

**PROGRAMME SPECIFICATION (V2)**

Degrees:

Programme Title	Final Award	duration of study/ years	UCAS code	Level
Computational Engineering	MSc	1	H131	7

<b>Ownership</b>	
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 School of Electronic Engineering & Computer Science
Main location(s) of study	Mile End Road, London
<b>External references</b>	
QAA Benchmark Group	Engineering
<b>External Accreditor (if applicable)</b>	Institution of Mechanical Engineers
Accreditation received	2018
Accreditation renewal	2022 pending (IMechE)

<b>Specification Details</b>	
Programme Lead	Dr Adrian Briggs
Student cohorts covered by specification	2021 entry
Date of introduction of programme	September 2019
Date of programme specification / amendment	23/09/2021
Approval by School	Sept 2021
Approval by Taught Programmes Board	May 2019

## **1. Programme Overview**

Computational Engineering is a strongly growing field in Engineering. In their drive for competitiveness manufacturing companies are developing integrated virtual design chains that build on computational engineering tools, spanning the disciplines and integrating into complete design management systems.

The program provides advanced training in the core computational methods for structures , fluids (CFD). A particular strength of SEMS is the strong research track record in Numerical Optimisation, which is the third core module. Elective modules are chosen from a large list of modules. The student can either focus on an application area, choosing advanced engineering modules from the area of specialisation, or can focus on advanced skills in generic computational methods.

The MSc in Computational Engineering has a 90 credit project over the entire year. It begins with a taught component on research methods in the first semester, worth 15 credits, continues in to the second semester with a further 15 credits of preliminary project work and is completed over the summer after the other the other taught modules are finished. This enables a strong focus on the project research, and allows the building of projects with strong industrial collaboration.

Research projects in Computational Engineering are drawn from a wide variety of applications in all of the specialisation areas, reflecting the strong research links that the staff members have with industrial companies such as Airbus, Alstom, Rolls Royce, TWI and VW. Projects are offered in conjunction with industrial collaborators to provide industrial impact and enhanced job opportunities for the students.

## **2. Learning outcomes for the programme**

In this degree programme we place strong emphasis not only on the technical content of our modules, 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.

You will acquire broad training in scientific analysis, engineering modelling and numerical methods to be able to design, carry out and evaluate the results of computational models of engineering problems.

You will conduct a substantial research project of current engineering relevance using state of the art methods. The knowledge and skills you gain in the taught and the research part of the programme will enable you to seek employment in industrial Research and Development teams, as well as conduct further research in a PhD.

### **2.1 Academic Content**

- Advanced knowledge of modelling across Mechanical, Aerospace and Chemical Engineering. Introduction to the relevant modern approaches to numerical modelling and analysis in Engineering.
- Advanced knowledge of computational fluid dynamics, computational structural simulation, programming and numerical optimisation.
- Research and communication skills: including detailed knowledge on structural and aerodynamic numerical simulations, as well as numerical optimisation.

### **2.2 Discipline specific**

- Use a range of scientific software and computational tools for solid/fluid mechanics analysis and optimisation.
- Carry out an individual research project in computational engineering, including the ability to assimilate published knowledge and advance a subject area through research.
- Analyse, evaluate and interpret the results of numerical analyses and research results. Prepare scientific/technical reports of an appropriate professional standard.

### 2.3 Attributes

- Apply scientific knowledge and problem-solving skills in a wide range of theoretical and practical situations.
- Be able to assess the relevance, importance and reliability of the ideas of others.
- Engage critically with engineering knowledge and design principles.

## 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 meets twice a year. The event in October runs in parallel with the SEMS prize day where companies award prizes to our best students. During the October event the projects that you will tackle in the academic year are planned and the second event in March is designed to help evaluate and review the projects.

### 3.2 Assessment methods

You can expect a wide variety 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 as 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. You will 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 and/or project supervisor. 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: [http://www.arcs.qmul.ac.uk/media/arcs/policyzone/Code-of-Practice-on-Assessment-and-Feedback\\_amended-2016.01.18.pdf](http://www.arcs.qmul.ac.uk/media/arcs/policyzone/Code-of-Practice-on-Assessment-and-Feedback_amended-2016.01.18.pdf)

### **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: [semsstudents@qmul.ac.uk](mailto:semsstudents@qmul.ac.uk) with any questions or to arrange an appointment.

#### **3.3.1 Academic Advisor arrangements**

Your Academic Advisor will be your project supervisor.

#### **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: 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 course 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/>

### 3.4 Interruption of Study

The University's Policy on a student's interruption of study is available at:

[http://www.arcs.qmul.ac.uk/media/arcs/policyzone/academic/Interruption-of-Study-Policy-\(June-2020\).pdf](http://www.arcs.qmul.ac.uk/media/arcs/policyzone/academic/Interruption-of-Study-Policy-(June-2020).pdf)

## 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. The indicative study programme in each of the streams is as follows.

