
- ◆ value management
- ◆ relationship management
- ◆ stakeholder management
- ◆ project evaluation
- ◆ 'last mile' risk

This unit is suitable for learners who want to develop key engineering skills to support a career in engineering. It is particularly relevant for learners who want to go on to have management roles in engineering or engineering service companies.

Entry to the unit is at your centre's discretion. However, we recommend that learners have one or more of the following:

- ◆ broad knowledge and understanding of engineering processes and theorems at SCQF level 7, for example completed units related to professional practice in engineering
- ◆ an understanding of manufacturing principles and project and risk management at SCQF level 7, for example in subjects related to manufacturing principles, and project and risk management
- ◆ relevant or equivalent workplace experience or SCQF level 7 qualifications, for example a Higher National Certificate (HNC) in Engineering Systems

The unit provides learners with the knowledge and skills they need to progress to further study, or employment in a wide range of engineering industries.

Unit outcomes

Learners who complete this unit can:

- 1 analyse project management concepts, tools and standards, and demonstrate a knowledge of total quality management (TQM) as applied to an engineering or engineering service industry
- 2 analyse and apply risk management techniques in project management, including an analysis of security risks and effective mitigation methods, and budget risk and control
- 3 analyse stakeholder needs and translate them into success criteria, while managing project stakeholders and maintaining effective project communications
- 4 evaluate, report and close a project using recognised project management methods and tools as applied to an engineering or engineering service industry

Evidence requirements

We recommend you assess the unit holistically, with assessments covering two or more outcomes. You can also assess on an outcome-by-outcome basis.

Evidence should principally consist of written and/or oral recorded evidence from case study review reports and mini projects, gathered into a single portfolio or e-portfolio.

Examples of suitable evidence include:

- ◆ evidence of completing an individual project or projects, for example photographs and reports
- ◆ evidence of contributing to and completing a group project or projects, for example photographs and reports
- ◆ interpretation and evaluation of case studies
- ◆ personal reflections and personal evolution reports

Learners must provide evidence in an appropriate format. This can be written, oral, video, electronic (for example, a blog), product (for example, photos) or another format.

In outcome 2, learners develop knowledge of a range of continuous improvement techniques and quality initiatives, but they only need to provide evidence of the application of one of these. They must include their justification for selecting this method.

Learners generate evidence under both supervised and unsupervised, open-book conditions.

Knowledge and skills

The following table shows the knowledge and skills covered by the unit outcomes:

Knowledge	Skills
<p>Outcome 1 Learners should understand:</p> <ul style="list-style-type: none"> ◆ management styles and approaches ◆ common business functional areas and their interrelationships (for example, marketing, sales, finance, production, quality assurance and quality control) ◆ operations management; operating systems; input–process–output model; operating decisions and objectives; the value/supply chain; vertical/horizontal integration ◆ operations strategies: <ul style="list-style-type: none"> — content — process — order winners — order qualifiers — trade-offs ◆ applications of continuous improvement techniques and quality initiatives, such as: <ul style="list-style-type: none"> — Kaizen — quality function deployment (QFD) — Six Sigma — Lean ◆ the iron triangle of project management 	<p>Outcome 1 Learners can:</p> <ul style="list-style-type: none"> ◆ get expert advice from external expert sources and teams as needed ◆ identify operating decisions ◆ apply capacity management techniques to a given project ◆ define project deliverables and the standards and quality criteria applied to their production ◆ create a plan for each project stage, scheduling tasks and resources, and identifying milestones ◆ update plans, with reasons for changes, to reflect actual activity and progress for two reporting periods ◆ explain the purpose of one of the scheduled quality reviews, including who should attend and why

