Queen Mary University of London

# Programme Specification

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| Awarding Body/Institution | Queen Mary University of London |
| Teaching Institution | Queen Mary University of London |
| Name of Final Award and Programme Title | MEng Chemical Engineering, MEng Chemical Engineering with Industrial Experience |
| Name of Interim Award(s) | Certificate HE, Diploma HE |
| Duration of Study / Period of Registration | 4/5 years |
| QM Programme Code / UCAS Code(s) | H814/H813 |
| QAA Benchmark Group | Engineering |
| FHEQ Level of Award | Level 7 |
| Programme Accredited by | Institute of Chemical Engineers, accreditation pending |
| Date Programme Specification Approved | |
| Responsible School / Institute | School of Engineering & Materials Science |

| Schools which will also be involved in teaching part of the programme |
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| Institution(s) other than Queen Mary that will provide some teaching for the programme |
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## Programme Outline

Engineering is fundamental to the economic and social prosperity of the UK. It is the profession responsible for the creation of all material objects and systems necessary for modern life from concept to customer to decommissioning. IChemE (the Institution of Chemical Engineers, UK) identified in its Technical Roadmap for 21st century chemical engineering six broad areas of critical global importance where chemical engineers will have enormous influence. These are (i) health, safety, environment, (ii) sustainable technology, (iii) energy, (iv) food and drink, (v) water and (vi) bio-systems.

The modern society relies on the work of Chemical Engineers who develop and design the processes that make the useful products for the society by efficient use and management of resources including water and energy while controlling health and safety procedures and protecting the environment. Your studies at QMUL will be a foundation for life aimed at developing a deep understanding of fundamental and 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 you with essential tools based on the concept of sustainability and low carbon footprint for changing raw materials into useful products in a safe and cost effective way. As a qualified Chemical Engineer you will understand how to alter the chemical, biochemical or physical state of a substance, to create everything from 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). An excellent way to develop these skills is to undertake an industrial placement as an integral part of your degree studies.

The School places emphasis on both teaching and research. We have particular research strengths in sustainable energy engineering, renewable energy materials, polymers, materials engineering (including the creation of complex components from powders, composites and polymers), thermofluids engineering, biomedical engineering, and nano-engineering. Our interdisciplinary research strengths are combined in the Materials Research Institute and the Institute for Bioengineering.

Upon graduation on our MEng programme you will be able to work in a management role as a projects engineer, design engineer or operations engineer in chemical, petroleum, food and pharmaceutical industries. You will have satisfied the academic criteria for obtaining the Chartered Engineer status, and will be able to obtain this status after a few years of relevant professional experience. The ability of an engineer to think clearly and logically and to solve problems is widely appreciated by many other professions and your studies may well be a stepping stone to many alternative careers other than Engineering – a real foundation for life and for a lifetime of learning.

The first two years of the Chemical Engineering programme at QMUL provide a firm grounding in subjects fundamental to all branches of engineering, including mathematics, thermodynamics, fluid mechanics, heat transfer and control engineering. They also provide an insight into basic chemistry and process engineering and computing. These subjects are developed further in Student Centred Learning modules, which run through the first two years and include group and individual project work that helps you to apply the academic and practical skills learned in the other modules to the solution of practical chemical engineering problems.

The third year gives you the opportunity to expand your knowledge through modules that address more advance chemical engineering topics, and you also have the opportunity to choose options in the areas of sustainable energy engineering, manufacturing processes and renewable energy materials. It also includes an individual project, which may be a detailed design study, an experimental and/or theoretical investigation, or a critical review of a topic in Chemical Engineering. The choice of project topic is not prescriptive, and you will be encouraged to choose a topic of mutual interest to you and your supervisor.

In the fourth year you will undertake further specialised modules as well as a group design project, which emphasises the benefits of teamwork and is often linked to industry. You will learn to function as part of a team and allocate work and responsibilities to team members, as well as developing an industrial link and gaining experience to add to your CV. Where possible projects are multi-disciplinary, with groups including students from other Engineering streams such as Mechanical Engineering, Sustainable Energy Engineering, Biomedical Engineering or Materials Science. You will also develop many transferable skills and your group will have responsibility for the overall management of the project including its finances.

## Aims of the Programme

To prepare graduates for professional careers in the process industries, primarily as process engineers in leading roles. Enable them to understand, solve, and manage technical problems in general to a high level, and to be able to take advantage of further education, research and experience throughout their careers.

To develop incoming students' knowledge, skills, understanding and attitudes to those of more able professional chemical engineers.

To impart in-depth knowledge of chemical engineering principles through the underlying mathematics, science and associated technologies.

