

## Advanced Mechanical Engineering MSc Programme Specification

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|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Academic Year:</b>            | 2026/27                                                                                                                                                                                 |
| <b>Degree Awarding Body:</b>     | The University of Bradford                                                                                                                                                              |
| <b>Main Location:</b>            | City Campus                                                                                                                                                                             |
| <b>Subject Benchmarks:</b>       | Engineering (Quality Assurance Agency 2015)                                                                                                                                             |
| <b>Qualifications Framework:</b> | HE Qualifications of UK Degree Awarding Bodies (FHEQ: QAA 2014)                                                                                                                         |
| <b>Target Degree Award:</b>      | Master of Science (MSc) Advanced Mechanical Engineering [FHEQ L7]                                                                                                                       |
| <b>Intermediate/exit awards:</b> | MSc Engineering (Mechanical) [FHEQ Level 7]<br>Postgraduate Diploma (PGD) Advanced Mechanical Engineering [FL7]<br>Postgraduate Certificate (PGC) Advanced Mechanical Engineering [FL7] |
| <b>Programme Admissions:</b>     | UK and international students                                                                                                                                                           |
| <b>Programme Start Dates:</b>    | September, January                                                                                                                                                                      |
| <b>Course Modes of Study:</b>    | 12 months full-time (September start)<br>12 months full-time (January start)                                                                                                            |

This programme is accredited by the Institution of Mechanical Engineers ([IMechE](#)) on behalf of the Engineering Council ([EngC](#)) as meeting the requirements for Further Learning for registration as a Chartered Engineer (CEng). Candidates must hold a CEng accredited BEng or BSc (Hons) undergraduate first degree to comply with full CEng registration requirements.

**Please note:** The University has a set of terms and conditions for all students accepting an offer to study on a course here at Bradford. This is called the Student Contract. This document sets out the Terms and Conditions which apply when you accept an offer of a place on a programme of study at the University of Bradford. [View our Student Contract for further details](#). Information about this programme and its modules has been published in advance of the academic year to which it applies. Every effort has been made to ensure that the information is accurate at the time of publication, but changes may occur given the interval between publishing and commencement of teaching. Any change which impacts the terms and conditions of an applicant's offer will be communicated to them.

### Minor Modifications Schedule

1. July 2025 - Changes for 2025 academic year, including new academic regulations.
2. April 2026 - Annual changes for the 2026 academic year.

# Introduction

Engineering is fundamental to the economic and social prosperity worldwide. It is a “people serving” profession whose activities not only manage humankind’s environment but also create that environment itself. It requires well-qualified and motivated students who seek to be the future leaders within their profession. Studying at Bradford will be a foundation for life aimed at developing an appreciation of technical and managerial principles and competence in their application using a wide range of personal and professional skills.

The Master of Science (MSc) degree programme in Advanced Mechanical Engineering is designed to meet the needs of the 21st Century Mechanical Engineering related industries. The core modules will provide students with advanced understanding in solid mechanics, computer-aided modelling, simulation and optimisation, design methodologies and design analysis. The range of optional modules allows students to develop either an automotive engineering specialism or a manufacturing engineering specialism; alternatively, students may select from across the School to build up a portfolio of expertise across these themes. The project modules will develop student’s research and project management skills whilst undertaking in-depth study of a particular topic. The major MSc dissertation project is usually linked with on-going research within the Institute of Digital and Sustainable Futures at the University of Bradford.

With reference to teaching and learning, the Faculty aims to produce postgraduates who aspire to challenging careers in industry, commerce and the public sector or to developing their own enterprises. Postgraduates will be able to move directly into responsible roles in employment with a minimum of additional training. The MSc will meet, in part, the exemplifying academic benchmark requirements for registration as a Chartered Engineer (CEng). Accredited MSc graduates who also have a BEng (Hons) accredited for CEng, will be able to show that they have satisfied the educational base for CEng registration.

This programme is accredited by IMechE. Accreditation aims to ensure that the MSc Advanced Mechanical Engineering degree meets the highest international standards.