module	semester	title		credit
DENM100	A,B,C	Extended Research Project	core	90
DENM004	A	Computational Engineering	compulsory	15
DENM026	A	Numerical Optimisation in Engineering Design	compulsory	15
1 from:				
DENM035	A	Renewable Energy Sources	elective	15
DENM011	A	Robotics	elective	15
DENM208	A	Advanced Heat Transfer and Fluid Mechanics	elective	15
DENM331	A	Computer Aided Engineering for Solids and Fluids	elective	15
DENM001	A	Advanced Flight Control and Simulation of Aerospace Vehicles	elective	15
DENM010	B	Computational Fluid Dynamics	compulsory	15
2 from:				
DENM405	B	Advanced High Speed Aerodynamics	elective	15
DENM032	B	Aeroelasticity	elective	15
DENM022	B	Advanced Gas Turbines	elective	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 Progression and Classification

### 5.1 Classification

The marks from modules contribute towards the final degree classification. In order to be considered for an award, you must have met all of the following requirements:

- i) take 180 credits, including a minimum 150 credits at level 7.
- ii) either: pass 180 credits; or, b pass a minimum 150 credits and meet the requirements for condoned failure in the remaining credits
- iii) achieve a Classification Mark of 50.0 or higher.

Failure may be condoned in up to 30 credits of modules where all of the following conditions are met:

- i) the module mark for each failed module is 40.0 or higher
- ii) the mean average mark across all modules, including the failed module(s), is 50.0 or higher
- iii) a failed module is not designated as 'core' (must be passed outright) in the programme regulations.

The Classification Mark is the mean average mark for the full programme of study

Classification Mark	Classification
70 – 100.0	Distinction
60.0 – 69.9	Merit
50.0 – 59.9	Pass

### 5.2 Exit awards

An exit award is an award at a lower level than that for which a student initially registered. An exit award may be recommended where a student meets the requirements for the lower level award and where the student has either withdrawn or been deregistered. Exit awards for the postgraduate programmes have the following hierarchy. A student will be awarded the highest linked award for which they meet all requirements: i Master of Science (MSc). ii Postgraduate Diploma (PgDip). iii Postgraduate Certificate (PgCert).

## 6 Entry requirements

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

<https://www.sems.qmul.ac.uk/pgtadmissions/entry/>

## 7 Quality assurance

### 7.1 Student-Staff Liaison Committee (SSLC) meetings

The School has a Student-Staff Liaison 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:

- Director of Student Support (Chair)
- Student Support Officer (Secretary)
- Directors of the relevant programmes
- At least one student representing the relevant programmes

The elections for the undergraduate representatives are organised through the Student Union. SSLC agendas and minutes are found on the SEMS QMplus landing page (<https://qmplus.qmul.ac.uk/course/view.php?id=13091>). Relevant items on the minutes are referred to the appropriate School committees for consideration and feedback.

## **7.2 Evaluating and improving the quality and standards of teaching and learning**

We assess our provision of teaching by:

- Module review by means of student feedback questionnaires and course organisers' reports.
- Annual staff appraisal.
- Peer observation of teaching.
- External examiners' reports.
- Periodic Internal Review by the College involving external panel members.
- Periodic Institutional Audit of the College by the Quality Assurance Agency.

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

- Education Board
- Education Coordination Group
- Student Experience Committee
- Academic Standards Committee
- Teaching Development and Scholarship Committee
- Student-Staff Liaison Committee
- Subject Examination Boards – meet in January, June and September to confirm marks and prizes, and to consider progression and awards
- Degree Examination Boards – meet in July to confirm progression and awards
- Science and Engineering Faculty Board
- University Quality Enhancement Committee.

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

- Annual National Student Survey
- Student-Staff Liaison Committee
- Student feedback questionnaire evaluation
- Student forums on the School's website, including module and programme specific forums as well as ones covering more general topics
- Discussions with Academic Advisors.

## **7.3 Staff development**

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

# **8 Supporting Information**

QMUL's Academic Regulations can be found at:

<http://www.arcs.qmul.ac.uk/media/arcs/policyzone/academic/Academic-Regulations-2020-21-FINAL.pdf>

QMUL's Assessment Handbook can be found at:

[http://www.arcs.qmul.ac.uk/media/arcs/policyzone/Assessment-Handbook-2020-21-FINAL-\(WEB\).pdf](http://www.arcs.qmul.ac.uk/media/arcs/policyzone/Assessment-Handbook-2020-21-FINAL-(WEB).pdf)

QMUL's Academic Credit Framework can be found at:

[http://www.arcs.qmul.ac.uk/media/arcs/docs/quality-assurance/Queen-Mary-Academic-Credit-Framework-\(June-2017\).pdf](http://www.arcs.qmul.ac.uk/media/arcs/docs/quality-assurance/Queen-Mary-Academic-Credit-Framework-(June-2017).pdf)

QMUL's admission policy can be found at:

<http://www.arcs.qmul.ac.uk/media/arcs/qmstaff/admissions/documents/Admissions-Policy-2021-22.pdf>

QMUL is regulated by the Office for Students (OfS) [www.officeforstudents.org.uk/advice-and-guidance/the-register/](http://www.officeforstudents.org.uk/advice-and-guidance/the-register/)

**This document provides a definitive record of the main features of the programme and the learning outcomes that a typical student may reasonably be expected to achieve and demonstrate if s/he takes full advantage of the learning opportunities provided. This programme specification is primarily intended as a reference point for prospective and current students, academic and support staff involved in delivering the programme and enabling student development and achievement, for its assessment by internal and external examiners, and in subsequent monitoring and review.**