Masters of Research (MRes) in
Plant Chemical Biology:
Multidisciplinary Research for
Next Generation Agri-Sciences

1-year full time and 2-year part time option available
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Why Plant Chemical Biology?

In the last half-century there have been remarkable advances in our knowledge of the chemistry of biological systems. However, a quantitative understanding of the molecular mechanisms taking place is still in its infancy. Without such knowledge, we cannot be said to truly understand how these systems operate and interact with their surroundings.

The food, fibre and fuel requirements of our ever-increasing population are some of the major challenges facing current society. There is therefore a clear need for innovation and technology to increase crop productivity in a sustainable way. Key targets include increasing photosynthetic efficiency, reducing losses caused by pests and diseases, enhancing food safety and quality for better nutrition, minimising waste throughout the food supply chain, and improving the processing of biomass materials for fuels and other plant derived chemicals and materials.

Chemical Biology through physical science innovation (in e.g. chemistry, physics, mathematics, engineering) is able to tackle biological problems on a molecular level. It is a discipline that is perfectly poised to address the next great challenges in the agri-sciences, in the postgenomic area and to understand how chemical and biological space are interacting and influencing each other.

Scientists trained in this area will be vital if we are to address bottlenecks in current agri-science research, as they will be able to participate in the generation of new areas such as novel agrochemical synthesis, innovative technologies for enhancing yield or computational modelling solutions – all tasks fitting with the new physical sciences based discipline of “Chemical Biology”.

The Institute of Chemical Biology brings together academic and industrial leaders from the plant and chemical biology fields, and is committed to providing multidisciplinary training to physical science graduates.
Programme Overview
A one year fulltime (or 2-year part-time) multidisciplinary MRes course that equips students with the language, knowledge and skills to enable them to tackle problems lying at the plant-physical science interface. Training is provided by world renowned academic and industrial scientists in the plant and chemical biology fields.

Programme Details – Taught Elements
Students will begin the course in the first term (October-December) with a fixed lecture programme of core courses, which will be followed in second term (January-March) with optional courses. The core courses, will address the demand for the breadth of knowledge that we aim to cover by the course, and will provide the foundation for the research project.

The course content will include the following broad range of chemical biology topics:
- Cell biology
- Systems and chemical biology
- Enzymology
- Bio-analytical science and technology
- Macromolecular structure & dynamics
- Chemical and biological mechanisms in plants and pests
- Protein engineering and design
- Theoretical approaches to Biology
- Single cell technologies
- Molecular Basis of Photosynthesis
- Molecular plant defence mechanisms

Students will also be exposed to a variety of different learning styles including lectures, interactive workshops, tutorials, journal clubs, and seminars. These have been tailored to meet their multidisciplinary needs.

Syngenta are the key industrial partner on this course. They will provide some lectures, workshops and tours around their research site for all students on this course.
Programme Details – Research Project

The major focus of the course will be an 8 month multidisciplinary research project (fulltime course), jointly supervised by at least one physical and one plant scientist. Students will select their research project in the first few weeks from a range of multidisciplinary proposals. Supervisors will be drawn from world leading departments at Imperial College London, such as Chemistry, Physics, Engineering, Life Sciences, Maths, Bioengineering etc. Students will be based in their supervisors research laboratories, allowing them to benefit from interaction with supervisors, postdoctoral and postgraduate researchers from both disciplines. Joint (Syngenta/Imperial) research projects are also possible. These Internships will either be based at Syngenta or at Imperial. They will be allocated on the basis of student merit.

The taught component of the MRes course will equip students with the foundations necessary to complete their research project within a multidisciplinary environment. During the first term students will also write a literature review which will allow them to make an in-depth critical review of the subject matter that they have chosen for their research project. During this time students will have regular contact with their supervisors. This will help to enhance the integration of the taught and research components of the programme.

The research infrastructure at Imperial College is of a standard expected from institutions top-graded in the last national Research Assessment Exercise. All the supervisors involved in providing research projects have significant research funding and will be able to offer access and exposure to internationally competitive facilities. Indeed in many cases the facilities are entirely unique and world-leading.

Programme Aims

The MRes programme is aimed at producing physical scientists who are able to bridge disparate fields and have the confidence to engage in multidisciplinary research.
Prospects

At the conclusion of this course you will be ideally placed to undertake PhD studies in collaborative multidisciplinary plant chemical biology or to apply your knowledge directly to the agri-science industrial sector.

Personal and Transferable Skills

Imperial College recognises the importance of postgraduate education and the development of transferable skills that will be useful in academic or industrial environments. You will be trained in a wide range of skills following exposure to the various teaching and learning aspects of the MRes course including:

1. Effective communication through oral presentations, computer processing, written reports and scientific publications.
2. Time and project management skills
3. Integration and evaluation of information from a variety of sources and disciplines.

The transferable skills components, given by the Graduate School of Engineering and Physical Sciences will include:

- Safety Awareness
- Intellectual Property Management
- Time and Project Management
- Presentation and Communication Skills

In addition to the transferable skills courses offered by the Graduate School, the Institute of Chemical Biology offers a bespoke Bioethics course, which gives an introduction to the ethical and social implications of advances in biology and technology. Topics that might be addressed could include genetic modification.
Application and Selection Process

It is our intention to take only the most able and highly motivated students on this programme. We will select candidates for this course on the basis of academic qualifications and commitment to a career in Chemical Biology.

Applicants should normally have obtained, or expect to obtain a first or an upper second class degree in a physical sciences-based subject, such as Chemistry, Physics, Mathematics and Engineering, from a UK academic institution or an equivalent overseas qualification. If your qualifications are not covered by these descriptions please contact us for a decision.

Interviews typically occur throughout springtime and places will be filled on a first come first served basis.

For further information, please visit www.chemicalbiology.ac.uk
If you have any questions, please contact the ICB administrator (icbadmin@imperial.ac.uk).

Funding
The fees for this course vary between home/EU and overseas students and you are advised to check the current fees on the relevant Imperial College web pages. These are located at: www.imperial.ac.uk/registry/studentfinancialsupport

Scholarships for fulltime students
There are opportunities to gain scholarships in a competitive fashion. These will provide funding towards tuition fees and/or living expenses and will be granted on the basis of academic merit and excellence of the applicant.