MRes in Green Chemistry at Imperial College

The MRes course in Green Chemistry at Imperial College is a multidisciplinary one-year course featuring the involvement of several world-class departments. Taught modules cover topics as diverse as clean solvents, renewable chemical feedstocks, environmental chemistry, biotechnology, renewable energy resources (including solar devices and fuel cells), biofuels, water treatment, carbon capture strategies and environmental technologies. In addition to lectures, you will spend nine months working on a cutting edge research project, typically with supervisors from at least two different departments.

Graduates of this course can expect to have all the necessary skills and experience to apply green chemical technologies in either commercial or academic laboratories, the research project in particular equipping them admirably for PhD studies.

The entry requirement is an honours degree (or equivalent overseas qualification) in Chemistry or a related subject at the upper second (or equivalent) level. Imperial College Registry will determine the corresponding grade for non-UK qualifications. Those without a degree in chemistry may struggle with the advanced level chemistry courses, which need to be passed at the 50% level.

The course is based around a large research component (75% of the course marks, 9-month project), which is far greater than a normal MSc. The remaining 25% consists of journal clubs, a poster project on renewable energy and exams on specialist courses. Further details can be found in the frequently asked questions (FAQ) below.

All applications must be submitted through the Registry website:
https://apply.imperial.ac.uk/login

Information on making an application is also provided:
http://www.imperial.ac.uk/study/pg/apply/how-to-apply/

The 2017-18 tuition fees are £10,900 for UK/EU students and £30,600 for overseas students. Both of these include consumables for the research project. There are scholarships for UK students (and EU students who have studied in the UK) from the Department to cover tuition fees, which are distributed based on merit once the applications have closed. Living costs in London for a year are around £14,000 but this cannot be covered by the Department.

Other sources of funding are described in the link below:
http://www3.imperial.ac.uk/studentfinance/prospectivepgstudents/mastersscholarships

The English language requirements (Standard level) for the course are provided here:
http://www.imperial.ac.uk/study/pg/apply/requirements/english/

Submit your application and we will get in touch once your application has been processed. Due to visa requirements, the deadline for overseas students is 1st July for starting the following October. Applications from students not requiring a visa can be accepted later than this but we recommend applying as you are able. We conduct a rolling programme of interviews (in person or by telephone) as required. We do not wait until 1st July to make offers – they are made throughout the year and usually within two weeks of interview.

If you have any queries relating to the admissions process not covered on the website, please contact the MRes Coordinator, Dr Mike Ray (michael.ray@imperial.ac.uk). For questions related to the academic content of the course, please contact the Course Director, Dr James Wilton-Ely (j.wilton-ely@imperial.ac.uk).
## Timetable

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**A REPRESENTATIVE SELECTION OF PAST MRes GREEN CHEMISTRY RESEARCH PROJECT TITLES**
(typically over 40-50 projects are available each year)

These should be viewed as an indication of some of the areas offered as projects to the students on the course in the last few years.

