Imperial College London

Programme Specification (Undergraduate)

MEng Materials Science & Engineering

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 intended as a reference point for prospective students, current students, external examiners and academic and support staff involved in delivering the programme and enabling student development and achievement.

Programme Information				
Award(s)	MEng			
Programme Title	Materials Science & Engineering			
Programme code	JFM2			
Awarding Institution	Imperial College London			
Teaching Institution	Imperial College London			
Faculty	Faculty of Engineering			
Department	Department of Materials			
Associateship	Royal School of Mines			
Mode and Period of Study	4 academic years full-time			
Cohort Entry Points	Annually in October			
Relevant QAA Benchmark Statement(s) and/or other external reference points	Honours Degrees in Engineering			
Total Credits	ECTS:	270	CATS:	540
FHEQ Level	Level 6			
EHEA Level	1st cycle			
External Accreditor(s)	Institute of Materials, Minerals & Mining (IOM^3)			
Specification Details				
Student cohorts covered by specification	2016-17 Entry			
Person responsible for the specification	Fiona Thomson (Head of Student Administration)			
Date of introduction of programme	October 1992			
Date of programme specification/revision	July 2016			

Description of Programme Contents

Undergraduate courses in the Department of Materials follow a common structure in years 1 and 2 where students build strong foundation knowledge of applied mathematics, chemistry, physics and engineering skills. Content is delivered through a combination of cohort lectures, small group workshops and tutorials and a significant number of laboratory activities. Professional skills development is supported in years 1 and 2 through the personal tutorial system, where students work in small groups with their academic mentor. In addition to individual learning students will participate in a number of small group projects *e.g.* year 2 Case Study, year 3 Design Study to develop team working proficiencies and refine their presentation skills.

Students will build on their knowledge from years 1 and 2 through the completion of core courses and the selection of optional courses in years 3 and 4. For the MEng Materials Science and Engineering programme year 3 consists of 5 free choice option courses with the completion of MSE 302 Materials Characterisation and MSE 301 Integrated Materials Engineering being compulsory. In the summer between years 3 and 4 students will undertake a minimum 12-week placement at a relevant industrial or academic research institute. In year 4, students will follow a programme consisting of 4 free choice option courses and the compulsory course of BS0845 Strategic Management in addition to completing an extended individual research project. Additional skills are developed through courses delivered by Imperial College business school in years 3 and 4 with students being encouraged to participate in extra-curricular courses available through the Imperial College Horizons programme across all years of study.

Learning Outcomes

The Imperial Graduate Attributes are a set of core competencies which we expect students to achieve through completion of any Imperial College degree programme. The Graduate Attributes are available at: www.imperial.ac.uk/students/academic-support/graduate-attributes

Upon successful completion of the programme a typical student is expected to:

- Understand scientific principles and methodologies necessary to underpin their education in their engineering discipline, to enable appreciation of its scientific and engineering context, and to support their understanding of historical, current and future developments and technologies.
- Understand mathematical principles necessary to underpin their education in their engineering discipline and to enable them to apply mathematical methods, tools and notations proficiently in the analysis and solution of engineering problems.
- Be able to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline
- Understand engineering principles and the ability to apply them to analyse key engineering processes
- Able to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques
- Able to quantify methods and computer software relevant to the engineering discipline, in order to solve engineering problems
- Understand and apply a systems approach to engineering problems and to work with uncertainty
- Investigate and define a problem and identify constraints including environmental and sustainability limitation, health and safety and risk assessment issues
- Understand customer and user needs and the importance of considerations such as aesthetics
- Identify and manage cost drivers
- Use creativity to establish innovative solutions

- Ensure fitness for purpose for all aspects of the problem including production, operation, maintenance and disposal
- Manage the design process and evaluate outcomes
- Understand the commercial and economic context of engineering processes
- Know management techniques which may be used to achieve engineering objectives within that context
- Understand the requirement for engineering activities to promote sustainable development
- Have awareness of the framework of relevant legal requirements governing engineering activities, including personnel, health, safety and risk (including environmental risk)
- Understand the need for a high level of professional and ethical conduct in engineering
- Know characteristics of particular materials, equipment, processes or products
- Possess workshop and laboratory skills
- Understand the contexts in which engineering knowledge can be applied (e.g. operations and management, technology development, etc.)
- Understand the use of technical literature and other information sources
- Be aware of nature of intellectual property and contractual issues
- Be aware of appropriate codes of practice and industry standards
- Be aware of quality issues
- Be able to work with technical uncertainty

Entry Requirements	
Academic Requirement	A*AA overall or equivalent to include A in Mathematics and A* in Physics or Chemistry.
Non-academic Requirements	None
Academic interviews are conducted at the Departments' discretion.	
English Language Requirement	IELTS 6.5 with a minimum of 6.0 in each element or equivalent
The programme's competency standards document can be found at: http://www.imperial.ac.uk/engineering/departments/materials/courses/undergraduate-beng-meng-courses/	

Learning & Teaching Strategy	
Scheduled Learning & Teaching Methods	• Lectures • Tutorials • Lab Work • Written lab reports • Lab book completion
E-learning & Blended Learning Methods	• Blackboard Learn • Multiple choice tests • Progress quizzes

Project and Placement Learning Methods	• Individual Research Project • Industrial Placement • Design Study • Case Study
Assessment Strategy	
Assessment Methods	• Written Exams • Class Tests • Coursework • Presentations large/small groups • Lab report grading and feedback

Academic Feedback Policy

All the courses provided by the Materials Department are constantly evolving. Constant sources of ideas for improvement come from student feedback - particularly via the Student-Staff Committee and from the student feedback in SOLE.

