

| Programme Information     |                |                       |
|---------------------------|----------------|-----------------------|
| Programme Title           | Programme Code | HECoS Code            |
| Metals and Energy Finance | J9U8           | For Registry Use Only |

| Award          | Length of Study | Mode of Study | Entry Point(s)      | Total Credits |      |
|----------------|-----------------|---------------|---------------------|---------------|------|
|                |                 |               |                     | ECTS          | CATS |
| MSc            | 12 months       | Full-Time     | Annually in October | 90            | 180  |
| PG Diploma     | N/A             | N/A           | N/A                 | 60            | 120  |
| PG Certificate | N/A             | N/A           | N/A                 | 30            | 60   |

The PG Certificate and PG Diploma are exit awards and are not available for entry. You must apply to and join the MSc.

| Ownership            |                                          |                           |                               |
|----------------------|------------------------------------------|---------------------------|-------------------------------|
| Awarding Institution | Imperial College London                  | Faculty                   | Faculty of Engineering        |
| Teaching Institution | Imperial College London                  | Department                | Earth Science and Engineering |
| Associateship        | Diploma of Imperial College London (DIC) | Main Location(s) of Study | South Kensington Campus       |

| External Reference                                                                         |                                                 |
|--------------------------------------------------------------------------------------------|-------------------------------------------------|
| Relevant <a href="#">QAA Benchmark Statement(s)</a> and/or other external reference points | <a href="#">Master's Degrees in Engineering</a> |
| <a href="#">FHEQ Level</a>                                                                 | Level 7                                         |
| <a href="#">EHEA Level</a>                                                                 | 2nd Cycle                                       |

| External Accreditor(s) (if applicable) |                                                        |                        |      |
|----------------------------------------|--------------------------------------------------------|------------------------|------|
| External Accreditor 1:                 | The Institute of Materials, Minerals and Mining (IOM3) |                        |      |
| Accreditation received:                | 2017                                                   | Accreditation renewal: | 2023 |

| Collaborative Provision |                    |                          |                       |
|-------------------------|--------------------|--------------------------|-----------------------|
| Collaborative partner   | Collaboration type | Agreement effective date | Agreement expiry date |
| N/A                     | N/A                | N/A                      | N/A                   |

| Specification Details                    |                         |
|------------------------------------------|-------------------------|
| Programme Lead                           | Prof. Stephen Neethling |
| Student cohorts covered by specification | 2023-24 entry           |

|                                          |             |
|------------------------------------------|-------------|
| Date of introduction of programme        | October 06  |
| Date of programme specification/revision | February 23 |

## Programme Overview

The MSc Metals and Energy Finance programme will educate future resource specialists in the multidisciplinary areas of resource geology and geoengineering, resource project evaluation, resource project management and quantitative finance. The programme will take you through a curriculum that enables a deepening of knowledge and skills associated with the mining and energy finance sectors and their application to a range of businesses and industry. In addition, in term 3, a fieldtrip will include visits to be both active mines and mining projects to apply the knowledge and skills acquired in earlier parts of the programme. The final part of the programme will be a dissertation in which a resource project will be researched and evaluated.

This programme is run jointly by the Department of Earth Science and Engineering and Imperial College Business School. Understanding the financial risk and uncertainty that arises is a core component of the programme and needs to be treated in a quantitative way which is why the MSc degree is delivered as a combined Faculty of Engineering/Business School programme where these concepts are treated formally using mathematical notation in the quantitative finance teaching delivered by the Business School.

Applicants to the programme normally have a few years of experience in the sector and are expected to have a strong background in mathematics, and students come from a range of backgrounds. The overall objective of the MSc programme is to ensure that you are able to critically assess, both technically and financially, metals and energy projects that are key for the green energy transition. This requires a combination of knowledge and practical skills, which are tailored to the latest developments from the resources sector.

On completion of the programme you will have acquired a strong background in key technical and geological concepts relevant to energy projects, traditional minerals-related training directly applicable to a career in the minerals industry, and be trained in financial modelling, financial engineering and the techniques of risk modelling. You will learn about the corporate finance, equity markets, debt finance, metals markets and associated derivative market in the City of London, a global centre for mining and energy finance, and you will be provided with an understanding of quantitative finance, accounting and strategic management within the context of technical principles that apply specifically to mineral and energy projects.

