

MSc in Engineering Management Programme Specification

Academic Year:	2023-2024
Degree Awarding Body:	University of Bradford
Partner(s), delivery organisation or support provider (if appropriate):	
Final and interim award(s):	[Framework for Higher Education Qualifications (FHEQ) level 7] MSc Engineering Management Postgraduate Diploma Engineering Management Postgraduate Certificate Engineering Management
Programme accredited by (if appropriate):	
Programme duration:	12 months full-time (September intake) 12 months full-time (January intake)
QAA Subject benchmark statement(s):	Engineering (QAA 2015), Business and Management (QAA 2019)
Date last confirmed and/or	March 2023

Introduction

Engineering activities are critical in the design and creation of products and services, adding value to national economies and also contributing with social prosperity. The engineering profession serves people by creating technical solutions to satisfy their needs, creating and managing the humankind environment of the modern and future world. Thus, the engineering profession requires well-qualified and motivated professionals to lead the design and implementation of more sustainable solutions. Future leaders in the engineering profession need to develop their managerial skills to apply more effectively their technical knowledge. Studying at the University of Bradford will be a foundation for life, personal and professional, aimed at developing an advanced understanding of managerial principles and competence in their application to support the development of technical solutions to engineering

problems. Furthermore, as part of this journey, you will develop a wide range of personal and professional skills.

Our MSc programme in Engineering Management will help you to develop and apply relevant management skills to complement and support your engineering knowledge and experience, enhancing your career prospects. This combination of skills will help you to further develop your engineering career and to progress into a senior or managerial position.

In this way, you will develop the skills to apply decision-making and manage engineering activities, operations, and transformation initiatives to address technological and sustainability challenges in organisations, benefiting both industry and society. The themes of sustainability, circular economy and industry 4.0 are embedded along different modules in our programme to align it with the contemporary and future needs and challenges of industry.

The MSc in Engineering Management will offer the opportunity to recent graduates and aspiring engineers from different engineering disciplines to further develop and apply management knowledge and skills to help them accelerating their career progression into a senior or managerial position. In addition, our programme will also be suitable and appropriate for engineering professionals with more experience and at different points of their career to learn and apply management principles, toolkits and skills in wide ranging engineering context and environment, enhancing their careers prospects. It is important to emphasise that our programme is designed with a broad and multidisciplinary industrial view, making it appropriate for different engineering disciplines. The programme has been designed by engineers for engineers, with learning activities and materials including concepts, principles, techniques, tools, analysis of case studies, projects, etc. applied to engineering problems or activities.

Utilising the combined expertise of our Faculty of Engineering and Digital Technologies, the School of Law, and the support of our Industrial Advisory Board, this programme will help students to develop a holistic thinking practice in applying their managerial skills when they take over leading roles in industry. Thus, our programme is aligned with the strategic mission of the University of Bradford to drive sustainable and economic development through the outstanding teaching delivered by our Faculties and also delivering a programme that is research informed and with a strong focus on innovation.

The core modules of the programme will provide students with advanced understanding in strategic management principles and the analysis of relevant costs in engineering projects, operations and supply chain management, the concept of sustainability, circular economy and innovation management, and risk management principles. These modules will cover essential management skills to support your engineering knowledge. Furthermore, these core modules will emphasise the concepts of sustainability and circular economy, to highlight their importance in the current business environment.

The range of optional modules will allow students to develop further knowledge in other multidisciplinary areas across other Departments and Faculties. Thus, you will be able to build up a portfolio of expertise across these themes of your professional interest. These optional modules include areas relevant to industry 4.0, like statistical application of industrial big data, and industrial big data analysis and mining. Another areas covered by optional modules include a module from the School of Law: Sustainable Development Law in Contemporary Business Society, and modules focused on more specific industries: Sustainability in the Built Environment, and Oil and Gas Management. Finally, an optional module on project management and six

sigma is available to students who want to acquire more knowledge on project management and the six sigma process improvement methodology.

The major MSc Project module (dissertation) will help students to further develop their research and project management skills whilst undertaking in-depth study of a particular engineering management topic. The MSc Project topics are usually linked with on-going research within the Faculty of Engineering and Digital Technologies. This, the MSc Project will have an emphasis on application, experiential learning and addressing current real-world issues, which will enhance your student experience. This module will make a major contribution in strengthening your skills' set and attributes for enhanced employability.

This Postgraduate programme has a strong input from industry, as it is built on our research, which it is often conducted jointly with industrial organisations. We will seek professional accreditation for this programme of study in the near future.

