Programme Information		
Programme Titles	Programme Code	HECoS Code
Materials Science and Engineering	JFM2	For Registry Use Only

Award	Length of Study	Mode of Study	Entry Point(s)	Total Credits	
				ECTS	CATS
MEng	4 years	Full time	October	240	480
BEng (Hons)₸	3 years	Full time	N/A	180	360
DipHE*	2 years	Full time	N/A	120	240
CertHE*	1 year	Full time	N/A	60	120

* The CertHE and DipHE are exit awards only and not accredited by any professional body. They may be offered to students, in exceptional circumstances, at the discretion of the Board of Examiners.
₸ The BEng is an exit award as per the Academic Regulations. For details of the for-entry award, please refer to the Materials Science and Engineering BEng programme specification.

Ownership			
Awarding Institution	Imperial College London	Faculty	Faculty of Engineering
Teaching Institution	Imperial College London	Department	Materials
Associateship	Royal School of Mines (RSM)	Main Location(s) of Study	South Kensington Campus
External Reference			
Relevant QAA Benchmark Statement(s) and/or other external reference points		Materials	
FHEQ Level		Level 7 - Master's	
EHEA Level		MEng - 2nd Cycle	
External Accreditor(s) (if applicable)			
External Accreditor 1:	Institute of Materials, Minerals and Mining (IoM^3)		
Accreditation received:	2018	Accreditation renewal:	2022
Collaborative Provision			
Collaborative partner	Collaboration type	Agreement effective date	Agreement expiry date
N/A	N/A	N/A	N/A

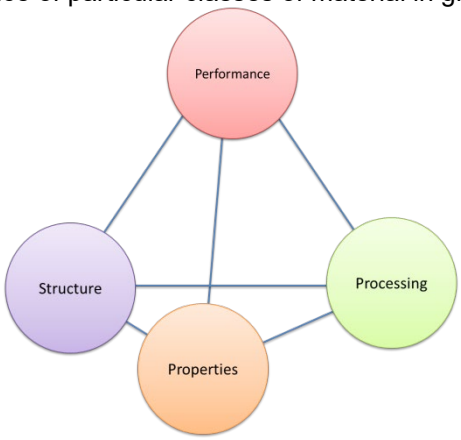
Specification Details	
Programme Lead	TBC
Student cohorts covered by specification	2022-23 entry
Date of introduction of programme	October 92
Date of programme specification/revision	June 23

Programme Overview

The programmes delivered by the Department of Materials are designed to engage you in both the scientific and engineering aspects of the discipline.

The complex interrelationship between processing, structure, properties and performance lies at the centre of Materials Science and Engineering, see figure below. For example, for steel, the most commonly used metal, how it is processed will influence its structure, the structure affects its mechanical properties which in turn determine the materials performance in a particular application. A practitioner in the discipline may ask the question “how do I design a material for my system” or “why does this material exhibit these properties,” the first question is Materials Engineering and the second Materials Science.

All undergraduate courses in the Department of Materials follow a common structure in years 1 and 2, allowing you, where visa conditions permit, to transfer between streams at set points within your degree. Core modules taught across the first, second and third years are designed to introduce you to the four foundations of the discipline: Processing, Structure, Properties and Performance (see figure below), plus Materials Characterisation, Mathematics and Computing, Business for Engineers and Engineering Practice. In the third and fourth years of the programmes you will have the option to select electives that probe the Processing, Structure, Properties and Performance of particular classes of material in greater depth.



In the Processing modules you will learn how raw materials are converted into engineered products, the Structure modules consider how processing influences structure, across a range of length scales, which determines the structural and functional Properties of materials, that then defines their Performance in a given application, for example steel structures or battery systems. The Mathematics and Computing module introduces you, through science and engineering examples, to the tools that support the discipline. In the Engineering Practice modules you will work as a member of a team to design a processing system and to deconstruct an artefact. The laboratory sessions associated with the modules are structured to introduce you to the key practical skills required of a Materials Scientist and Engineer; then as the course progresses, you are given more opportunity to design your own experiments to test a hypothesis and investigate materials using electron microscopy and X-ray diffraction.

