Programme Specification for the MRes in Structural Molecular Biology

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.imperial.ac.uk/structuralbiology/teachingandtraining. 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): MRes and DIC
5. Programme Title (e.g. Biochemistry with Management): Structural Molecular Biology
6. Name of Department / Division: Division of Molecular Biosciences
7. Name of Faculty: 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 (please select and list the QAA Subject Benchmark Statement(s) for your programme, where appropriate, which can be found at http://www.qaa.ac.uk/academicinfrastructure/benchmark/honours/ There may be other external /internal reference points that you may also wish to add here): Biosciences
10. Level(s) of programme within the Framework for Higher Education Qualifications (FHEQ):

<table>
<thead>
<tr>
<th>Programme Level</th>
<th>Level</th>
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<tbody>
<tr>
<td>Bachelor’s (BSc, BEng, MBBS)</td>
<td>Level 6</td>
</tr>
<tr>
<td>Integrated Master’s (MSci, 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 (please indicate whether the programme is available full-time, part-time or both):
One year full time

12. Language of Study: English

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

1 [Please add title of award as footer]
14. Educational aims/objectives of the programme (when completing this section you may wish to indicate how the programme supports the College Mission Statement, Subject Benchmarks Statements (as listed above), FHEQ qualification level descriptors and the requirements of Accrediting or Statutory Bodies):

The programme aims/objectives are to:

- To provide students with broad research training in structural molecular biology which will (a) prepare them for a career in biotech or other drug-discovery industries (b) prepare them for Ph.D. studies (c) enable them to make a more informed choice for their Ph.D. research (d) offer training in the area of structural molecular biology

15. Programme Learning Outcomes (please list the programme learning outcomes under the headings that follow. Please also list the teaching/learning methods and strategies used to promote the programme learning outcomes. Module learning outcomes can be listed within Module Handbooks and are not required for this section):

Institutions have an obligation to respond to individual needs and must have due regard to the need to eliminate unlawful disability discrimination and to promote equality of opportunity. To meet the expectations of the Disability Equality Duty (DED), institutions should be pro-active in anticipating the variety of possible requirements that disabled students may have, rather than making adjustments for students on an ad hoc basis. This document should list all the skills needed for students to meet the learning outcomes of the programme and may be used by the College’s Disability Advisory Service when considering reasonable adjustments to assessment. You may find the following link to the College Disability Advisory Service useful when completing this section: http://www3.imperial.ac.uk/disabilityadvisoryservice

1. Knowledge and Understanding

Knowledge and Understanding of (teaching/learning methods and strategies may include lectures, direct study, group work, work-based learning, practical skills, transferable skills, project work, problem solving, analysis, evaluation):

1. Principles of structural molecular biology
2. Principles of structural biology techniques
3. Importance and fundamentals of quantitative description of biological systems
4. Importance and applications of interdisciplinary research
5. Computing skills, general and specialised
6. Design, execution, and presenting a research project
7. Integrate, evaluate, and critically analyze experimental data
8. Management and communication skills including problem definition, project design, teamwork, written and oral reports, scientific publications

Teaching/Learning methods and strategies

Each student carries out two research projects based in the affiliated research groups. These projects cover different areas of structural molecular biology. Formal course work includes attendance of a series of lectures, practical, and seminars and well as a literature dissertation. Assessment of the knowledge and understanding is through project reports, presentations and vivas.

2. Skills and other Attributes

Intellectual Skills (lateral and critical thinking, logic):

- To be able to analyse and solve structural problems
- To be able to integrate and evaluate information
- To be able to formulate and test hypotheses using appropriate experimental design and statistical analysis of data
To be able to plan, conduct and write-up a programme of original research

**Practical Skills** (experimental design, data analysis, research skills):

- Plan and execute safely a series of experiments
- Use laboratory methods to generate data
- Analyze experimental data
- Interpret experimental data
- Prepare technical reports
- Give technical presentations
- Use the scientific literature effectively
- Use computational tools and packages

**Transferable Skills** (initiative, group work, independent thought etc):

- Searching and retrieving information from online databases
- Scientific report writing
- Oral presentation skills
- Poster design and presentation
- Powerpoint – basic, intermediate and advanced
- Basic computing skills – word processing, spreadsheets, graphics, UNIX and Linux operating systems
- Experience in computation and computer graphics
- Experimental design
- The creation, management and exploitation of intellectual property – key issues for scientists
- Commercialization of research
- Time management and personal effectiveness
- Research ethics and responsibility
- An introduction to statistical thinking
- Science and the media

16. The following reference points were used in creating this programme specification (please choose from the following and add any other external reference points used: FHEQ, European Higher Education Area (EHEA), Course Handbook, Subject Benchmark Statements (where appropriate), Professional Statutory and Regulatory Bodies (PSRB) documents etc)

Student Handbook for Course approved by Senate of Imperial College

17. Programme structure and features, curriculum units (modules), ECTS assignment and award requirements (for each year of study, please complete the structure for each term (including what modules or course units will be taken and indicate whether there are any pre-requisites). Please also provide information about progression between years. Please indicate whether placement activity will apply to your programme, for example, year abroad):

**Year One: [please complete]**

The programme is only offered as a full-time, one-year course and leads to the MRes degree. Students will attend both lectures selected from existing course modules and specially designed seminar style lectures. Furthermore, students will also attend practical courses and workshops on specific techniques to gain training in the broad area of structural molecular biology. Specific tutorials are also offered to provide opportunity for in-depth discussion and knowledge on selected topics. A dissertation in literature review style provides further opportunity for broad in depth knowledge in structural molecular biology. The remainder of the course comprises two individual (17-18 weeks) research projects followed by a seminar presentation and viva voce with two internal examiners. A final viva voce with the visiting examiners take place
at the conclusion of the course. The overall pass mark is 50% and each project contributes 45% of the final mark and the dissertation contributes to 10%.