The Bradford Graduate

We aim to produce MSc graduates who are creative, innovative, versatile, analytical, confident, competitive, and equipped with interpersonal skills which will allow them to become successful professionals. Thus, the MSc graduates in this programme will be able to apply their technical and managerial knowledge to conceive and lead sustainable solutions to engineering management problems related to specialist and interdisciplinary projects, contributing to enhance the operational performance and sustainability of organisations. These knowledge and abilities will facilitate our graduates to progress their careers rapidly into professional positions of responsibility with minimal additional training.

Upon graduation students will be able to take engineering related roles in which they can apply their technical expertise and managerial skills to progress rapidly to positions of greater responsibility.

Students will develop high-level professional and interpersonal skills gained from learning through a team-based environment. This is a learning strategy where students have spent their time conceiving, designing, implementing, and operating solutions to problems that they have tackled as part of a learning team.

Students will be adept at working with complex value-added engineering systems and understand the key factors influencing the successful management of those systems. This, students will be familiar with applying a system thinking approach and with having a solid understanding of the business and enterprise context.

In addition, the ability of an engineer to think clearly, logically and ethically is widely appreciated by many other professions. In this way, your studies at Bradford may well be a stepping-stone to an alternative career in financial services, consulting, teaching, etc.

Alternatively, students could pursue a research career. They will have highly developed research skills and their personal tutor can help them identify postgraduate research opportunities here at Bradford or elsewhere. The third route open to students on graduation is to develop their own business. As a Bradford graduate, you will have the ability to combine your managerial skills with your engineering knowledge to design and develop products processes or systems that could have serious commercial potential. We have a long track record of supporting and developing new companies and helping graduates on those first steps as an entrepreneur.

As a Bradford graduate, students have a real foundation for life. The programme is designed to meet the requirements of both the Learning, Teaching and Student Experience Strategy of the University and the Bradford Curriculum.

The University

The University of Bradford has four key strategic objectives: excellence; internationalisation; equality and diversity; and sustainability. We believe in doing research and teaching to deliver career opportunities for our students as well as for economic development and job creation. The Faculty of Engineering and Digital Technologies strongly believes that each programme subscribes to these four objectives through the three key streams of the University vision:

- The creation of knowledge through fundamental and applied research.
- The dissemination of knowledge by teaching students from all backgrounds.
- The application of knowledge for the prosperity and wellbeing of people.

Lecturers at Bradford are active researchers in their fields of expertise, developing new knowledge, contributing to peer-reviewed journals and books. This research permeates their teaching practice giving students access to world leading professionals, equipment, and ideas within the University's academic themes of Innovative Engineering, Advanced Healthcare and Sustainable Societies. Our programme of study will include research with an emphasis on application, experiential learning and real-world engagement. This will make a major contribution to student's skill set, enhancing your employability prospects.

The University recognises the importance of providing pastoral support, taking into consideration all aspects of our students' journeys and development. All students are allocated a personal academic tutor, with whom they meet regularly to discuss and receive guidance on their learning and development. The University also operates a wide range of support services covering areas such as disability, counselling, faith advisors and careers.

We recognise that society benefits from the talents of all, and that the development of creative, collaborative professionals, skilled in communication and teamwork is vital. Diverse engineering teams are known to be more innovative. We help students to contribute to and learn from the varied perspectives of their tutors and peers. We want to equip our graduates with the knowledge and skills to respond to the many different and ever-changing needs of our societies and businesses. We create opportunities, spaces and resources to promote proactive dialogue among staff and students to integrate all cultures and enhance the curriculum.

The University welcomes and celebrates the diverse cultural and national backgrounds of our students and staff. We are committed to an educational experience that is inclusive, one where gender and ethnicity are central elements in developing engineering solutions that address the needs of a diverse society.

The University of Bradford encourages and supports women in engineering, and the Faculty is instrumental in organising events to celebrate occasions including International Women in Engineering Day (INWED), the UN International Day of Women and Girls in Science, and International Women's Day. We are members of WISE (<https://www.wisecampaign.org.uk/>) whose long-term vision is for gender balance in

STEM, and we signpost students to networking events and specific upskilling opportunities offered via the organisation. Our Faculty website has a specific page highlighting Women in Engineering for further information, visit: <https://www.bradford.ac.uk/ei/women-in-engineering/>

The University currently holds Bronze Athena Swan accreditation from the Equality Challenge Unit, demonstrating our commitment to striving for gender equality.

The University also provides wider support services to help you succeed in your studies and to enhance your student experience:

The library offers several resources and services to help you further develop your research and academic skills.

MyBradford: Student Support Service provide information and advice to students to access different support services:

<https://unibradfordac.sharepoint.com/sites/student-life-service-intranet>

These services include:

Career and Employability Services deliver a range of professional and impartial career information, advice, guidance, and skills development services to students and graduates.