An extended laboratory project that investigates the relationship between processing, structure and properties of a material is a major part of the third year of the programme. There are also core[1] modules in Materials

[1] **Core** modules are those which serve a fundamental role within the curriculum, and for which achievement of the credits for that module is essential for the achievement of the target award. Core modules must therefore be taken and passed in order to achieve that named award. **Compulsory** modules are those which are designated as necessary to be taken as part of the programme syllabus. Compulsory modules can be compensated. **Elective** modules are those which are in the same subject

Processing, Theory and Simulation of Materials, Business for Materials Scientists and Engineers and an assessed seminar programme that examines the impact of Materials in Society. In the third year you will have the opportunity to select electives from a list that map on to the Department's research themes and give you the opportunity to study in more detail a particular class of material or underpinning principle. You will also broaden your educational experience by taking an I-Explore module.

If you are undertaking the Materials Science and Engineering MEng programme you will in your 4th year undertake four electives plus an individual research project with one of the Department's research groups. This may involve you working at an external facility such as Diamond in Oxfordshire or spending time in a laboratory overseas, e.g. at MIT in the US. Project students work alongside researchers, including world leading academics and PhD students, in areas from bone regeneration to aircraft landing gear and from solar cells to cement bonded refractories.

MEng vs BEng
The department offers both a three-year BEng programme and four-year integrated Master's MEng programme in Materials Science and Engineering. Both degree programmes involve substantial group and individual project work. The MEng has the added benefit of Master's level elective modules and the opportunity to undertake a research project in a cutting-edge Materials Research Group in the final year of the programme. As the first two years are the same for all programmes, you can, visa issues permitting, transfer between programmes at any point up until the end of the second year.

For details of the other programmes offered by the department please refer to the individual programme specifications for:

- Materials Science and Engineering BEng
- Biomaterials and Tissue Engineering MEng
- Materials with Nuclear Engineering MEng
- Materials with Management BEng

Accreditation
These degrees are professionally accredited by the IOM3 (The Institute of Materials, Minerals and Mining) on behalf of the Engineering Council.

Achieving a professionally accredited degree demonstrates to employers that you have achieved an industry-recognised standard of competency.

Achieving a professionally accredited integrated Master's degree (MEng) means that you have satisfied the first step to becoming a Chartered Engineer (CEng) in your chosen field by satisfying the educational requirements of professional registration. To gain Chartered status, you will need to demonstrate your ability to meet additional graduate level competences described in the Engineering Council's UK-SPEC.

A CEng is a highly respected qualification earned by professionals working in engineering, which can lead to higher earning potential and better career prospects.

Professional registration also brings international recognition of your qualification, which is particularly useful for students preparing for a career abroad.

Learning Outcomes

Upon the successful completion of an **MEng** award, you will be able to:

- Explain Materials Science and Engineering phenomena using scientific and mathematical reasoning.
- Synthesise scientific and engineering knowledge in processing/synthesis, characterisation and modelling to explore and control the structure, properties and performance of materials.
- Analyse, evaluate and interpret experimental or in-service data.
- Communicate effectively, both orally and in writing, to a range of audiences.
- Work effectively in multi-cultural, international teams and across disciplinary boundaries to deliver complex projects.
- Appraise procedures to enhance your own safety and working practice and that of others.
- Devise creative and innovative solutions that enable advances in Materials Engineering.

area as the field of study and are offered to students in order to offer an element of choice in the curriculum and from which students are able to select. Elective modules can be compensated.

- Design and perform experiments to test a scientific hypothesis.
- Confront the challenges of implementing Materials Science and Engineering solutions in a commercial environment.
- Exercise independent scholarship and adapt your skillsets to keep pace with an evolving sector.
- Consider the legal, social, ethical and professional principles associated with Materials Science and Engineering and act in a manner that respects those principles.
- Reflect and action improvements in personal development needs.