Academic feedback to students on coursework is primarily delivered using the Blackboard Learn portal and is normally returned to students within 2 weeks of submission. Feedback may also be given (where appropriate) verbally following assessment or during interactions with Personal Academic Tutors, the Senior Tutor or Director of Undergraduate Studies.

Feedback may be provided in a number of formats, including:

- Oral (during/after lectures, workshops, labs);
- Personal (during academic discussions *e.g.* personal tutorials, office hours);
- Interactive (during workshops with academic staff/GTAs);
- Written (solutions to coursework, comments on laboratory reports).

Feedback is not provided on written examinations.

During the academic year preliminary results will be provided to students as indicative alpha-grades Numerical results are only published via registry following the meeting of the Board of Examiners.

Re-sit Policy

The College's Policy on Re-sits is available at: www.imperial.ac.uk/registry/exams/resit

The Board of Examiners, in line with College policy, determines eligibility for resists. The Department of Materials does not normally offer re-sit examinations; students with a marginal failure may be offered a "supplementary qualifying test" (SQT) in place of a re-sit examination.

Mitigating Circumstances Policy

College policy on mitigating circumstances makes provision for the Board of Examiners to use their discretion where extenuating circumstances may have impacted students' academic performance. Advice is given from a small panel of academic staff who have details of the mitigating circumstances and, where appropriate, evidence from external parties *i.e.* College Health Centre.

The College's Policy on Mitigating Circumstances is available at: www.imperial.ac.uk/registry/exams

Assessment Structure
Marking Scheme

Year One

A student must:

- Achieve an aggregate mark of at least 40% in each element

Year Two

A student must:

- Achieve an aggregate mark of at least 40% in each element

Year Three

A student must:

- Achieve an aggregate mark of at least 40% in each element

Year Four

A student must:

- Achieve an aggregate mark of at least 40% in each element

Final Degree Classifications

Third – a student must achieve an aggregate mark of 40%
Lower Second – a student must achieve an aggregate mark of 50%
Upper Second – a student must achieve an aggregate mark of 60%
First - a student must achieve an aggregate mark of 70%

Year	% Year Weighting	Total Marks Available	Module	Total Marks Available
Year One	11.1%	700	Mathematics and Computing	135
			Materials Chemistry and Biology	140
			Mechanical Behaviour	40
			Microstructure and Properties of Materials	190
			Materials Physics	130
			Materials Engineering	65
Year Two	22.2%	800	Mathematics and Computing	135
			Materials Chemistry and Polymer Sciences	127
			Mechanical Behaviour	132
			Microstructure	127
			Electronic Properties of Materials	122
			Materials Engineering 2	157
Year Three	33.3%	900	Integrated Materials Engineering	300
			Materials Characterisation	100
			*Five modules from elective group (A/B)**	100 each
Year Four	33.3%	1000	Strategic Management	100
			Work Placement	150
			Research project	350
			*Four modules from elective group (B/C)**	100 each

*Students may only select up to **ONE** module from elective group (B).

Indicative Module List												
Code	Title	Core/ Elective	Year	L&T Hours	Ind. Study Hours	Place-ment Hours	Total Hours	% Written Exam	% Course-work	% Practical	FHEQ Level	ECTS
MSE 101	Mathematics and Computing	Core	1	88	212	0	300	88%	12%	0%	4	12.00
MSE 102	Materials Chemistry and Biology	Core	1	87	213	0	300	86%	14%	0%	4	12.00
MSE 103	Mechanical Behaviour	Core	1	20	155	0	175	100%	0%	0%	4	7.00
MSE 104	Microstructure and Properties of Materials	Core	1	102	198	0	300	74%	26%	0%	4	12.00
MSE 105	Materials Physics	Core	1	87	213	0	300	85%	15%	0%	4	12.00
MSE 106	Materials Engineering	Core	1	20	105	0	125	61%	23%	16%	4	5.00
MSE 201	Mathematics and Computing	Core	2	88	137	0	225	88%	12%	0%	5	9.00
MSE 202	Materials Chemistry and Polymer Sciences	Core	2	57	168	0	225	79%	21%	0%	5	9.00
MSE 203	Mechanical Behaviour	Core	2	54	171	0	225	83%	17%	0%	5	9.00
MSE 204	Microstructure	Core	2	63	162	0	225	79%	21%	0%	5	9.00
MSE 205	Electronic Properties of Materials	Core	2	54	171	0	225	82%	18%	0%	5	9.00
MSE 206	Materials Engineering 2	Core	2	60	315	0	375	37%	63%	0%	5	15.00
MSE 301	Integrated Materials Engineering	Core	3	8	542	0	550	33%	67%	0%	6	22.00

