### PROGRAMME SPECIFICATION

<table>
<thead>
<tr>
<th>Awarding body/institution:</th>
<th>Queen Mary University of London</th>
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<tbody>
<tr>
<td>Teaching institution (if different from above):</td>
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<tr>
<td>Name of the final award and Programme title:</td>
<td>MSc Biomaterials</td>
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<tr>
<td>Duration of Study/Period of Registration</td>
<td>1 year</td>
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<tr>
<td>UCAS code:</td>
<td>J5S5</td>
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<tr>
<td>QAA Benchmark Group</td>
<td>Materials</td>
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<tr>
<td>Academic Department/s involved in programme delivery</td>
<td>School of Engineering and Materials Science</td>
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If accredited by a professional/statutory body, please give the name, date of last accreditation visit, approximate date of next visit and details of exemptions that will be given to QMUL graduates.

Institute of Materials, Minerals and Mining, on behalf of the Engineering Council. Last accredited in 2009.
### Criteria for admission to the programme

Students will be admitted typically with:

A first degree in an appropriate area with at least a good 2:2 qualification.

### Aims of the programme

The **overall aims** of the programme are:

- to provide a materials education of a standard recognised to be amongst the highest in UK institutions
- to take a multi-disciplinary approach to the elements of materials science and engineering, including design
- to educate our students in the scientific and mathematical principles underpinning materials science
- 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.

**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 science
- an appreciation of how theoretical and practical approaches can be synthesized to arrive at optimal solutions
- an appreciation of the financial context of the development of new materials and products
- an understanding of the relationship between their discipline and social, economic and environmental issues and constraints
- an appreciation of the relative merits of a proposed solution,
- the detailed skills needed to undertake a research, development or design project in depth, understanding the technical, financial and time limitations.

This programme aspires to produce the type of highly skilled, motivated, creative and team-work oriented graduates which the related industry needs.
### Learning outcomes for the programme

Students who have successfully completed one of the programmes will:

- have acquired a body of contemporary factual knowledge incorporating the fundamentals of Materials Science and, as appropriate, recognise the application of this to Bio-Materials
- have acquired sufficient knowledge of fundamentals of Materials Science principles as applied to realistic materials applications
- have an understanding of the fundamental physical concepts of core technologies so that the limitation of the experimental, mathematical and computational techniques available are fully recognised
- have the ability to analyse and solve problems individually and in groups
- have the ability to communicate knowledge and ideas verbally and in written reports
- have enthusiasm, a spirit of enquiry and a desire for continued learning throughout their careers
- recognise the responsibilities of the professional materials engineer

### Knowledge and Understanding

Students will be able to:

- Demonstrate sufficient fundamental scientific and engineering principles to be able to work with materials science related problems and projects
- Appreciate the wider multidisciplinary scientific and engineering context and its underlying principles
- Appreciate the social, environmental, ethical economic and commercial considerations affecting their engineering judgement

### Cognitive Skills

Students will be able to:

- Reason clearly and critically
- Apply scientific principles to a range of materials related applications
- Understand both the application and limitation of mathematical, computational and experimental techniques available to an engineer
- Demonstrate creativity and innovation in the synthesis of solutions

### Practical skills

Students will:

- Possess general study skills
- Be able to carry out a substantial piece of individual work whose structure and content is largely self-determined
- Be able to work co-operatively within a team
- Be computationally competent

### Transferable skills

Students will:

- Develop presentation skills
- Have good numerical skills
- Be able to manage their time efficiently
- Be effective with general IT facilities and information retrieval skills
- Develop significant team working skills
### Teaching, learning and assessment strategies

#### General strategies
A wide range of teaching, learning and assessment techniques are adopted. Teaching methods are tailor-made to suit the size of classes, the nature of the subject and the level of study. Each course has a mix of lectures, tutorials, laboratory sessions, industrial visits, workshops, group work, etc.

The individual projects are designed for students to exercise independent thinking, research and problem solving skills. The group projects enhance students’ communication, organisational as well as technical skills.

Assessment strategies vary and are described in detail on the SEMS website for each module. They include end of year examinations, in class tests, written reports and presentations. The assessment operates in accordance with the London University Course-Unit Regulations and established College procedures.

#### Programme specific strategies
This MSc programme covers both theoretical and applied knowledge of biomaterials. Technological advances, as well as methodological issues, biomaterials and their functions are covered in detail. The programme will provide an insight into areas of material science, biocompatibility, ethical issues, nanomaterials, and biological systems. The programme is interdisciplinary in nature and involves a combination of theoretical and practical approaches covered during the three semesters.

In the first Semester, special emphasis is placed on materials – structure property correlations in the context of materials used in medicine (biomaterials) and how the field of medical materials have made enormous impact on the repair and replacement of injured and diseased part of the human body. Courses, such as, Advanced Structure-Property Relationships in Materials, Advanced Tissue Engineering and Regenerative Medicine, and materials chemistry are covered in detail which provides a detailed insight into the theoretical aspects of the biomaterials in general.

