

Programme Title: J551 BSc Materials Science and 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	BSc Materials Science and Engineering
Name of Interim Award(s)	
Duration of Study / Period of Registration	3/4 years
QM Programme Code / UCAS Code(s)	J551
QAA Benchmark Group	Materials
FHEQ Level of Award	Level 6
Programme Accredited by	
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

### Programme Outline

The BEng degree in Materials is a 3 year programme, part of suite of programmes offered in Materials at Queen Mary. Materials is a fundamentally important technological subject focusing on the application of knowledge to real world problems with a particular focus on the concerns of industry. BEng programmes are aimed at producing graduates who will have an in depth knowledge of their subject area along with the ability to apply this knowledge to solve real life problems.

The Materials 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: Materials Characterisation, Polymer Composite Synthesis and Processing, Ceramics, and Thin Film Deposition

The first two years of the Materials programme provides a firm grounding in subjects fundamental to all branches of Materials, including: Properties of matter, Processing and Applications, Polymers, Metals, Chemistry for Materials Structural Characterisation, and Surfaces and Interfaces. These subjects are developed further in future modules in the final year and includes group project work.

The final year gives you the opportunity to specialise in some areas of Materials of particular interest to you. It also includes an individual project, which may be an experimental research project, a theoretical investigation, a detailed design study, or a

critical review of a topic in Materials of mutual interest to yourself and your supervisor.

The Materials degree programmes are accredited by the Institute of Materials, Mineral and Mining (IOMMM), and students are entitled to become graduate members of IOMMM on graduation. Enrolment as a student member of the IOMMM is also encouraged.

## Aims of the Programme

The overall aims of the Materials programme are:

- to provide an education in materials science and engineering of a standard recognized to be amongst the highest in UK institutions;
- to take a multi-disciplinary approach to the elements of materials science and engineering, including ...
- to educate our students in the scientific and mathematical principles underpinning materials engineering;
- to enable all our students to achieve their academic potential by providing a stimulating, friendly and supportive environment;
- to offer challenging programmes which provide our graduates with a clear pathway to Chartered Engineering status;
- to prepare our graduates with discipline-specific knowledge and transferable skills that will equip them for employment and continued professional development through self-learning.
- to develop an appreciation of the relative merits of a proposed materials solution to those who need translate them into final products

Specific aims include:

- analytical, creative, organisational, practical and communication skills,
- problem-recognition and solving abilities
- competence in discipline-specific topics which contribute to the solution of problems applied to materials selection, specification and design
- an appreciation of how theoretical and practical approaches can be combined to arrive at a solution balanced to optimise performance
- an appreciation of the financial context of the development of a material,
- an understanding of the relationship between their discipline and social, ethical, economic and environmental issues and constraints.
- the detailed skills needed to undertake a research/ development/ design project in depth, understanding the technical, financial and time limitations

## What Will You Be Expected to Achieve?

Acquire a body of contemporary factual knowledge incorporating the fundamental principles of Materials Science and Engineering and develop the ability to apply this knowledge in the selection and design of materials.

### Academic Content:

A 1	Knowledge of the scientific and engineering principles necessary to underpin their education in Materials Science and Engineering.
A 2	Understanding of mathematical principles underpinning Materials Science and Engineering, and Engineering more generally, in addition to the mathematical methods, tools and notations used in the analysis of Materials Science and Engineering problems.
A 3	An understanding of concepts from a range of areas, particularly those related to materials science, and the ability to apply them effectively in Engineering projects.
A 4	An awareness of developing technologies related to Materials Science and Engineering.
A 5	Knowledge of the ethical and moral issues underpinning the Materials Science and Engineering industry and how an engineer must operate within these.
A 6	Knowledge of the regulatory framework governing the development of new products.

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A 7	Knowledge of the design process and project management.
A 8	Knowledge of the relevant business management principles.