Geopolymers – A carbon-free concrete.
Treatment of ligno-cellulose.
Ionic Liquids - the new super solvents?
Photochemical water splitting – the role of photocatalyst morphology.
Combating climate change: New technologies for carbon dioxide capture.
Bacterial cellulose nanocomposite coatings for corrosion protection.
Catalytic electrophilic bromination of deactivated aromatics in ionic Liquids.
Novel processing methods for organic materials, device structures, and their application in OPV.
Electrodestruction of ionic liquid impurities.
Synthesis of semiconducting polymers by continuous flow chemistry.
Siloxanes as Solvents for Synthesis.
Elucidating the composition, development and potential applications of silica materials from plants.
Covalently Linked Lewis Pairs as Materials for Hydrogen Storage and Transfer.
Construction of a ligand library for biopolymer synthesis.
The conversion of biomass into useful platform chemicals.
Environmentally friendly organic electronics – what happens when you upgrade your mobile?
Water purification – one of the major environmental challenges.
Supramolecular approaches for next generation photovoltaic devices.
Biomedical materials from biodegradable ionic liquids.
Electrochemical and Chemical Methods for the Destruction of Metal Complexes.
Optimality and control in bio-reactions: a systems approach.
Investigating the electrochemical properties of ionic liquids.
The effects of water contamination in ionic liquids.
A generic platform for computer-aided solvent design for selectivity in catalytic reactions
Renewable polymers using biobased alternatives to phthalic anhydride
Contact printed organic solar cells from water-based formulations
Frustrated Lewis pairs for clean green catalysis
Separation of biobutanol for green fuels using novel porous nanomaterials
Ionic liquid biorefining
Catalytic in flow: Aerobic oxidation of alcohol
Detection of toxins in drinking water
Visible-light photochemical reactions of tetrahydropyridines
Quantifying triplets in polymeric blend films for Organic Photovoltaics (OPVs)
Butyl-3-hydroxybutyrate as a sustainable solvent for chemicals synthesis
A Quantitative Structure function relationship to reveal how nature overcomes the challenge of watersplitting – what can we learn from nature to guide novel fuel generation?
Synthetic routes to novel organometallic precursors of earth abundant, non-toxic metal sulfides for use in low-cost solution processed solar cells.
Functionalised gold nanoparticles for catalysis
Development of green catalytic oxidation reactions in the multiphase
Cause and resolution of anomalous hysteresis in organic-inorganic perovskite solar cells
Green metal free conversion of $H_2$ and $CO_2$
Enzymatic lignin re-polymerisation
Enantioselective selenocatalytic transformations of chiral diselenides: Enantioselective oxidations of activated C–H bonds, including photoredox co-catalyzed aerobic oxidations
Generating new covalent materials for carbon dioxide capture
Understanding of Cu-catalysed coupling reactions leading to reliable and scalable processes
Screening porous materials for uptake of environmentally harmful gases
Silanols, silanediols and silanetriols as novel catalysts for direct amide bond formation from carboxylic acids and amines
Detection of carbon monoxide in air using chromo-fluorogenic probes
Generation of an oxidant by electrochemistry
Enantioselective selenocatalytic transformations of chiral diselenides: Enantioselective alkene difunctionalizations, including photoredox co-catalyzed anaerobic oxidations
Fabrication and characterization of organic-metal halide perovskite solar cells based on non-toxic metals
Ionic liquids for technological applications
Protein-friendly ionic liquids
Combating climate change: New technologies for carbon dioxide capture
Viscosity of ionic liquids: Iodide vs triiodide
Enantioselective selenocatalytic transformations of chiral selenides: Redox neutral $\beta,\gamma$-difunctionalizations of electron-deficient alkynes and allenes
Next generation “frustrated” Lewis pairs: Towards methane activation.
Catalytic upgrading of lignin obtained from ionic liquid treatment of biomass
Enantioselective selenocatalytic transformations of chiral diselenides: Intramolecular redox-neutral atom-economical dearomatizations
Transition Metal C–H activated Carbonylation Reactions in Flow
Nitrogen-rich framework materials for carbon capture technologies
Redox-neutral approaches to C–O bond activation
Ionic liquids for green applications
Mechanistic studies on the stereo-retentive C–H oxidation of aliphatics with iron complexes
Solar water splitting with semiconductor/molecular hybrid electrodes
Photovoltaic devices based upon hybrid inorganic-organic nanocomposite films composed of earth-abundant materials.
Discrete subnanometre gold clusters for catalysis
Ionosolv pseudolignin: What is it and where does it come from?
Nanoengineered layered double hydroxides on graphene oxide supports as regenerable sorbents and catalysts for clean energy systems
Improving copper catalysis: Well-defined catalysts for ‘green’ N-arylation reactions
Silicon nanowire/ionic liquid technology for energy storage
Renewable energy from biomass: Valorising contaminated wastes into renewable fuels
Fluorescent molecular rotors measure viscosity of ionic liquids
Frequently Asked Questions

1. How do I know if I am eligible?

Whether an applicant meets the minimum academic standard for admission to a master’s degree will be decided by the Imperial College Registry. If this is met, the application is passed on to the Course Director. The minimum academic standard for this course is an upper second class degree in the UK or the equivalent from an overseas institution. Very occasionally candidates with a lower second class degree will be considered at the discretion of the course organisers if the candidate has significant additional experience or mitigating circumstances. We recommend you submit your application and the Registry will advise you regarding your eligibility.

2. What is the application procedure?

All applications must be done online through the Imperial College site: [https://apply.imperial.ac.uk/login](https://apply.imperial.ac.uk/login)

A guide to making an application can be found using the link below: [http://www.imperial.ac.uk/study/pg/apply/how-to-apply/](http://www.imperial.ac.uk/study/pg/apply/how-to-apply/)

3. Is the MRes in Green Chemistry a taught or a research master’s programme?

In contrast to MSc courses, the MRes course consists principally of research (75%) with a mixture of core and optional lecture courses on relevant topics making up the remaining 25%. Lectures are not confined to the Chemistry Department but also include ones offered by the Centre for Environmental Policy and the Sustainable Energy Futures course. Research projects commence in January after a proposal has been devised between student and supervisor. The projects can be based in one department or jointly between supervisors in various departments across the University such as Chemistry, Chemical Engineering, Materials, Physics, Biology and Biochemistry.