Upon the successful completion of a **BEng** award, you will be able to:

1. Apply scientific and mathematical reasoning to explain Materials Science and Engineering phenomena.
2. Use a combination of scientific and engineering knowledge in processing/synthesis, characterisation and modelling to explore and control the structure, properties and performance of materials.
3. Collect, analyse and evaluate experimental or in-service data.
4. Communicate effectively, both orally and in writing, to a range of audiences.
5. Work as a member of a multi-cultural, international team across disciplinary boundaries to deliver a project.
6. Comply with and improve procedures to enhance your own safety and practice and that of others.
7. Develop creative and innovative solutions to problems in Materials Engineering.
8. Perform experiments to test a scientific hypothesis.
9. Demonstrate an awareness of the challenges of implementing Materials Science and Engineering solutions in a commercial environment.
10. Exercise independent scholarship and adapt your skillsets to keep pace with an evolving sector.
11. Demonstrate an awareness of the legal, social, ethical and professional principles associated with Materials Science and Engineering and act in a manner that respects those principles.

Upon successful completion of two years of study, leading to the award of a **Diploma (DipHE)**, you will be able to:

1. Illustrate the use of scientific and mathematical reasoning to explain Materials Science and Engineering phenomena.
2. Explain the relationships between processing, structure, properties and performance of materials.
3. Collect and analyse experimental data.
4. Communicate effectively, both orally and in writing.
5. Work as a member of a team to deliver a project.
6. Comply with procedures to ensure your own safety and that of others.

Upon successful completion of one year of study, leading to the award of a **Certificate (CertHE)**, you will be able to:

1. Demonstrate familiarity with the terminology of Materials Science and Engineering.
2. Understand the principal relationships between processing, structure, properties and performance of materials through solving MSE related problems.
3. Collect and analyse experimental data.
4. Write experimental reports.
5. Work as a member of a team to deliver a project.
6. Comply with procedures to ensure your own safety and that of others.

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

Entry Requirements	
Academic Requirement	**A-levels** ***Minimum entry standards*** Our minimum entry standard for 2019 entry is **AAA overall**, to include: A in Mathematics A in Chemistry A in Physics General Studies and Critical Thinking **are not** accepted.

	Typical offer range As a guide, here are the typical offers made in 2017 to at least 85% of applicants studying A-levels: Three A-level offer: **A*AA** ***Practical endorsement (practical science assessment)*** If you are made an offer you will be required to achieve a pass in the practical endorsement in all science subjects that form part of the offer. The practical endorsement is part of the reformed English linear A-levels. **International Baccalaureate** ***Minimum entry standards*** Our minimum entry standard for 2019 entry is 38 points overall, to include: 6 in Mathematics at higher level 6 in Physics at higher level 6 in Chemistry at higher level ***Typical offer range*** As a guide, the typical offer made in 2017 to at least 85% of applicants studying IB was 38 points overall. For further information on entry requirements, please go to https://www.imperial.ac.uk/study/ug/apply/requirements/ugacademic/
Non-academic Requirements	N/A
English Language Requirement	Standard requirement Please check for other Accepted English Qualifications
Admissions Test/Interview	There is no admissions test. All applicants who are shortlisted will be invited for an interview at Imperial College, the interview will include an opportunity for students to tour the Department.
The programme's competency standards can be found at: TBC.	
Learning & Teaching Approach	
Teaching You will learn through a combination of entire cohort sessions, small group workshops, tutorials, a significant number of laboratory activities and independent study. Students will build on their core knowledge from years 1 and 2 in specific areas through the selection of optional courses in years 3 and 4. The teaching methods used to deliver core and optional modules will vary from standard classroom teaching to more active learning in which, for example, you may be required to watch a short lecture on a subject online and then during the teaching session work on a structured problem set with the support of the academic in charge. Professional skills development is supported in years 1 and 2 through the personal tutorial system, where students work in small groups together with an academic. In addition to individual learning students will participate in a number of group projects e.g. in year 1 a Design Study, in Year 2 a Case Study and in Year 3 an extended laboratory exercise, these are designed to develop team work and also offer you opportunities to refine your presentation skills.	

