

Programme Title: Advanced Mechanical Engineering



Programme Specification

Awarding Body/Institution	Queen Mary University of London
Teaching Institution	Queen Mary University of London
Name of Final Award and Programme Title	MSc in Advanced Mechanical Engineering
Name of Interim Award(s)	
Duration of Study / Period of Registration	1 calendar year
QM Programme Code / UCAS Code(s)	H1S3
QAA Benchmark Group	Masters Degrees
FHEQ Level of Award	Level 7
Programme Accredited by	Institution of Mechanical Engineers (to be sought)
Date Programme Specification Approved	4 Feb 2015
Responsible School / Institute	School of Engineering & Materials Science

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

Institution(s) other than Queen Mary that will provide some teaching for the programme

Programme Outline

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 as 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

Programme Title: Advanced Mechanical Engineering

- 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 Solid Mechanics, Robotics and Automation, and Thermofluids and Combustion. The content of the programme includes a compulsory Research Methods and Experimental Techniques module in the first semester. Besides this module, you will take modules that will align with your background, your choice of specialisation area and your project topic.

A 60 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, a UK CueSim Flight Simulator and France-Price Induction Jet engine test bench, and materials synthesis and characterisation labs. Nanotechnology research is further supported by the facilities and expertise provided by Nanoforce, a company directly associated with the School.

Aims of the Programme

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: Solid Mechanics, Robotics and Automation or Thermofluids and Combustion. 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.

1. Teaching advanced computational, experimental and analytical techniques applicable to general Mechanical Engineering systems in order to provide an advanced base of knowledge and skills
2. Teaching advanced computational and experimental techniques applicable to modelling and simulation of Mechanical Engineering systems.
3. Teaching modern design procedures used by the leading Mechanical Engineering research and development units.
4. Teaching advanced materials used in Mechanical Engineering systems and implementing materials into research/design projects.
5. Enabling students to participate in advanced research and industrial developments in Mechanical Engineering systems.

What Will You Be Expected to Achieve?

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.

Academic Content:

A 1	Gain in-depth knowledge into finding practical solutions to Mechanical Engineering system problems using advanced computational, experimental and theoretical methods
A 2	Have in-depth understanding of the development cycle of novel technologies of Mechanical Engineering systems and be able to contribute to advanced design developments
A 3	Gain advanced knowledge and research capability in one of the areas of Solid Mechanics, Robotics and Automation, or Thermofluids and Combustion.

Disciplinary Skills - able to:	
B 1	Undertake independent research on a topic relating to Mechanical Engineering systems
B 2	Apply advanced engineering methods to a range of related applications of Mechanical Engineering systems
B 3	Select analysis techniques for Mechanical Engineering systems and system performance assessment
B 4	Critically assess feasibility of analytical, computational and experimental techniques in use and propose practical methods for their improvement.

Attributes:	
C 1	Engage critically with knowledge.
C 2	Be able to assess both the application and limitation of mathematical, computational and experimental techniques available to an engineer.
C 3	Undertake independent research using state of the art computing, processing, characterisation and testing facilities.
C 4	Research capacity and Information expertise.

How Will You Learn?

Through a wide range of different interactions including lectures, tutorials, laboratory classes, exercise classes and project supervisions. It is expected that the programme will demand between 1800 and 2000 hours in total to complete. About 10% of this time will be in scheduled lectures.

A significant amount of independent personal study is anticipated as part of this degree.

How Will You Be Assessed?

The taught modules will be assessed through both coursework and examinations. The details are as outlined in the individual module specifications. The examinations will all take place in the standard college examination periods in January and May. The final project thesis will be assessed in September and the student will also complete a presentation as well as an oral examination.

How is the Programme Structured?

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

60 credits of taught modules will be taught in the first semester from September until December and a further 60 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.

A 60 credit Advanced Mechanical Engineering research project will be completed after the examination period in semester 3 (from June - September). Preparation for this research project will begin in the module on Research Methods taken in the first semester.

The modules making up the programme are presented in the table below. The indicative study programme in each of the streams is as follows, but there is some flexibility depending on the student's background and interests.

