

MSc Metals and Energy Finance

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

Programme Title	Metals and Energy Finance			
Award(s)	MSc			
Programme Code	J9U8			
Awarding Institution	Imperial College London			
Teaching Institution	Imperial College London			
Faculty	Faculty of Engineering			
Department(s)	Department of Earth Science and Engineering (lead) Imperial College Business School			
Associateship	Royal School of Mines			
Main Location of Study	South Kensington Campus			
Mode and Period of Study	1 academic year, October to September 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	2 nd cycle			
External Accreditor(s)	The Institute of Materials, Minerals and Mining			
Specification Details				
Student cohorts covered by specification	2020-21 entry			
Person responsible for the specification	Professor Dennis Buchanan			
Date of introduction of programme	October 2006			

Date of programme specification/revision

December 2020

Programme Overview

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.

The programme covers mineral deposit studies, resource evaluation, basic petroleum engineering and petroleum geology, minerals engineering and extractive metallurgy, accounting and cash flow modelling, mathematics in finance, investment and portfolio management, derivatives, metals and energy project appraisal and finance, project management, and markets and supplies and strategic management.

The programme:

- Produces graduates equipped to pursue careers in the technical and financial appraisal of natural energy and mineral resource projects;
- Offers traditional minerals-related training directly applicable to a career in the minerals industry;
- Introduces key technical and geological concepts relevant to petroleum projects;
- Enhances career opportunities in the financial services and petroleum and mineral industries;
- Provides the basis for an understanding of quantitative finance, accounting and strategic management within the context of technical principles that apply specifically to mineral and energy projects;
- Responds to the importance of the City of London as a global centre for mining and energy finance by providing knowledge of corporate finance, equity markets, debt finance, metals markets and associated derivative markets;
- Provides training in financial modelling, financial engineering and the techniques of risk modelling;
- Enhances entrepreneurial skills;
- Covers transitioning to business leadership roles, sustainable development and engineering ethics.
- Provides the skills needed to undertake independent research projects both in industry and in a university environment.

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:

- Accounting and strategic management including a foundation course in how to generate a Balance Sheet and Profit and Loss account from the cash flows;

- Key aspects of quantitative finance (futures, forwards, options, Black & Scholes, gold loans, hedging, real option analysis, and the role of commodity markets);
- How to determine uncertainty in resource estimations through the application of geostatistics and relate this to risk in financial modelling;
- The application of financial accounting and taxation models to determining the cost of capital;
- The role of financial engineering in optimising the relationship between capital structure (the balance between debt and equity) and the scale of production;
- The factors that are involved in securing financing for capital-intensive extractive industry projects through equity, debt or joint ventures;
- Technical principles which apply specifically to the mineral and energy industry and how dependent and independent variables influence financial modelling;
- Technical principles including resource estimation, mine planning, surface and underground mining techniques, mineral processing and extractive metallurgy and characterisation of reservoir rocks and fluids;
- The role of professional responsibility within the mineral and energy industries and how theory is applied in practice;
- Management and communication skills;
- Research techniques including the requirement to generate an independent piece of research;

Intellectual Skills - able to:

- Analyse and solve problems using a multidisciplinary approach, applying professional judgement to balance financial assessment, technical detail and engineering design;
- Plan, generate and complete a programme of independent research;
- Think innovatively and independently and recognise emerging opportunities.

Practical Skills - able to:

- Read, interpret and analyse financial statements and apply this to an understanding of the underlying commercial viability of a business;
- Evaluate the commercial potential of natural resource projects and apply this in the new business divisions of major natural resource companies;
- Apply the key principles of entrepreneurship through an understanding of valuation techniques and relate this to raising equity funding for project development as well as within the new business divisions of international mining and petroleum companies;
- Apply information technology to a range of technical and financial situations;
- Develop a basic proficiency in Spanish, French or Italian which permits additional flexibility in undertaking technical reviews or developing commercial relationships;
- Manage resources and time;
- Use the scientific literature effectively.

Transferable Skills - able to:

- Communicate effectively through oral presentations supported by power point slides;
- Work in groups and develop interpersonal skills;
- Transfer techniques and solutions from one discipline to another;
- Understand decision processes that depend on a sound understanding of technical and financial parameters.
- Scope the application of IT systems to a range of different circumstances.

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
Applicants may be invited to attend an interview.	
English Language Requirement	Standard requirement IELTS score of 6.5 overall (minimum 6.0 in all elements)
The programme's competency standards document can be found at: http://www.imperial.ac.uk/engineering/departments/earth-science/prosp-students/pg-courses/programme-specifications/	
Learning & Teaching Strategy	
Scheduled Learning & Teaching Methods	<ul style="list-style-type: none"> • Interactive lectures • Syndicate exercises and role playing. • Video-recorded presentations as part of the strategic management programme. • Literature-based assignments. • Presentations by external contributors aimed at reconciling theory with application. • There are two trips. A three-day field trip to the Wessex Basin to observe petroleum systems and a two week visit to South Africa to visit active mining, processing and extractive operations.
E-learning & Blended Learning Methods	<ul style="list-style-type: none"> • The Business School deliver their teaching with the support of their Student Communications Hub. This the Business School in-house Virtual Learning Environment (VLE) which all course messaging, materials and lecture recordings can be viewed. Students work through selected on-line courses which are made available from the beginning of September and accessed via the Student Hub. • Teaching in the Department of Earth Sciences and Engineering is delivered with the support of the BlackBoard VLE and most