## Learning with and as part of a research community

The Faculty places emphasis on both teaching and research, believing them to be mutually dependent. We have particular research strengths in:

- Automotive Engineering (especially braking, engine tribology, engine mapping and calibration, turbo-charger testing, quality engineering in system and component design and manufacture).
- Materials Engineering (especially polymeric engineering and processing, composites and nanocomposites, recycling, product design and manufacture).
- In-line Monitoring and Control of Manufacturing Processes (instrumentation, sensors, computer-based data acquisition and control).

- Mechanical Dynamics and Control (especially machine tool dynamics and control, and vehicle dynamics and control).
- Computer Aided Modelling and Design (creation, virtual testing and prototyping).

We conduct this research jointly with many companies including Jaguar Land Rover, Ford, Sabic, Sinopec, Dow, SCG Chemical, Autodesk, Cummins, and their supplier bases as well as with UK Research Councils.

Lecturers at the University of Bradford are active researchers in their fields of expertise, developing new knowledge, contributing to peer-reviewed journals and books. This research permeates to 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. Each year students will engage in enquiry-based projects allowing learning through practical research. The programmes of study include research with an emphasis on application, experiential learning and real-world engagement. This will make a major contribution to students' skill sets, in the skills and attributes for enhanced employability.

[The Faculty of Management, Sciences and Engineering](#) welcomes and celebrates the diverse cultural and national backgrounds of our students. We are committed to an educational experience that is inclusive of the diversity of the students and staff, and that addresses attainment gaps within our student body, particularly those between BME and white students. The University of Bradford holds Bronze [Athena Swan Charter](#) and [Race Equality Charter](#) accreditations from [AdvanceHE](#), recognising our commitment to advancing the careers of everyone in STEM.

We also recognise that the future for engineers is one where they will be working in interdisciplinary teams to solve new, complex and evolving problems that will require innovative solutions. Students' ability to work across engineering disciplines and collaboratively with experts in other specialist fields will be crucial to creating the solutions of tomorrow. We have designed our programmes to encourage and experience interdisciplinary working, to develop breadth as well as depth of skills and knowledge, and in this way, we believe students will be ideally equipped to be successful and employable.

We value sustainability at Bradford and to that end we have embedded sustainable development across all our programmes. In a future where sustainability is to become increasingly important students will have sound understanding of the challenges and the potential for solutions in a world where the actions of human industry is creating new pressures on resources.

## **The Bradford Graduate**

We aim to produce MSc graduates who are imaginative, innovative, versatile and competitive, who will be able to progress rapidly to professional positions of responsibility with minimal additional training, and who can provide technical, managerial and entrepreneurial leadership in specialist and interdisciplinary projects.

Upon graduation students will be able to work as:

- a) Projects Engineer
- b) Design Engineer
- c) Operations Engineer or
- d) Research and Development Engineer (R&D).

Students will have the capacity for professional growth to continue the path to Chartered Engineer (CEng) status. Students will develop high-level professional and interpersonal skills gained from learning through a team-based environment. An education where students have spent their time conceiving, designing, implementing and operating solutions to problems that they have tackled as part of a learning team.

As an engineering graduate from Bradford students have a real foundation for life. Students will be adept at working with complex value-added engineering systems and will be familiar with experimentation, system thinking and have 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 and studies at Bradford may well be a stepping-stone to an alternative career in financial services, teaching, law, 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 engineering graduate, they will have the skills 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.

## **Programme Aims**

The programme is intended to:

- Give technical depth across the discipline of Mechanical Engineering and its applications.
- Provide breadth to encourage innovators of mechanical systems.
- Facilitate exposure to other engineering disciplines.
- Provide a supportive, structured environment in which students are encouraged to develop and enhance research skills and independent learning skills.
- Developing subject knowledge and understanding, developing discipline skills and developing personal transferable skills, to enable graduates to pursue programmes of further study, or to move directly into responsible employment.