Knowledge	Skills
<p>Outcome 2 Learners should understand:</p> <ul style="list-style-type: none"> ◆ risk, uncertainty and the engineering industry ◆ risk and procurement projects ◆ the risk management framework ◆ sources, events and effects of project risk ◆ tools and techniques of risk management ◆ risk response and mitigation ◆ vendor risk management and the procurement process ◆ the basics of value management ◆ value engineering and function analysis 	<p>Outcome 2 Learners can:</p> <ul style="list-style-type: none"> ◆ create a project risk log, including: <ul style="list-style-type: none"> — description of project risks — allocation of risk owners — assessment of probability and impact of risks — actions to minimise likelihood of risks or contain their impact ◆ create logs to record, monitor and respond to changes and issues in a consistent way ◆ provide updated logs and status reports on risks, changes and issues over two reporting periods ◆ identify sources, amounts and timings of funding to cover project costs, with your guidance ◆ identify and justify appropriate cost headings for the project budget ◆ apply estimating and forecasting techniques to create reliable projections for project spend
<p>Outcome 3 Learners should understand:</p> <ul style="list-style-type: none"> ◆ management of project relationships ◆ internal stakeholder management ◆ external stakeholder management 	<p>Outcome 3 Learners can:</p> <ul style="list-style-type: none"> ◆ maintain effective project communications ◆ develop a stakeholder map to identify key stakeholders and their project involvement ◆ develop a framework for project communications presented as a mapping of stakeholders against channel of communication, indicating regularity, to whom and from whom

Knowledge	Skills
<p>Outcome 4 Learners should understand:</p> <ul style="list-style-type: none"> ◆ the purpose of evaluating a project ◆ last mile risk and its importance ◆ how to use project evaluation in feedforward and lessons learned 	<p>Outcome 4 Learners can:</p> <ul style="list-style-type: none"> ◆ explain how to ensure that all products from a project have been delivered and accepted ◆ identify lessons learned from a project and describe the means by which they are distributed for the benefit of others ◆ create an end-of-project evaluation report that details how well the project has performed against its original and revised business cases and plans ◆ describe and justify any follow-on actions and recommendations for further development ◆ provide a plan for a post-project review ◆ create a list of all records of a project, and recommend suitable methods of storage and retrieval

Meta-skills

Throughout the unit, learners develop meta-skills to enhance their employability in the engineering sector.

Self-management

Learners develop the meta-skill of integrity as they complete their reflective reports.

Social intelligence

Learners develop the meta-skill of collaborating through group projects.

Innovation

Learners develop the meta-skill of sense-making as they consider multiple aspects of engineering systems.

Literacies

Numeracy

Learners develop numeracy skills by performing engineering calculations.

Communication

Learners develop communication skills by studying the course material and engaging with their lecturers and other learners. They develop written communication skills by writing academic reports and reflective essays.

Digital

Learners develop digital skills and computer literacy by accessing the course material through a virtual learning environment (VLE), collaborating online and keeping an e-portfolio.

Delivery of unit

This unit is a mandatory unit in the Higher National Diploma (HND) in Engineering. The framework includes mandatory and optional units, and you can tailor the selected combination of units to specific engineering pathway needs.

You can deliver this unit through taught content to develop theoretical knowledge and skills, with learners then putting it into practice in group and/or individual projects.

You should design projects to allow learners to develop and apply the skills they have learned in other units relevant to their course of study.

While the exact time allocated to the unit is at your centre's discretion, the notional design length is 80 hours.

The amount of time you allocate to each outcome is also at your discretion (particularly as we recommend a holistic approach). We suggest the following distribution of time, including assessment:

- Outcome 1** — Analyse project management concepts, tools and standards, and demonstrate a knowledge of total quality management (TQM) as applied to an engineering or engineering service industry
(28 hours)
- Outcome 2** — Analyse and apply risk management techniques in project management, including an analysis of security risks and effective mitigation methods, and budget risk and control
(20 hours)
- Outcome 3** — Analyse stakeholder needs and translate them into success criteria, while managing project stakeholders and maintaining effective project communications
(14 hours)
- Outcome 4** — Evaluate, report and close a project using recognised project management methods and tools as applied to an engineering or engineering service industry
(18 hours)

We also expect learners to work on their projects outside of class time.

Additional guidance

The guidance in this section is not mandatory.

Content and context for this unit

This unit allows learners to demonstrate the technical knowledge and skills they have developed in other units by applying them to, and successfully completing, a project.