In the second semester, the theoretical aspects covered in the first semester are reinforced by applications of Biomaterials in medicine. In addition, the underlying principles of materials selection and design, bioactivity, biocompatibility, research methods and experimental techniques in engineering, nano-materials, advanced topics in biomaterials and advanced materials characterisation techniques are discussed in detail. The taught courses are complimented by research projects that are based on both the student’s and staff’s research interests.

In the third semester, the taught courses are complemented by research projects that are based on both the student’s and staff’s research interests.

The research project will teach students to organise their research, compare and appraise the viability of results for a given project, demonstrate the various functions and skills required of a professional, graduate scientist in the industrial and academic environment and illustrate the experimental procedure for challenging problems.
### Programme structure(s) and requirements, levels and modules

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<tr>
<th>Semester</th>
<th>Modules</th>
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<tr>
<td>A</td>
<td>MTRM065 (7) Advanced Structure-Property Relationships in Materials</td>
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<td></td>
<td>MTRM064 (6) Advanced Tissue Engineering and Regenerative Medicine</td>
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<td>MAT309 (5) Materials Science 3: Materials Chemistry</td>
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<td>DENM014 (7) Research Methods and Experimental Techniques in Engineering</td>
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<td>B</td>
<td>MTRM011 (7) Materials Selection and Design or MTRM059 (4) Nanotechnology Based Materials</td>
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<td>MTRM021 (7) Advanced Topics in Biomaterials</td>
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<td>MTRM066 (7) Advanced Materials Characterisation Techniques</td>
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<td>C</td>
<td>MTRM005 (7) Materials Research Project</td>
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**Notes**

The numbers in brackets indicate the academic level of each module, where a typical first year module is delivered at a level 4, whilst a master's module is delivered at level 7.

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### Quality assurance mechanism (please include details of: SSLC meetings, student feedback mechanisms, personal tutor arrangements, programme induction, programme review and monitoring.)

- **Student-Staff Liaison Committee (SSLC) meetings**
  
  The School has three Student-Staff Liaison Committees and students on this programme are fully represented on one of these. The committees meet twice during each semester and each one is made up of the following members:
  
  - Senior Tutor (Chair).
  - Directors of the relevant programmes.
  - At least one student representing the relevant programmes and all four years.
  - A member of the School’s administration staff who also acts as secretary.
  
  The elections for the undergraduate representatives are organised through the Student Union. SSLC agendas and minutes are displayed on the Senior Tutor’s notice-board and sent to the Registry. Relevant items on the minutes are referred to the appropriate School committees for consideration and feedback.

- **Programme induction**
  
  A wide range of activities are incorporated into the induction programme to improve the students' laboratory, communication and IT skills. This includes classes in topics as varied as campus orientation, course registration, networking, using college e-mail facilities and using the School intranet.

- **Methods for evaluating and improving the quality and standards of teaching and learning**
  
  - 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 member
- Periodic Institutional Audit of the College by the Quality Assurance Agency

**Committees with responsibility for monitoring and evaluating quality and standards**
- Quality Committee
- Discipline Teaching Groups
- Teaching and Learning Committee
- Education Board
- Student-Staff Liaison Committee
- Subject Examination Boards – meet in June to confirm marks and prizes, and to consider progression and awards
- Degree Examination Boards – meet in July to confirm progression and awards.
- Engineering and Mathematical Sciences Faculty Board
- College Quality Enhancement Committee

**Mechanisms for gaining student feedback on the quality of teaching and their learning experience**
- 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

**Staff development**
- Staff appraisal scheme and institutional staff development courses
- All new members of staff to attain the Postgraduate Certificate in Academic Practice.

**Employers Links**
**Please provide details of any links with employers**
- Details of advisory panels that include current or potential employers;
- Organisations that regularly employ graduates from this programme and the roles that graduates undertake.
- Student prizes donated by organisations that may offer employment to graduates from this programme.

If there are no links with employers consider the learning outcomes and transferable skills and explain how these might be used to inform employers about the qualities and skills a graduate from this programme might be expected to have.

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, DuPuy, Apatech, 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 such as Cookson, Apatech, Rolls Royce, Corus, DuPuy award prizes to more than 30 of our best students. Also during the October event the projects that students will tackle in the academic year are planned and the second event in March is designed to help evaluate and review the projects. The School is always looking at extending membership
of the ILF.
| **Person Completing Programme Specification** | Dr. Ihtesham ur Rehman |
| **Person responsible for management of programme** | Dr. Ihtesham ur Rehman |
| **Date programme specification agreed by School Education Board** | 18 Feb 2010 |
| **Date of approval by Faculty Board/SMD Education Board** | |
| **Date of update/amendment** | 3rd Feb 2010 |