

Advanced Chemical and Petroleum Engineering MSc Programme Specification

Academic Year:	2026/2027
Degree Awarding Body:	The University of Bradford
Target award:	MSc Advanced Chemical and Petroleum Engineering [Framework for Higher Education Qualifications (FHEQ) Level 7]
Intermediate/exit awards	MSc in Engineering (Chemical); Postgraduate Diploma Advanced Chemical and Petroleum Engineering; Postgraduate Certificate Advanced Chemical and Petroleum Engineering [FHEQ Level 7]
Programme Admissions:	UK and international students
Programme entry points:	September and January
Programme duration:	1 year full-time
External benchmark:	QAA Subject Benchmark Statement for Masters degrees in Engineering (2016)

This programme is accredited the Institution of Chemical Engineers (IChemE) on behalf of the Engineering Council (EngC) as meeting the requirements for Further Learning for registration as a Chartered Engineer (CEng) with the target award. 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 Modification Schedule

1. July 2025: Annual Changes for the 2025 academic year, including changes to academic regulation.
2. April 2026: Annual Changes for the 2026 academic year.

Introduction

Chemical Engineers develop and design the processes to make everything the modern society needs: from advanced polymeric materials (packaging, electrical goods, electronics, automotive, aircrafts) to health care products (face creams, shampoo, perfume, drugs) to food (dairy products, cereals, agro-chemicals) and water (desalination for freshwater) to energy (petroleum to nuclear fuels). They do this by efficient use and management of resources including oil and gas, water and energy while controlling health and safety procedures and protecting the environment.

Chemical engineers are concerned with small and large-scale chemical and biochemical processes in which materials undergo change. In practice, this may mean anything from a relatively small

batch production of a drug to the massive scale of equipment needed to turn seawater to freshwater, natural gas to agrochemicals etc. by applying advanced reaction and separation processes. The complexity of the oil and gas industry offers a wide variety of opportunities for career development in the petrochemical industries. Further, engineering new materials with advanced properties is at the heart of the new technological drive of this century. Electronic Polymers, Biomaterials, Nanocomposites, and "Smart" Materials are examples of new material developments where the technological applications and impact on society are enormous.

The impact of Chemical Engineering in the 21st century is set out in the [Chemical Engineering Matters report \(3rd edition\)](#) which identifies Water, Energy, Food & Nutrition, Health & Wellbeing, as the four key areas where Chemical Engineering can make a positive impact on the quality of life and help produce a more sustainable future. The MSc in Advanced Chemical and Petroleum Engineering curriculum addresses aspects of these four challenge areas and the related topics of process design, optimisation, safety and risk management. This programme also addresses IChemE's recommendations for incorporating aspects of climate change and new digital technologies into chemical engineering curricula.

The University of Bradford has particular research strengths in Chemical and Petrochemical Engineering, Polymer and Advanced Materials Engineering, Energy, Desalination Technologies, Water Treatment and Pharmaceutical Engineering. We have state of the art research facilities in these areas. Study at MSc level at Bradford will be a foundation for life aimed at developing a deep understanding of advanced technical principles, analytical tools and competence in their application together with a wide range of management, personal and professional skills. The Programme will provide students with essential tools based on the concept of sustainability and maintaining a low carbon footprint for changing raw materials into useful products in a safe and cost-effective way.

This MSc is an industrially relevant programme designed with the aim of producing employable Master's graduates with problem-solving skills and the ability to critically apply their knowledge and make informed judgements. The curriculum helps students develop breadth and depth of advanced technical principles, advanced engineering practice whilst taking into consideration environmental, economic, social, sustainability and ethical issues associated with the operation of industrial processes. The programme is designed to provide balanced in-depth exposure across chemical and petroleum engineering to help students find their career using research-led and research-engaged learning.

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.

