Programme Specification for the **MSc in Metals and Energy Finance**

**PLEASE NOTE.** This specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. This specification provides a source of information for students and prospective students seeking an understanding of the nature of the programme and may be used by the College for review purposes and sent to external examiners. More detailed information on the learning outcomes, content and teaching, learning and assessment methods of each module can be found in the course handbook or on-line at:

http://www3.imperial.ac.uk/earthscienceandengineering

The accuracy of the information contained in this document is reviewed by the College and may be checked by the Quality Assurance Agency.

1. **Awarding Institution:** Imperial College London

2. **Teaching Institution:** Imperial College London

3. **External Accreditation by Professional / Statutory Body:** Accreditation with the Engineering Council being sought.

4. **Name of Final Award (BEng / BSc / MEng etc):** MSc

5. **Programme Title (e.g. Biochemistry with Management):** MSc in Metals and Energy Finance

6. **Name of Department / Division:** Department of Earth Science and Engineering, joint degree with the Business School

7. **Name of Faculty:** Engineering

8. **UCAS Code (or other coding system if relevant):** Not Relevant

9. **Relevant QAA Subject Benchmarking Group(s) and/or other external/internal reference points. Not Relevant**

10. **Level(s) of programme within the Framework for Higher Education Qualifications (FHEQ):**

| Master’s (MSc, MRes) | Level 7 |

11. **Mode of Study:** Full time study only

12. **Language of Study:** English

13. **Date of production / revision of this programme specification (month/year):** Launched in October 2006

14. **Educational aims/objectives of the programme**

1. MSc in Metals and Energy Finance
The programme aims/objectives are to:

Covers the key technical, financial and geological concepts relevant to oil, gas, coal and metalliferous minerals projects.

The programme aims to:

- produce graduates equipped to pursue careers in the technical and financial appraisal of natural energy and mineral resource projects and develop an understanding of how this knowledge may be applied in practice;
- offer traditional minerals related training directly applicable to a career in the minerals industry for graduates with geology and minerals engineering undergraduate degrees;
- introduce key technical and geological concepts relevant to petroleum projects;
- enhance career opportunities in the financial services and petroleum industries for graduates of all backgrounds;
- provide 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;
- respond to the importance of the City of London as a global centre for mining and energy finance by providing knowledge of corporate finance (acquisitions and mergers), the equity markets, debt finance, metals markets and associated derivative markets;
- provide training in financial modelling, financial engineering and in the techniques of risk modelling;
- enhance entrepreneurial skills;
- provide the skills needed to undertake independent research projects both in industry and in the university environment.

15. Programme Learning Outcomes

Applicants to the course are expected to have reasonable fitness and agility as both the Wessex and South African excursions involve some physical exertion.

1. Knowledge and Understanding

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;

• the greenhouse gas economy.

2. Skills and other Attributes

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 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 though 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.

16. The following reference points were used in creating this programme specification

Students undertaking the course are provided with a Handbook that incorporates details on health and welfare, general information on the administration of the programme of the library services, course assessment and examinations, the role of the virtual learning environment, the course timetable, key deadlines and a detailed description of each of the courses that make up the separate modules.

