

Programme Title: MEng Dental Materials, MEng Dental with Industrial Experience



## Programme Specification

Awarding Body/Institution	Queen Mary University of London
Teaching Institution	Queen Mary University of London
Name of Final Award and Programme Title	Master of Engineering (MEng) Dental Materials
Name of Interim Award(s)	
Duration of Study / Period of Registration	4 years (plus optional year in industry)
QM Programme Code / UCAS Code(s)	J504 (JN00 with year in industry)
QAA Benchmark Group	Materials
FHEQ Level of Award	Level 7
Programme Accredited by	Institute of Materials, Minerals and Mining
Date Programme Specification Approved	
Responsible School / Institute	School of Engineering & Materials Science

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

Centre for Commercial Law Studies

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

### Programme Outline

The MEng degree in Dental Materials is an advanced 4 year integrated masters programme, part of suite of programmes offered in Dental Materials at Queen Mary. The Dental Materials programme aspires to produce the type of highly skilled, motivated, creative and team-work oriented graduates which the dental industry needs in order to improve the delivery, quality and longevity of interventional and therapeutic dental treatments.

The suite of Dental Materials programmes at QMUL is the only in the country. The programme is designed to equip students with an understanding of the uses and limitations of current and emerging dental materials, the complexity and aggressive nature of the oral environment, the varied ways in which materials can respond to this environment, the materials properties that modulate aesthetics, tools that can be used to help predict or monitor behavior and the importance of interdisciplinary thinking, ethics and regulatory approval in next generation dental materials development and optimisation.

The first two years of the Dental Materials programme provides a firm grounding in subjects fundamental to all branches of Materials, including materials chemistry, processing and properties, in addition to modules introducing the specific challenges and solutions materials face when used in the clinical environment.

The third year gives you the opportunity to undertake 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 Dental Materials of mutual interest to yourself and your supervisor.

In the fourth year students undertake further specialised modules as well as a group design project, which emphasises the benefits of teamwork and is often linked to industry. The project is an excellent opportunity to consolidate learning from previous years, with a focus of solving a real industrial bioengineering or materials problem. Students learn to function effectively as a team, allocating work and responsibilities appropriately, as well as developing an industrial link and gaining experience to add to their CV. Where possible projects are multi-disciplinary, with groups including students from other Engineering streams such as Mechanical Engineering or Materials Science. They also develop many transferable skills and will have the responsibility for the overall management of the project including its finances.

The Dental 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 programme are:

- to provide an education in dental 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 dental materials science and engineering, including functionality and aesthetics, interaction with soft and hard tissues, diseases and biomechanics
- 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 dental materials solution to those who need translate them into dental artefacts and the financial implications.

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 dental materials selection, implant or device 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 dental 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 basic oral physiology and develop the ability to apply this knowledge in the selection and design of materials for dental implants and devices.

### Academic Content:

A1	Knowledge of the scientific and engineering principles necessary to underpin their education in Dental Materials
A2	The application of materials science principles to dental materials as applied to problems of materials development and selection, implant or device specification and design

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A3	The scientific principles behind physiological systems and biocompatibility within the oral environment
A4	The principles of engineering and materials science behind hierarchical maxillofacial anatomical systems
A5	Understanding of mathematical principles underpinning Dental Materials and Materials Science and Engineering more generally, in addition to the mathematical methods, tools and notations used in the analysis of Dental Materials Science and Engineering problems.
A6	An understanding of concepts from a range of areas, particularly those related to dentistry and the ability to apply them effectively in Dental materials engineering projects.
A7	An awareness of developing technologies related to Dental Materials
A8	An understanding of how materials scientists, engineers and clinicians interface within the medical sector and the technological requirements of the dental sector.
A9	Knowledge of the ethical and moral issues underpinning the Dental Materials profession and how a Dental materials scientist must operate within these.
A10	Knowledge of the regulatory framework governing the development of new Dental products.

Disciplinary Skills - able to:	
B1	Apply materials science and engineering principles to a range of orthodontal related problems and applications
B2	Extract data pertinent to an unfamiliar problem, and apply it, particularly in relation to the dental field.
B3	Apply quantitative methods and computer software relevant to engineering disciplines, to solve Dental Materials problems.
B4	Demonstrate creativity and innovation in the synthesis of solutions
B5	Use fundamental knowledge to investigate new and emerging dental related technologies.
B6	Effectively communicate and interface with dental practitioners to formulate dental problems from an engineering viewpoint.
B7	Learn new theories, concepts, methods etc. in unfamiliar situations.
B8	Develop, monitor and update a plan, to reflect a changing operating environment.

Attributes:	
C1	Engage critically with knowledge, and apply it in a rigorous way
C2	Use communications technologies competently to engage with a range of audiences
C3	Critically evaluate the reliability of different sources of information
C4	Use information for evidence based decision making

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C5	Develop a spirit of enquiry and a desire for continued learning throughout their careers
C6	Use quantitative data confidently and competently
C7	Develop the necessary transferable skills to be effective in the workplace

QMUL Model Learning Outcomes - Level 4:	
D1	Identify and discuss their own career aspirations or enterprise skills and knowledge and how they impact on others
D2	Identify and discuss what their own role in their programme and/or subject discipline might mean to them for future careers
D3	Identify and demonstrate the perspectives or problem solving techniques of different disciplines
D4	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, 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 utilise knowledge gained throughout the degree towards approaching a real Dental Materials Engineering problem.

