Programme Specification for the **MSc Advanced Methods in Taxonomy and Biodiversity**

**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://www.nhm.ac.uk/research-curatin/postgraduate/index.html](http://www.nhm.ac.uk/research-curatin/postgraduate/index.html). 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:** *Not applicable*
4. **Name of Final Award (BEng / BSc / MEng etc):** *MSc*
5. **Programme Title (e.g. Biochemistry with Management):** *Advanced Methods in Taxonomy and Biodiversity*
6. **Name of Department / Division:** *Division of Biology*
7. **Name of Faculty:** *Faculty of Life Sciences*
8. **UCAS Code (or other coding system if relevant):** *Not applicable*
9. **Relevant QAA Subject Benchmarking Group(s) and/or other external/internal reference points:**
   
   **Biosciences**
   
   [http://www.qaa.ac.uk/academicinfrastructure/benchmark/statements/Biosciences07.asp](http://www.qaa.ac.uk/academicinfrastructure/benchmark/statements/Biosciences07.asp)

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

<table>
<thead>
<tr>
<th>Degree Type</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelor’s (BSc, BEng, MBBS)</td>
<td>Level 6</td>
</tr>
<tr>
<td>Integrated Master’s (MSc, MEng)</td>
<td>Levels 6 and 7</td>
</tr>
<tr>
<td>Master’s (MSc, MRes)</td>
<td>Level 7</td>
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11. **Mode of Study:** *Full-time*

12. **Language of Study:** *English*

13. **Date of production / revision of this programme specification (month/year):** *October 2009*

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

MSc Advanced Methods in Taxonomy and Biodiversity
The programme aims/objectives are to:

- produce graduates equipped to pursue careers in biodiversity and systematics research, museums and industry;
- develop recognition and understanding of phylogenetic and systematic concepts;
- develop understanding of how biodiversity data may be collected and assessed;
- develop broad research and analytical skills related to systematics and biodiversity;
- attract and educate highly motivated students, from the UK and overseas, in the principles and practical application of systematics and biodiversity research.

15. Programme Learning Outcomes

1. Knowledge and Understanding

**A. Knowledge and understanding of:**

1. principles of phylogeny reconstruction;
2. taxonomic practice;
3. measuring the interpreting biodiversity;
4. using the comparative method to test for causal relationships;
5. interpreting palaeontological data;
6. detailed knowledge and understanding of species concepts and their consequences;
7. understanding of principles and practice of molecular systematics;
8. research techniques, including information retrieval, experimental design and statistics, sampling, taxonomic keys, molecular systematics, laboratory and field safety;
9. management and communication skills, including problem definition, project design, decision processes, teamwork, written and oral reports, scientific publications.

**Teaching/learning methods and strategies:**

Acquisition of A1 to A6 is through a combination of lectures, seminars, laboratory work, computer-based work and coursework. Acquisition of A7 is through a combination of lectures, laboratory work and computer-based work, and through the full-time, individual, supervised research project (May to September). Acquisition of A7 and 8 is through a combination of lectures, laboratory exercises, coursework, small group projects linked to workshops and tutorials, and individual presentations. Throughout the students are encouraged to undertake independent reading both to supplement and consolidate what is being taught/learnt and to broaden their individual knowledge and understanding of the subject.

Assessment of knowledge is through unseen written examinations (A1-A7), assessed coursework (A1-A3), assessed practical write-ups (A1-A7), oral examination (A1-A3, A5-A7), group poster presentation (A3) and individual project reports and viva (A8/A9).