Disciplinary Skills - able to:	
B 1	Understand materials and engineering principles and apply them to analyse key Materials Science and Engineering problems.
B 2	Extract data pertinent to an unfamiliar problem, and apply it, particularly in relation to the materials field.
B 3	Apply quantitative methods and computer software relevant to materials and engineering disciplines, to solve Materials Science and Engineering problems.
B 4	Use fundamental knowledge to investigate new and emerging materials technologies.
B 5	Effectively communicate and interface with engineering and science professional to formulate industrial solutions from an engineering viewpoint.
B 6	Learn new theories, concepts, methods etc. in unfamiliar situations.
B 7	Develop, monitor and update a plan, to reflect a changing operating environment.
B 8	Follow and update a plan, to reflect a changing operating environment.
B 9	Perform safe experimental work in laboratory settings.
B 10	Utilise team working skills to effectively work with colleagues on materials engineering projects.
B 11	Understand the relevance of both computational and experimental approaches to addressing materials problems.

Attributes:	
C 1	Engage critically with knowledge, and apply it in a rigorous way
C 2	Use communications technologies competently to engage with a range of audiences
C 3	Critically evaluate the reliability of different sources of information
C 4	Use information for evidence based decision making
C 5	Use quantitative data confidently and competently
C 6	Develop the necessary transferable skills to be effective in the workplace

QMUL Model Learning Outcomes - Level 4:

D 1	Identify and discuss their own career aspirations or enterprise skills and knowledge and how they impact on others
D 2	Identify and discuss what their own role in their programme and/or subject discipline might mean to them for future employment
D 3	Identify and demonstrate the perspectives or problem solving techniques of different disciplines
D 4	Demonstrate connections between different theoretical perspectives within your discipline

### How Will You Learn?

Teaching materials are delivered through a combination of lectures, problem solving classes, laboratory practicals, Student Centered Learning, and a variety of coursework. In addition problem-based learning plays a role in the your first and second years.

You will undertake a major individual research project in the third year, and a substantive industrially led group research project in the fourth year, both of which are designed to assimilate and utilize knowledge gained throughout the degree towards approaching a real Engineering problem.

The 3rd year project allows you to participate in the specialist internationally-recognized research taking place within the School of Engineering and Materials Science.

### How Will You Be Assessed?

Assessment is continuous throughout the degree, with written reports, projects, presentations, group work and exams (exams take place in the summer only). The degree programme has eight modules per year split over two semesters, and most are assessed by a combination of coursework and an end of year exam. Some modules, such as the research and design projects, count for two or four modules. In the third year, you can select from a range of module options allowing you to tailor your degree to specific areas of interest within your specialist degree programme.

### How is the Programme Structured?

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

The Materials BEng programme at QMUL is a 3 year programme accredited by the Institute of Materials, Minerals and Mining, which means students can progress to chartered engineer status (CEng). The first three years of the BEng are identical to the four year MEng, meaning that you have the option to transfer to the MEng if their grades are appropriate.

Whilst at University, you gain a solid foundation in Materials by studying core Materials modules such as Mathematics for Materials Scientist, Properties of Matter , Materials and Selection and Materials Processing and Application.

We also offer the BEng degree 'with Industrial Experience' where you would take a year working in a Materials related industrial position between after your second or third years of study. You are paid by the company during this year which also counts towards their degree. If you are not registered on a 'with Industrial Experience' programme you can opt into it at any stage prior to taking your placement. You would extend your studies by a year as you undertake a structured programme at one of our many partner companies. To support this activity we employ a full time Industrial Placement Manager in the School, who supports you through the application process and then manages the programme whilst you are on the placement. Recent placement

employers include: DSTL, RollsRoyce, DePuy, Alcoa, Microsoft, ARTIS, GE, & Philips. This exciting opportunity gives you a valuable insight into future careers and enhances employability.

Please see attached programme schematic.

### QMUL Model

Students are required to undertake the equivalent of one module (15 credits in 2017/18) per year of study which has been identified as meeting the requirements of the QMUL Model. Each of these modules has been designed to combine the best of QMUL's academic excellence with your ability to identify and develop your skills, networks and experience. This will help to ensure you become a graduate who can undertake further study or secure graduate employment in areas that interest you, and will support your ability to position yourself to find the right job or opportunity for you. The relevant module for your first year of study in 2017/18 is indicated below.

