**MSc Theory and Simulation of Materials**

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| 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 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.  |
| **Programme Information** |
| Programme Title | Theory and Simulation of Materials |
| Award(s) | MSc |
| Programme Code(s) | F3U5 – 1 Yr FTF3U52 – 1 Yr FT + 3 Yr PhD |
| Awarding Institution | Imperial College London |
| Teaching Institution | Imperial College London |
| Faculty | Faculty of Natural Sciences |
| Department | Physics |
| Associateship | Royal College of Science |
| Main Location of Study | South Kensington Campus |
| Mode and Period of Study | 1 calendar year full-time (12 months) |
| Cohort Entry Points | Annually in October |
| Relevant [QAA Benchmark Statement(s](http://www.qaa.ac.uk/assuring-standards-and-quality/the-quality-code/subject-benchmark-statements)) and/or other external reference points | Master’s Awards in Physics, Astronomy and Astrophysics |
| Total Credits | ECTS: | 90 | CATS: | 180 |
| [FHEQ Level](http://www.qaa.ac.uk/assuring-standards-and-quality/the-quality-code/qualifications) | Level 7 - Master’s  |
| [EHEA Level](http://www.nvao.net/page/downloads/Framework_for_Qualifications_of_the_European_Higher_Education_Area.pdf) | 2nd cycle |
| External Accreditor(s) | N/A |
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| Student cohorts covered by specification | 2018-19 entry |
| Person Responsible for the specification | Dr Arash Mostofi |
| Date of introduction of programme | September 2009 |
| Date of programme specification/revision | May 2018 |
| **Programme Overview** |
| The Department of Physics is leading an interdisciplinary Centre for Doctoral Training (CDT) onTheory and Simulation of Materials.The Centre offers a four-year PhD, the first year of which leads to an MSc. Self-funded students may take the MSc by itself as a 12-month full-time course.This course is aimed at mathematically talented students who relish theoretical and computational treatments of condensed matter that are relevant to major issues facing society today, such as energy supply, global warming, health and security.It provides a foundation in the theoretical physics of materials and its application in simulations across different length and time scales to problems of technological importance.With strong links to industry, other leading academic institutions, and government labs in the UK and overseas, there are plenty of opportunities to engage with external organisations, including collaborative research projects. |
| **Learning Outcomes** |
| MSc in Theory and Simulation of Materials graduates will be able to:1.    Define the unique properties of materials on several scales and describe how those properties can be applied to ‘real world’ problems.2.    Review and evaluate critically the current ‘state of the art’ research in the field of materials science.3.    Employ appropriate mathematical and computational tools to design, construct and evaluate models of the behaviour of materials, and to interpret the results.4.    Solve problems while working with people contributing other skills within a team environment.5.    Explain orally and in writing the results of the research to a specialist and non-specialist audience.6.    Manage an independent, major research project.  |
| 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](http://www.imperial.ac.uk/students/academic-support/graduate-attributes) |
| **Entry Requirements** |
| Academic Requirement | Normally a first class (1st) UK Bachelor’s Degree with Honours in PhysicalSciences or Engineering (or a comparable qualification recognised by the College). |
| Non-academic Requirements | None |
| English Language Requirement | [Standard requirement](https://www.imperial.ac.uk/study/ug/apply/requirements/english/)IELTS score of 6.5 overall (minimum 6.0 in all elements)  |
| The programme’s competency standards documents can be found at: <http://www.imperial.ac.uk/natural-sciences/departments/physics/students/current-students/taught-postgraduates/> |
| **Learning & Teaching Strategy** |
| Scheduled Learning & Teaching Methods | The MSc uses: * lectures,
* problem classes,
* computational work,
* e-learning,
* tutorials,
* practical classes.
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| E-learning & Blended Learning Methods | * Blackboard
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| Project Learning Methods | * Supervised and self-study project work.
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| Placement Learning Methods | * The MSc does not have placements.
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| **Assessment Strategy** |
| Assessment Methods | * Written examination,
* Coursework,
* Written report,
* Presentation,
* Oral presentation,
* Viva,
* Dissertation.
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| Academic Feedback Policy |
| The feedback policy will follow the guidelines of the Department of Physics, where written feedback should be provided to the student as per the information in the programme handbook and at the start of the programme.  |
| Re-sit Policy |
| The College’s Policy on Re-sits is available at: <http://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: <http://www.imperial.ac.uk/student-records-and-data/for-current-students/undergraduate-and-taught-postgraduate/exams-assessments-and-regulations/>  |
| **Programme Structure** |
| Full-time | Pre-session | Autumn Term | Spring Term | Summer Term | Summer Vacation |
| Core Modules | 0 | 6 | 2 | 0 | 0 |
| Elective Modules | 0 | 0 | 2 | 0 | 0 |
| Projects | 0 | 0 | 1 | 1 |
| **Assessment Dates & Deadlines** |
| Written Examinations | January |
| Coursework Assessments | Continuous |
| Project Deadlines | Early September |
| Practical Assessments | Continuous |
| **Assessment Structure** |
| Rules of Progression |
| N/A |
| Marking Scheme |
| The MSc consists of two elements:* Taught modules, accounting for 60% of the total programme mark, and
* Research element, accounting for 40% of the total programme mark.