Laboratory and computing sessions get progressively more complex through the programme. Initially key skills such as sample polishing, polymer synthesis and python programming are taught. This progresses to core characterisation laboratories, modelling workshops and an extended processing exercise in years 2 and 3. The MEng programmes culminate in a research project in the final year; projects may be totally experimental, totally computational or contain aspects of both. In addition to the Research Project students take four electives.

You will be expected to spend significant time on independent study outside of face to face contact time. This will typically include reading journal articles and books, undertaking research online and in the library, reviewing lecture notes and watching lecture recordings, working on individual and group projects, working on coursework assignments and revising for exams. There is also a programme of extra-curricular lectures delivered by guest speakers from industry (e.g. Shell and Rolls-Royce) designed to introduce you to some of the key technical challenges in industry.

Overall workload
Module size at Imperial is measured in ECTS (European Credit Transfer System) credits. One ECTS represents about 25 hours of student effort for a typical conscientious student, including formal teaching, practical work, private study, examination preparation and assessment. A full academic year involves 60 ECTS, or about 1500 hours of study in total.

Core modules in years 1 and 2 are worth 10 ECTS. Some of these modules have a very high component of coursework, e.g. Engineering Principles 1 is 100% coursework. However, the majority involve about 60 hours of lectures, tutorials and workshops, 40 hours of laboratory work, 100 hours of coursework, problem solving, private study and project work, and about 50 hours of revision for an end of module examination. There is significant variation in this balance between different modules, but all modules of equivalent value involve similar levels of commitment and workload. Electives in years 3 and 4 are typically worth 5 ECTS and will involve 30 hours of lecture or workshop time, 60 hours of coursework, problem solving, private study and project work, and about 35 hours of revision for an end of module examination.

Lectures, practicals and other formal activities take place on weekdays only, with Wednesday afternoons normally remaining free. We do not normally schedule teaching out of term time.

Assessment Strategy

Assessment Methods

You can expect a variety of different types of assessment, such as:

- Performance in the Teaching Laboratory
- Laboratory reports
- Online programming tests
- Written coursework
- Group project reports
- Written examinations
- Poster Presentations
- Research thesis
- Oral presentations

You will have already experienced various forms of academic assessment during your previous education. At Imperial, we use assessment in two ways: *Formative assessment* is used to develop your skills, knowledge and understanding, and to help you judge your own progress; formative assessment does not contribute to your final marks and class of degree awarded. *Summative assessment* involves formal assessment of your work, through examination, coursework and project work; summative assessment does contribute to your final result.

Year 1 and 2 core modules are either year-long (and run in every term of the year) or run for a single term. The year-long Mathematics and Computing and Performance of Structural Materials modules will be assessed by a combination of coursework and end of term tests. The Engineering Practice modules will be both formatively and summatively assessed by coursework throughout the year. Care is taken when setting coursework to distribute deadlines through the year. The Processing, Structure and Property modules will be assessed by an end of module examination in the term in which they are taught. It is important to note that the final activity in the Engineering Practice modules will consider how mathematics, processing, structure, property and skills taught during the year influence the performance of a material system. To perform well in

the final assessment of the Engineering Practice module will require a knowledge of all material introduced across the entire course to date.

In years 3 and 4 the core modules will all be coursework only or a combination of coursework and examination whilst the electives will be assessed by a combination of coursework and examination or examination only.

The exact balance of the summative assessment through the programme depends upon which elective modules are taken, but is likely to be:

	Coursework	Examination
Year 1	40%	60%
Year 2	35%	65%
Year 3	38% - 45%	55% - 62%
Year 4	67% - 74%	26% - 33%

Academic Feedback Policy

Academic feedback to students on coursework is primarily returned by Blackboard Learn portal and internal departmental systems within the timeline identified in the student handbooks.
Feedback will also be given (where appropriate) verbally following assessment or during interactions with GTAs, Teaching Staff, Personal 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 on written examinations is provided in the form of written commentaries which comment on the performance of the entire cohort on each individual question.