Indicative Module List												
Code	Title	Core/ Elective	Year	L&T Hours	Ind. Study Hours	Place-ment Hours	Total Hours	% Written Exam	% Course-work	% Practical	FHEQ Level	ECTS
MSE 302	Materials Characterisation	Core	3	41	159	0	200	50%	50%	0%	6	8.00
MSE 307	Engineering Alloys	Elective (A)	3	24	126	0	150	100%	0%	0%	6	6.00
MSE 309	Polymers and Composites	Elective (A)	3	24	126	0	150	100%	0%	0%	6	6.00
MSE 310	Electronic Structures & Opto Electronic Properties	Elective (A)	3	24	126	0	150	100%	0%	0%	6	6.00
MSE 305	Metal Processing	Elective (A)	3	24	126	0	150	100%	0%	0%	6	6.00
MSE 308	Ceramics and Glass	Elective (A)	3	24	126	0	150	100%	0%	0%	6	6.00
MSE 312	Nanomaterials I	Elective (A)	3	24	126	0	150	100%	0%	0%	6	6.00
MSE 315	Biomaterials	Elective (A)	3	24	126	0	150	100%	0%	0%	6	6.00
MSE 317	Materials Modelling	Elective (A)	3	24	126	0	150	0%	100%	0%	6	6.00
MSE 318	Surfaces and Interfaces	Elective (A)	3	24	126	0	150	80%	20%	0%	6	6.00
N/A	Business for Professional Engineers & Scientists	Elective (B)	3/4	Various							6	6.00
N/A	Horizons	Elective (B)	3/4	Various							6	6.00
BS0845	Strategic Management	Core	4	22	128	0	150	70%	30%	0%	6	6.00

Indicative Module List												
Code	Title	Core/ Elective	Year	L&T Hours	Ind. Study Hours	Place-ment Hours	Total Hours	% Written Exam	% Course-work	% Practical	FHEQ Level	ECTS
MSE 420	Compulsory Work Placement	Core	4	0	150	600	750	0%	50%	50%	7	30.00
MSE 421	Research Project	Core	4	290	335	0	625	0%	80%	20%	7	25.00
MSE 404	Modelling Materials with Density-Functional Theory	Elective (C)	4	24	126	0	150	60%	40%	0%	7	6.00
MSE 414	Nuclear Materials I	Elective (C)	4	24	126	0	150	100%	0%	0%	7	6.00
MSE 419	Nuclear Materials II	Elective (C)	4	24	126	0	150	100%	0%	0%	7	6.00
MSE 413	Advanced Structural Ceramics	Elective (C)	4	24	126	0	150	100%	0%	0%	7	6.00
MSE 417	Advanced Biomaterials	Elective (C)	4	24	126	0	150	100%	0%	0%	7	6.00
MSE 418	Advanced Tissue Engineering	Elective (C)	4	24	126	0	150	100%	0%	0%	7	6.00
N/A	Inter-Departmental Exchange (IDX)	Elective (C)	4	Various							7	6.00
MSE 409	High Performance Alloys	Elective (C)	4	24	126	0	150	100%	0%	0%	7	6.00
MSE 410	Advanced Thin Films Manufacturing	Elective (C)	4	24	126	0	150	50%	50%	0%	7	6.00
MSE 411	Electroceramics	Elective (C)	4	24	126	0	150	100%	0%	0%	7	6.00
MSE 412	Nanomaterials II	Elective (C)	4	24	126	0	150	80%	20%	0%	7	6.00

Supporting Information
The Programme Handbook is available at: http://www.imperial.ac.uk/engineering/departments/materials/courses/undergraduate-beng-meng-courses/masters-in-engineering-meng-courses-in-mse/materialseng/
The Module Handbook is available at: http://www.imperial.ac.uk/engineering/departments/materials/courses/undergraduate-beng-meng-courses/
The College's entry requirements for undergraduate programmes can be found at: www.imperial.ac.uk/study/ug/apply/requirements/
The College's Quality & Enhancement Framework is available at: http://www.imperial.ac.uk/about/governance/academic-governance/senate-subcommittees/
The College's Academic and Examination Regulations can be found at: http://www.imperial.ac.uk/about/governance/academic-governance/regulations/
Imperial College is an independent corporation whose legal status derives from a Royal Charter granted under Letters Patent in 1907. In 2007 a Supplemental Charter and Statutes was granted by HM Queen Elizabeth II. This Supplemental Charter, which came into force on the date of the College's Centenary, 8th July 2007, established the College as a University with the name and style of "The Imperial College of Science, Technology and Medicine". http://www.imperial.ac.uk/admin-services/secretariat/college-governance/charters-statutes-ordinances-and-regulations/
Imperial College London is regulated by the Higher Education Funding Council for England (HEFCE) http://www.hefce.ac.uk/reg/of/