Imperial College London

Programme Specification (Master's Level)

MSc Advanced Materials Science and 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)	MSc			
Programme Title	Advanced Materials Sciences and Engineering			
Programme Code	J2U3T			
Awarding Institution	Imperial College London			
Teaching Institution	Imperial College London			
Faculty	Faculty of Engineering			
Department	Department of Materials			
Associateship	N/A			
Mode and Period of Study	1 academic year, full-time			
Cohort Entry Points	Annually in October			
Relevant QAA Benchmark Statement(s) and/or other external reference points	Master's Degrees in Engineering			
Total Credits	ECTS:	90	CATS:	180
FHEQ Level	Level 7			
EHEA Level	2nd cycle			
External Accreditor(s)	Institute of Materials, Minerals and Mining (IoM3)			
Specification Details				
Student cohorts covered by specification	2016/17 entry			
Person responsible for the specification	Dr Sandrine Heutz (Course Director)			
Date of introduction of programme	October 2011			
Date of programme specification/revision	October 2016			

Description of Programme Contents

The aim of the MSc in Advanced Materials Science and Engineering is to provide a comprehensive understanding of all aspects related to the applications and development in Materials Science and Engineering today. We motivate our students to develop their ability to research, design, assess, implement and review solutions to real-life engineering problems across a wide range of materials. This degree course prepares students to become independent, ethical and responsible Materials Science and Engineering professionals with a global appeal. Our courses are taught by expert academics, through formal lecturing and student-led course works. Our students will have access to world-leading knowledge and infrastructure by working on real research projects as part of established research groups.

This broad and flexible degree allows engineers and scientists from a variety of backgrounds (i.e. Materials, Mechanical, Civil, Chemical Engineering, Physics or Chemistry) to build on their experience and expertise. It supplements strong bases in engineering and sciences with transferable skills training to take them to the next stage of their career in academia or industry, and is accredited by the Institute of Materials, Mineral and Mining (IOM3).

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

Knowledge and Understanding of:

- Key structural properties of materials
- Different classes of materials
- Characterisation of materials, in particular their structural, thermal, morphological and chemical properties
- Principles and underlying theory of a range of characterisation methods, including X-ray diffraction, Focussed Ion Beam, Secondary Ion Mass Spectrometry, Atomic Force Microscopy, Electron Microscopy and Scanning Probe Microscopies.
- A range of modelling tools, applicable to a broad spectrum of materials types at different length scales.
- In addition to the core skills, students are expected to develop an expertise in specialist subjects, based on at least five option courses. The breadth of knowledge acquired ranges from different classes of materials (e.g. biomaterials, electroceramics, alloys, polymers and composites, nanomaterials, ceramics and classes, nuclear materials) and cross-cutting advanced knowledge of materials properties and applications (electronic structure and optoelectronic behaviour, surfaces and interfaces, tissue engineering, advanced thin films manufacturing)

Intellectual Skills:

- Perform analysis and, thereby, solve problems in specific areas shown above.
- Integrate theory and practice in dealing with problems which involve several of the subject areas shown above.
- Carry out a synthesis/design of a process when faced with a conflicting set of objectives which are, to some extent, mutually exclusive.
- Demonstrate the skills necessary to plan, conduct and report a programme of original research or, alternatively, a project of direct and immediate industrial relevance.

Practical Skills:

- Plan and execute safely a series of experiments.
- Use laboratory methods to generate data.
- Analyse experimental results and determine their accuracy, precision and validity.
- Prepare technical reports.
- Give technical presentations.
- Use effectively, a wide range of computational tools and packages of a general nature.
- Use effectively, a wide range of computational tools and packages relating specifically to the relevant engineering discipline being studies and to determine the range of their validity.
- Make use of knowledge from a number of diverse areas to synthesise a feasible solution to a complex problem or design.

Professional Skills Development:

- Communicate effectively through oral presentations and written reports.
- Use information and communications technology.
- Develop management skills: group coordination, decision processes, objective criteria, problem definition, project design and evaluation needs.
- Work as a team and/or independently as appropriate.
- Be adequately prepared to enter a chosen sector of industry as a professional.
- Become aware of the environmental, economic and social impact of the specific engineering discipline being studied.
- Integrate and evaluate information from a variety of sources.
- Learn effectively for the purpose of continuing professional development.

Entry Requirements	
Academic Requirement	First or good 2:1 honours BEng or MEng degree or equivalent international qualification in an engineering or science discipline (Materials, Mechanical, Civil, Chemical Engineering or Physics or Chemistry).
Non-academic Requirements	Applicants with relevant industrial experience may also be considered.
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/materials/postgraduate/pgt/msc-materials/

Learning & Teaching Strategy	
Scheduled Learning & Teaching Methods	• Lectures • Tutorials • Practical sessions • Laboratory • Matlab • Oral presentations • Written presentations • Small group discussions

E-learning & Blended Learning Methods	N/A
Project and Placement Learning Methods	• Research project
Assessment Strategy	
Assessment Methods	• Examination • Coursework • Practical
Academic Feedback Policy	
We aim to provide feedback within two weeks of the hand-in date.	
Re-sit Policy	
The College's Policy on Re-sits is available at: www.imperial.ac.uk/registry/exams/resit	
Mitigating Circumstances Policy	
The College's Policy on Mitigating Circumstances is available at: www.imperial.ac.uk/registry/exams	
Assessment Structure	
Marking Scheme	

Final Degree Classifications

Pass - the Pass Mark for all postgraduate taught course modules is 50%. Students must pass all elements in order to be awarded a degree.