2. Skills and other Attributes

**B Intellectual (thinking) skills – able to:**

1. Understand and evaluate current research through reading published papers in recommended journals
2. Decide appropriate scientific methods and techniques for analysing raw data and solving phylogenetic problems
3. Plan, undertake and write up an original and individual research project

**Teaching/learning methods and strategies**

Regular tutorials are held when students can discuss current research and published work in small groups, led by a PhD student specialising in that particular area. Experimental design and statistical skills are developed in lectures and computer-based practical work in the taught part of the course, and subsequently in the individual research project. Assessment is through coursework, oral presentations, written examinations and individual research project.
Practical Skills:

C Practical skills – able to:

4. use laboratory and field-based methods to generate data;
5. analyse experimental results and determine their strength and validity;
6. analyse morphological and molecular character data;
7. prepare technical reports;
8. prepare reports for an intelligent lay audience;
9. give technical presentations;
10. use the scientific literature effectively;
11. use computational tools and packages.

Teaching/learning methods and strategies

Practical skills are developed through the teaching and learning programme outlined above (and in section 11). Practical experimental skills (C1 to C4 and C6) are developed through laboratory, computer-based, individually supervised project and field work. Skills C3 and C4 are taught and developed through feedback on reports written and presentations made as part of coursework assignments. Skill C5 is developed through lectures, coursework reports and essays, group project exercises and the individual supervised research project. Skill C6 is taught and developed through coursework exercises and project work.

Practical skills are assessed through biometric analysis and phylogenetic analysis write-ups, field work and related poster production and the research project dissertation.

Transferable Skills:

D Transferable skills – able to:

1. communicate effectively through oral and poster presentations, written reports and scientific publications;
2. apply statistical and systematic skills;
3. management skills: problem definition, project design and evaluation, risk management, teamwork and coordination;
4. integrate and evaluate information from a variety of sources;
5. transfer techniques and solutions from one discipline to another;
6. use Information and Communications Technology;
7. manage resources and time;
8. learn independently with open-mindedness and critical enquiry;
9. learn effectively for the purpose of continuing professional development.

Teaching/learning methods and strategies

Transferable skills are developed through the teaching and learning programme outlined above and in section 11. Skill D1 is taught through coursework and developed through feedback on reports, essays and oral presentations. Skill D2 is taught through lectures and practical work and developed, as appropriate, during individual research project. Skills D3 to D5 are developed through group project work. Skill D6 is developed through computer-based exercises, projects and other coursework activities and individual learning. Skill D7 is developed throughout the course within a framework of staged coursework deadlines and the split examination system. Although not explicitly taught, skills D8 and D9 are encouraged and developed throughout the course, which is structured and delivered in such a way as to promote this. Skill D2 is assessed through coursework, workshop presentations, written examinations and the oral examination. Skill D1 is assessed through coursework, workshop presentations, written examinations and the oral examination. Skills D3 to D5 are assessed in workshops.

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

- Subject benchmarking information for Biosciences.
- Student Handbook for Course approved by Senate of Imperial College.

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

There are no optional parts of the course. Students carry out coursework for the first two terms – of which four different items are assessed. By the middle of the second term students will normally have selected a research project topic and agreed this with their supervisor(s) and one of the Course Convenors. The MSc examinations take place the week following the Easter break and are followed by a week-long field course at Silwood Park (also assessed). Then they carry out their project until approximately the end of the first week of September.
Year One:

Term one:
All students undertake all modules.
The first module (three weeks) includes approximately one week’s worth of induction to museum library, IT, security, H & S and catering facilities, and an introduction to Phylogenetics. The second week introduces taxonomic and systematic principles, and the third week students are taught to use the statistical programme R.
Module 2 (one week) covers biodiversity: Tree of Life, including lectures on insects, birds, protists, arthropods, algae, amphibians, nematodes, polychaetes and fungi.
Module 3 'ordination techniques in taxonomy' covers two weeks, and is an intensive introduction to various biometric techniques and data analysis, assessed by a practical write-up.
Module 4 is the 2nd biodiversity module, covering concepts, and dealing with patterns of diversity, biodiversity assessment, and species concepts. It is assessed through production of a TREE-style article relevant to the topic, but based on the students’ choice of organisms.
This is followed by a “reading week” during which students complete their TREE articles, catch up on revision for the first 4 modules, and also attend the Young Systematists' Forum.
Module 4 is a two-week-long module dealing with the difficult topic of Phylogeny Reconstruction. Lectures run parallel with practicals in which students apply techniques to collect and analyse data from a set of specimens (Lepidoptera), for which they produce an assessed write-up.