Term one:

All students attend an induction week and are advised to start discussing possible research projects with appropriate academic staff. Students will then attend lectures in Macromolecule in 3D and carry out background reading in the following weeks. Projects (about 18 weeks) begins in the 6th week of term. Students also attend lectures on practical protein crystallography course.

Term Two:

Project continues and students attend a series of lectures shared with MRes in Bioinformatics and Systems Biology. A written report will be handed in and examined before Easter Vacations.

Term Three:

The Students hand in their literature dissertation and begins their second project (about 17 weeks). All students are expected to attend 6 weeks lectures (2 hours per week) specifically designed for the course as well as divisional seminars (once a month). Dissertations will be marked by two examiners and feedbacks are given to the students. Practicals are also schedules in x-ray crystallography, NMR and EM. In august, the students write up their project reports followed by an internal viva. In September, special tutorials are offered to help strengthening the fundamental knowledge acquired throughout the year. Towards the end of September, all students are examined by viva voce on their projects and the taught aspects of the course by the visiting examiners before final marks are allocated.

**Year Two** (if applicable): [please complete]

Term one:

Term Two:

Term Three:

**Year Three** (if applicable): [please complete]

Term one:

Term Two:

Term Three:

**Year Four** (if applicable): [please complete]

Term one:

Term Two:

4  [Please add title of award as footer]
Term Three:

18. Support provided to students to assist learning (including collaborative students, where appropriate). (The description should include information about the induction programme, welfare and pastoral support, library and other facilities available to students, personal tutoring, and access to teaching and learning support services, English language support, feedback to students and dissemination of actions taken as a result):

- One week induction programme for orientation, introduction to library, information technology, literature evaluation and safety
- MRes student handbook which includes description of each course component.
- Staff:student ratios for teaching of 1:1
- A large community of postgraduate research students and postdoctoral researchers who work in structural biology research at South Kensington
- Library and other learning resources and facilities at South Kensington
- Dedicated computing facilities at South Kensington with access throughout each day
- Mentoring system – the students have a postgraduate tutor
- Open access to staff in the Division of Molecular Biosciences
- Student email and open personal access to staff including the course director
- Access to student counsellors on the south Kensington campus
- Access to teaching and learning support services, which provides assistance and guidance, e.g. on careers.

19. Criteria for admission:

- The minimal qualification for admission is normally an upper second class honours degree in Life Science or related subject from a UK academic institute or an equivalent overseas qualification.

20. Processes used to select students:

- All UK applicants (and where possible oversea applicants) are invited to South Kensington for a site tour and interview. The Course Committee will initiate offering prospective students. When an applicant has a lesser degree qualification but has research experience, the Course Committee can make a special case for admission to be approved by the Graduate School of Life Sciences and Medicine Postgraduate Quality Committee.

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

Information regarding College-level practices is outlined below. Please amend this as appropriate to incorporate details of departmental activity.

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.

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.

Course Committees monitor and evaluate the project quality, the students progress and overall performance.

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:

Grades are given to students immediately after the viva for each project and feedback on their performance on individual course components are provided by the course director.

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:
We hold student/staff meeting once a term when the students can discuss with the course committees. Additional feedback is provided by the student representative or directly by contacting the course director or through academic staff over informal gatherings. External examiners also meet with the students as a cohort at the end of the course and any feedback is taken seriously by the course committee.

e) Mechanisms for monitoring the effectiveness of the personal tutoring system:
Student-staff meeting, student performance.

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 Structural Molecular Biology
Staff Appraisal scheme and institutional staff development courses
College teaching development grant scheme to fund the development of new teaching and appraisal method
Updating professional and IT/computing development

22. Regulation of Assessment (you may find the following link useful when completing this section: http://www3.imperial.ac.uk/registry/information/academicregulations)

a) Assessment Rules and Degree Classification:

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

- First class: 70 - 100%
- Second class (upper division): 60 - 69.9%
- Second class (lower division): 50 - 59.9%
- Third class: 40 - 49.9%

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** *(e.g. accreditation reports)*:

- Favourable comments by Visiting Examiners
- First Destination data for MRes students, showing a majority starting a PhD in a leading university upon completion of this course
- Independent review of the quality of the educational provision of the Faculty of Natural Sciences by the Quality Assurance Agency.

24. **Key sources of information about the programme can be found in** *(links to course handbook, prospectus, departmental website, syllabus etc)*:

- Postgraduate Prospects, Imperial College London (available on-line [www.imperial.ac.uk](http://www.imperial.ac.uk))
- Postgraduate Training in Life Sciences at Imperial College London (available on-line [www.imperial.ac.uk/lifesciences](http://www.imperial.ac.uk/lifesciences))
- MRes in Structural Biology Course Handbook (available on-line [www.imperial.ac.uk/structuralbiology](http://www.imperial.ac.uk/structuralbiology)).