To provide knowledge and understanding of leading edge subjects within modern chemical engineering.

To develop the ability to reason critically, collect, analyse, evaluate and synthesise data to facilitate optimisation, gather and use information, apply concepts and methodologies.

To develop skills to a high level, especially in (a) drawing rational conclusions from experimental investigations, (b) information technology, including the use of calculation and design packages, computer graphics and word processing, and (c) communication, both oral and written.

Programme Title: BEng/MEng Chemical Engineering, BEng/MEng Chemical Engineering with Industrial Experience

## What Will You Be Expected to Achieve?

| Academic Content: | |
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| A 1 | Knowledge and understanding of mathematics, science and engineering principles (including ICT and technically leading subjects), relevant to the process industries. |
| A 2 | Understanding of economic evaluation and business principles relevant to engineering and engineers, including entrepreneurship. |
| A 3 | Knowledge of the role of the engineer in society and as a team player, and the constraints within which their engineering judgement will be exercised. |
| A 4 | Knowledge of the professional and ethical responsibilities of engineers, including those in leading roles. |
| A 5 | Knowledge of the international role of the engineer and the impact of engineering solutions in a global context. |
| A 6 | Knowledge of the detailed principles of process selection and design. |

| Disciplinary Skills - able to: | |
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| B 1 | Demonstrate significant and wide ranging ability in identifying, defining and solving engineering problems using mathematical and modelling techniques with due cognisance of science and engineering principles. |
| B 2 | Show strong ability in the selection, design and optimisation of process engineering systems and processes. |
| B 3 | Recognise how to ensure safe operation of apparatus and plant whilst exercising judgement of economic and environmental constraints. |
| B 4 | Evaluate and integrate information and processes through individual and team project work; communicating articulately in the process. |
| B 5 | Show strong ability to plan an experiment (or project), analyse and interpret data recorded in the laboratory and on processes to deliver supported recommendations and/or solutions. |
| B 6 | Use laboratory and pilot equipment well and safely, including advanced analytical apparatus. |
| B 7 | Observe and record data in the laboratory and on processes. |
| B 8 | Use computer packages appropriate to process engineering to a high level. Integrate them extensively with project, laboratory and design work. |
| B 9 | Prepare technical reports, technical research papers and dissertations to a level that demonstrates initiative and in-depth thinking - research the material(s) required to produce these. |
| B 10 | Understand technical drawings. Prepare block, flow & piping and instrumentation, and mechanical drawings. |

| Attributes: |
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Queen Mary University of London

Programme Title: BEng/MEng Chemical Engineering, BEng/MEng Chemical Engineering with Industrial Experience

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| C 1 | Communicate in a detailed and effective manner using written, oral, graphical and presentational skills – sorting data in the most appropriate manner. |
| C 2 | Use IT effectively (e.g. process simulator, word processor, spreadsheet, database, presentation, CAD, email, WWW and specialist software) and integrate the benefits well with communication and reporting. |
| C 3 | Use mathematical skills appropriate to a well qualified professional engineer. |
| C 4 | Work independently to a high level. |
| C 5 | Work in a team environment, taking a leading role if required. |
| C 6 | Manage workloads and time effectively and efficiently. |
| C 7 | Work with limited or contradictory information whilst being able to fully justify conclusions that are drawn |

| QMUL Model Learning Outcomes - Level 4: | |
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| D 1 | Identify and discuss their own career aspirations or enterprise skills and knowledge and how they impact on others |
| D 2 | Identify and discuss what their own role in their programme and/or subject discipline might mean to them for future e |
| D 3 | Identify and demonstrate the perspectives or problem solving techniques of different disciplines |
| D 4 | Demonstrate connections between different theoretical perspectives within your discipline |

## How Will You Learn?

Teaching materials are delivered through a combination of lectures, problem solving classes, laboratory practicals, and a variety of coursework. In addition problem-based learning plays a role in the your first and second years.
You will undertake a major individual research project in the third year, and a substantive industrially led group research project in the fourth year, both of which are designed to assimilate and utilise knowledge gained throughout the degree towards approaching a real Engineering problem.

The 3rd year project allows you to participate in the specialist internationally-recognised research taking place within the School of Engineering and Materials Science. The 4th year project is a group design project worth half of the final year. These exciting student-led projects are frequently sponsored by industry and provide a valuable insight into real life engineering design and project management.

## How Will You Be Assessed?

Assessment is continuous throughout the degree, with written reports, projects, presentations, group work and exams (exams take place in the summer only). The degree programme has eight modules per year split over two semesters, and most are assessed by a combination of coursework and an end of year exam. Some modules, such as the research and design projects, count for two or four modules. In the third and fourth year, you can select from a range of module options allowing you to tailor your degree to specific areas of interest within your specialist degree programme.