Term Two:
The students start with a Reading Week in order to revise the first terms worth of modules, and are presented with half a day of careers talks. The then have a day presenting their first appraised oral presentations.
Module 6 is a three and a half week module dealing with molecular systematics, including laboratory and computer practicals which culminate in a written assessment.
Module 7 is the third of the biodiversity modules, and the three week course covers Applied biodiversity, involving identification techniques, measuring biodiversity, and collections management, including curation experience within the NHM science departments.
There is then a further reading and revision week, during which students revise the 2nd terms worth of lectures.
Module 8 is a two-week course covering Palaeontology and stratigraphy, including a day’s field trip.

Term Three:
The first week is devoted to formal examination (two x three hours) and revision. The second week is occupied by Module 9, the field course, held at Silwood Park which is assessed through production of group posters which the students prepare using Powerpoint. By mid-May, the students commence their research projects which normally have to be submitted by the last week in August. All projects are supervised by a member of staff of imperial College or NHM, even if the project is carried out at an external institution or overseas.

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

- Three week induction programme for orientation, introduction to museum libraries and information technology and to basic principles of systematics and taxonomy, computing and statistics using R.
- Msc student handbook, which includes descriptions of each module.
- Staff:student ratios for teaching of >1:1.
- A large community of postgraduate research students and postdoctoral research workers who work on various aspects of biodiversity and systematics at the NHM.
- Library and other learning resources and facilities at South Kensington, the NHM (separate general, zoology, Botany, Entomology and palaeontology libraries) and at IC.
- Dedicated computing facilities at NHM with access 0700 to 1900 hours.
- Probably the largest collection of natural history specimens in the world (estimated 67,000,000).
- An MSc staff-student committee, which meets three times per year.
- Weekly seminars presented in NHM departments of Entomology, Botany, Zoology and palaeontology.
- Students conducting research projects at an external site are assigned a member of Imperial College/Natural History Museum academic staff to oversee progress and advise on the project dissertation. Where practical, students are visited by staff during their project.
- Student email and open personal access to tutorial staff including the course directors and the course administrator.
- Access to student counsellors on the South Kensington site.
- Personal tutors at the Natural History Museum.
- Access to teaching and learning support services, which provide assistance and guidance, e.g. on careers.
- Opportunities for students to conduct their research projects at various external institutions and companies, including placements overseas.
19. Criteria for admission:

The minimum qualification for admission is normally a Lower Second Class Honours degree in a Science-based subject from a UK academic institution or an equivalent overseas qualification. Where an applicant has a lesser degree qualification but has at least two years work experience in biology, agriculture or a related discipline, a special case for admission may be submitted to the Dean of the Royal College of Science by the Course Director.

20. Processes used to select students:

Most UK applicants (and where possible overseas applicants) are invited to Silwood Park or the Natural History Museum for a site tour, offers made to students are initiated by the Course Director.

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:

- Module reviews, based on feedback questionnaires and convenor reports.
- Annual course review prepared by the Course Directors and Course Administrator.
- MSc Staff-Student Committee, held each term, with report to Departmental Teaching Committee.
- Biennial staff appraisal.
- Peer teaching observations.
- External Examiner reports.
- Review by NERC every five years, as part of application process for renewal of Postgraduate Studentships (last review in 2009).
- Periodic review of departmental teaching by an external panel with members drawn from another university, a research institute and industry.

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 there is opportunity to highlight examples of good practice and 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.

