

School of Chemistry

FACULTY OF MATHEMATICS AND PHYSICAL SCIENCES



UNIVERSITY OF LEEDS



Postgraduate
Research
Degrees 2012

Postgraduate Research Degrees 2012

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Chemistry at Leeds is one of the leading departments in the UK ranked 8th in the 2008 Research Assessment Exercise

Welcome to the School of Chemistry at Leeds and our Research Prospectus. Choosing to study for a research degree is one of the biggest decisions you can make. Chemistry is at the centre of our lives, controlling the way our bodies work, controlling the atmosphere and environment and underpinning much of successful modern British, European and International industry.

Only through research will fundamental advances be made that help us understand our bodies and the world around us to ensure we solve today's societal challenges.

As a research student in chemistry, our goal is to help you become one of the people who make the next big advances in this subject and define the scientific agenda of the future as one of the research leaders of tomorrow. We are well placed to achieve this as part of a research-led University with a mission to deliver world-class research, training and teaching at all levels from undergraduate to postgraduate.

Our pledge to help you realise your ambitions is based on a strong track record – we were ranked 8th in the UK for research quality during the 2008 Research Assessment Exercise (RAE). As an outstanding centre of excellence for chemistry with over 55 staff, 120 PhD students and 50 research associates, we can offer you an enormously varied range of research projects. We also guarantee that you will have the extensive support and facilities to allow you to get the most out of your project both within the School and through interdisciplinary links that we have forged across the University within the areas of biological sciences, engineering and environmental sciences.

As a postgraduate student who joins our school you will become an integral part of our mission and have the opportunity to develop your skills as an educator and leader.

Our undergraduate Bachelor (BSc) and Integrated Masters (BSc, MChem) degrees are accredited by the Royal Society of Chemistry. Similarly, we offer the only accredited taught Masters Degrees in the UK in Chemical Biology and Drug Design and in Chemical Process Research and Development. All these programmes have been rated “excellent” in the Teaching Quality Assessment and as a postgraduate research student you can share your enthusiasm for scientific research and play a central role in supporting junior colleagues during the research component of these degrees.

Our size and inclusive structure make for an outstanding, supportive and friendly environment with our postgraduate research students at the centre of everything we do. The School of Chemistry is proud of the success of its postgraduates who progress to positions in academic, industrial and commercial organisations across the globe.

The following pages in this brochure will describe our research programmes and peaks of excellence in atmospheric chemistry, medicinal chemistry, chemical biology, laser spectroscopy and organic synthesis. We hope you enjoy reading about our School and look forward to joining you on your exciting journey as a postgraduate research student.

ANDY WILSON
Director of Postgraduate Studies



“Thanks to an EPSRC/GlaxoSmithKline studentship, I have the chance to carry out my research both in an academic environment and in a world renowned industrial company.”

PAOLO TOSATTI 4TH YEAR PhD STUDENT

COLOUR SCIENCE

Teaching and research in Colour Science at Leeds began in 1878. Today the section is a unique multi-disciplinary international centre of excellence in chemistry, physics and various technologies associated with colorants, polymers, colour and imaging.

The section is also at the forefront of academic and collaborative industrial research in polymer chemistry, polymer materials science, formulation and delivery of functional complex fluids, organic printed electronics, chemistry of colorants including the design and synthesis of novel chromophores, colour measurement and imaging science.

A host of multinational companies and numerous small to medium size enterprises have derived significant benefits through their interaction with Colour Science. The outreach activities of the staff of the section have resulted in various forms of information and knowledge transfer schemes being generated, in schools, institutes and universities, both at home and abroad, whilst our research on photochromic dyes resulted in The Chemical Industries Association Innovation Award 2005 and The Queen's Award for Enterprise (Innovation Award) 2006.

INORGANIC & MATERIALS CHEMISTRY

Research in the Inorganic and Materials Chemistry section spans all areas of the subject including fundamental studies of crystallisation processes, studies on the origins of life, development of switchable materials, nanochemistry, discovery and development of new catalysts for small molecule and materials synthesis and the discovery of new inorganic pharmaceuticals.