The 3rd year project allows you to participate in the specialist internationally-recognised research taking place within the School of Engineering and Materials Science. The 4th year project is a group design project worth half of the final year. These exciting student-led projects are frequently sponsored by industry and provide a valuable insight into real life engineering design and project management.

### 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 fourth 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 Dental Materials MEng programme at QMUL is an integrated 4 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 MEng are identical to the three year BEng, with the 4th year providing additional opportunity to specialise, alongside the experience of industrially related group project work.

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. In addition, you take specialist Dental Materials modules starting in year 1 and these increase in number throughout the degree programme. In year 4 you are able to choose your modules from a range of Dental Materials module options (see programme structure below). This allows you to tailor your degree programme to match your own Dental Materials interests and career intentions.

We also offer the MEng degree 'with Industrial Experience' where you would take a year working in a Dental Materials related industrial position between your third and fourth 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, Aloca, Microsoft, ARTIS, GE, Caterham F1 & Philips. This exciting opportunity gives you a valuable insight into future careers and enhances employability.

### 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
Materials Science 1: Properties of Matter	MAT100	15	4	Compulsory	1	Semester 1	No
Materials Selection and Mechanical Modelling	MAT102	15	4	Compulsory	1	Semester 1	No
Clinical Problems in Biomedical Engineering and Materials	MAT4003	15	4	Compulsory	1	Semester 1	No

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Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester	QMUL Model
Student Centred Learning 1	MAT106	30	4	Compulsory	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: Processing and Applications	MAT206	15	4	Compulsory	1	Semester 2	<input type="checkbox"/> No
Molecules to Materials	MAT4001	15	4	Compulsory	1	Semester 2	<input type="checkbox"/> No
Transferable Skills for Engineers and Materials Scientists	MAT4444	0	4	Compulsory	1	Semesters 1 & 2	<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 2	MAT308	30	5	Core	2	Semesters 1 & 2	<input type="checkbox"/> No
Polymers	MAT313	15	5	Compulsory	2	Semester 1	<input type="checkbox"/> No
Chemistry for Materials	MAT5002	15	5	Compulsory	2	Semester 1	<input type="checkbox"/> No
Surfaces and Interfaces in Dental Materials	MAT211	15	5	Compulsory	2	Semester 1	<input type="checkbox"/> No
Metals	MAT321	15	5	Compulsory	2	Semester 2	<input type="checkbox"/> No
Structural Characterization	MAT400	15	5	Compulsory	2	Semester 2	<input type="checkbox"/> No
Medical Physiology	MAT5222	15	5	Compulsory	2	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
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Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester	QMUL Model
Final Year Undergraduate Research Project	MAT500	30	6	Core	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
Applied Dental Materials	MAT220	15	6	Compulsory	3	Semester 1	<input type="checkbox"/> No
Manufacturing Processes	MAT601	15	6	Compulsory	3	Semester 2	<input type="checkbox"/> No
Failure of Solids	MAT501	15	6	Compulsory	3	Semester 2	<input type="checkbox"/> No
Science of Biocompatibility	MAT6312	15	6	Compulsory	3	Semester 2	<input type="checkbox"/> No

Academic Year of Study FT - Year 4

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester	QMUL Model
Research and Design Team Project	MAT7400	60	7	Core	4	Semesters 1 & 2	<input type="checkbox"/> No
Advanced Structure-Property Relationships in Materials	MAT706	15	7	Compulsory	4	Semester 1	<input type="checkbox"/> No
Nanotechnology and Nanomedicine	MAT7803	15	7	Elective	4	Semester 1	<input type="checkbox"/> No
Introduction to Law for Science and Engineering	IPLM701U	15	7	Elective	4	Semester 1	<input type="checkbox"/> No
Advanced Materials Characterization Techniques	MAT804	15	7	Compulsory	4	Semester 2	<input type="checkbox"/> No
Chemical and Biological Sensors	MAT707	15	7	Elective	4	Semester 2	<input type="checkbox"/> No
Tissue Mechanics	DEN7311	15	7	Elective	4	Semester 2	<input type="checkbox"/> No
Foundations of Intellectual Property Law and Management	IPLM702U	15	7	Elective	4	Semester 2	<input type="checkbox"/> No

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Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester	QMUL Model
Advanced Polymer Synthesis	MAT7797	15	7	Elective	4	Semester 2	No

### What Are the Entry Requirements?

Minimum Entry Requirements with A-levels are:  
AAA or 360 points from 3 A-levels  
Must include two from maths, physics, biology, or chemistry.  
Maths/science subjects A-level must be an A or above

Other qualifications:

International Baccalaureate - 36 points or above overall, with two from maths, physics, biology, or chemistry at higher level 6  
European Baccalaureate - 85% or above including maths and/or science  
French Baccalaureate - 15/20 overall, with 15/20 in maths and/or science  
HE Advanced Diploma - Grade A or above overall, with Maths or science A-level grade A 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 MEng 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 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.

## Programme Specification Approval

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**Person completing Programme Specification**

Dr Karin Hing/ Dr Henri Huijberts

**Person responsible for management of programme**

Dr Karin Hing

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

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