Upon graduation students will have the capacity for meaningful interdisciplinary interaction, a leadership role, and professional growth, which may include Chartered Mechanical Engineer (CEng) status.

## **Programme Learning Outcomes**

On successful completion of the programme, holders of a Master of Science degree award will be able to demonstrate all of the following outcomes:

1. Demonstrate a comprehensive knowledge of relevant scientific principles of discipline specialization, applying knowledge (possibly at discipline forefront), understanding, and skills to work with (incomplete or uncertain) information, quantifying the effect of this on the design, and using theory or experiment to mitigate deficiencies.
2. Select and apply appropriate advanced modelling and analysis methods and computational tools to critically evaluate complex and multidisciplinary problems in engineering, generate (optimized) solutions, and assess their limitations, robustness, and effects of changes in design parameters.
3. Evidence advanced level knowledge of a wide range of engineering materials and components.
4. Critically evaluate current problems and/or new insights informed by the specialization forefront and apply and adapt knowledge and comprehensive understanding of design processes and methodologies in unfamiliar situations.
5. Work effectively in a team in order to meet shared objectives.
6. Evidence awareness of the need for a high level of professional and ethical conduct in engineering, evidencing business and management practices relevant to engineering and engineers.
7. Additionally, to be eligible for the award of Postgraduate Diploma at FHEQ level 7, students will be able to:
8. Demonstrate a critical evaluation of concepts relevant to discipline, some from outside engineering, and apply them effectively (including in engineering projects).
9. Integrate engineering knowledge and insight to investigate new and emerging technologies, applying professional judgements to balance risks, cost, benefits, safety, reliability and environmental impact.
10. Evidence self-direction, independent learning, and originality of thought to generate innovative designs for products, systems, components or processes to fulfil new needs.
11. Use software packages in the advanced analysis, design, evaluation, and optimisation of complex engineering systems.

12. 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.
13. Plan self-learning to improve performance as a foundation for lifelong learning/CPD, and exercise initiative and personal responsibility in professional practice, which may be as a team member or leader, evidence good negotiation, written and oral communication skills.
14. Plan, implement, monitor and adjust on an on-going basis, a self-directed individual research programme of work, 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 technical report.

## **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; that means great problem solvers, great team-workers with an inquisitive and curious mind. 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 engineering fundamentals through formal learning opportunities such as lectures and tutorials, experiential learning through practical classes and lab sessions and informal and social learning through team-working in projects and competitions.

Study with us will include formal lectures (including those from Visiting Lecturers), 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 problems and solutions where possible. To this end we make use of case studies, practical demonstrations, and provide lots of opportunities for students to design their own solutions.

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. 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 Operate the product or solution. In line with the CDIO philosophy students will have numerous opportunities to be

an active learner, to work as an engineer on real-world projects. The PG/Dip students will operate analytical instruments, under supervision, during the initial phase of their research project.

## **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, the 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. Project work will often be assessed on the basis of the quality of the product produced as part of the project, 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 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.

## **Curriculum structure**

The curriculum map shows the core and optional units for this programme, which extends over 12 months. It is made up of a taught element of 120 credits and an individual research project element of 60 credits. Please note that the curriculum may change, subject to the University's programme approval, monitoring and review procedures, as improvements are made each year. More detail, including learning outcomes, is available for each unit in the module handbooks.

The taught element is structured in the form of 20 credit modules over the 2 semesters forming the "Academic Year" of September-May. Students study 60 core credits and select 60 credits of options: one in Autumn Semester 1 and two in Spring Semester 2. Students who start in January study Spring modules first.