Queen Mary University of London

Programme Title: BEng/MEng Chemical Engineering, BEng/MEng Chemical Engineering with Industrial Experience

**How is the Programme Structured?**

Please specify the full time and part time programme diets (if appropriate).

**QMUL Model**

Students are required to undertake the equivalent of one module (15 credits in 2017/18) per year of study which has been identified as meeting the requirements of the QMUL Model. Each of these modules has been designed to combine the best of QMUL's academic excellence with your ability to identify and develop your skills, networks and experience. This will help to ensure you become a graduate who can undertake further study or secure graduate employment in areas that interest you, and will support your ability to position yourself to find the right job or opportunity for you. The relevant module for your first year of study in 2017/18 is indicated below.

Where more than one module is specified, this is because pertinent elements from these modules have been identified as being appropriate to the QMUL Model and when studied together, deliver the equivalent content of one 15-credit QMUL Model module.

The QMUL Model modules for future years and associated Learning Outcomes will be identified as your studies continue.

Should Professional, Statutory and Regulatory Body requirements apply to your programme of study, these will be taken into account in the specification of QMUL Model requirements.

Academic Year of Study FT - Year 1

| Module Title | Module Code | Credits | Level | Module Selection Status | Academic Year of Study | Semester | QMUL Model |
|---|---|---|---|---|---|---|---|
| Mathematics and Computing for Engineers 1 | DEN4122 | 15 | 4 | Compulsory | 1 | Semester 1 | No |
| Mechanics of Fluids I | DEN4101 | 15 | 4 | Compulsory | 1 | Semester 1 | No |

Queen Mary University of London

Programme Title: BEng/MEng Chemical Engineering, BEng/MEng Chemical Engineering with Industrial Experience

| Module Title | Module Code | Credits | Level | Module Selection Status | Academic Year of Study | Semester | QMUL Model |
|---|---|---|---|---|---|---|---|
| Engineering Chemistry | DEN4401 | 15 | 4 | Compulsory | 1 | Semester 1 | No |
| Student Centred Learning for Chemical Engineers 1 | DEN4402 | 30 | 4 | Core | 1 | Semesters 1 & 2 | Yes |
| Mathematics and Computing for Engineers 2 | DEN4123 | 15 | 4 | Compulsory | 1 | Semester 2 | No |
| Thermodynamics 1 | DEN107 | 15 | 4 | Compulsory | 1 | Semester 2 | No |
| Introduction to Chemical Reactor Design | DEN4403 | 15 | 4 | Compulsory | 1 | Semester 2 | No |
| Transferable Skills for Engineers and Materials Scientists | MAT4444 | 0 | 4 | Compulsory | 1 | Semester 2 | No |

Academic Year of Study FT - Year 2

| Module Title | Module Code | Credits | Level | Module Selection Status | Academic Year of Study | Semester | QMUL Model |
|---|---|---|---|---|---|---|---|
| Energy Conversion Analysis | DEN5107 | 15 | 5 | Compulsory | 2 | Semester 1 | No |
| Chemical Reaction Engineering 1 | DEN5401 | 15 | 5 | Compulsory | 2 | Semester 1 | No |
| Student Centred Learning for Chemical Engineers 2 | DEN5402 | 15 | 5 | Compulsory | 2 | Semesters 1 & 2 | No |
| Engineering Biochemistry | DEN5403 | 15 | 5 | Compulsory | 2 | Semester 1 | No |
| Particle Technology and Separation Processes 1 | DEN5404 | 15 | 5 | Compulsory | 2 | Semester 2 | No |
| Control Systems Analysis and Design | DEN5200 | 15 | 5 | Compulsory | 2 | Semester 2 | No |
| Heat Transfer and Fluids Mechanics 1 | DEN5208 | 15 | 5 | Compulsory | 2 | Semester 2 | No |