Where more than one module is specified, this is because pertinent elements from these modules have been identified as being appropriate to the QMUL Model and when studied together, deliver the equivalent content of one 15-credit QMUL Model module.

The QMUL Model modules for future years and associated Learning Outcomes will be identified as your studies continue.

Should Professional, Statutory and Regulatory Body requirements apply to your programme of study, these will be taken into account in the specification of QMUL Model requirements.

Academic Year of Study FT - Year 1

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester	QMUL Model
Transferable Skills for Engineers and Materials Scientists	MAT4444	0	4	Compulsory	1	Semesters 1 & 2	<input type="checkbox"/> No
Materials Science 1: Properties of Matter	MAT100	15	4	Compulsory	1	Semester 1	<input type="checkbox"/> No
Materials Selection and Modelling	MAT102	15	4	Compulsory	1	Semester 2	<input type="checkbox"/> No
Student Centered Learning 1	MAT106	30	4	Core	1	Semesters 1 & 2	<input type="checkbox"/> Yes
Mathematics for Materials Scientists	MAT115	15	4	Compulsory	1	Semester 2	<input type="checkbox"/> No
Materials Science 2	MAT206	15	4	Compulsory	1	Semester 2	<input type="checkbox"/> No
Engineering Design Methods	MAT4002	15	4	Compulsory	1	Semester 1	<input type="checkbox"/> No

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Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester	QMUL Model
Molecules to Materials	MAT4001	15	4	Compulsory	1	Semester 1	<input type="checkbox"/> No

Academic Year of Study FT - Year 2

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester	QMUL Model
Student Centred Learning	MAT308	30	6	Core	3	Semesters 1 & 2	<input type="checkbox"/> No
Polymers	MAT313	15	6	Compulsory	3	Semester 1	<input type="checkbox"/> No
Chemistry for Materials	MAT5002	15	6	Compulsory	3	Semester 1	<input type="checkbox"/> No
Surfaces and Interfaces in Materials	MAT210	15	6	Compulsory	3	Semester 1	<input type="checkbox"/> No
Metals	MAT321	15	6	Compulsory	3	Semester 2	<input type="checkbox"/> No
Structural Characterisation	MAT400	15	6	Compulsory	3	Semester 2	<input type="checkbox"/> No
Composites for Aerospace Applications	MAT5030	15	6	Compulsory	3	Semester 2	<input type="checkbox"/> No

Academic Year of Study FT - Year 3

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester	QMUL Model
Final Year Undergraduate Research Project	MAT500	30	6	Compulsory	3	Semesters 1 & 2	<input type="checkbox"/> No
Materials Selection in Design	MAT602	15	6	Compulsory	3	Semester 1	<input type="checkbox"/> No
Ceramics	MAT522	15	6	Compulsory	3	Semester 1	<input type="checkbox"/> No
Environmental Properties of Materials	MAT507	15	6	Compulsory	3	Semester 1	<input type="checkbox"/> No

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester	QMUL Model
Manufacturing Processes	MAT601	15	6	Compulsory	3	Semester 2	No
Failure of Solids	MAT501	15	6	Compulsory	3	Semester 2	No
Renewable Energy Materials	MAT427	15	6	Compulsory	3	Semester 2	No

### What Are the Entry Requirements?

Minimum Entry Requirements with A-levels are:

ABB from 3 A-levels

Must include two from maths, physics or chemistry.

Maths/science subjects A-level must be an B or above

Other qualifications:

International Baccalaureate - 34 points or above overall, with two from maths, physics, biology, or chemistry at higher level 6

European Baccalaureate - 80% or above including maths and/or science

French Baccalaureate - 14/20 overall, with 14/20 in maths and/or science

HE Advanced Diploma - Grade B or above overall, with Maths or science A-level grade B or above

### How Do We Listen and Act on Your Feedback?

The Staff-Student Liaison Committee provides a formal means of communication and discussion between the School and its students. The committee consists of student representatives from each year of the programme, together with appropriate representation from staff within the School. It is designed to respond to both the general needs of students, and subject specific concerns, as well as act as a forum for discussing programme and module developments. Staff-Student Liaison Committees meet regularly throughout the year.