Many of our staff are internationally recognised research leaders and hold prestigious awards. Our staff play a significant role in the interdisciplinary research of the University, working closely with colleagues in the Astbury Centre and in the Centre for Molecular Nanoscience. This programme of research activity provides our graduate students with a rich and varied experience that gives them a competitive edge in securing long term scientific careers.

Research within the Section is supported from a wide variety of sources including the UK research councils (EPSRC, STFC) and the European Union. Many topics are supported by industry, including our own spin-out company DyeCat Ltd, and our research gives rise to a regular stream of high-impact publications and patents.



Research at Leeds is underpinned by a **large grant portfolio of £41M** secured from the Research Councils, Charities, Industry and the European Union

ORGANIC CHEMISTRY

Leeds has one of the leading Organic Chemistry Sections in the UK. It offers an exciting range of research opportunities in areas ranging from drug discovery and understanding the fundamental chemistry of large biomolecules, to process development for sustainable large scale manufacture of important organic molecules. Members of the Section play major roles in interdisciplinary research at the University, working closely with colleagues in Biological Sciences through the Astbury Centre, Clinical Medicine through the Biomedical Health Research Centre and with those in Chemical Engineering through the Institute of Process Research and Development.

Such a diverse research base provides exposure to a broad spectrum of organic chemistry, essential for equipping students for future careers in science and technology, in an increasingly competitive environment. Research within the Section is supported from a wide variety of sources including the UK research councils (EPSRC, BBSRC), the Wellcome Trust, the European Union, the Wolfson Foundation, the Royal Society, Yorkshire Cancer Research, Heart Research UK and Yorkshire Forward.

There are also many industrially funded projects through our close links with the pharmaceutical and fine chemical industries, including projects of particular industrial importance, led by industry and sponsored by the Technology Strategy Board. The Section also hosts two spin out companies, C-Capture Ltd and DyeCat Ltd, commercialising new patented research developed by members of the Section and their collaborators.

PHYSICAL CHEMISTRY

Research in the Physical Chemistry section focuses on fundamental studies of elementary and complex chemical reactions and their applications in various areas such as atmospheric chemistry, combustion, coherent control, biological processes and planetary atmospheres.

The fourteen research groups cover a broad range of basic and applied research, involving experimentalists and theoreticians. We boast one of the largest NERC grant portfolios in the UK and are also supported through the EPSRC and European Research Councils. Our outputs consistently feature in top interdisciplinary journals such as Nature and Science and there are extensive collaborations with other schools across the University such as Earth and Environment, Physics and Engineering.





“I think that there is a lot of opportunity within the School, for example, I went to Philadelphia to do a poster presentation and there were also a lot of other opportunities at other conferences within the country.”

SARAH MURRISON PhD IN SYNTHETIC ORGANIC CHEMISTRY

FACILITIES AT THE UNIVERSITY OF LEEDS

The School of Chemistry boasts world-class facilities for research training and you can be certain that we will offer you the outstanding well-equipped environment that you need for your project to be a success.

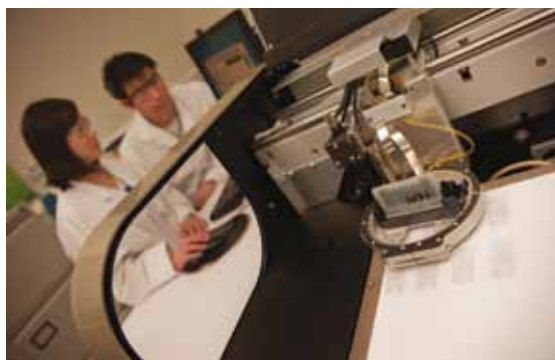
The School has undergone a £13M refurbishment of all its research and teaching laboratories, providing some of the best facilities for synthetic, physical and analytical chemistry in the country. We offer a friendly environment to support all aspects of your studies, and aim to provide you with the opportunities to reach your full potential and career aspirations.

Beyond the school, additional facilities and services are available with other schools and faculties across campus through collaborative arrangements that are embedded throughout our research programme. Students have hands-on access to most items of equipment and are supported by numerous highly experienced technical staff.