Students can gain here accreditation for becoming student representative for their course, by becoming a student ambassador, helping with open days and applicant experience days, or by being a PAL leader. The peer assisted learning scheme or PAL is where experienced students support undergraduate students, especially those in stage 1. The PAL scheme has been very successful, providing guidance on all aspects of being a student of Bradford. PAL leaders become mentors and role models for new students. We support people to become PAL leaders.

The Bradford Graduate

We recognise that society benefits from the talents of all, and that the development of creative, collaborative engineers, skilled in communication and teamwork is vital. Diverse engineering teams are known to be more innovative. We help students 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 diverse needs of our businesses and communities.

Upon completion of the Programme students will have the capacity for meaningful interdisciplinary interaction, leadership roles, and professional growth. We aim to produce MSc graduates who are imaginative, innovative, versatile and competitive. These graduates will be able to progress rapidly to professional positions of responsibility with minimal additional training and who will be able to provide technical, managerial and entrepreneurial leadership in specialist/interdisciplinary projects.

Having completed the programme, students will be able to work as any of:

- a) Project Engineer
- b) Design Engineer
- c) Operations Engineer
- d) Research and Development Engineer (R&D) in Chemical/Petroleum/Polymer/Food and Pharmaceutical Industries.

Students will have the capacity, potential and opportunity for professional growth to continue the path to Chartered Engineer (CEng) status. The ability of an engineer to think clearly and logically is widely appreciated by many other professions and studies at Bradford may well be a stepping stone to many alternative careers other than Engineering – a real foundation for life and for a lifetime of learning.

Programme Aims

- Equip students with the theoretical knowledge, concepts and skills necessary for original thought and problems analysis related to core chemical, petroleum, water, Food and Pharmaceutical engineering fields.
- Equip students with the organisational, practical and computational skills necessary to carry out research in chemical, petroleum, water, Food and Pharmaceutical engineering fields.
- Enable students to engage in research by carrying out, under expert supervision, a specific project in chemical/petroleum/ water/Food or Pharmaceutical engineering.
- Provide bridging information to non-specialists enabling them to extend their career opportunities.

Programme Learning Outcomes

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

1. Evidence comprehensive understanding 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 and understanding 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. Evidence critical evaluation of concepts relevant to discipline, some from outside engineering, and apply them effectively (including in engineering projects).
8. Integrate engineering knowledge and insight to investigate new and emerging technologies, applying professional judgements to balance risks, cost, benefits, safety, reliability, and environmental impact.
9. Evidence self-direction, independent learning, and originality of thought to generate innovative designs for products, systems, components, or processes to fulfil new needs.
10. Use appropriate software packages for advanced analysis, design, evaluation, and optimisation of complex engineering systems.
11. Apply skills in problem solving, communication, information retrieval, and 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.

12. 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, and evidence good negotiation, written and oral communication skills.
13. 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 solve 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.

Curriculum

The taught element is structured in the form of 20 credit modules over the two semesters forming the academic session. It is made up of a taught element of 120 credits (60 per Semester) and an individual research project element of 60 credits. More detail on modules, including learning outcomes, is available for each module online and 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. In each of Semester 1 (September) and Semester 2 (January), students study 40 core credits and choose 1 optional module for a total of 120 credits. Students who start in January study Spring modules first.

For students from a non-chemical engineering background, module CPE7014-B Process Design must be selected in the Autumn semester. Students who have previous chemical engineering study may select it or an alternative option.

Table 1: Advanced Chemical and Petroleum Engineering taught modules (FHEQ Level 7)

Code	Module Title	Credit	Study Period	Selection
CPE7002-B	Desalination Technology	20	Autumn (Sem1)	Core
CPE7011-B	Transport Phenomena	20	Autumn (Sem1)	Core
CPE7014-B	Process Design	20	Autumn (Sem1)	Core/Option
COS7049-B	Statistical Applications of Industrial Big Data	20	Autumn (Sem1)	Option 2
ENB7008-B	Supply Chain Management and Production	20	Autumn (Sem1)	Option 3
CPE7004-B	Food and Pharmaceutical Processes Engineering	20	Spring (Sem2)	Core
CPE7007-B	Upstream Production and Refinery Operations	20	Spring (Sem2)	Core
CPE7013-B	Oil and Gas Management	20	Spring (Sem2)	Option 4
CPE7012-B	Polymer and Materials Engineering	20	Spring (Sem2)	Option 5
ENB7007-B	Risk Assessment and Management	20	Spring (Sem2)	Option 6
CSE7013-B	Water and Wastewater Treatment	20	Spring (Sem2)	Option 7