The chair of the SSLC sits on the School's Education and Learning Committee, which advises the School's Director of Taught Programmes on all matters relating to the delivery of taught programmes at School level, and ensures that student feedback is fed into the reviewing of modules and programmes. Student views are also incorporated in the Committee's work in other ways, such as through the National Student Survey (NSS), student module evaluations and module forums. We also use the forums to listen to student feedback on an individual module basis and develop materials and support classes to address comments or requests suggested in the forum.

All Schools operate an Annual Programme Review (APR) 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's work throughout the year to monitor academic standards and to improve the student experience.

### Academic Support

Academic support for individual modules is the responsibility of the module organiser and co-organiser(s). These are supported by Teaching Assistants and post-graduate students, many of whom will have studied the modules themselves as undergraduates in the School. In addition there is technician support available for practical sessions.

Academic support for the programme as a whole, including choosing optional modules and possible transfer between programmes is provided in the first instance by the Personal Tutor, with further guidance available from the Senior Tutor and Programme Director, the latter having overall responsibility for the programme structure. The Programme Director in turn reports to the relevant Discipline Teaching Group in the School, the Chair of which is a member of the School's Education and Learning Committee.

We additionally have a School Office, with many student facing staff available to support student learning and one full time

Student Support Officer. These staff members will help with coursework submission, time tabling concerns and other general administration as well as providing pastoral support and further guidance on dealing with extenuating circumstances. We also have staff designated to support students in achieving industrial placements and providing careers advice.

## Programme-specific Rules and Facts

The Programme operates under the standard QMUL rules for BEng programmes. Students on the "with Industrial Experience" version need a year 1 average of at least 55% to progress to year 2 of the programme. Failure to achieve this will result in a transfer to the version without Industrial Experience.

## 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

We place a strong emphasis on supporting our students in achieving quality graduate positions at the end of their degrees. In the first year, all students take a transferable skills module, designed to both support them through the transition to university life, and also introduce the important employability skills they will need in later life. We run an extensive range of employability training events, with weekly timetabled careers slots and field trip visits to more than 20 collaborating companies. Our relationships with both the Careers Group and Student Services are strong in SEMS, and we co-deliver our training in study skills and career development for maximum benefit.

Since 2011 we have had a placement officer working in the school dedicated to supporting our new "with Industrial Experience" programmes which have grown immensely in popularity in the last few years.

The School has run Industrial Liaison Forums (ILFs) each academic year since the School was formed in 2007. Since 2010, the Autumn event is focused on encouraging more industrial participation in our research programmes, rewarding excellence by allowing companies to present student prizes for academic excellence across the School and also as a way of allowing companies and our students to interact through themed panel sessions and a careers fair. The Spring event aims to showcase our best third year project students and all of our group MEng projects. This event again allows extensive networking opportunities between employers and placement providers with all of our students in SEMS. Typically these events are attended by over 50 companies including our regular student prizes sponsors: Tata Steel, Eaton Industries, JRI, GSK, RollsRoyce, Apatech, Morgan Crucible, ARTIS, NPL, TWI, Becker Coatings; Advanced Healthcare Ltd & Apatech. Many of these companies are also actively engaged in student projects and in addition to these our events are also attended by additional companies that also collaborate with projects such as: Jaguar Land Rover, Alcoa, Perryman, DSTL, BAe, Airbus, Corin, DePuy, Baxter's Healthcare, Norman Foster Partners and many others. In recent times we have extended these events to encourage participation from our more recent alumni as well.

These forums have a direct impact by encouraging employers to sponsor and support the student projects and to provide real



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engineering case studies to engage the students throughout the curriculum. Many of these companies also support our lecture programme in individual modules. Recent case studies that have been taught and assessed were delivered by companies including Tata, Gillette, Sugru, JRI, DuPuy, Apatech, Artis, BAe, DSTL, Rolls Royce, Perryman and Advanced Healthcare Ltd.

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## Programme Specification Approval

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**Person completing Programme Specification**

**Person responsible for management of programme**

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

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