17. Programme structure and features, curriculum units (modules), ECTS assignment and award requirements

**Year One:**

<table>
<thead>
<tr>
<th>Course Element. Must achieve at least 50% for each module.</th>
<th>Explanation of element components. Not fail more than two examination papers (out of the nine)</th>
<th>Total Hours spent on Element</th>
<th>ECTS Allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examinations (43%)</td>
<td>Management &amp; Business Examination Module</td>
<td>225</td>
<td>9</td>
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<tr>
<td></td>
<td>Accounting paper (2 hours)</td>
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<td></td>
<td>Management of Projects, Markets &amp; Supplies, Strategic Management paper (3 hours)</td>
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<td></td>
<td>Petroleum &amp; Mineral Geoscience Examination Module</td>
<td>200</td>
<td>8</td>
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<td></td>
<td>Mineral Deposits (2 hours)</td>
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<td></td>
<td>Petroleum Geology and Engineering papers(2 hours)</td>
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<td></td>
<td>Project Evaluation Examination Module</td>
<td>250</td>
<td>10</td>
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<td></td>
<td>Metals &amp; Energy Project Appraisal and Finance, Resource Evaluation paper (2 hours)</td>
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<td></td>
<td>Mining Engineering, Extractive Metallurgy paper (2 hours)</td>
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<tr>
<td>Module</td>
<td>Code</td>
<td>Credits</td>
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<tr>
<td><strong>Quantitative Finance Examination Module</strong></td>
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<tr>
<td>Theory of Finance 1 paper (3 hours)</td>
<td>300</td>
<td>13</td>
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<tr>
<td>Theory of Finance 2 paper (3 hours)</td>
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<tr>
<td>Mathematical Techniques in Finance paper (3 hours)</td>
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<tr>
<td><strong>Language Module</strong></td>
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<tr>
<td>Choice of Spanish, French or Italian. Assessment through a Viva voce, coursework and test</td>
<td>100</td>
<td>4</td>
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<tr>
<td><strong>Excursion to Wessex and South Africa Course Work Module</strong></td>
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<tr>
<td>Field exposure to petroleum systems and active energy and metal operations. Write-up presented in two extended reports</td>
<td>475</td>
<td>18</td>
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<tr>
<td><strong>Dissertation Module</strong></td>
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<tr>
<td>Independent research undertaken over 10 weeks during the summer</td>
<td>700</td>
<td>28</td>
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<tr>
<td><strong>Language and Excursions (26%)</strong></td>
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<tr>
<td><strong>Dissertation Module</strong></td>
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<tr>
<td>2250</td>
<td></td>
<td>90</td>
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</tbody>
</table>

**Term one:**

**Management & Business Module**
- Accounting

**Project Evaluation Module**
- Extractive Metallurgy

**Foundation Mathematics**

**Language Module**

**Quantitative Finance Module**
- Mathematical Techniques in Finance
- Investment and Portfolio Management

**Petroleum and Mineral Geoscience Module**
- Mineral Deposits Studies
- Petroleum Engineering
- Petroleum Geology

**Term Two:**

**Management & Business Module**
- Cash Flow Modelling
- Management of Projects, Markets and Supplies
- Strategic Management

**Project Evaluation Module**
- Metals and Energy project Appraisal and Finance
- Minerals Engineering
- Resource Evaluation

**Quantitative Finance Module**
- Asset pricing and Derivatives
Language Module

Excursion
- Wessex Basin Oil System

Term Three plus Summer:

Excursion
- South Africa and Active Mineral Operations

Dissertation
- Formulation of Proposals
- Generation and submission of thesis.

18. Support provided to students to assist learning (including collaborative students, where appropriate).

The course Director has overall responsibility for academic and pastoral support arrangements but specific provision is made for students to have an alternative person to approach. This is the course administrator, who can often offer general advice. If there is an urgent academic issue and the course Director is not immediately available a designated academic member of staff acts as an interlocutor. This also provides a mechanism for the Director to receive feedback on the quality of his own teaching and course administration.

It is made very clear to the students that none of the above are qualified to handle emotional issues arising from personal problems and that these can often have significant impact on academic performance. In those circumstances they are reminded of the role of the Student Counsellors. The Director personally recommends this option to at least one student each year. It is made clear that any disclosures they make to them are treated as confidential. It is not at all unusual for stress fractures to appear in the run-up to examinations and in these circumstances the Student Counsellor can alert the Director, without necessarily disclosing private information. The Board of Examiners are of course bound to take formal opinions of the Student Counsellor into consideration when reviewing academic performance.

19. Criteria for admission:

Normally at least a Lower Second Class Honours degree in engineering or the physical sciences with appropriate experience or the equivalent overseas qualification would be required.

Graduates with degrees in economics where this included a component of mathematics could also be considered. While prior relevant experience will be considered desirable, there will be no restriction on accepting applications from recent graduates.

Where an applicant has a lesser degree qualification but has at least 3 years’ relevant work experience the Course Director will make a special case for admission; few such applications are received.

