Programme Specification (PG)

Awarding body / institution:	Queen Mary University of London
Teaching institution:	Queen Mary University of London
Name of final award and title:	MSc Advanced Chemical Engineering
Name of interim award(s):	PGCert/PGDip Advanced Chemical Engineering,
Duration of study / period of registration:	1 calendar year
Queen Mary programme code(s):	
QAA Benchmark Group:	Engineering
FHEQ Level of Award:	Level 7
Programme accredited by:	Institution of Chemical Engineers (pending)
Date Programme Specification approved:	
Responsible School / Institute:	School of Engineering & Materials Science

Schools / Institutes which will also be involved in teaching part of the programme:

Add School

Remove School

Collaborative institution(s) / organisation(s) involved in delivering the programme:

Programme outline

The MSc in Advanced Chemical Engineering offers graduates in BEng Chemical Engineering (or similar) an opportunity to cement their chemical and process engineering expertise to become thought-leaders and key problem solvers for the critical challenges associated with the future of engineering.

Focusing on the needs of current and future chemicals and energy industry, the programme harnesses QMUL's expertise in sustainability, future materials processing and engineering interdisciplinarity.

By the end of this programme, students will be at the forefront of our present critical engineering challenges: how do we harness existing industries, or create new industries to meet societal needs for energy and chemicals but keep within planetary and societal boundaries?

Particular focus is given to enabling students to think outside the box, problem solving from a nano- to systems- scale, incorporating business, regulatory and societal perspectives to become thought-leaders in chemical engineering and beyond. We do this by surrounding the delivery of advanced engineering concepts with the study of real-world, current engineering problems that need us to incorporate new perspectives and get creative.

A key pillar of programme lies in the research project conducted throughout the year (but mainly during the summer semester) that will be tied to one of our key SEMS research centres (Sustainable Engineering, Intelligent Transport, Bioengineering). Students are offered a series of elective modules to suit their career aspirations, including modules that give Chemical Engineering depth (e.g. macromolecular engineering, electrochemical energy storage systems, advanced nanocomposites) and breadth (Environment, ethics and economics in design, Business strategy and technology entrepreneurship).

Aims of the programme

The aims of the Advanced Chemical Engineering programme are to
- Provide BEng chemical engineers with skills and expertise to place themselves at the forefront of the sustainable chemical engineering industry
- Advanced concepts in chemical engineering depth such as sustainability, process safety and water treatment, as well as other key topics
- Provide a breadth of knowledge relating to safety, ethics, and business to place chemical engineering students at the forefront of societal challenges
- Develop problem solving skills for modern engineering challenges
- Enable forward thinking in design, practice and research
- Provide the practice of solving real-world industrial problems incorporating uncertainty in complex environments

What will you be expected to achieve?

- Gain chemical engineering knowledge to thrive at the forefront of related industries or research
- Demonstrate and critique skills and tools that chemical engineers use to design safe, sustainable and profitable processes
- Be proficient in using key software tools for complex computational activities (e.g. programming, process simulation, detailed design)
- Conduct research that reaches the forefront of knowledge in a targeted chemical engineering or complementary area

Add Learning Outcome

		Academic Content:
X	A1	Core scientific principles. Understand the core engineering, scientific and mathematical principles needed to underpin Chemical Engineering professions.
X	A2	Disciplinary concepts. Understand, apply and critique a broad range of advanced disciplinary concepts related to Chemical Engineering.
X	A3	Problem solving. Apply engineering approaches to solve a wide range of advanced problems, relating to risks, costs, safety, reliability, aesthetics and environmental impact.
X	A4	Key technologies. Fundamentally understand advanced state-of-the-art technologies and understanding their capabilities and limitations related to Chemical Engineering.
X	A5	Systems design and optimisation. Design and optimise a broad range of products, processes and systems, based on key technical and sustainability related factors.
X	A6	Experimental design and delivery. Plan, execute and communicate the outputs of an experiment or project.
X	A7	Experimental approaches. Use and integrate a wide range of advanced computational and experimental approaches to solve Chemical engineering problems and be able to interpret the results affected by uncertainties
X	A8	Engineering economics. Understand economic evaluation and business principles relevant to engineering.
X	A9	Engineering responsibility. Fully understand the roles and responsibility of engineers in society and their impact on both a local and global context.