During the academic year indicative results will be provided to students, the results are ratified at the Board of Examiners.

Feedback from students is imperative to helping us improve the course - particularly via the Student-Staff Committee and through termly Student Online Evaluation (SOLE).

The College's Policy on Academic Feedback and guidance on issuing provisional marks to students is available at:
www.imperial.ac.uk/about/governance/academic-governance/academic-policy/exams-and-assessment/

Re-sit Policy

The College's Policy on Re-sits is available at: www.imperial.ac.uk/student-records-and-data/for-current-students/undergraduate-and-taught-postgraduate/exams-assessments-and-regulations/

Mitigating Circumstances Policy

The College's Policy on Mitigating Circumstances is available at: www.imperial.ac.uk/student-records-and-data/for-current-students/undergraduate-and-taught-postgraduate/exams-assessments-and-regulations/

Additional Programme Costs

This section should outline any additional costs relevant to this programme which are not included in students' tuition fees.

Description	Mandatory/Optional	Approximate cost

You will need a laptop for some classes and coursework. The laptop must meet a minimum specification. Windows 10 capable Intel i5/i7 6th/7th generation processor 8GB RAM (16 recommended) 256 GB SSD HDD	Mandatory	N/A

Important notice: The Programme Specifications are the result of a large curriculum and pedagogy reform implemented by the Department and supported by the Learning and Teaching Strategy of Imperial College London. The modules, structure and assessments presented in this Programme Specification are correct at time of publication but might change as a result of student and staff feedback and the introduction of new or innovative approaches to teaching and learning. You will be consulted and notified in a timely manner of any changes to this document.

Programme Structure

Year 1 – FHEQ Level 4
Students study all modules.

Code	Module Title	Core/ Elective	Group*	Term	Credits
MATE40001	Mathematics and Computing 1	Core	N/A	1-3	10
MATE40002	Performance of Structural Materials	Core	N/A	1-3	10
MATE40003	Engineering Practice 1	Core	N/A	1-3	10
MATE40004	Fundamentals of Processing	Core	N/A	1	10
MATE40005	Structure 1	Core	N/A	2	10
MATE40006	Properties 1	Core	N/A	2	10
				Credit Total	60

Year 2 – FHEQ Level 5
Students study all modules.

Code	Module Title	Core/ Elective	Group	Term	Credits
MATE50001	Mathematics and Computing 2	Core	N/A	1-3	10
MATE50002	Performance of Functional Materials	Core	N/A	2-3	10
MATE50003	Engineering Practice 2	Core	N/A	1-3	10
MATE50004	Structure 2	Core	N/A	2	10
MATE50005	Materials Characterisation	Core	N/A	1-2	10
MATE50006	Properties 2	Core	N/A	2	10
				Credit Total	60

Year 3 - FHEQ Level 6 Students take all core modules. Those students following the MEng programme in Materials Science and Engineering should select four electives from groups A and B.

Code	Module Title	Core/ Elective	Group	Term	Credits
BUSI60044	Managerial Economics Online	Core	N/A	1-2	5
MATE60002	Theory and Simulation of Materials	Core	N/A	3	7.5
MATE60003	Processing Laboratory	Core	N/A	2	5
MATE60004	Research Techniques	Core	N/A	2,3	7.5
MATE60005	Transport Phenomena for Materials Processing	Core	N/A	2	10
	I-Explore	Compulsory	N/A	1 &/or 2	5
MATE60006	Biomaterials	Elective	B	1	5

MATE60007	Engineering Alloys	Elective	A	1	5
MATE60008	Ceramics and Glasses	Elective	A	1	5
MATE60009	Mathematics and Quantum Mechanics	Elective	A	1	5
MATE60010	Optoelectronic Materials	Elective	A	1	5
MATE60011	Surfaces and Interfaces	Elective	A	1	5
MATE60012	Nanomaterials	Elective	A	1	5
				Credit Total	60

Year 4 - FHEQ Level 7
All students complete an individual research project. If you are following the Materials science and engineering MEng programme you can choose four electives from groups A-C.