20. Processes used to select students:

The key criteria for selection are the academic credentials of the candidate, but given that the number of eligible candidates for admission onto the course significantly exceeds the 25 places available, no offers are made unless candidates already have a degree. Once 25 offers have been made, candidates with suitable qualifications are placed on a reserve list. Good applicants due to graduate in the summer preceding the start of next academic year are placed on a reserve list once they inform College that they have been awarded the degree.
While scholarships linked to the programme are available, no single individual is awarded an amount that exceeds 25% of the course fee so no offer is made unless candidates declare that they are able to meet the full cost of joining the programme.

21. Methods for evaluating and improving the quality and standards of teaching and learning

a) Methods for review and evaluation of teaching, learning, assessment, the curriculum and outcome standards:

The external examiner system and Boards of Examiners are central to the process by which the College monitors the reliability and validity of its assessment procedures and academic standards. Boards of Examiners comment on the assessment procedures within the College and may suggest improvements for action by relevant departmental teaching Committees.

The Faculty Studies Committees and the Graduate Schools’ Postgraduate Quality Committees review and consider the reports of external examiners and accrediting bodies and conduct periodic (normally quinquennial) and internal reviews of teaching provision. Regular reviews ensure that there is opportunity to highlight examples of good practice and ensure that recommendations for improvement can be made.

At programme level, the Head of Department/Division has overall responsibility for academic standards and the quality of the educational experience delivered within the department or division.

b) Committees with responsibility for monitoring and evaluating quality and standards:

The Senate oversees the quality assurance and regulation of degrees offered by the College. It is charged with promoting the academic work of the College, both in teaching and research, and with regulating and supervising the education and discipline of the students of the College. It has responsibility for approval of changes to the Academic Regulations, major changes to degree programmes and approval of new programmes.

The Quality Assurance Advisory Committee (QAAC) is the main forum for discussion of QA policy and the regulation of degree programmes at College level. QAAC develops and advises the Senate on the implementation of codes of practice and procedures relating to quality assurance and audit of quality and arrangements necessary to ensure compliance with national and international standards. QAAC also considers amendments to the Academic Regulations before making recommendations for change to the Senate. It also maintains an overview of the statistics on completion rates, withdrawals, examination irregularities (including cases of plagiarism), student appeals and disciplinaries.

The Faculty Studies Committees and Graduate School Postgraduate Quality Committees are the major vehicle for the quality assurance of undergraduate / postgraduate courses respectively. Their remit includes: setting the standards and framework, and overseeing the processes of quality assurance, for the areas within their remit; monitoring the provision and quality of e-learning; undertaking reviews of new and existing courses; noting minor changes in existing programme curricula approved by Departments; approving new modules, changes in module titles, major changes in examination structure and programme specifications for existing programmes; and reviewing proposals for new programmes, and the discontinuation of existing programmes, and making recommendations to Senate as appropriate.

The Faculty Teaching Committees maintain and develop teaching strategies and promote inter-departmental and inter-faculty teaching activities to enhance the efficiency of teaching within Faculties. They also identify and disseminate examples of good practice in teaching.

Departmental Teaching Committees have responsibility for the approval of minor changes to course curricula and examination structures and approve arrangements for course work. They also consider the details of entrance requirements and determine departmental postgraduate student
The Faculty Studies Committees and the Graduate School Postgraduate Quality Committees receive regular reports from the Departmental Teaching Committees.

c) **Mechanisms for providing prompt feedback to students on their performance in course work and examinations and processes for monitoring that these named processes are effective:**

Investment and Portfolio Management, Mathematical Techniques in Finance, Accounting and Mineral Deposit Studies examinations are written at the start of the Spring Term. The balance of examination papers are written during the summer term.

The Director e-mails each candidate individually and provides *provisional/indicative* grades for January examinations when they are available (usually by the end of February) as follows:

- A = 70% or more
- B = 60 - 69%
- C = 50 - 59%
- D = 40 – 49%
- E = 30 – 39%
- F = less than 30%

Marks "D" "E" or "F" are all fail marks.

The implications of personal performance are outlined for the students ranging from encouragement to maintain standards set where these show potential to achieve a Distinction, to alerts where there is a risk of failure.

Students are also informed using the same mechanism of overall examination performance as *provisional/indicative* grades after the Board of Examiners meeting held in the last week of the summer term.