The Language Centre supports students with services to improve their academic English and offers courses in modern foreign languages.

The Academic Skills Advice Service helps students with all areas of academic study and interpersonal skills, offering 1-2-1 sessions, group advice, workshops, and online study skills resources.

The Disability Service provide information, advice and guidance whether you are an applicant, current or international disabled student.

The Counselling & Mental Health Service provide free and confidential counselling, mental health advice, a 24-hour helpline, self-help resources, and workshops for students.

Programme Aims

The programme is intended to:

- Provide students with advanced and coherent theoretical knowledge, concepts, discipline skills and personal transferable skills necessary for original thought, holistic thinking, and analysis of complex problems related to the application of management principles and tools to support and enhance engineering activities in organisations and providing sustainable solutions.
- Facilitate exposure to other engineering disciplines.
- Provide a supportive structured environment in which students are encouraged to develop and enhance research and independent learning skills.

- Enable students to carry out independently a specific research project applying their acquired knowledge on management principles, with the support of an academic supervisor.
- Enable students to move directly into responsible roles in employment with a minimum of additional training, or to pursue programmes of further study.

Programme Learning Outcomes

To be eligible for the award of Postgraduate Certificate at FHEQ level 7, students will be able to:

1. Apply coherent knowledge of relevant management principles, systematically applying them to enhance activities and processes in different engineering disciplines, applying knowledge (possibly at discipline forefront), understanding and skills to work with (incomplete or uncertain) information, quantifying the effect of this on those activities and processes, and using theory or experiment to mitigate deficiencies.
2. Identify and critically evaluate current complex engineering management problems and/or new insights informed by the specialisation forefront and apply and adapt knowledge and comprehensive understanding of management principles and appropriate tools in unfamiliar situations to create safe, secure, innovative and sustainable solutions.
3. Work effectively in a team in order to meet shared objectives and develop leadership skills.
4. Develop awareness of the need for a high level of professional and ethical conduct in engineering, evidencing appreciation of global social responsibilities and awareness of commercial and management practices relevant to engineering activities and engineers.
5. Additionally, to be eligible for the award of Postgraduate Diploma at FHEQ level 7, students will be able to:
6. Apply depth and breadth knowledge to develop advanced engineering management proficiency and developing the ability to integrate knowledge from different engineering and professional disciplines to create innovative and sustainable solutions.
7. Integrate management and engineering knowledge and awareness to understand new and emerging technologies, applying professional judgements to balance risks, cost, benefits, circularity and environmental impact.
8. Develop the skill to select and apply advanced quantitative and computational analysis techniques to design and/or evaluate of organisational operations and business models in the context of complex systems, addressing issues of incomplete data and discussing the limitations of the methods employed.
9. Apply skills in problem solving, communication, information retrieval, working effectively with general IT facilities to develop, monitor and update a plan for the solution of both technical and personnel contributions to meeting organisational need.
10. Plan self-learning to improve performance as a foundation for lifelong learning/CPD, maybe as a team member or leader, exercise initiative and personal responsibility in professional practice, enhancing awareness of

commercial and engineering practice, evidence good negotiation, written and oral communication skills.

11. Additionally, to be eligible for the award of Degree of Master at FHEQ level 7, students will be able to:
12. Plan, implement, monitor and adjust on an on-going basis, a self-directed individual research programme of work related to the advanced application of engineering management proficiency and skills in a wide ranging engineering context, evidencing collection and critical analysis of research data, use or adaptation of appropriate analysis tools to tackle unfamiliar problems (e.g. those with uncertain or incomplete data or specification), innovation, and application of relevant skills, reflection, and research methodologies in the production of an advanced dissertation.

Curriculum

The MSc programme consist of 180 credits. Students study a total of 60 credits each in Semesters 1 and 2, plus the 60 credit MSc Project module across the whole year. The curriculum may change, subject to the University's programme approval, monitoring and review procedures.

The programme has two entry points: September and January. Students who enter via the September intake will carry out their studies via the usual semester sequence (1,2,3), whilst those students who enter onto the course in January will study semesters in the sequence 2,3,1.