On completion of the programme you will be in an ideal position to

- pursue careers in the technical and financial appraisal of natural energy and mineral resource projects, or in the financial services and energy and mineral industries.
- to undertake independent research projects both in industry and in a university environment.
- to transition to business leadership roles, sustainable development and engineering ethics

The programme consists of 5 modules delivered over the first two terms of the academic year, culminating in a project evaluation at the end of the second term. In summer term, after the assessments, you will undertake a fieldtrip, a highlight of the MSc programme, to a region of active exploration, mine development and energy investment. This will provide first-hand experience of a variety of aspects of the minerals industry, and in the process, promote deep learning on concepts studied during the programme. Following submission of the fieldtrip report, you will undertake your individual research project for the remaining time in the programme.

The research project is chosen with the support of staff teaching on the programme. The research project will be based on an evaluation of a resource project that is typically at the pre-feasibility/feasibility stage of development. You will be given guidance on how to identify suitable projects and on how to obtain the required data and based on this you will need to develop and present a research proposal. This will take place shortly after the fieldtrip report submission.

The programme will be taught by expert staff members who will draw on their research, business and industrial application experience at national and international level to ensure you are provided with an opportunity to engage with a broad range of techniques and applications. You will also have the opportunity to undertake research with academics within the top-rated Earth Science and Engineering Department from the Research Excellence Framework (REF) 2014 and Research Assessment Exercise (RAE) 2008. The programme will be focused on the South Kensington Campus, predominantly within the Earth Science and Engineering department's facilities in the Royal School of Mines Building.

## Learning Outcomes

On successful completion of the MSc in Metals and Energy Finance you will be able to:

1. Apply the key aspects of quantitative finance (including futures, forwards, options, Black & Scholes, gold loans, hedging, real option analysis, and the role of commodity markets)
2. Build a financial model of a resource project
3. Analyse resource company accounts
4. Calculate the uncertainty in resource estimations through the application of geostatistics and apply this to the analysis of risk in financial modelling
5. Analyse the performance of resource projects, including mining, minerals processing and subsurface engineering
6. Use financial engineering to optimise project returns using the relationship between capital structure (the balance between debt and equity) and the scale of production
7. Assess the factors that are involved in securing financing for capital-intensive extractive industry projects through equity, debt or joint ventures
8. Analyse and solve problems using a multidisciplinary approach, applying professional judgement to balance financial assessment, technical detail and engineering design
9. Work in an interdisciplinary team to develop a realistic funding case for a resource project and present the case to industry experts
10. Conduct independent research, including developing a project proposal and research plan
11. Interpret technical, financial and scientific reports and carry out a critical evaluation of this literature
12. Produce a written dissertation which presents the aims, background, methodology, results and discussion in a coherent and concise manner

On successful completion of the PG Diploma in Metals and Energy Finance you will be able to:

1. Apply the key aspects of quantitative finance (including futures, forwards, options, Black & Scholes, gold loans, hedging, real option analysis, and the role of commodity markets)
2. Build a financial model of a resource project
3. Analyse resource company accounts
4. Calculate the uncertainty in resource estimations through the application of geostatistics and apply this to the analysis of risk in financial modelling
5. Analyse the performance of resource projects, including mining, minerals processing and subsurface engineering
6. Use financial engineering to optimise project returns using the relationship between capital structure (the balance between debt and equity) and the scale of production
7. Assess the factors that are involved in securing financing for capital-intensive extractive industry projects through equity, debt or joint ventures
8. Analyse and solve problems using a multidisciplinary approach, applying professional judgement to balance financial assessment, technical detail and engineering design

On successful completion of the PG Certificate in Metals and Energy Finance you will be able to:

1. Apply the key aspects of quantitative finance (including futures, forwards, options, Black & Scholes, gold loans, hedging, real option analysis, and the role of commodity markets)
2. Build a financial model of a resource project
3. Analyse resource company accounts
4. Calculate the uncertainty in resource estimations through the application of geostatistics and apply this to the analysis of risk in financial modelling
5. Analyse the performance of resource projects, including mining, minerals processing and subsurface engineering

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 2:1 UK Bachelor's Degree with Honours (or a comparable qualification recognised by the College) in Engineering, the Physical Sciences or Economics, with a substantial Mathematics element. Appropriate experience, while not essential, would be an advantage. |
| Non-academic Requirements | None                                                                                                                                                                                                                                                                       |

