Programme Title: MSc 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 Mechanical Engineering
Name of Interim Award(s)	
Duration of Study / Period of Registration	1 calendar year
QM Programme Code / UCAS Code(s)	H3C1
QAA Benchmark Group	Engineering
FHEQ Level of Award	Level 7
Programme Accredited by	IMechE (will be sought)
Date Programme Specification Approved	
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
N/A

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 an internal combustion engine or an entire system such as an automobile or a factory production line.
The MSc degree in Mechanical Engineering is a 1 calendar year conversion programme that is part of a suite of programmes offered in Mechanical Engineering at Queen Mary University of London. This programme is aimed at students who already have a science background (e.g. biology, mathematics, chemistry, physics), and who wish to convert to a career in 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 modular in format. During Semester A, students will take the compulsory modules Engineering Methods, which exposes them to essential engineering techniques and philosophy as well as Computer Aided Engineering and Materials Selection. Depending on their background, one conversion module from Vector Calculus and Energy Conversion Analysis. In Semester B students have the choice to specialise in one of the main areas of Solid Mechanics, Robotics and Automation, and Thermofluids and Combustion.

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 provides the required curriculum to develop appropriate programme level learning outcomes supporting the development of engineers at postgraduate level, taking in graduate scientists in biology, chemistry, physics and maths. The programme has been developed with a view to encouraging science and maths graduates to engage with the subject area, under a UK Government initiative funded by HEFCE. The programme title and employment prospects have been considered, both internally within QM and externally through industrial contacts.

This programme will develop science graduates to become engineers, concerned with applying scientific knowledge, mathematics and ingenuity to develop solutions for technical, societal and commercial problems. Upon completing of 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 computational, experimental and analytical techniques applicable to general Mechanical Engineering systems in order to provide a base of knowledge and skills
2. Teaching 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 materials used in Mechanical Engineering systems and implementing materials into design projects.
5. Enabling students to participate in 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.

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

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Disciplinary Skills - able to:	
B 1	Apply engineering methods to a range of related applications of Mechanical Engineering systems
B 2	Select appropriate analysis techniques for Mechanical Engineering systems and system performance assessment
B 3	Assess feasibility of analytical, computational and experimental techniques in use and propose practical methods for their improvement.

Attributes:	
C 1	Engage critically with engineering knowledge and design principles
C 2	Be able to assess both the application and limitation of mathematical, computational and experimental techniques available to an engineer.
C 3	Demonstrate rounded intellectual development

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.

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A compulsory zero-credit module DENM122 Essential Mathematics Skills for Engineers will be studied pre-sessionally by Distance Learning and in workshops during Semester A. This module will be assessed by coursework only.

A 60 credit Mechanical Engineering 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 Engineering Methods taken in the first semester.

The modules making up the programme are presented in the table below.

In the first semester students will take the compulsory module DENM114 Engineering Methods as well the following modules:
DENM512 Grad, div and curl: Vector Calculus for Engineering OR DENM510 Energy Conversion Analysis
DENM331 Computer Aided Engineering for Solids and Fluids
MTRM011 Materials Selection in Design

In the second semester, the study programme in each of the streams is as follows.

Solid Mechanics
Semester 2: DENM026 Numerical Optimisation in Engineering Design, MTRM730 Composites, MTRM025 Failure of Solids, DENM032 Aeroelasticity.

Robotics and Automation
Semester 2: DENM011 Robotics, DENM026 Numerical Optimisation in Engineering Design, MTRM713 Manufacturing Processes, DENM336 Modelling and Control of Mechanical Systems

Thermofluids and Combustion
Semester 2: DENM021 Advanced Combustion in Automotive Engines, DENM022 Advanced Gas Turbines, DENM010 Computational Fluid Dynamics, DENM433 Whole System Design in Sustainable Engineering

Academic Year of Study FT - Year 1

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Engineering Methods	DENM114	15	7	Compulsory	1	Semester 1
Grad, div and curl: Vector Calculus for Engineering	DENM512 (PG clone of DEN5122)	15	5	Elective	1	Semester 1
Energy Conversion Analysis	DENM510 (PG clone of DEN5107)	15	5	Elective	1	Semester 1
Computer Aided Engineering for Solids and Fluids	DENM331	15	6	Compulsory	1	Semester 1
Materials Selection in Design	MTRM011	15	7	Compulsory	1	Semester 1

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Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
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
Robotics	DENM011	15	7	Elective	1	Semester 2
Manufacturing Processes	MTRM713	15	7	Elective	1	Semester 2
Modelling and Control of Mechanical Systems	DENM336	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
Computational Fluid Dynamics	DENM010	15	7	Elective	1	Semester 2
Whole System Design in Sustainable Engineering	DENM433	15	7	Elective	1	Semester 2
Advanced Mechanical Engineering Research Project	DENM703	15	7	Core	1	Semesters 1-3
Essential Mathematics Skills for Engineers	DENM122	0	4	Compulsory	1	Semester 1

What Are the Entry Requirements?

Minimum of a 2:1 degree or the equivalent international undergraduate degree.

We welcome applications from students with a background in science including Chemistry, Physics, Mathematics and Biology etc.

English at IELTS 6.5 (if needed) – details of equivalent English Qualifications available on the QMUL website.

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

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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 PTES and module evaluations.
The School participates in the College's Annual Programme Review process, which supports strategic planning and operational issues for all undergraduate and taught postgraduate programmes. The APR includes consideration of the School's Taught Programmes Action Plan, which records progress on learning and teaching related actions on a rolling basis. Students' views are considered in the APR process through analysis of the PTES and module questionnaires, among other data.

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 adheres to the standard Academic Regulations for taught postgraduate 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

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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 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.
Recent graduates have found employment as IT consultants, specialist engineers, web developers, systems analysts, software designers and network engineers in a wide variety of industries and sectors. A number of students also go on to undertake PhDs in electronic engineering and computer science. Merril Lynch, Microsoft, Nokia, Barclays Capital, Logica,, Credit Suisse, KPMG, Transport for London, Sky and Selex ES are among the organizations that have recently employed graduates of EECS programmes.

Transferable skills are developed through a variety of means, including embedding of QM Graduate Attributes in taught modules and the summer project, together with the opportunity to participate in extra-curricular activities, e.g. the School's E++ Society, the School's Annual Programming Competition and external competitions with support from the School.

Students have the opportunity to undertake an industrial-linked project in the summer - these are very competitive.

There is also the opportunity to undertake an industrial experience placement, which is highly prized by employers.

Programme Specification Approval

Person completing Programme Specification	Dr Henri Huijberts
Person responsible for management of programme	Dr Henri Huijberts
Date Programme Specification produced/amended by School Learning and Teaching Committee	29 Feb 2016
Date Programme Specification approved by Taught Programmes Board	

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