Every effort is made to turn around coursework in a timely manner and particular care is given in assessing excursion reports to identify poor reporting style that, if repeated in preparing dissertations, will result in poor grades.

d) **Mechanisms for gaining student feedback on the quality of teaching and their learning experience and how students are provided with feedback as to actions taken as a result of their comments:**

The class nominates a representative who then co-ordinates feedback from the class at the end of the Autumn and Spring terms under the following proposed topics:

- Start-of-term arrangements/orientation/ Library services
- Timetable and scheduling of delivery.
- Feedback from Faculty, approachability and communications.
- Careers advisory
- Any outstanding coursework awaiting assessment
- Briefings on forward perspective and assessment guidelines.
- Teaching facilities.
- Specific comments on individual taught modules that the Director should be aware of.

The class is invited to add more topics if they think it appropriate.

e) Mechanisms for monitoring the effectiveness of the personal tutoring system:

Applicable to undergraduate degrees only

f) Mechanisms for recognising and rewarding excellence in teaching and in pastoral care:

Staff are encouraged to reflect on their teaching, in order to introduce enhancements and develop innovative teaching methods. Each year College awards are presented to academic staff for outstanding contributions to teaching, pastoral care or research supervision. A special award for Teaching Innovation, available each year, is presented to a member of staff who has demonstrated an original and innovative approach to teaching. Nominations for these awards come from across the College and students are invited both to nominate staff and to sit on the deciding panels.

g) Staff development priorities for this programme include:

Extend the range of e-Learning modules used to support the delivery of the teaching programme.

22. Regulation of Assessment

a) Assessment Rules and Degree Classification:

For postgraduate taught programmes: The Pass Mark for postgraduate taught courses is 50%. In order to be awarded a result of merit, a candidate must obtain an aggregate mark of 60% or greater; a result of distinction requires an aggregate mark of 70% or greater.

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

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

b) Marking Schemes for undergraduate and postgraduate taught programmes:

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

c) Processes for dealing with mitigating circumstances:

For postgraduate taught programmes: A candidate for a Master’s degree who is prevented owing to illness or the death of a near relative or other cause judged sufficient by the Graduate Schools from completing at the normal time the examination or Part of the examination for which he/she has entered may, at the discretion of the Examiners,

(a) Enter the examination in those elements in which he/she was not able to be examined on the next occasion when the examination is held in order to complete the examination,
or

(b) be set a special examination in those elements of the examination missed as soon as possible and/or be permitted to submit any work prescribed (e.g. report) at a date specified by the Board of Examiners concerned. The special examination shall be in the same format as specified in the course regulations for the element(s) missed.

Applications, which must be accompanied by a medical certificate or other statement of the grounds on which the application is made, shall be submitted to the Academic Registrar who will submit them to the Board of Examiners.

d) Processes for determining degree classification for borderline candidates:

For postgraduate taught programmes: Candidates should only be considered for promotion to pass, merit or distinction if their aggregate mark is within 2.5% of the relevant borderline. Nevertheless, candidates whom the Board deems to have exceptional circumstances may be considered for promotion even if their aggregate mark is more than 2.5% from the borderline. In such cases the necessary extra marks should be credited to bring the candidate’s aggregate mark into the higher range.

e) Role of external examiners:

The primary duty of external examiners is to ensure that the degrees awarded by the College are consistent with that of the national university system. External examiners are also responsible for approval of draft question papers, assessment of examination scripts, projects and coursework (where appropriate) and in some cases will attend viva voce and clinical examinations. Although external examiners do not have power of veto their views carry considerable weight and will be treated accordingly. External examiners are required to attend each meeting of the Board of Examiners where recommendations on the results of individual examinations are considered. External examiners are required to write an annual report to the Rector of Imperial College which may include observations on teaching, course structure and course content as well as the examination process as a whole. The College provides feedback to external examiners in response to recommendations made within their reports.

23. Indicators of Quality and Standards

The programme was reviewed by the Postgraduate Quality Committee of the Graduate School of Engineering and Physical Sciences in March 2009. Overall, GSEPS members agreed with the recommendation that the course should be graded as "good" (the highest level) noting that it attracted well qualified candidates and had good links with industry. The Committee endorsed the assessment of the reviewer and it was agreed that the course should be next reviewed in three years time.

24. Key sources of information about the programme can be found in

http://www3.imperial.ac.uk/earthscienceandengineering