Students will be eligible to exit with the FHEQ Level 7 award of Postgraduate Certificate if they have successfully completed 60 credits. Students will be eligible to exit with the FHEQ Level 7 award of Postgraduate Diploma if they have successfully completed at least 120 credits.

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

Table 2: Advanced Chemical and Petroleum Engineering research project (FHEQ Level 7)

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

At the end of the programme, students will be eligible to exit with the FHEQ Level 7 Master's Degree award of MSc Engineering (Chemical) if they have successfully completed at least 180 credits and achieved the award learning outcomes but not met the criteria for an accredited award.

Students will be eligible for the FHEQ Level 7 Master's Degree award of MSc Advanced Chemical and Petroleum Engineering if they have successfully completed at least 180 credits, achieved the award learning outcomes and met the programme-specific accredited award criteria.

Learning and Teaching Strategy

The teaching and learning strategies take 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.

We want students to become great engineers; that means great analysts and 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, chemical engineering 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 and invited speakers), but these will always be interactive and two way. We want to develop students 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. Students will operate analytical instruments, under supervision, from Semester 2 during the initial phase of their research project.

The University of Bradford is well known for attracting students from a wide variety of backgrounds, experiences and countries and the students benefit greatly from this diversity. The University of Bradford encourages and supports women in engineering. The University of Bradford's modus operandi, Making Knowledge Work, is embedded in the philosophy of this programme.

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 they complete the learning journey and assess for themselves if they have understood what they have been taught and are able to apply and use the skills and knowledge they have learned. There are two forms of assessment; formative and summative. Formative assessment provides an opportunity for our staff to give students feedback during their learning. This feedback is designed to help and guide students learning. All the modules will have some formative assessment delivered in various forms. These formative activities are important 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 their grade will be determined.

Each assessment is tailored to the most efficient way(s) for achieving the intended learning outcomes. For example, project work is assessed on the basis of the quality of the product or system produced as part of the project. Practical tests are used to assess practical skills and written reports are used to show the depth of understanding of concepts and ideas. Practical skills are often assessed via individual and group technical reports commensurate with associated laboratory work for given modules. The methods of assessment of transferable skills are built in the structure of the examinations, case studies, laboratory demonstrations and project work.

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 (Chemical), which is a non-accredited award.

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.

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-sessional English course](#).

We specifically require that applicants to MSc Advanced Chemical and Petroleum Engineering who hold a Chemical Engineering undergraduate degree (e.g., Bachelor with Honours) do so with a 2:2 (lower second) classification or above or equivalent bachelor's degree in chemical engineering.

Those applicants seeking to use this MSc, accredited by the IChemE base requirements for Chartered Engineer (CEng) must also have an appropriate accredited undergraduate degree.

International students are welcome to apply and should [check the entry requirements page for their country on our website](#) details of equivalent qualifications.

Applicants without Chemical Engineering (who do not fulfil the normal entry requirements) will need EITHER a 2:1 (upper second) classified undergraduate degree in Petroleum, Pharmaceutical, Food, Energy, Water or Nuclear engineering, or Applied Chemistry or Physics or equivalent OR have extensive industrial experience (at least 5 years) in the Chemical, Food, Pharmaceutical, Water, Energy, Nuclear, or Petroleum industries are considered on an individual basis and by interview. Applicants from these routes accepted on the programme will need to take the Process Design module.

Applications are welcome from students with non-traditional qualifications, and/or significant personal/professional experience as outlined above. 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-chemical-and-petroleum-engineering/>