September Intake students, module sequence:

Semester 1 (September-January)

FHEQ Level	Module Title	Core/Option/Elective	Credits	Study Period	Module Code
7	Strategic Management and Cost Engineering	Core	20	1	ENB7010-B
7	Supply Chain Management and Production	Core	20	1	ENB7008-B
7	Statistical Applications of Industrial Big Data	Optional	20	1	COS7049-B
7	Sustainability in the Built Environment	Optional	20	1	CSE7016-B
7	Sustainable Development Law in Contemporary Business Society	Optional	20	1	LAW7030-B

Semester 2 (January-May)

FHEQ Level	Module Title	Core/Option/Elective	Credits	Study Period	Module Code
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7	Risk Assessment and Management	Core	20	2	ENB7007-B
7	Sustainability and Innovation for Engineers	Core	20	2	ENB7011-B
7	Project Management and Six Sigma	Optional	20	2	ENB7009-B
7	Industrial Big Data Analysis and Mining	Optional	20	2	COS7050-B
7	Oil and Gas Management	Optional	20	2	CPE7013-B

Semester 3 (June-August)

FHEQ Level	Module Title	Core/Option/Elective	Credits	Study Period	Module Code
7	MSc Project	Core	60	1,2,3	ENG7002-E

January Intake students, module sequence:

Semester 2 (January-May)

FHEQ Level	Module Title	Core/Option/Elective	Credits	Study Period	Module Code
7	Risk Assessment and Management	Core	20	2	ENB7007-B
7	Sustainability and Innovation for Engineers	Core	20	2	ENB7011-B
7	Project Management and Six Sigma	Optional	20	2	ENB7009-B
7	Industrial Big Data Analysis and Mining	Optional	20	2	COS7050-B
7	Oil and Gas Management	Optional	20	2	CPE7013-B

Semester 3 (June-August)

FHEQ Level	Module Title	Core/Option/Elective	Credits	Study Period	Module Code
7	MSc Project	Core	60	1,2,3	ENG7002-E

Semester 1 (September-January)

FHEQ Level	Module Title	Core/Option/Elective	Credits	Study Period	Module Code
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7	Strategic Management and Cost Engineering	Core	20	1	ENB7010-B
7	Supply Chain Management and Production	Core	20	1	ENB7008-B
7	Statistical Applications of Industrial Big Data	Optional	20	1	COS7049-B
7	Sustainability in the Built Environment	Optional	20	1	CSE7016-B
7	Sustainable Development Law in Contemporary Business Society	Optional	20	1	LAW7030-B

Students will be eligible to exit with the award of Postgraduate Certificate if they have successfully completed 60 credits and achieved the award learning outcomes (1 to 4).

Students will be eligible to exit with the award of Postgraduate Diploma if they have successfully completed at least 120 credits and achieved the award learning outcomes (1 to 9).

Students will be eligible for the award of Degree of Master if they have successfully completed at least 180 credits and achieved the award learning outcomes (1 to 10).

Learning and Teaching Strategy

The programme's teaching and learning strategy takes into consideration the learning outcomes, the nature of the subject and the student intake, and the need for students to take greater responsibility for their own learning as they progress through the Programme.

Our strategy begins with the end in mind. We want students to become great engineers and managers who are able to provide holistic and creative solutions, becoming great problem solvers, great team-workers with an inquisitive and curious mind, with a strong business awareness and demonstrating leadership skills. This should mean that by the end of their study with us they can move seamlessly into the world of work, academic research or become an entrepreneur.

The teaching and learning methods have been selected to engage students in developing their knowledge and understanding of management fundamentals applied to different engineering disciplines through formal learning opportunities such as lectures, tutorials, experiential learning through practical classes and computer lab sessions, oral presentations, and informal and social learning through team-working in projects.

As a distinctive approach to promote teamworking, participation in multidisciplinary group discussions and develop presentation skills, several tutorial sessions in core modules (e.g. Supply Chain Management and Production, Sustainability and Innovation for Engineers, and Strategic Management and Cost Engineering) will include group discussions to analyse case studies with relevant engineering management problems. Representatives of the discussion groups will present their findings and reflection at the end of the sessions. Feedback will be provided by the

instructor and by peers. This approach will help to develop interpersonal and intercultural skills. Furthermore, it will also allow to promote a sense of programme identity and enhance a cohesive student experience.

This combination of teaching and learning methods will help to engage and keep students purposeful and motivated, with a sustained effort throughout their learning journey. Team-working will be used to foster collaborations and a sense of community between the students. Opportunities will also be provided for self-evaluation and reflection, so that students can learn to self-regulate.

Study with us will include formal lectures (including those from visiting professors and guest speakers from industry), but these will always be interactive and two way. We want to develop student's understanding of the vast array of opportunities open to today's professional engineer and therefore we look to incorporate aspects of real-world engineering and managerial problems and solutions where possible. To this end we make use of case studies, practical demonstrations, and provide opportunities for students to propose and elaborate their own solutions.