The marking scheme for the elements and components will follow the ‘Regulations for the Examinations of Masters Degrees’ |

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| **Module Weightings** |
| Element (% Weighting) | Module | % Module Weighting |
| Taught modules (60%) | Mathematics for Theory of Materials  | 14.81% |
| Equilibrium in Materials | 7.40% |
| Transformation of Materials | 7.40% |
| Classical Field Theory of Materials | 7.40% |
| Electronic Structure of Materials | 7.40% |
| Methods of Simulating Materials | 14.81% |
| Computational Methods for Materials | 11.11% |
| Group Research Strategy Project | 14.81% |
| Elective Modules  | 7.40% each |
| Research Project (40%) | Literature review | 25% |
| Research project | 75%  |

| **Indicative Module List** |
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| Code | Title | Core/Elective | L&T Hours | Ind. Study Hours | Place-ment Hours | Total Hours | % Written Exam | % Course-work | % Practical | FHEQ Level | ECTS |
| PH9-TMTM | Mathematics for Theory of Materials | Core | 32 | 168 | 0 | 200 | 80% | 20% | 0% | 7 | 8 |
| PH9-TCFTM | Classical Field Theory of Materials | Core | 20 | 80 | 0 | 100 | 80% | 20% | 0% | 7 | 4 |
| PH9-TCFTM | Classical Field Theory of Materials - Advanced | Option | 8 | 92 | 0 | 100 | 0% | 50% | 50% | 7 | 4 |
| PH9-TEQM | Equilibrium in Materials | Core | 20 | 80 | 0 | 100 | 80% | 20% | 0% | 7 | 4 |
| PH9-TEQM | Equilibrium in Materials – Advanced | Option | 8 | 92 | 0 | 100 | 0% | 50% | 50% | 7 | 4 |
| PH9-TESM | Electronic Structure of Materials | Core | 20 | 80 | 0 | 100 | 80% | 20% | 0% | 7 | 4 |
| PH9-TESM | Electronic Structure of Materials – Advanced | Option | 8 | 92 | 0 | 100 | 0% | 50% | 50% | 7 | 4 |
| PH9-TTM | Transformation of Materials | Core | 20 | 80 | 0 | 100 | 80% | 20% | 0% | 7 | 4 |
| PH9-TTM | Transformation of Materials – Advanced | Option | 8 | 92 | 0 | 100 | 0% | 50% | 50% | 7 | 4 |
| PH9-TMSM | Methods of Simulating Materials | Core | 32 | 168 | 0 | 200 | 0% | 70% | 30% | 7 | 8 |
| PH9-TCOMM | Computational Methods for Materials | Core | 36 | 114 | 0 | 150 | 0% | 100% | 0% | 7 | 6 |
| PH9-TGRSP | Group Research Strategy Project | Core | 10 | 190 | 0 | 200 | 0% | 80% | 20% | 7 | 8 |
| PH9-TPRJ | Literature Review | Core | 0 | 175 | 0 | 175 | 0% | 100% | 0% | 7 | 9 |
| PH9-TPRJ | Research Project | Core | 0 | 675 | 0 | 675 | 0% | 80% | 20% | 7 | 27 |

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| Supporting Information |
| The Programme Handbook is available at: <https://www.imperial.ac.uk/theory-and-simulation-of-materials/programmes/msc-in-theory-and-simulation-of-materials/> |
| The Module Handbook is available at: <https://www.imperial.ac.uk/theory-and-simulation-of-materials/programmes/msc-in-theory-and-simulation-of-materials/> |
| The College’s entry requirements for postgraduate programmes can be found at:[www.imperial.ac.uk/study/pg/apply/requirements](http://www.imperial.ac.uk/study/pg/apply/requirements) |
| The College’s Quality & Enhancement Framework is available at:[www.imperial.ac.uk/registry/proceduresandregulations/qualityassurance](http://www.imperial.ac.uk/registry/proceduresandregulations/qualityassurance) |
| The College’s Academic and Examination Regulations can be found at: [https://www.imperial.ac.uk/about/governance/academic-governance/regulations](https://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/charter-and-statutes/>  |
| Imperial College London is regulated by the Office for Students (OfS)<https://www.officeforstudents.org.uk/>  |