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| English Language Requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <a href="#">Standard requirement</a><br>IELTS score of 6.5 overall (minimum 6.0 in all elements)                                                                                          |
| Admissions Test/Interview                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Applicants may be invited to interview. This will be predominantly to ascertain the student's mathematical background and ability where it is not obvious from their academic transcript. |
| The programme's competency standards documents can be found at: <a href="http://www.imperial.ac.uk/earth-science/prosp-students/pg-courses/">www.imperial.ac.uk/earth-science/prosp-students/pg-courses/</a> . <a href="http://www.imperial.ac.uk/engineering/departments/earth-science/prosp-students/pg-courses/programme-specifications/">http://www.imperial.ac.uk/engineering/departments/earth-science/prosp-students/pg-courses/programme-specifications/</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                           |
| <b>Learning &amp; Teaching Approach</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                           |
| <p><b>Learning and Teaching Delivery Methods</b></p> <ul style="list-style-type: none"> <li>• Lectures</li> <li>• Case studies</li> <li>• Group work exercises</li> <li>• A mining project field trip</li> <li>• Individual research</li> <li>• Formal presentations</li> </ul> <p>All module content will be made available online in addition to face to face teaching sessions. The lectures will predominantly consist of short presentations interspersed with exercises and practical examples so that you can practise implementing the skills that you have been taught. This will be done with the support of academic staff.</p> <p>A number of modules will involve group projects where you will need to collaboratively solve a challenge and present the results. Other modules will involve more substantial individual coursework exercises where you can practice and demonstrate your ability to combine the methods and skills that you have been taught in order to solve a problem.</p> <p>In the field trip you will be expected to record your own observations about the projects that we will be visiting and will need to demonstrate your ability to critically assess what you are told and shown by the companies that we will be visiting.</p> <p>The final activity of the programme is the research project that you will undertake independently with support and advice from a project supervisor.</p> <p><b>Overall Workload</b></p> <p>Your overall workload consists of face-to-face sessions and independent learning. While your actual contact hours may vary according to the optional modules you choose to study, the following gives an indication of how much time you will need to allocate to different activities at each level of the programme. At Imperial, each ECTS credit taken equates to an expected total study time of 25 hours. Therefore, the expected total study time is 2250 (90 ECTS) hours per year.</p> <p>The first 8 months of the course (October till May) will consist of formal lecturing and associate tutorials and practical sessions. As well as the formal teaching, you will also be expected to do independent study.</p> <p>After the formal teaching there will be a 2 week field trip followed by a 2 week period in which the field trip report should be written.</p> <p>The final three months of the course will be exclusively devoted to the individual research project.</p> |                                                                                                                                                                                           |
| <b>Assessment Strategy</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                           |
| Assessment Methods                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                           |
| The assessment consists of a combination of exams and coursework. All the core modules except the dissertation and field trip have formal written exams, with these exams occurring at the end of the Autumn and Spring terms.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                           |

In addition, all the modules have coursework components. These provide an opportunity for feedback prior to the formal exams, as well contributing to the summative assessment for the module, with the coursework contribution ranging between 20% and 40% depending on the module. The form that this coursework takes varies from module to module and includes written reports, calculation exercises and oral presentations.

In addition to the feedback from formal coursework, you will be provided with formative assessment of your performance in class exercise and tutorial sessions.

The Project Evaluation module includes the Syndicate Exercises. These are a series of group projects, which are assessed based on a combination of written reports and oral presentations. In these group exercises all members of the group receive the same mark.

The field trip is assessed based on a combination of the notebook that is generated while on site based on your observations and a subsequent report in which you must synthesise their observations into a coherent structure. During the field trip there is formative assessment of the notebook to ensure that appropriate data and observations are being recorded. The summative assessment will be based 80% on the report and 20% on the notebook.

A final dissertation will be the main basis for the summative assessment of the 3 month research project undertaken over the summer. In addition to the mark for the dissertation, there will also be a mark based on your management of the project, including your presentation of the initial project plan and your interim progress reports. This will account for 15% of the total mark, with the written dissertation accounting for the other 85%.

#### Academic Feedback Policy

Feedback on coursework will be provided in line with the College's Policy on Academic Feedback. The good practice guidelines of feedback being provided within two weeks of the submission date will be employed. You will also be given indicative marks after the January and April exam periods.

The final numerical marks will be provided by the Registry after the Board of Examiners' meeting at the end of the academic year.

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/](http://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/](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: [www.imperial.ac.uk/student-records-and-data/for-current-students/undergraduate-and-taught-postgraduate/exams-assessments-and-regulations/](http://www.imperial.ac.uk/student-records-and-data/for-current-students/undergraduate-and-taught-postgraduate/exams-assessments-and-regulations/)

#### Additional Programme Costs

There are no additional costs. The field trip is included in the tuition fees.