Add Learning Outcome

		Disciplinary Skills - able to:
X	B1	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.
X	B2	Show strong ability in the selection, design and optimisation of process engineering systems and processes.
X	B3	Assess and improve the safety of complex chemical plants whilst exercising judgement of economic and environmental constraints.
X	B4	Evaluate and integrate information and processes through individual and team project work; communicating effectively in the process.
X	B5	Show strong ability to plan and execute a project, analyse and interpret data to deliver supported recommendations and/or solutions.
X	B6	Use laboratory and pilot equipment well and safely, including advanced analytical apparatus.
X	B7	Use industry-standard software and modelling packages appropriate to process engineering at an advanced level. Integrate them extensively with project, laboratory or design work.
X	B8	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.
X	B9	Understand uncertainty and complexity in chemical systems
X	B10	Research and critique the current state of knowledge and develop new approaches

Add Learning Outcome

		Attributes:
X	C1	Evaluate complex or contradictory information, data and processes in order to make judgements and decisions.
X	C2	Identify and solve real world problems, developing creative solutions with a full awareness of sustainability.
X	C3	Be effective in verbal communication, develop speaking and listening skills, and provide and receive constructive feedback.
X	C4	Use a range of digital technologies to facilitate effective verbal, graphical and visual communication of technical ideas with engineers, scientists, technicians and a lay audience.
X	C5	Work effectively in a team, appreciating different team roles including the leadership.
X	C6	Understand and comply with professional engineering and scientific ethics and codes of conduct.
X	C7	Have a working knowledge and ability to comply with relevant regulatory frameworks, quality assurance processes and good laboratory practice.
X	C8	

How will you learn?

Teaching methods are tailor-made to suit the size of classes, the nature of the subject and the level of study. Each module has a combination of methods including lectures, tutorials, laboratory sessions, industrial visits, workshops and group work. QMUL degrees combine face to face teaching and practical experiences, with supported and structured on-line learning. Our virtual learning platform is referred to as QMplus. Through this platform you will be able to find details about your modules, assessments, timetables and other activities.

Projects throughout the programme are designed for you to exercise independent thinking, research and problem solving skills and are preferably undertaken in a related subject. Group projects enhance your communication, organisational as well as technical skills.

How will you be assessed?

We will assess you in a variety of ways over this module, with a particular focus on authentic assessment that reflects effective demonstration of knowledge in real-world environments.
You can expect a variety of different types of assessment methods:
- Written assessment (e.g. Examinations, Project reports)
- Practical assessment (Laboratory/workshop practicals)
- Oral assessment (presentations and vivas)

Assessments allow you to demonstrate that you have met the intended learning outcomes for each module and contribute towards your achievement of the programme learning outcomes. There are summative (formal) assessments during and/or at the end of each module and well as ongoing formative (informal – no marks) through the degree. Examinations are intended to assess understanding rather than recall. Group assessments may incorporate peer marking.
Feedback is provided through a number of formats, including:
• Oral (e.g. face to face during or after face-to-face sessions, video)
• Personal (e.g. discussion with staff)
• Interactive (e.g. Team Based Learning, peer-to-peer, online quizzes)
• Written (e.g. solutions, model answers, comments on work)
You will receive feedback on intermediate, developmental assessments such as project plan and progress reports and on coursework assessments. This feedback may be summarised for the whole cohort or be directed towards your work individually Feedback is intended to help you learn and you are encouraged to engage with it, reflect upon it and discuss it with your module organiser. Feedback will be provided on coursework and practical assessments within an appropriate time. Feedback on examination performance is available upon request from the module leader and overall class performance feedback on a question-by-question basis may also be provided.
QMUL's Policy on Assessment and Feedback and guidance on issuing provisional marks to students is available at: https://arcs.qmul.ac.uk/policy/

How is the programme structured?

Please specify the structure of the programme diets for all variants of the programme (e.g. full-time, part-time - if applicable). The description should be sufficiently detailed to fully define the structure of the diet.

Key components of the programme are as follows:
• Research project spanning the year enabling specialisation in a chosen chemical engineering or related area
• A selection of compulsory modules that develop chemical engineering depth in principles, practice and design
• A selection of elective modules that provide breadth across a wide array of chemical engineering and complementary topics
Within each module, you will be challenged to solve critical, industry-facing, real world problems.
Total number of credits = 180, (60 per semester)

Core module
• EMS782P: Advanced Chemical Engineering Research Project (60 credits), Sem 1-3

Compulsory modules
• EMS705P: Environment, ethics and economics in design (15 credits), Sem 2
• EMS780P: Advanced Water Treatment (15 credits), Sem 1
• EMS781P: Advanced safety engineering (15 credits), Sem 2

You can then choose elective modules from the following three tranches to ensure sufficient chemical engineering, depth, breadth and complementarity.