To support MSc students to prepare better regarding development of academic skills and engagement with the MSc project module (60 credits), we deliver a series of three seminars related to the MSc Project module for both cohorts of MSc students (September and January intake). These seminars are delivered in the first semester when these students join their programme of study. These seminars cover: an introduction to the MSc Project module (including allocation process, key deadlines, supervision meetings, library resources, etc.), a library seminar about research skills to find information, and a library seminar about referencing and plagiarism. After the exams in Semester 2, we deliver a seminar for all Engineering MSc students to emphasise key information and provide further support to carry out the MSc project during the summer months (June to August). In addition, we organise a meeting with all MSc students in the Mechanical and Energy Systems Engineering Department to discuss their student experience and to promote the sense of programme identity within the department. Particularly, this will help January entry students to engage quickly with their MSc project.

As part of our focus on building a learning experience which will prepare students for the world of work our curriculum has been developed using the Conceive Design Implement Operate (CDIO) framework for engineering. This means that our learning strategy will be to encourage students to work in teams to Conceive potential solutions, Design new products, processes or services, Implement (or model) and test those designs and processes, and elaborate on the Operation of the product or solution. In line with the CDIO innovative educational framework for engineering, students will have numerous opportunities to be an active learner, to think and execute as an engineer leading real-world projects and reflecting on operational and implementation aspects.

Assessment Strategy

In the same way that our teaching and learning strategy is designed to prepare students for the world of work, academic research or entrepreneurship, our assessment methods incorporate a wide range of different methods designed to meet the needs of industry and accrediting bodies as well as prepare students for a potential academic research career.

Assessment is a key part of the learning process, it is only through challenging themselves to express what they have learned or put it to practical use, can students complete the learning journey and assess for themselves if they have understood what they have been taught and are able to apply and use that skill and knowledge. There are two forms of assessment formative assessment which provides an opportunity for our staff will give students feedback during their learning. This feedback is designed to help and guide learning. All the modules will have some formative assessment, and this may be in various forms including discussions or questioning from the supervisor, tests, practical activities, et cetera. These formative activities are crucial if students are to make best use of their learning experience and they are designed to prepare students for their summative assessment. Summative assessment is how we grade the work on a module and the details of this assessment will be available from the beginning of the module so that students understand how the grade will be determined.

Each assessment on the programme is tailored to the specific learning outcomes and is structured to ensure that the learning is embedded by application of knowledge to real world examples. This is aligned with our CDIO strategy. The design of assessments also considers ensuring academic integrity aspects. Thus, individual and group coursework, lab reports, presentations, etc. are designed to be very specific to allow students to demonstrate their knowledge and own work. Project work will often be assessed on the basis of the quality of the product or process produced by the students as part of their own projects. We use practical tests to assess practical skills and written reports to show the depth of understanding of concepts and ideas. Practical skills are often assessed via individual and group technical reports with the computer/laboratory work linked with the taught modules. The methods of assessment of transferable skills are built in the structure of the examinations, case studies, laboratory demonstrations and project work.

Assessment Regulations

This Programme conforms to the standard University Regulations (for Postgraduate Taught Programmes) which are available at the following link:

<https://www.bradford.ac.uk/regulations/>

Admission Requirements

The University welcomes applications from all potential students and most important in the decision to offer a place is our assessment of a candidate's potential to benefit from their studies and of their ability to succeed on this particular programme. Consideration of applications will be based on a combination of formal academic qualifications and other relevant experience.

The standard entry requirements for the programme are as follows:

A second-class Honours degree or equivalent in an engineering discipline (e.g. mechanical, manufacturing, industrial, chemical, electrical, electronics, computer, biomedical, civil, etc.).

Candidates who do not fulfil the normal entry requirements but have extensive industrial experience (minimum two years) in an engineering area/position are considered on an individual basis.

The University of Bradford has always welcomed applications from disabled students, and these will be considered on the same academic grounds as are applied to all applicants. If applicants have some form of disability, they may wish to contact the programme leader before they apply.

English language requirements:

IELTS at 6.0 or the equivalent, with no less than 6.0 in any band.

Applicants who do not meet the IELTS requirement can take a University of Bradford pre-sessional English course. See the Language Centre for more details. For further information on English Language requirements please see the dedicated international entry requirements page.

Recognition of Prior Learning

Applications are welcome from students with non-standard qualifications or mature students (those over 21 years of age on entry) with significant relevant experience.

If applicants have prior certificated learning or professional experience which may be equivalent to parts of this programme, the University has procedures to evaluate and recognise this learning in order to provide applicants with exemptions from specified modules or parts of the programme.

Minor Modification Schedule

Version Number	Brief description of Modification	Date of Approval (Faculty Board)
1	Approved Programme Spec	14/06/2023