**Table 1: Advanced Mechanical Engineering taught modules (FHEQ Level 7)**

| Code      | Module Title                                          | Credit | Study Period  | Selection |
|-----------|-------------------------------------------------------|--------|---------------|-----------|
| ENM7005-B | Modelling and Optimisation                            | 20     | Autumn (Sem1) | Core      |
| MAE7013-B | Advanced Solid Mechanics                              | 20     | Autumn (Sem1) | Core      |
| COS7049-B | Statistical Applications of Industrial Big Data       | 20     | Autumn (Sem1) | Option 1  |
| ENB7008-B | Supply Chain Management and Production                | 20     | Autumn (Sem1) | Option 2  |
| MAE7030-B | Vehicle Powertrain and Dynamics                       | 20     | Spring (Sem2) | Core      |
| ENB7007-B | Risk Assessment and Management                        | 20     | Spring (Sem2) | Option 3  |
| CPE7012-B | Polymer and Materials Engineering                     | 20     | Spring (Sem2) | Option 4  |
| MAE7031-B | Automotive Tribology & Noise, Vibration and Harshness | 20     | Spring (Sem2) | Option 5  |
| COS7050-B | Industrial Big Data Analysis and Mining               | 20     | Spring (Sem2) | Option 6  |

The 60 credits MSc research project is carried out throughout the year and over the summer.

**Table 2: Advanced Mechanical Engineering research project (FHEQ Level 7)**

| Code      | Module Title | Credit | Study Period | Selection |
|-----------|--------------|--------|--------------|-----------|
| ENG7002-E | MSc Project  | 60     | Full Year    | Core      |

## Assessment, Continuation and Award Regulations

This programme follows the Assessment, Continuation and Award regulations published on the University's website for postgraduate courses ([Regulation 9](#)) with variance from the regulation as outlined below and documented in the Variance Register:

- Variance from 4.2 - the pass threshold for each of the modules for the accredited award is 50% or higher in 160 credits and a minimum mark of 40% or higher in 20 credits.
- Variance from 5.1, 5.2 & 5.3 - Students who achieve marks between 40% and 49% in up to 60 credits worth of modules will be permitted one supplementary assessment attempt in order to support continuation on the accredited MSc.

Students who do not meet the threshold outlined above but do meet the standard requirements of Regulation 9 for Postgraduate Taught Assessment, Continuation and Award Regulations will be eligible for an MSc Engineering (Mechanical), which is a non-accredited award.

Only the target award of MSc Advanced Mechanical Engineering is eligible for registration with IMechE.

# Admission Requirements

We are proud to be [one of the most inclusive universities in the UK](#). All our students have potential, and we believe that as many people as possible should have the chance to benefit from higher education, no matter what their background or circumstances.

We take the time to understand the background of our applicants, understand their journey to education, and make decisions based on an applicant's potential to thrive at university and beyond.

In addition to satisfying the general admissions requirements of the University of Bradford, we typically require that all applicants have a second-class Honours degree or equivalent in a relevant discipline (science, technology, engineering or mathematics). Examples of other equivalent international qualifications are provided on the [University of Bradford page for a country or region](#).

Applications are welcome from students with non-traditional qualifications, and/or significant personal/professional experience. Candidates who do not fulfil the normal entry requirements but have extensive industrial experience in a related area are considered on an individual basis and by interview.

For international students, the level of English required is listed on the [University of Bradford English language requirements website](#). Exceptionally, holders of a UK degree awarded within 2 years prior to entry to the Bradford programme may be exempt from these English test requirements. International applicants who do not meet the IELTS requirement can take a [University of Bradford pre-session English course](#).

If applicants have prior certificated learning or professional experience which may be equivalent to parts of this programme, the University of Bradford has procedures to evaluate and recognise this learning to provide applicants with exemptions from specified modules or parts of the programme. Find more information about [recognition of prior learning decisions](#) on the University website.

People thinking of studying with the University of Bradford don't need to wait for the start of the year to contact our Disability Service. The University can arrange for anyone to talk to this team about what support is on offer at Bradford including an invitation to our Get Set Day. To contact the Disability Service please complete the [request support form](#).

Information in this document is for the contemporary recruitment cycle and was accurate at time of publication. The current tariff and accepted qualifications for entry onto the programme is published at the online course page:  
<https://www.bradford.ac.uk/courses/pg/advanced-mechanical-engineering/>