Chemical engineering depth modules (elective, choose 1-3)
- EMS712P: Macromolecular engineering (15 credits), Sem 1
- EMS760P: Electrochemical energy storage systems (15 credits), Sem 1
- EMS730P: Advanced Nanocomposites (15 credits), Sem 2

Chemical engineering breadth modules (elective, choose 1-2)
- EMS761P: Solar energy engineering (15 credits), Sem 2
- EMS711P: Renewable fuels (15 credits), Sem 2
- EMS703P: Introduction to systems engineering (15 credits), Sem 1
- EMS740P: Machine learning and artificial intelligence for engineering (15 credits), Sem 1

Complementary modules (choose 0-1)
- EMS774P: Business strategy and technology entrepreneurship (15 credits), Sem 2
- EMS771P: Engineering project management (15 credits), Sem 1

Add Year of Study | Remove Year of Study

Academic Year of Study FT - Year 1 Add Module

	Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
X	Advanced Chemical Engineering Research Project	EMS782P	60	7	Core	1	Semester 1-3
X	Advanced Water Treatment	EMS780P	15	7	Compulsory	1	Semester 1
X	Macromolecular Engineering	EMS712P	15	7	Elective	1	Semester 1
X	Electrochemical Energy Storage Systems	EMS760P	15	7	Elective	1	Semester 1
X	Machine Learning and Artificial Intelligence for Engineering	EMS740P	15	7	Elective	1	Semester 1
X	Introduction to Systems Engineering	EMS703P	15	7	Elective	1	Semester 1
X	Engineering Project Management	EMS771P	15	7	Elective	1	Semester 1
X	Environment, Ethics and Economics in Engineering Design	EMS705P	15	7	Compulsory	1	Semester 2
X	Advanced Safety Engineering	EMS781P	15	7	Compulsory	1	Semester 2
X	Advanced Nanocomposites	EMS730P	15	7	Elective	1	Semester 2
X	Business Strategy and Technology Entrepreneurship	EMS774P	15	7	Elective	1	Semester 2

	Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
X	Solar Energy Engineering	EMS761P	15	7	Elective	1	Semester 2
X	Renewable Fuels	EMS711P	15	7	Elective	1	Semester 2

What are the entry requirements?

Minimum 2:1 BEng Chemical Engineering or similar.
IELTS: 6.5 Overall, Writing 6.0, Reading/Listening/Speaking 5.5

How will the quality of the programme be managed and enhanced? How do we listen to and act on your feedback?

From our Industrial Advisory Board, we will regularly receive the feedback regarding the teaching directions of modules and workshop we provide. Also, we will review feedback from the students through module evaluation questionnaires and the Student-Staff Liaison Committee. Programme improvements will be enhanced through actions taken at the Annual Programme Review and less frequently through Extended Programme Reviews.

What academic support is available?

We aim to support all students throughout their time with us. We encourage students to develop independently but this does not mean that you need to be alone. We know that support and encouragement from staff and fellow students is very important throughout your degree.

The Student Support Officer for SEMS is the first contact for any personal support; they can be contacted by email: semsstudents@qmul.ac.uk with any questions or to arrange an appointment.

Your project supervisor will be your Academic Advisor, providing a first point of contact for study advice and information on programmes. Project supervisors will be allocated early in the first semester, with the Programme Director and the Director of PGT programmes being alternative academic point of contact until the project supervisor has been allocated.

Programme-specific rules and facts

The programme follows the standard QMUL Academic Regulations for programmes accredited by the Engineering Council.

How inclusive is the programme for all students, including those with disabilities?

All teaching venues will be accessible for the student with disability. If needed, a sign language interpreter will join the teaching to support students with disability.

Disability and Dyslexia Service:
QMUL 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 QMUL students: full-time, part-time, undergraduate, postgraduate, UK and international at all campuses and all sites. You 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 module materials in alternative formats
- 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.

Advice and Counselling:
QMUL offers a wide range of advice, guidance and self-help material. These free and confidential professional services are available to all students. Details can be found at:
https://www.welfare.qmul.ac.uk/student-advice-guides/

Links with employers, placement opportunities and transferable skills

The school has an active Industrial Advisory Board, and strong links with engineering businesses. This has a direct impact on the programme content by encouraging employer engagement in the programme, for example by providing real-world case studies, delivering guest-lectures or engaging with research projects. We run an Industrial Liaison Forum twice per year where we bring our collaborators, advisory board and alumni to campus to engage with students. Students will have a chance to present their project work to our industrial contacts as well as receive career advice.

Programme Specification Approval

Person completing Programme Specification:	Paul Balcombe/Henri Huijberts
Person responsible for management of programme:	Paul Balcombe
Date Programme Specification produced / amended by School / Institute Education Committee:	
Date Programme Specification approved by Taught Programmes Board:	