**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 <sup>1</sup>                                         |                                     |                                  |       |                   |         |
|--------------------------------------------------------------------------|-------------------------------------|----------------------------------|-------|-------------------|---------|
| Year 1 - FHEQ Level 7<br>You will study all core and compulsory modules. |                                     |                                  |       |                   |         |
| Code                                                                     | Module Title                        | Core/<br>Compulsory/<br>Elective | Group | Term              | Credits |
| EART70182                                                                | Management & Business               | Core                             |       | Autumn-<br>Spring | 15      |
| BUSI97336                                                                | Mathematics for Finance             | Compulsory                       |       | Autumn            | 7.5     |
| BUSI97337                                                                | Investment and Portfolio Management | Compulsory                       |       | Autumn            | 7.5     |
| BUSI97344                                                                | Derivatives                         | Compulsory                       |       | Spring            | 7.5     |
| EART70180                                                                | Resource Geology and Geoscience     | Core                             |       | Autumn            | 7.5     |
| EART70185                                                                | Project Evaluation                  | Core                             |       | Spring            | 15      |
| EART70184                                                                | MEF Field Trip                      | Core                             |       | Summer            | 10      |
| EART70183                                                                | MEF Dissertations                   | Core                             |       | Summer            | 20      |
| Credit Total                                                             |                                     |                                  |       |                   | 90      |

<sup>1</sup> **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 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.

### **Award and Classification for Postgraduate Students**

#### **Award of a Postgraduate Certificate (PG Cert)**

To qualify for the award of a postgraduate certificate you must have a minimum of 30 credits at Level 7 from the taught modules

#### **Award of a Postgraduate Diploma (PG Dip)**

To qualify for the award of a postgraduate diploma you must have passed modules to the value of no fewer than 60 credits at Level 7 from the taught modules in the Autumn, Spring and Summer terms

1. and no more than 10 credits as a Compensated Pass;

#### **Award of a Masters Degree**

To qualify for the award of a postgraduate degree you must have:

1. accumulated credit to the value of no fewer than 90 credits at level 7;
2. and no more than 10 credits as a Compensated Pass;
3. met any specific requirements for an award as outlined in the approved programme specification for that award.

### **Classification of Postgraduate Taught Awards**

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

1. Distinction: 70.00% or above.
2. Merit: 60.00% or above but less than 70.00%.
3. Pass: 50.00% or above but less than 60.00%.

For a Masters, your classification will be determined through the Programme Overall Weighted Average and the designated dissertation or final major project module meeting the threshold for the relevant classification band.

Your degree algorithm provides an appropriate and reliable summary of your performance against the programme learning outcomes. It reflects the design, delivery, and structure of your programme without unduly over-emphasising particular aspects.

### **Programme Specific Regulations**

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 10 ECTS credits can be compensated across the MSc programme.

| <b>Supporting Information</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The Programme Handbook is available from the department.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| The Module Handbook is available from the department.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| The College's entry requirements for postgraduate programmes can be found at:<br><a href="http://www.imperial.ac.uk/study/apply/postgraduate-taught/entry-requirements/">www.imperial.ac.uk/study/apply/postgraduate-taught/entry-requirements/</a>                                                                                                                                                                                                                                                                                                                                                                                         |
| The College's Quality & Enhancement Framework is available at:<br><a href="http://www.imperial.ac.uk/registry/proceduresandregulations/qualityassurance">www.imperial.ac.uk/registry/proceduresandregulations/qualityassurance</a>                                                                                                                                                                                                                                                                                                                                                                                                          |
| The College's Academic and Examination Regulations can be found at:<br><a href="http://www.imperial.ac.uk/about/governance/academic-governance/regulations">www.imperial.ac.uk/about/governance/academic-governance/regulations</a>                                                                                                                                                                                                                                                                                                                                                                                                         |
| 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".<br><a href="http://www.imperial.ac.uk/admin-services/secretariat/college-governance/charters/">www.imperial.ac.uk/admin-services/secretariat/college-governance/charters/</a> |
| Imperial College London is regulated by the Office for Students (OfS)<br><a href="http://www.officeforstudents.org.uk/advice-and-guidance/the-register/">www.officeforstudents.org.uk/advice-and-guidance/the-register/</a>                                                                                                                                                                                                                                                                                                                                                                                                                 |
| This document provides a definitive record of the main features of the programme and the learning outcomes that you may reasonably be expected to achieve and demonstrate if you take 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.                                                                |