	<p>lectures are recorded using the Panopto system</p> <ul style="list-style-type: none"> For a two-month period in the Spring term students will be able to access an EduMine e-Learning module through the VLE (www.edumine.com) which will provide them with an introduction to modelling project finance and cover the critical issues associated with the debt financing of mining projects. A fully integrated IC-MinEval-generated spreadsheet model is included in the module, together with interactive review sessions.
Project and Placement Learning Methods	<ul style="list-style-type: none"> Dissertations prepared by the students recognise the link between inherent uncertainty associated with resource estimation for petroleum and minerals using a quantitative approach, and that these are integrated into the stochastic concepts covered in the finance lectures delivered by the Business school. If sought, students can work with companies and base their dissertations on actual projects.
Assessment Strategy	
Assessment Methods	<ul style="list-style-type: none"> Course work assignments set as part of the delivery of teaching modules There are four syndicate exercises. Grades for exercises 2, 3 and 4 are awarded based on an equal split between group and individual effort. Detailed appraisal sheets are generated for the trips to Wessex and South Africa Assessment of dissertations includes performance in the initial presentation of proposals and the two progress reports.
Academic Feedback Policy	
<p>The College policy of academic feedback to postgraduate taught students is to promote 10 working days as best practice timescale and this is the timescale that can be expected. If feedback is not provided by staff within two weeks of submitting written work and you have not been notified of a delay, we ask students to notify the Course Director by e-mail.</p>	

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	Term One	Term Two	Term Three
Core Modules	1	2	2	0
Elective Modules	0	0	0	0
Projects	0	0	0	1

Assessment Dates & Deadlines

Written Examinations	January, March and May
Coursework Assessments	Continuous
Project Deadlines	Mid-September
Practical Assessments	Continuous

Assessment Structure

Marking Scheme

Distinction: to be awarded where a candidate has achieved an aggregate mark of 70% or greater across the programme as a whole, including a mark of 70% or greater in each of the three elements of the course (i.e. coursework, examinations and independent project).

Merit: to be awarded where a candidate has achieved an aggregate mark of 60% or greater across the programme as a whole including a mark of 60% in each of the three elements of the course (i.e. coursework, examinations and independent project).

Pass: to be awarded where a candidate has achieved an aggregate mark of 50% or greater across the programme as a whole.

Fail: results when a candidate has achieved an aggregate mark of less than 50% or across the programme as a whole, and/or has failed to pass each of the three elements of the course.

All candidates must pass at least seven of the nine examinations papers.

Recommendations for final degree results are at the discretion of the Examinations' Board.

Module Weightings		
Element (and % weighting)	Module	% Module Weighting
Examinations (43%)	Management & Business Accounting, Management of Projects Markets & Supplies and Strategic Management	24%
	Quantitative Finance Mathematics for Finance, Investment and Portfolio Management and Derivatives	
	Petroleum & Mineral Geoscience Mineral Deposits, Petroleum Engineering and Petroleum Geology	24%
	Project Evaluation Metals & Energy Project Appraisal and Finance, Resource Evaluation and Mining Engineering Extractive Metallurgy	
Excursions (28.5%)	Wessex Trip (20%)	26%
	South Africa Excursion (80%)	
Dissertation (28.5%)	Dissertation	26%

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
	Accounting	Core	20	20	0	40	70%	30%	0	7	2.5
	Cash Flow Modelling	Core	20	20	0	40	0	0	0	7	2.5
	Mathematics for Finance	Core	50	50	0	100	80%	20%	0	7	2.5
	Mineral Deposits Studies	Core	25	25	0	50	70%	30%	0	7	2.5
	Petroleum Engineering	Core	12	15	0	27	70%	30%	0	7	2.5
	Petroleum Geology	Core	15	15	0	30	100	0	0	7	2.5
	Investment and Portfolio Management	Core	40	60	0	100	70%	30%	0	7	2.5
	Management of Projects, Markets and Supplies	Core	33	33	0	66	70%	30%	0	7	2.5
	Metals and Energy Project Appraisal and Finance	Core	38	22	0	60	80%	20%	0	7	2.5
	Minerals Engineering (Mining)	Core	25	10	0	35	80%	20%	0	7	2.5
	Resource Evaluation	Core	30	30	0	60	80%	20%	0	7	2.5
	Extractive Metallurgy	Core	30	30	0	60	75%	25%	0	7	2.5
	Strategic Management	Core	40	20	0	60	70%	30%	0	7	2.5

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
	Derivatives	Core	40	60	0	100	70%	30%	0	7	2.5
	Foundation Mathematics	Optional	20	40	0	60	0	0	0	7	2.5
	Language Option (Oral + Written Exam)	Optional	66	34	0	100	50%	25%	25%	7	2.5

Supporting Information

The Programme Handbook is available at: TBC

The Module Handbook is available at: TBC

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://www.imperial.ac.uk/registry/proceduresandregulations/regulations>

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<http://www.imperial.ac.uk/admin-services/secretariat/college-governance/charters-statutes-ordinances-and-regulations/>

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<https://www.officeforstudents.org.uk/>