Solid Mechanics

Semester 1: DENM014, DENM004, and two from DENM512, MTRM011, DENM033

Semester 2: DENM026, MTRM730, MTRM025 and one from DENM032, DENM010, DENM011

Semester 1-3: DENM703

Robotics and Automation

Semester 1: DENM014, DENM512, DENM004, MTRM011

Semester 2: DENM011, DENM336, and two from MTRM713, DENM026, DENM010

Semester 1-3: DENM703

Thermofluids and Combustion

Semester 1: DENM014, DENM208 and two from DENM512, DENM004, DENM035, MTRM011

Semester 2: DENM021, DENM022, DENM010, and one from DENM433, DENM405

Semester 1-3: DENM703

Academic Year of Study FT - Year 1

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Research Methods and Experimental Techniques in Engineering	DENM014	15	7	Compulsory	1	Semester 1
Computational Engineering	DENM004	15	7	Elective	1	Semester 1
Grad, div and curl: Vector Calculus for Engineering	DENM512	15	5	Elective	1	Semester 1
Materials Selection in Design	MTRM011	15	7	Elective	1	Semester 1
Vehicle Crashworthiness	DENM033	15	7	Elective	1	Semester 2
Advanced Heat Transfer and Fluid Mechanics	DENM208	15	7	Elective	1	Semester 1

Programme Title: Advanced Mechanical Engineering

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Renewable Energy Sources	DENM035	15	7	Elective	1	Semester 1
Numerical Optimisation in Engineering Design	DENM026	15	7	Elective	1	Semester 2
Composites	MTRM730	15	7	Elective	1	Semester 2
Failure of Solids	MTRM025	15	7	Elective	1	Semester 2
Aeroelasticity	DENM032	15	7	Elective	1	Semester 2
Computational Fluid Dynamics	DENM010	15	7	Elective	1	Semester 2
Robotics	DENM011	15	7	Elective	1	Semester 2
Manufacturing Processes	MTRM713	15	7	Elective	1	Semester 2
Advanced Combustion in Automotive Engines	DENM021	15	7	Elective	1	Semester 2
Advanced Gas Turbines	DENM022	15	7	Elective	1	Semester 2
Advanced High Speed Aerodynamics	DENM405	15	7	Elective	1	Semester 2
Advanced Mechanical Engineering Research Project	DENM703	60	7	Core	1	Semesters 1-3
Whole System Design in Sustainable Engineering	DENM433	15	7	Elective	1	Semester 2

What Are the Entry Requirements?

The entry requirement is that the student to have secured at least a high 2ii (>55%) BEng degree or equivalent qualification in engineering, science or an equivalent academic programme and supporting references. A minimum of IELTS 6.5 or equivalent is required for non-native English speakers.

How Do We Listen and Act on Your Feedback?

The Staff-Student Liaison Committee provides a formal means of communication and discussion between schools/institutes and its students. The committee consists of student representatives from each year in the school/institute together with appropriate

Programme Title: Advanced Mechanical Engineering

representation from staff within the school/institute. It is designed to respond to the needs of students, as well as act as a forum for discussing programme and module developments. Staff-Student Liaison Committees meet regularly throughout the year.

The School operates an Education and Learning Committee, which advises the School Director of Taught Programmes on all matters relating to the delivery of taught programmes at school level including monitoring the application of relevant QM policies and reviewing all proposals for module and programme approval and amendment before submission to Taught Programmes Board. Student views are incorporated in the committee's work in a number of ways, such as through consideration of student surveys and input from Staff-Student Liaison Committees..

All schools/institutes operate an Annual Programme Review 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/institute's work throughout the year to monitor academic standards and to improve the student experience. Students' views are considered in this process through analysis of the NSS and module evaluations.

Academic Support

During induction the students will be welcomed to the college by the programme leader. Early on in the programme the students will select an project supervisor based upon a wide choice of different project areas. This academic will then also act as a personal tutor. Many of the modules are taught to small classes and so a high level of personal support will also be available from the module organisers in the majority of the taught modules.

Programme-specific Rules and Facts

The programme follows the standard QMUL guidelines for MSc delivery.

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

The school has an active Industrial Liaison forum (ILF). This forum has a direct impact on our programmes by encouraging

Programme Title: Advanced Mechanical Engineering

employers to sponsor and support both the students and to provide real design case studies to engage the students throughout the curriculum.

The ILF meets twice a year. The event in October runs in parallel with the SEMS prize day where prospective employers attend the event, meet MSc and final year undergraduate students discussing opportunities and tips for applications. The new MSc students are encouraged to attend the October event to discuss their projects with industry to forge further ties, where our industrial liaison partners are regularly involved in some of the projects that are of applied research nature. The second industrial forum day takes place in March, where the MSc students are encouraged to meet industrial representatives to discuss potential future employment.

Programme Specification Approval

Person completing Programme Specification

Dr Adrian Briggs

Person responsible for management of programme

Dr Guang Li

**Date Programme Specification produced/amended
by School Learning and Teaching Committee**

28 Jan 2019

**Date Programme Specification approved by
Taught Programmes Board**

4 Feb 2015