Each synthetic chemistry laboratory is equipped with two metre fume cupboards which are generally allocated to individual researchers. Offices for researchers adjoin the laboratories, and are used for data analysis, report writing and access to on-line journals and searching tools. Researchers also have access to other equipment needed for synthetic chemistry including vacuum lines and glove boxes for working under inert atmospheres, and facilities for solvothermal reactions. We are also uniquely equipped within the Institute of Process Research and Development with large scale (20 and 50L) vessels and associated equipment fitted with extensive process analytical technology for reaction monitoring. The recently opened Wolfson laboratory for carbon dioxide chemistry houses much of our CO₂-based research.

There are numerous high-field NMR machines including four 500 MHz instruments and a range of mass spectrometers and HPLC instruments dedicated to the characterisation of molecules whilst our Bruker X8 single crystal X-ray diffractometer is one of the best in the country, with a rotating anode X-ray source for measuring weakly diffracting samples and a HELIX helium cryostat for ultra-low temperature studies.

Our integrated molecular biology and synthetic chemistry laboratory is fully equipped for research in molecular biology and protein chemistry with all the equipment required for expression and purification of proteins. We also house one of the few small molecule screening facilities in UK academia including a liquid handling robot and multifunctional plate reader.



Our world class research facilities continue to be supported through ongoing investment in our infrastructure of over £13M





Interdisciplinary links across the University provide access to state of the art equipment and expertise necessary for multidisciplinary research

The Dainton and Challenger laser kinetics laboratories have significant high quality space, consisting of 10 experimental bays with a very wide range of laser-based instrumentation for studying fast time-resolved kinetics and photochemistry, mainly of processes important in atmospheric chemistry and combustion. There are two further laser laboratories for studying ultra-fast (femtosecond) processes and the coherent control of reactions. The School also boasts laser-based and spectroscopic instrumentation for field measurements of radical species; a highly-instrumented atmospheric simulation chamber; and labs for studying the formation, growth and reactivity of atmospheric aerosols. The experimental infrastructure is complemented through theoretical studies supported by the advanced High Performance Computing facility at the University.

Our research in colour science is supported by instrumentation unrivalled in the UK. In addition to a comprehensive range of materials characterisation equipment, we possess state of the art NMR instrumentation with solid state capability. Specific to colour measurement we house a range of instrumentation including: X-rite spectrophotometers, tri-stimulus colorimeters and spectroradiometers, chart readers for ICC colour profiling, Ishihara and City University colour vision tests, and DigiEye system for total-appearance measurement. Colour Science also has a well equipped dyehouse containing machinery for both batch and continuous processing of textiles and polymers.

Beyond chemistry, our collaborative interactions with the Astbury Centre provide access to all the infrastructure and expertise for structural molecular biology and biophysics and we make extensive use of transmission (TEM), scanning (SEM) and atomic force (AFM) electron microscopy facilities in the School of Physics and Astronomy and in the School of Process, Environmental and Materials Engineering.

YOU WILL ALSO BENEFIT FROM

- Expert student support services
- Strong connections with industry
- Exceptional career prospects and a dedicated careers centre
- One of the UK's best academic research libraries
- The Skills Centre supporting students, researchers and staff to enhance their learning, teaching and research
- One of the largest collections of online journals in the UK including all Wiley, Royal Society of Chemistry and American Chemical Society Journals backdated to their very first issues
- Access to outstanding electronic resources such as Scifinder Scholar and Reaxys



Significant numbers of our students participate in **exchange visits** and **field trips to fantastic locations such as Antarctica!**

LIFE AS A RESEARCH STUDENT

The School of Chemistry offers a structured training programme to help you develop your skills effectively and ensure you gain the most out of your research experience to produce outstanding research and further your career objectives.

The School supports you throughout your studies in a variety of ways. Invariably supervisors meet informally with their students several times a week in the laboratory or at a group meeting in addition to more formal review meetings. This friendly and supportive approach is designed to help you develop your research skills and other generic skills like planning and organisation such that you can become an independent researcher producing outstanding research outputs by the conclusion of your studies. In addition to your supervisor, the Director of Postgraduate Studies and Postgraduate Progression Tutor are available to meet with you and provide independent advice and support on all aspects of your studies. Research students can also take advantage of the broader generic skills training offered through the Faculty Graduate School, which provides courses to help develop research, interpersonal and life skills.

