Programme Specification for the MSc in Applied Biosciences and Biotechnology

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/pgprospectus/facultiesanddepartments/lifesciences/postgraduatecourses/appliedbio

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: N/A
4. Name of Final Award (BEng / BSc / MEng etc): MSc
5. Programme Title: Applied Biosciences and Biotechnology
6. Name of Department / Division: Life Sciences
7. Name of Faculty: Natural Sciences
8. UCAS Code (or other coding system if relevant): N/A
9. Relevant QAA Subject Benchmarking Group(s) and/or other external/internal reference points N/A
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

12. Language of Study: English

13. Date of production / revision of this programme specification: October 2011

14. Educational aims/objectives of the programme

The programme aims to:

1. MSc in Applied Biosciences and Biotechnology
• produce graduates equipped to pursue careers in applied biosciences and biotechnology in the industrial and public sectors in the UK and overseas;
• produce graduates with an understanding of the fundamental principles underlying the biosciences;
• produce graduates with an understanding of the fundamental principles of exploitation of bioscience research;
• improve the students’ abilities to think for themselves and to develop a critical approach to the analysis of data and interpretation of published research;
• provide a solid foundation for those who intend to go on to study for a PhD;
• provide a training in laboratory and research skills;
• provide a supportive learning environment;
• attract highly motivated students, both from within the UK and from overseas;
• meet the global need for highly trained individuals in biotechnology;
• develop broad business skills related to the translation of research in applied biosciences and biotechnology

15. Programme Learning Outcomes

1. Knowledge and Understanding

Knowledge and Understanding

1. fundamental principles of molecular biology, molecular cell biology and bioinformatics;
2. modern approaches in biotechnology: the ‘omics technologies;
3. Basic Mathematics and Statistics;
4. research techniques, including essential molecular biology methodologies; protein chemistry, proteomics, glycomics, metabolomics and bioprocessing;
5. principles of translation of research; innovation and entrepreneurship;
6. detailed knowledge and understanding of the essential facts, concepts, principles, techniques and theories relevant to the student’s chosen research project;
7. management and communication skills, including problem definition, project design, decision processes, teamwork, written and oral reports, scientific publications.

Acquisition of 1 to 5 is through a combination of lectures, computer-based work, coursework, individual presentations and private study. Acquisition of 6 and 7 is through the written dissertation, mini-conference and individual supervised research project. 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 written examinations (1-4), assessed coursework (1-4), assessed presentation (5), individual project reports (6,7) and a viva at the completion of the course.

2. Skills and other Attributes

Intellectual Skills

Able to:

1. understand and evaluate current research in applied bioscience and biotechnology through reading published papers
2. integrate and evaluate information from a variety of sources
3. formulate and test hypotheses
4. be creative in the solution of problems and in the development of hypotheses
5. plan, conduct and write-up a programme of original research.

Achieved by:

Intellectual skills are developed in lectures and computer-based practical work in the taught part of the course, and subsequently in the research project.

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During the research projects students are exposed to and can discuss ongoing research and published work with their academic advisor and their research groups. Analysis and problem solving skills are further developed through the research project. Experimental design and research skills are developed in lectures and tutorials in the course and subsequently in the individual research project. Individual formative feedback is given to students on all work produced including oral presentations.

Assessment of thinking skills is through coursework, oral presentations, written examinations and the research project.

**Practical Skills**

Able to:

- plan and execute safely an individual research project in the biosciences
- use laboratory equipment to generate data;
- analyse experimental results and determine their strength and validity;
- prepare technical reports;
- give technical presentations;
- use the scientific literature effectively;
- use computational tools and packages.

Achieved by:

Practical planning and execution skills are developed through the teaching and learning programme outlined above and in the research project. Practical research and analytical skills are developed through the project work. Computational skills are developed through lectures, tutorials and coursework exercises. Reporting and presentation skills are taught and developed through feedback on reports written and presentations made as part of coursework. Effective use of the scientific literature is developed through lectures, tutorials, seminars, the dissertation and the research project.

**Transferable Skills**

Able to:

- communicate effectively through oral presentations, computer processing and presentations, written reports and scientific publications;
- management skills: decision processes, objective criteria, problem definition, project design and evaluation, risk management, teamwork and coordination, extension needs;
- integrate and evaluate information from a variety of sources;
- use Information and Communications Technology;
- transfer techniques and solutions from one discipline to another;
- manage resources and time;
- learn independently with open-mindedness and critical enquiry;
- learn effectively for the purpose of continuing professional development.

Achieved by:

Transferable skills are developed through the teaching and learning programme outlined above and in section 14. The first skill is taught through lectures and coursework and developed through feedback on reports, tutored dissertations, essays and oral presentations. The second is taught through practical work, tutored dissertation and developed, as appropriate, during individual research project. The third and fourth are developed through tutored dissertation and project work and computer-based exercises. Managing resources and time is developed throughout the course within a framework of staged coursework deadlines and during the lab based project through individual mentoring by the research supervisor. Although not explicitly taught, the last two skills are encouraged and developed throughout the course, which is structured and delivered in such a way as to promote this.