4. Do I need to choose a supervisor for my research project when applying?

In August/September a list of projects (each with a title, one-page description and references) will be sent to all students holding an offer for the course. This provides the students with the opportunity to look through them and draw up a list of attractive projects. Once the students arrive in London in September/October, contact is encouraged between students and prospective supervisors. This provides the chance to talk to those offering projects and their research groups. The students will submit a list of their 5 preferred projects and this information will be used to allocate projects by the end of October. Students who wish to conduct research with a specific supervisor can make contact with that supervisor before they start the course. If they can find an Imperial-based academic researcher who is willing to supervise them on a specific project (within the topic of green/sustainable/environmental chemistry), it can be arranged for the student to be allocated this project.
5. Are scholarships available?

Departmental funding for scholarships is limited and is currently only open to UK applicants (and EU students who have done their first degree in the UK). However, a number of external scholarships are available, which can provide funding to both UK and overseas applicants: http://www3.imperial.ac.uk/studentfinance/prospectivepgstudents/mastersscholarships

6. What reading material related to the course would you recommend?

A good source is the book ‘Green Chemistry: An introductory text’ by Mike Lancaster (RSC paperbacks, ISBN: 978-1-78262-294-9). On the topic of energy, we recommend ‘Without the Hot Air’ by David MacKay, which is available as a free download (consider before printing that the book consists of 370 pages including appendices!) in a number of languages.

7. What are the career prospects after graduation?

Environmental concerns have never been more prominent on the international stage, making this field of study particularly relevant. Around two thirds of students follow this course by studying for a PhD while others go on to use what they have learnt in fields related to Green Chemistry, in governmental roles or in the commercial sector. We have a LinkedIn network of current and former students who can be contacted to provide advice on how they secured the positions they currently hold. This network is exclusively for current and former students on this MRes course.

8. How much are living costs in London?

It is recommended that you budget £14,000 per annum for living costs in London.

9. Is it possible to do a part-time job while attending the course.

The course is full time so we only suggest that, if you wish to work while attending the course, you only take a part-time job at weekends.

10. Can I apply if I do not hold a Chemistry degree?

Those with a degree in Chemistry are at a clear advantage. Engineering courses do not typically offer enough Chemistry material to prepare people for this course. You will be expected to pass exams (at 50%) on material equivalent to fourth year advanced courses. Applications are considered on an individual basis.

12. Do you interview everyone who applies?

We will interview most candidates who are likely to achieve (or already hold) a degree in a relevant subject as the upper second class degree level (or overseas equivalent). The interviews are done either in person or by Skype/telephone.
13. How many students are accepted onto the course and how many apply.

The size of the course varies between 15-20 students, selected from a shortlist of over 60 applicants. We believe that this size is just right for all the students to know each other and form a self-supporting and social cohort. This is encouraged by the course with regular events such as a cohort meal paid for by the course each term.

14. Is there a closing date for applications?

We recommend that overseas applicants try to apply before the 1st July in order to leave time to complete all the documentation required. Applications from the UK/EU can apply later but it is advisable to apply as early as possible. These dates give us time to process your application, conduct the interview and let you know whether we can make you an offer in good time for those requiring a visa. Applications are assessed as they are received.

15. What are the current fees for the course?

The 2017-18 fees for the MRes course are £30,600 for overseas students and £10,900 for UK/EU students. These amounts include all consumables and other costs for the 9-month research project.

16. What do I need to do for Academic Technology Approval Scheme (ATAS) clearance?

This applies only to non-UK/EU students. Once an offer has been made, we will send you a letter for you to use in your ATAS clearance application. Instructions will also be provided on how to do this.

17. What are the language requirements for the course?

Imperial College requires an English language test as part of the entry requirements. Information is provided below:
http://www.imperial.ac.uk/study/pg/apply/requirements/english/

We require the ‘Standard’ level of English.

There are also summer courses provided by the Centre for Academic English, which can help with satisfying the English language requirement for admission to the MRes course:
http://www.imperial.ac.uk/academic-english/pre-sessional-english/