You also have every opportunity to practise and implement your generic training. You will prepare regular reports which help to develop your scientific writing skills and you will receive feedback on these from your supervisor and an internal assessor. For PhD students, the report at the conclusion of your first year forms the basis of the 'transfer' viva which simulates a thesis examination and provides you with the opportunity to evaluate your progress on the road towards your PhD degree.

Each academic year concludes with the postgraduate conference during which you will

have the opportunity to celebrate the excellent work of your peers. As an active participant in the conference you will also develop your presentation skills through poster and oral presentations with prizes awarded for the best contributions.

Many students have the opportunity to travel to and present at major national and international conferences. Significant numbers of our students participate in exchange visits and field trips to fantastic locations such as Antarctica!

You will be encouraged to take part in the life of the School and to contribute to the full range of academic and social activities available. Our students are as friendly and supportive as our staff and will be an enormous source of support for you. In turn you will have the opportunity to share your enthusiasm and new found expertise through demonstrating in undergraduate laboratory classes allowing you to develop skills in teaching.

Our friendly and vibrant atmosphere extends beyond research: many students are active in our postgraduate society which runs an annual postgraduate social, following on from the annual conference, in addition to numerous other activities such as football tournaments and quiz nights.



“I thoroughly enjoy my PhD in chemical biology; I get to take advantage of the state-of-art equipment available at the University of Leeds, and I love the community feel where other researchers are always willing to offer their experience and advice.” **HEATHER COX 2ND YEAR PhD STUDENT**



“By doing a PhD at Leeds in atmospheric science I was able to pursue cutting edge research and obtain the skills necessary to pursue my next career step as a postdoctoral fellow at Harvard.”

RÓISÍN COMMANE – PhD GRADUATE 2009 – EN ROUTE TO COLLECT A WIND PROFILER FROM A VILLAGE IN NIGER, WEST AFRICA

THE UNIVERSITY

The University of Leeds has an international reputation and is a member of the prestigious Russell Group of research-led universities. The University is well known worldwide for the quality of its education and research, making it one of the most popular universities in the UK. Degrees from Leeds are recognised by employers and universities globally.

There are around 24,000 undergraduate and 6,000 postgraduate students at the University. Despite its size, the University has a friendly and supportive environment as students are taught within smaller schools ensuring more personal surroundings for study. Within the schools you will find modern, well-equipped educational facilities and laboratories. On campus, we have an internationally-renowned academic library featuring a collection of over 2.7 million books, and 9,500 printed and online journals.

In your spare time you will find the University has a lot to offer including great sports facilities. The Sports Centre offers a range of activities from beginners to competitive level. There is an on-campus fitness studio and playing fields for hockey, cricket, football and rugby are a short distance away. The University also has a brand new swimming pool and sports complex. The impressive design includes a 200 station fitness suite, a sauna and a steam room.

The University also boasts a thriving Student Union with a range of shops, bars and eateries. The Union is renowned for showcasing the latest bands and events. There are also over 200 student societies you can get involved with.

THE CITY

Leeds is a key multi-cultural hub in the North of England with a vibrant mix of culture, commerce and style. It is one of the most exciting and cosmopolitan cities in the UK and many students enjoy their time here so much that they stay on to live and work in the city after graduation.

The city is well known for its shopping and you can find a range of shopping outlets from small boutiques to huge shopping malls. Leeds also offers an extensive choice of places to eat and drink. All culinary tastes are catered for, from Italian to Thai, Caribbean to Vegan. Nightlife in and around the city is also known for its diversity and popularity, offering a range of cafes and vibrant bars and clubs.

Leeds is one of the greenest cities in Britain, with more parkland than any other European city and benefits from being close to the awe-inspiring scenery of the Yorkshire Dales where you can pursue a huge selection of outdoor activities.

WE WELCOME INTERNATIONAL STUDENTS

The University of Leeds is a truly international University. We have links with over 600 institutions worldwide and up to 5,000 international students study with us each year.

We are one of the UK's top universities, world-famous for our teaching and research and situated in the heart of a vibrant and multicultural city.

The University has a dedicated International Centre which will provide support and advice throughout your time at Leeds University. The Centre can provide help from managing your money, to your health and welfare. Visit www.leeds.ac.uk/international for more information.

