PROGRAMME SPECIFICATION

Degrees:

Programme Title	Final Award	duration of study/ years	Programme code	Level
Advanced Mechanical Engineering	MSc	1	PMSF-QMENNG1-PSAMEZ	7

Ownership	
Awarding institution:	Queen Mary University of London
Teaching institution	Queen Mary University of London
Academic Department(s) involved in programme delivery	School of Engineering and Materials Science
Main location(s) of study	Mile End Road, London
External references	
QAA Benchmark Group	Engineering
External Accreditor (if applicable)	Institution of Mechanical Engineers and Royal Aeronautical Society
Accreditation received	2022
Accreditation renewal	

Specification Details	
Programme Lead	Dr Hicham Adjali
Student cohorts covered by specification	2025 entry
Date of introduction of programme	September 2019
Date of programme specification / amendment	15 November 2024
Approval by School Education Committee	15 November 2024
Submitted to Directorate of Governance & Legal Services	16 November 2024

1. Programme Overview

Mechanical Engineering is the application of physical science to practical problem solving. As a Mechanical Engineer you could be working on anything from a simple component such as a switch, to more complex machines such an internal combustion engine or an entire system such as an automobile or a factory production line.

The MSc degree in Advanced Mechanical Engineering is a 1 calendar year programme that is part of a suite of programmes offered in Mechanical Engineering at Queen Mary University of London. MSc programmes are aimed at students who already have an in-depth knowledge of an area of Science and Engineering, and who wish to specialise further in an area of Mechanical Engineering.

The Mechanical Engineering degree programmes at QMUL are delivered by a large number of specialist academic staff, who, in addition to their teaching, are involved in internationally recognised research in a wide range of topics, including:
- Energy generation and conversion, including alternative and sustainable sources
- Heat transfer and fluid mechanics
- Computational engineering, both solids and fluids
- Control engineering
- Robotics
- Materials science, including structural and functional materials

The programme structure is designed to appeal to students with engineering, sciences or mathematics backgrounds, and is modular in format. It gives students the choice to specialise in one of the main areas of Computational Design & Engineering or Energy & Thermofluids. You will take modules that will align with your background, your choice of specialisation area and your project topic.

A 90-credit research project is to be undertaken using our research activities and our state-of-the-art facilities. Several high-performance computing clusters owned by the university support a full spectrum of computational research. Our well-equipped laboratories include a wide range of IC engines, heat transfer facilities, wind tunnels, an anechoic chamber, Flight Simulator, and materials synthesis and characterisation labs.

The programme aims to prepare specialists with advanced skills in computational modelling, numerical and experimental techniques in one of the following areas of Mechanical Engineering: Computational Design & Engineering or Energy & Thermofluids. Upon completing this programme you will be able to perform design and analysis of Mechanical Engineering systems in your chosen area and to develop novel computational and technology products for the Mechanical Engineering industries.

In particular the programme has the following aims.

- Teaching advanced computational, experimental and analytical techniques applicable to general Mechanical Engineering systems in order to provide an advanced base of knowledge and skills
- Teaching advanced computational and experimental techniques applicable to modelling and simulation of Mechanical Engineering systems.
- Teaching modern design procedures used by the leading Mechanical Engineering research and development units.
- Teaching advanced materials used in Mechanical Engineering systems and implementing materials into research/design projects.

- Enabling students to participate in advanced research and industrial developments in Mechanical Engineering systems.

2. Learning outcomes for the programme

In this degree programme we place strong emphasis not only on the technical content of our modules, such as mechanics, thermodynamics and design, but also on cross disciplinary skills vital for an engineer to be effective in the work place. We embed these skills in the technical modules on the programme, to ensure that the technical knowledge and understanding works as you progress through your degree, and also to allow you to graduate with skills you can apply to a range of future careers.

Students who complete this programme will be trained to work in a wide range of industries that develop, design, and maintain Mechanical Engineering systems from full systems to component design and analysis. In addition students will have been given an ideal preparation for undertaking a PhD in a related discipline.

2.1 Academic Content

- Gain in-depth knowledge into finding practical solutions to Mechanical Engineering system problems using advanced computational, experimental and theoretical methods
- Have in-depth understanding of the development cycle of novel technologies of Mechanical Engineering systems and be able to contribute to advanced design developments
- Gain advanced knowledge and research capability in one of the areas of Computational Design & Engineering or Energy & Thermofluids

2.2 Discipline specific

- Undertake independent research on a topic relating to Mechanical Engineering systems
- Apply advanced engineering methods to a range of related applications of Mechanical Engineering systems
- Select analysis techniques for Mechanical Engineering systems and system performance assessment
- Critically assess feasibility of analytical, computational and experimental techniques in use and propose practical methods for their improvement.

2.3 Attributes

- Engage critically with knowledge.
- Be able to assess both the application and limitation of mathematical, computational and experimental techniques available to an engineer.
- Undertake independent research using state of the art computing, processing, characterisation and testing facilities.
- Research capacity and Information expertise.

3 Learning and teaching approaches

Teaching methods are tailor-made to suit the size of classes and the nature of the subject. 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. Group work enhances your communication, organisational as well as technical skills.