Merit - in order to be awarded a result of merit, a candidate must obtain an aggregate mark of 60% or greater. Where appropriate, a Board of Examiners may award a result of merit where a candidate has achieved an aggregate mark of 60% or greater across the programme as a whole AND has obtained a mark of 60% or greater in each element with the exception of one element AND has obtained a mark of 50% or greater in this latter element.

Distinction - in order to be awarded a result of distinction, a candidate must obtain an aggregate mark of 70% or greater. Where appropriate, a Board of Examiners may award a result of distinction where a candidate has achieved an aggregate mark of 70% or greater across the programme as a whole AND has obtained a mark of 70% or greater in each element with the exception of one element AND has obtained a mark of 60% or greater in this latter element.

Module Weightings	
Module	% Module Weighting
Materials Characterisation (6 ECTS)	6.6%
Materials Modelling (6 ECTS)	6.6%
5 x modules from elective group (A) (30 ECTS, 6 ECTS)	6.6% each
Research Essay (8 ECTS)	8%
Art of Research (3 ETCS)	3%
Research Project (37 ECTS)	42.8%

Indicative Module List											
Code	Title	Core/ Elective	L&T Hours	Ind. Study Hours	Place-ment Hours	Total Hours	% Written Exam	% Course-work	% Practical	FHEQ Level	ECTS
MSE302	Material Characterisation	CORE	41	109	0	150	50%	50%	0%	7	6.00
MSE317	Materials Modelling	CORE	24	126	0	150	100%	0%	0%	7	6.00
R1	The Art of Research	CORE	0	75	0	75	0%	100%	0%	7	3.00
R2	Research Essay	CORE	0	200	0	200	0%	100%	0%	7	8.00
R3	Research Project	CORE	0	750	0	750	0%	100%	0%	7	37.00
MSE307	Engineering Alloys	ELECTIVE (A)	24	126	0	150	100%	0%	0%	7	6.00
MSE308	Ceramic and Glasses	ELECTIVE (A)	24	126	0	150	100%	0%	0%	7	6.00
MSE309	Polymers and Composites	ELECTIVE (A)	24	126	0	150	100%	0%	0%	7	6.00
MSE310	Electronic Structure and Optoelectronic Behaviour	ELECTIVE (A)	24	126	0	150	80%	20%	0%	7	6.00
MSE312	Nanomaterials I	ELECTIVE (A)	24	126	0	150	80%	20%	0%	7	6.00
MSE315	Biomaterials	ELECTIVE (A)	24	126	0	150	100%	0%	0%	7	6.00
MSE 318	Surfaces and Interfaces	ELECTIVE (A)	24	126	0	150	80%	20%	0%	7	6.00
MSE 404	Modelling Materials with Density-Functional Theory	ELECTIVE (A)	24	126	0	150	60%	40%	0%	7	6.00

Indicative Module List											
Code	Title	Core/ Elective	L&T Hours	Ind. Study Hours	Place-ment Hours	Total Hours	% Written Exam	% Course-work	% Practical	FHEQ Level	ECTS
MSE409	High Temperature Alloys	ELECTIVE (A)	24	126	0	150	100%	0%	0%	7	6.00
MSE410	Advanced Thin Film Manufacturing Technologies	ELECTIVE (A)	24	126	0	150	70%	30%	0%	7	6.00
MSE411	Electroceramics	ELECTIVE (A)	24	126	0	150	100%	0%	0%	7	6.00
MSE412	Nanomaterials II	ELECTIVE (A)	24	126	0	150	100%	0%	0%	7	6.00
MSE413	Advanced Structural Ceramics	ELECTIVE (A)	24	126	0	150	100%	0%	0%	7	6.00
MSE414	Nuclear Materials	ELECTIVE (A)	24	126	0	150	100%	0%	0%	7	6.00
MSE417	Advanced Biomaterials	ELECTIVE (A)	24	126	0	150	100%	0%	0%	7	6.00
MSE418	Tissue Engineering	ELECTIVE (A)	24	126	0	150	100%	0%	0%	7	6.00

Supporting Information
The Programme Handbook is available at: http://www.imperial.ac.uk/materials/postgraduate/pgt/msc-materials/
The Module Handbook is available at: http://www.imperial.ac.uk/materials/postgraduate/pgt/msc-materials/
The College's entry requirements for postgraduate programmes can be found at: www.imperial.ac.uk/study/pg/apply/requirements
The College's Quality & Enhancement Framework is available at: www.imperial.ac.uk/registry/proceduresandregulations/qualityassurance
The College's Academic and Examination Regulations can be found at: http://www3.imperial.ac.uk/registry/proceduresandregulations/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/