Academic Year of Study FT - Year 3

Programme Title: BEng/MEng Chemical Engineering, BEng/MEng Chemical Engineering with Industrial Experience

| Module Title | Module Code | Credits | Level | Module Selection Status | Academic Year of Study | Semester | QMUL Model |
|---|---|---|---|---|---|---|---|
| Individual Project | DEN318 | 30 | 6 | Core | 3 | Semesters 1 & 2 | No |
| Chemical Reaction Engineering 2 | DEN6401 | 15 | 6 | Compulsory | 3 | Semester 1 | No |
| Process Synthesis | DEN6402 | 15 | 6 | Compulsory | 3 | Semester 1 | No |
| Heat Transfer and Fluid Mechanics 2 | DEN6208 | 15 | 6 | Elective | 3 | Semester 1 | No |
| Environmental Properties of Materials | MAT507 | 15 | 6 | Elective | 3 | Semester 1 | No |
| Ma\terials Selection in Design | MAT602 | 15 | 6 | Elective | 3 | Semester 1 | No |
| Particle Technology and Separation Processes 2 | DEN6403 | 15 | 6 | Compulsory | 3 | Semester 2 | No |
| Process Fluid Dynamics | DEN6404 | 15 | 6 | Compulsory | 3 | Semester 2 | No |
| Manufacturing Processes | MAT601 | 15 | 6 | Elective | 3 | Semester 2 | No |
| Renewable Energy Materials | MAT427 | 15 | 6 | Elective | 3 | Semester 2 | No |
| Environmental Engineering | DEN320 | 15 | 6 | Elective | 3 | Semester 2 | No |
| Combustion in Automotive Engines | DEN326 | 15 | 6 | Elective | 3 | Semester 2 | No |

Academic Year of Study FT - Year 4

| Module Title | Module Code | Credits | Level | Module Selection Status | Academic Year of Study | Semester | QMUL Model |
|---|---|---|---|---|---|---|---|
| Research and Design Team Project | MAT7400 | 60 | 7 | Core | 4 | Semesters 1 & 2 | No |
| Membrane Science and Technology | DEN7401 | 15 | 7 | Compulsory | 4 | Semester 1 | No |
| Renewable Energy Sources | DEN438 | 15 | 7 | Elective | 4 | Semester 1 | No |

Programme Title: BEng/MEng Chemical Engineering, BEng/MEng Chemical Engineering with Industrial Experience

| Module Title | Module Code | Credits | Level | Module Selection Status | Academic Year of Study | Semester | QMUL Model |
|---|---|---|---|---|---|---|---|
| Introduction to Law for Science and Engineering | IPLM701U | 15 | 7 | Elective | 4 | Semester 1 | No |
| Advanced Structure-Property Relationships in Materials | MAT706 | 15 | 7 | Elective | 4 | Semester 1 | No |
| Advanced Heat Transfer and Fluid Mechanics | DEN7208 | 15 | 7 | Elective | 4 | Semester 1 | No |
| Whole System Design in Sustainable Engineering | DEN7433 | 15 | 7 | Elective | 4 | Semester 1 | No |
| Utility Systems | DEN7402 | 15 | 7 | Compulsory | 4 | Semester 2 | No |
| Advanced Gas Turbines | DEN427 | 15 | 7 | Elective | 4 | Semester 2 | No |
| Energy Storage Engineering | DEN7600 | 15 | 7 | Elective | 4 | Semester 2 | No |
| Advanced Polymer Synthesis | MAT7797 | 15 | 7 | Elective | 4 | Semester 2 | No |
| Advanced Materials Characterization Techniques | MAT804 | 15 | 7 | Elective | 4 | Semester 2 | No |

## What Are the Entry Requirements?

Minimum Entry Requirements with A-levels are:
AAA must include Maths A-level and Physics or Chemistry.
Maths A-level must be an A or above

Other qualifications:
International Baccalaureate - 36 points or above overall, with maths and physics or chemistry at higher level 6
European Baccalaureate - 85% or above including maths and science
French Baccalaureate - 15/20 overall, with 15/20 in maths and science
HE Advanced Diploma - Grade A or above overall, with Maths A-level grade A or above

## How Do We Listen and Act on Your Feedback?

The Student-Staff Liaison Committee provides a formal means of communication and discussion between the School and its students. The committee consists of student representatives from each year of the programme, together with appropriate representation from staff within the School. It is designed to respond to both the general needs of students, and subject specific concerns, as well as act as a forum for discussing programme and module developments. Student-Staff Liaison Committees meet regularly throughout the year.

The chair of the SSLC sits on the School's Education Board, which advises the School's Director of Taught Programmes on all matters relating to the delivery of taught programmes at School level, and ensures that student feedback is fed into the reviewing of modules and programmes. Student views are also incorporated in the Committee's work in other ways, such as through the National Student Survey (NSS), student module evaluations and module forums. We also use the forums to listen to student feedback on an individual module basis and develop materials and support classes to address comments or requests suggested in the forum.

Queen Mary University of London

Student representation is also present in the following School committees: All Staff Meeting, Education Board and Student Experience Group.