3.1 Employers Links

The school has an active Industrial Liaison forum (ILF). This forum has a direct impact on the programmes by encouraging employers to sponsor and support the students and to provide real design case studies to engage the students throughout the curriculum. Recent case studies that have been taught and assessed were delivered by Bridgestone, DePuys, Baxter, Artis, Corus, BAe, DSTL, Rolls Royce. The ILF takes place twice a year, in Autumn and Spring.

3.2 Assessment methods

You can expect a variety of different types of assessment methods:

- Written assessment
- Examinations
- Progress tests
- Online assignments and quizzes
- Report and other writing
- Peer assessment
- Practical assessment
- Laboratory/workshop practicals
- Design work
- Programming tests
- CAD & simulation tool tests
  Oral assessment
- Oral presentations
- Poster presentations
- Group presentations
- Design presentations

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.

Assessments operate in accordance with QMUL Regulations and established procedures.
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. The final project thesis will be assessed in September and the student will also complete a presentation as well as an oral examination.

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.

3.3 Support of students

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: sems-office@qmul.ac.uk with any questions or to arrange an appointment.

3.3.1 Advisor arrangements

You will be allocated an Advisor when you register. You will meet with your Advisor at least twice per semester, but can always book more meetings if you need help.

3.3.2 Central support services 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.

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.

4 Programme structure

45 credits of taught modules will be taught in the first semester from September until December plus an additional 15 credits of taught material associated with the research project. A further 45 credits of taught modules will be taught in the second semester from January until April. All taught module examinations will be in the standard examination periods during January and May. The 90 credit Research Engineering project will be completed over 3 semesters.

The modules making up the programme are presented in the table below. Students will follow one of the following study pathways.

Computational design & engineering pathway

Module	Semester	Title		Credit
EMS715P	A,B,C	Extended Research Project	Core	90
EMS724P	A	Computational Engineering	Compulsory	15
EMS726P	A	Engineering Design Optimisation and Decision Making	Compulsory	15
1 from:				
EMS703P	A	Introduction to Systems Engineering	Elective	15
EMS740P	A	Machine Learning and Artificial Intelligence for Engineering	Elective	15
EMS714P	A	Modern Robotics: Fundamentals and Applications	Elective	15
EMS730P	B	Advanced Nanocomposites	Compulsory	15
EMS709P	B	Computational Fluid Dynamics	Compulsory	15
1 from:				
EMS704P	B	Simulation and Model Based Systems Engineering	Elective	15
EMS707P	B	Digital Signal Acquisition and Processing	Elective	15

Energy & thermofluids pathway

Module	Semester	Title		Credit
EMS715P	A,B,C	Extended Research Project	Core	90
3 from:				
EMS717P	A	Renewable Energy Sources	Elective	15
EMS760P	A	Electrochemical Energy Storage Systems	Elective	15
EMS726P	A	Engineering Design Optimisation and Decision Making	Elective	15
EMS724P	A	Computational Engineering	Elective	15
EMS709P	B	Computational Fluid Dynamics	Compulsory	15
EMS705P	B	Environment, Ethics and Economics in Engineering Design	Compulsory	15
EMS711P	B	Renewable Fuels	Compulsory	15

The credit load for elective modules are to be balanced across semesters.

Note: The modules, structure and assessments presented in this Programme Specification are correct at time of publication but might change as a result of student and staff feedback and the introduction of new or innovative approaches to teaching and learning. You will be consulted and notified in a timely manner of any changes to this document.

5 Entry requirements

Students will be admitted according to the entry requirements found at:

https://www.sems.qmul.ac.uk/pgadmissions

6 Quality assurance

6.1 Student Voice Committee (SVC) meetings

The School has a Student Voice Committee and students on this programme are represented on this committee. The committee meets twice during each semester and is made up of the following members:

- Academic Lead for Student Experience(Chair)
- Student Support Officer (Secretary)
- Directors of the relevant programmes
- At least one student representing the relevant programmes

The elections for the postgraduate representatives are organised through the Student Union. SVC agendas and minutes are found on the SEMS QMplus landing page. Relevant items on the minutes are referred to the appropriate School committees for consideration and feedback.

6.2 Evaluating and improving the quality and standards of teaching and learning

We assess our provision of teaching by:

- Module review by means of student experience questionnaires and module organisers' reports.
- Annual staff appraisal.
- Peer observation of teaching.
- External examiners' reports.
- Periodic Programme Review by the University.

The Committees within SEMS that have responsibility for monitoring and evaluating quality and standards are

- Education Committee
- Student Experience Committee
- Academic Standards Committee
- Student Voice Committee
- Subject Examination Boards
- Degree Examination Boards

The ways we receive student feedback on the quality of teaching and your learning experience are:

- Annual Postgraduate Taught Experience Survey (PTES)
- Student Voice Committee
- Student Experience Questionnaire evaluation for each of your modules

- Student forums on QMplus, including module and programme specific forums as well as ones covering more general topics
- Discussions with Advisors.

6.3 Staff development

Our staff are continuously engaging with professional development activities, including courses and workshops related to teaching and learning.