Most of the College’s undergraduate programmes are accredited by professional engineering and science bodies or by the General Medical Council. Accreditation provides the College with additional assurance that its programmes are of an appropriate standard and relevant to the requirement of industry and the professions. Some postgraduate taught courses are also accredited.

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 numbers. 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:

- Mark sheets with comments returned to students;
- viva with External Examiner;
- open contact with students.

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:

- MSc Staff-Student Committee;
- course questionnaire evaluation of each module;
- viva with External Examiner;
- open contact with students.

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

- MSc Staff-Student Committee;
- viva with External Examiner;
- course questionnaire evaluation at end of course;
- open contact with students.

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:

- active research programme in systematics, biodiversity and ecology;
- staff appraisal scheme and institutional staff development courses;
- college Teaching Development Grant Scheme to fund the development of new teaching and appraisal methods;
- updating professional and IT/computing developments.
22. Regulation of Assessment

a) Assessment Rules and Degree Classification:

- Minimum pass mark is 50% for each module.
- Assessment details are provided in the MSc Student Handbook.
- To qualify for the award of MSc students must complete all the course requirements and must achieve an overall pass mark in the combined examinations (Parts 1 and 2), in the coursework and in the research project.
- The weighting of marks contributing to the degree for the examinations, coursework and research project is 4:2:4.

For undergraduate programmes classification of degrees will be according to the following range of marks:

<table>
<thead>
<tr>
<th>Classification</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>First class</td>
<td>70 - 100%</td>
</tr>
<tr>
<td>Second class (upper division)</td>
<td>60 - 69.9%</td>
</tr>
<tr>
<td>Second class (lower division)</td>
<td>50 - 59.9%</td>
</tr>
<tr>
<td>Third class</td>
<td>40 - 49.9%</td>
</tr>
</tbody>
</table>

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 undergraduate modules is 40%. From October 2008 entry all undergraduates are required to pass all their course units to progress to the next year.

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 undergraduate programmes: Candidates with mitigating circumstances are not subject to the borderline restrictions but should be considered individually. However, as a general principle, candidates whose marks are more than 5% below the borderline should not normally be raised to the next higher classification. Where the Board of Examiners determines that a higher classification should be awarded extra marks should be applied to bring the final marks into the higher range.

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 **undergraduate programmes**: Candidates who fall no more than 2.5% below the minimum mark for a higher honours classification shall be eligible for review of their final classification; this review could include an oral examination or practical test or other mechanism appropriate to the discipline. Candidates whose marks are below the 2.5% borderline may be considered for a higher honours classification where certain provisions apply. Where the Board of Examiners determines that a candidate should be awarded a higher honours classification extra marks should be applied to bring their final marks into the higher range. Detailed records of all decisions should be recorded in the minutes of the meeting of the Board.

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

- Favourable comments by External Examiners.
- First destination data for MSc graduates, showing a high proportion find employment or further postgraduate research training.
- Independent review of the quality of the educational provision of the Biological Sciences Department by the Quality Assurance Agency subject review process in 1998 achieving an excellent grading of 22 out of a maximum 24 points:
  - **Curriculum Design Content and Organisation** = 4
  - **Teaching Learning and Assessment** = 3
  - **Student Support and Guidance** = 4
  - **Student Progression and Achievement** = 4
  - **Learning Resources** = 4
  - **Quality Management and Enhancement** = 3

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

- Postgraduate Prospectus, Imperial College London (available on-line [www.imperial.ac.uk](http://www.imperial.ac.uk))
- Postgraduate Training in Biology at Imperial College (available on-line [www3.imperial.ac.uk/lifesciences](http://www3.imperial.ac.uk/lifesciences))
- MSc Course Handbook (2009/2010) (available on request from Course Administrator: g.whitaker@nhm.ac.uk; tel 020 7942 5998)
- Postgraduate website, Natural History Museum: ([http://www.nhm.ac.uk/research-curation/postgraduate/index.html](http://www.nhm.ac.uk/research-curation/postgraduate/index.html))