All Schools operate an Annual Programme Review (APR) of their taught undergraduate and postgraduate provision. APR is a continuous process of reflection and action planning which is owned by those responsible for programme delivery; the main document of reference for this process is the Taught Programmes Action Plan (TPAP) which is the summary of the School's work throughout the year to monitor academic standards and to improve the student experience.

## Academic Support

Academic support for individual modules is the responsibility of the module organiser and co-organiser(s). These are supported by Teaching Associates and post-graduate students, many of whom will have studied the modules themselves as undergraduates in the School. In addition there is technician support available for practical sessions.
Academic support for the programme as a whole, including choosing optional modules and possible transfer between programmes is provided in the first instance by the Personal Tutor, with further guidance available from the Senior Tutor and Programme Director, the latter having overall responsibility for the programme structure. The Programme Director in turn reports to the relevant Division in the School, the Teaching Chair of which is a member of the School's Education and Learning Committee.
We additionally have a School Office, with many student facing staff available to support student learning and one full time Student Support Officer. These staff members will help with coursework submission, time tabling concerns and other general administration as well as providing pastoral support and further guidance on dealing with extenuating circumstances. We also have staff designated to support students in achieving industrial placements and providing careers advice.

## Programme-specific Rules and Facts

The programme operates under the standard QMUL rules for MEng programmes.

## Specific Support for Disabled Students

Queen Mary has a central Disability and Dyslexia Service (DDS) that offers support for all students with disabilities, specific learning difficulties and mental health issues. The DDS supports all Queen Mary students: full-time, part-time, undergraduate, postgraduate, UK and international at all campuses and all sites.

Students can access advice, guidance and support in the following areas:
• Finding out if you have a specific learning difficulty like dyslexia
• Applying for funding through the Disabled Students' Allowance (DSA)
• Arranging DSA assessments of need
• Special arrangements in examinations
• Accessing loaned equipment (e.g. digital recorders)
• Specialist one-to-one "study skills" tuition
• Ensuring access to course materials in alternative formats (e.g. Braille)
• Providing educational support workers (e.g. note-takers, readers, library assistants)
• Mentoring support for students with mental health issues and conditions on the autistic spectrum.

## Links With Employers, Placement Opportunities and Transferable Skills

We place a strong emphasis on supporting our students in achieving quality graduate positions at the end of their degrees. In the first year, all students take a transferable skills module, designed to both support them through the transition to university life,

and also introduce the important employability skills they will need in later life. We run an extensive range of employability training events, with weekly timetabled careers slots and field trip visits to more than 20 collaborating companies. Our relationships with both the Careers Group and Student Services are strong in SEMS, and we co-deliver our training in study skills and career development for maximum benefit.
Since 2011 we have had a placement officer working in the school dedicated to supporting our new "with Industrial Experience" programmes which have grown immensely in popularity in the last few years.

The School has run Industrial Liaison Forums (ILFs) each academic year since the School was formed in 2007. Since 2010, the Autumn event is focused on encouraging more industrial participation in our research programmes, rewarding excellence by allowing companies to present student prizes for academic excellence across the School and also as a way of allowing companies and our students to interact through themed panel sessions and a careers fair. The Spring event aims to showcase our best third year project students and all of our group MEng projects. This event again allows extensive networking opportunities between employers and placement providers with all of our students in SEMS. Typically these events are attended by over 50 companies including our regular student prizes sponsors: Tata Steel, Eaton Industries, JRI, GSK, RollsRoyce, Apatech, Morgan Cruicible, ARTIS, NPL, TWI, Becker Coatings; Advanced Healthcare Ltd & Apatech. Many of these companies are also actively engaged in student projects and in addition to these our events are also attended by additional companies that also collaborate with projects such as: Jaguar Land Rover, Alcoa, Perryman, DSTL, BAe, Airbus, Corin, DePuy, Baxter's Healthcare, Norman Foster Partners and many others. In recent times we have extended these events to encourage participation from our more recent alumni as well.

These forums have a direct impact by encouraging employers to sponsor and support the student projects and to provide real engineering case studies to engage the students throughout the curriculum. Many of these companies also support our lecture programme in individual modules. Recent case studies that have been taught and assessed were delivered by companies including Tata, Gillette, Sugru, JRI, DuPuy, Apatech, Artis, BAe, DSTL, Rolls Royce, Perryman and Advanced Healthcare ltd.

## Programme Specification Approval

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| **Person completing Programme Specification** | Dr Henri Huijberts |
| **Person responsible for management of programme** | Dr Lorenzo Botto/Dr Henri Huijberts (acting) |
| **Date Programme Specification produced/amended by School Learning and Teaching Committee** | |
| **Date Programme Specification approved by Taught Programmes Board** | |