Code	Module Title	Core/ Elective	Group	Term	Credits
MATE70005	Individual Project	Core	N/A	1-3	40
MATE70013	Advanced Engineering Alloys	Elective	A	2,3	5
MATE70014	Advanced Nanomaterials	Elective	A	2,3	5
MATE70015	Advanced Structural Ceramics	Elective	A	2,3	5
MATE70016	Advanced Tissue Engineering	Elective	B	2,3	5
MATE70017	Electroceramics	Elective	A	2,3	5
MATE70018	Advanced Biomaterials	Elective	B	2,3	5
MATE70019	Nuclear Materials for Reactor Systems	Elective	C	1	5
MATE70020	Modelling Materials with Density Functional Theory	Elective	A	2,3	5
				Credit Total	60

Progression and Classification

For each year a mark for the year is determined by aggregating the weighted module marks, the weighting is by the ECTS associated with each module.

To proceed from Year One
An MEng student must:

- Achieve an aggregate mark of at least 40.00% in each module.
- Achieve a mark for the year of at least 40.00%.

To proceed from Year Two
An MEng student must:

- Achieve an aggregate mark of at least 40.00% in each module.
- Achieve a mark for the year of at least 40.00%.
- .

To proceed from Year Three
A MEng student must:

- Achieve an aggregate mark of at least 40.00% in each module and pass the year with an overall mark of at least 50.00%, failure in an elective module may be compensated provided that you have been awarded 30.00% or higher. No more than 15 ECTS may be earned as compensated passes across the degree programme.

To be awarded an MEng after Year Four
A student must:

- Achieve an aggregate mark of at least 50.00% in each module, failure in an elective module may be compensated provided that you have been awarded 40.00% or higher. No more than 15 ECTS may be earned as compensated passes across the degree programme.

Transferring between programmes
As the first two years are the same for all programmes students can, visa issues permitting, transfer between programmes at any point up until the end of Year Two.

Classification

The marks from modules in each year contribute towards the final degree classification.

In order to be considered for an award, you must have achieved the minimum number of credits at the required levels.

Your classification will be determined by your year weighted mark:

For a MEng award, Year One is weighted at 7.50%, Year Two at 20.00% and Years Three and Four at 36.25%.

The College sets the class of undergraduate degree that may be awarded as follows:

First	70.00% or above for the average weighted module results
Upper Second	60.00% or above for the average weighted module results
Lower Second	50.00% or above for the average weighted module results
Third	40.00% or above for the average weighted module results

Please find the full Academic Regulations at https://www.imperial.ac.uk/about/governance/academic-governance/regulations/. Please follow the prompts to find the set of regulations relevant to your programme of study.

Programme Specific Regulations

Provided a student has passed the year a student may be allowed the opportunity to be reassessed on failed modules in Years 1, 2, and 3, at the discretion of the Board of Examiners.
As an accredited degree, students on this programme are subject to the standards set by the Engineering Council in relation to compensation: a maximum of 15 ECTS credits can be compensated across the entire programme.

Supporting Information
The Programme Handbook is available at: https://www.imperial.ac.uk/study/ug/courses/materials-department/
The Module Handbook is available at: https://www.imperial.ac.uk/study/ug/courses/materials-department/
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: 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". www.imperial.ac.uk/admin-services/secretariat/college-governance/charters/
Imperial College London is regulated by the Office for Students (OfS) www.officeforstudents.org.uk/advice-and-guidance/the-register/
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 primarily intended as a reference point for prospective and current students, academic and support staff involved in delivering the programme and enabling student development and achievement, for its assessment by internal and external examiners, and in subsequent monitoring and review.

Modifications			
Description	**Approved**	**Date**	**Paper Reference**
N/A	N/A	N/A	N/A