It also gives them the opportunity to further develop their own non-technical and meta-skills by successfully completing and evaluating an engineering project of a level of complexity appropriate to HND, and in an area relevant to their core topic of study.

Approaches to delivery

You do not have to deliver the outcomes sequentially. We suggest you begin by holistically teaching the elements of outcomes 1 to 3 that learners need to know to start their projects. Then, deliver the remainder of outcomes 1 to 3 as learners work on their projects.

We recommend you deliver outcome 4 towards the end of the unit, as it covers closure and project evaluation. You may feel it is appropriate to deliver this outcome when the rest of the unit and all project work is fully complete.

Approaches to assessment

Assessment evidence for the unit is a portfolio of work. Learners generate evidence largely through a combination of case study reviews and mini projects. For example, you could use two case studies, one looking at an example of poor project management, and another looking at an example of effective project management. The mini projects could consist of one or more individual projects in which learners create a product under the direction of the assessor, and/or one or more group projects where learners work together to create a larger product. In both instances, learners should manage the project and provide evidence of decisions they have made. Learners should also provide evaluative reflective pieces, such as journal entries, to identify what they have learned.

Equality and inclusion

This unit is designed to be as fair and as accessible as possible with no unnecessary barriers to learning or assessment.

You should take into account the needs of individual learners when planning learning experiences, selecting assessment methods or considering alternative evidence.

Guidance on assessment arrangements for disabled learners and/or those with additional support needs is available on the assessment arrangements web page:

www.sqa.org.uk/assessmentarrangements.

Information for learners

Engineering Project Management (SCQF level 8)

This information explains:

- ◆ what the unit is about
- ◆ what you should know or be able to do before you start
- ◆ what you need to do during the unit
- ◆ opportunities for further learning and employment

Unit information

This unit provides you with fundamental knowledge and skills you need to study for the Higher National Diploma (HND) in Engineering.

You study some of the key project management principles found in all project management environments, particularly those within engineering disciplines.

Unit outcomes

On completion of the unit, you can:

- 1 analyse project management concepts, tools and standards, and demonstrate a knowledge of total quality management (TQM) as applied to an engineering or engineering service industry
- 2 analyse and apply risk management techniques in project management, including an analysis of security risks and effective mitigation methods, and budget risk and control
- 3 analyse stakeholder needs and translate them into success criteria, while managing project stakeholders and maintaining effective project communications
- 4 evaluate, report and close a project using recognised project management methods and tools as applied to an engineering or engineering service industry

Outcome 1 introduces you to the fundamental concepts of project management, along with the tools and techniques used to ensure the quality of a project is properly managed and maintained. This gives you the foundation you need to successfully complete projects.

Outcome 2 looks at the key concept of risk and risk management. This includes not just physical and safety risk, but also looks at other risks — such as financial or supply chain issues — that can define a project's likelihood of success.

Outcome 3 introduces the concept of stakeholder management, and the vital skill of analysing stakeholder needs and translating them into the criteria that decides if a project is successful.

Outcome 4 looks at closing a project, and evaluating its success and lessons that can be applied to future projects. This is both to ensure that the project is completed successfully, and to give the opportunity to increase the chances of success in all future projects.

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You are assessed by written and/or oral recorded evidence from case study review reports and mini projects, which you collate in a portfolio or e-portfolio. This can include reports on group or individual projects you complete, photographic evidence of any products you create and recorded testimony of stakeholders. It must also include reflection and evaluation to demonstrate what you have learned in the unit, including lessons learned that you can apply to future projects.

Meta-skills

Throughout the unit, you develop meta-skills to enhance your employability in the engineering sector.

Meta-skills include self-management, social intelligence and innovation.

Self-management

You develop the meta-skill of integrity as you complete your reflective reports.

Social intelligence

You develop the meta-skill of collaborating through group projects.

Innovation

You develop the meta-skill of sense-making as you consider multiple aspects of engineering systems.

Administrative information

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Superclass: AG

History of changes

Version	Description of change	Date

Note: please check [SQA's website](#) to ensure you are using the most up-to-date version of this document.