The first two skills are assessed through coursework, project presentations, written examinations and the oral examination. The third skill is assessed through the dissertation and written research project. All skills are assessed in tutored dissertation, coursework and vivas.
16. The following reference points were used in creating this programme specification
N/A

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

The programme is only offered as a full-time, one year course and leads to the MSc degree (equivalent to 90 ECTS units). The course is comprised of three parts, a taught component, a tutored dissertation and a research component. The taught component in weeks 1-30 will include lectures, seminars, computer practicals and tutorials. Computer based practicals will be held throughout weeks 1-14. The dissertation will be carried out in weeks 31-35. A full time laboratory based research project will be carried out from week 36 to 48. The titles of the tutored dissertations and research projects will be available well in advance. On completion of the project a written report will be produced by the end of week 49 and submitted for an oral examination followed by a viva with an internal and external examiner. The overall pass mark is 50% and the coursework, written examinations and the research project contribute 25%, 35% and 40%, respectively.

Year One:

Weeks 1-15: All students attend an induction week and all students undertake courses in Biochemistry, Molecular Cell Biology, Bioinformatics, Systems Biology and Statistics which introduce students to the fundamental concepts of modern biology, including cell biology, genomics, proteomics, experimental techniques and data handling. Assessment will be through written examination in week 15.

Weeks 16-30: All students attend two modules comprising advanced lectures in applied bioscience and biotechnology encompassing; industrial biotechnology, glycotechnology, structural biology, cellular damage, repair and ageing, genes and genomics, infection and immunity, stem cells and regenerative medicine, neurobiology in health and disease, integrative systems biology and synthetic biology. Additional seminars and workshops will introduce students to innovation and entrepreneurship. All students will attend weekly seminars with invited external speakers from industry and the public sector. Assessment will be through two written examinations in week 30.

Weeks 31-52: For the first four weeks students will undertake a full-time tutored dissertation followed by a mini-conference. Students will then undertake full-time individual projects in the research laboratories of the Department. On completion of the research project a written report will be produced. Students will have an assessed viva with two internal examiners prior to the MSc Examination Board meeting in late September.

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

- One week induction programme for orientation, introduction to library and computer facilities, safety training
- MSc Student Handbook, which includes lecture timetable and practical protocols
- A large community of postgraduate research students and postdoctoral research workers who work on various aspects of applied biosciences and biotechnology
- Access to the Graduate School MSc courses and advisory resources
- A comprehensive external speaker seminar programme
- Library and other learning resources
- An MSc staff - student committee, which meets three times per year.
- Support from the Departmental Postgraduate Education Team
- Access to student counsellors

19. Criteria for admission:

The minimum qualification for admission is normally an Upper Second Class Honours degree in a Life Science-based subject from an UK academic institution or an equivalent overseas qualification. Where an applicant has a lesser degree qualification relevant experience will also be taken into account during

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assessment of the applications. Applicants will have to satisfy the College’s English language requirement.

20. Processes used to select students:

Candidates will be selected after careful consideration of qualifications and experience by the Admissions Panel and 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
- Annual course review prepared by the Course Director and considered by the Course Committee and the Departmental Teaching Committee.
- Biennial review of the course by an Imperial College academic from outside the department with a report and grading to the Graduate School Quality Committee
- MSc Staff-Student Committee
- Biennial staff appraisal
- Peer teaching observations
- External examiner reports

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

- MSc Staff-Student Committee
- Management Committee
- Board of Examiners
- Departmental Postgraduate Education/Teaching Committee
- Graduate School Educational Quality Committee
- Science Studies Committee
- Senate

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:

- All assessed work for MSc modules is handed back and discussed with the student. Students have regular meetings with dissertation tutors and, during the final term, project supervisors.
- MSc Student-Staff Committee
- Module evaluation questionnaires
- Course Mentor

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
- Anonymous questionnaires evaluating modules
- Anonymous questionnaires evaluating the entire course

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

N/A

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 molecular biosciences, bioinformatics, systems biology and related disciplines.
- Staff appraisal scheme and institutional professional development courses
- Courses offered by the Educational Development Unit supporting learning and teaching.

22. Regulation of Assessment

a) Assessment Rules and Degree Classification:

The pass mark is 50%. In order to be awarded a result of merit, a candidate must obtain a mark of 60% or greater in each element; a result of distinction requires a mark of 70% or greater in each element.

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 postgraduate taught programmes:

The Pass Mark is 50%. Students must pass all elements in order to be awarded a degree.

c) Processes for dealing with mitigating circumstances:

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:

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 feedback from the external examiners
- First destination data for MSc graduates showing the proportion who go on to employment or postgraduate research in the field and related areas

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

Course website: [http://www3.imperial.ac.uk/pgprospectus/facultiesanddepartments/lifesciences/postgraduatecourses/appliedbio](http://www3.imperial.ac.uk/pgprospectus/facultiesanddepartments/lifesciences/postgraduatecourses/appliedbio)

Graduate School website: [http://www3.imperial.ac.uk/graduateschools](http://www3.imperial.ac.uk/graduateschools)

Course specification: [link to be added when available](#)