The School offers **PhD** and **MSc** programmes that you can apply for using a simple online system

THE APPLICATION PROCESS

You can apply online. For information regarding our application process please visit www.chem.leeds.ac.uk/postgraduate-research/how-to-apply

If you submit a paper copy of the application form, please remember to include your signature, so we can proceed with your application – emailed forms are not acceptable on their own. Applicants are encouraged to include a covering letter, CV, academic transcripts and English language certificates (where appropriate).

1. Please ensure you state your areas of research in order of preference on the application form. You are also welcome to indicate specific research projects that particularly interest you.
2. In addition to the application form we require sight of any degree qualifications you may have together with transcripts of your academic records showing detailed marks in courses you have taken.
3. We require two academic references. A reference request form (Word) is available for you to download and pass to your referees from the following website: www.chem.leeds.ac.uk/postgraduate-research/how-to-apply

Once completed your application and references should be sent to:

Research Postgraduate Admissions
School of Chemistry
University of Leeds
Leeds LS2 9JT

All applications are given careful consideration on academic grounds. We can only review your application once we have received all the necessary supporting documents. Suitably qualified applicants may have an interview.

EQUAL OPPORTUNITIES

We welcome applications from students with disabilities. Visit the Equality Service website for more information www.equality.leeds.ac.uk

ENTRY ENQUIREMENTS

The School offers full-time PhD and MSc programmes but also considers applications from those wishing to study on a part-time basis. We welcome applications from all suitably qualified students.

PhD candidates must have, or expect to achieve a first or upper second class degree, or equivalent. For an MSc by Research you must have an upper second class degree. The School also offers taught MSc degrees in Chemical Biology and Drug Design, Chemical Process Research and Development and Polymers and Surface Coatings Science and Technology.

More information on taught MSc programmes can be found on our website at: www.chem.leeds.ac.uk/postgraduate-taught

If you have any questions regarding your eligibility to study please e-mail Postgraduate Admissions at: chmpost@leeds.ac.uk or telephone +44 (0)113 343 6552

Many of our students are supported through the award of fully funded studentships and scholarships

ENGLISH LANGUAGE REQUIREMENTS

If English is not your first language, you will be required to produce evidence of a language qualification before registration as a postgraduate student.

The School of Chemistry will accept the following qualifications and scores:

IELTS: an overall band of 6.0 with no individual skill component below 5.5.

iBT TOEFL (Internet-based Test of English as a Foreign Language): a score of 87 overall with Listening 21; Reading 22; Speaking 23; Writing 21.

FUNDED STUDENTSHIPS

The vast majority of research students are supported through research studentships which cover full payment of UK/EU tuition fees and provide a tax-free stipend of approximately £13,000 per annum. Many research studentships give you the opportunity to choose your research area. The School of Chemistry offers studentships funded through the research councils, charities and the University. Please visit our Project Opportunities pages on our website for more details. In addition, we always have a number of PhD studentships associated with specific research projects fully funded through research council grants, charities and industry. More information on current opportunities can be found at the following website:

www.chem.leeds.ac.uk/postgraduate-research

DOCTORAL TRAINING PROGRAMMES

Doctoral training programmes provide structured PhD training and focus on multi-disciplinary challenges in modern science, with groups of students working as a cohort in a defined scientific area.

Each programme varies in structure, however studentships typically last for four years with opportunities to learn theoretical and experimental skills through lectures and/or laboratory rotations during the first year. PhD projects usually include collaborative supervision.

We actively participate in the following chemistry related doctoral training programmes:

- Astbury Centre Wellcome Trust Funded PhD 4 Year Programme
- Astbury Centre BBSRC Doctoral Training Programme
- Low Carbon Technology Doctoral Training Centre

INSTITUTE OF PROCESS RESEARCH AND DEVELOPMENT (iPRD) CENTRE FOR DOCTORAL TRAINING

Applications are invited for fully funded studentships within the (iPRD) Centre for Doctoral Training.

iPRD offers a four year integrated MSc and PhD degree programme in Chemical Process Research and Development, which spans the chemistry-chemical engineering interface.

Studentships include fees and a maintenance grant of £13,000 (tax free) per annum for UK students. In exceptional cases European and International applicants may be considered for this scheme.

For further information on these studentship opportunities please visit the iPRD website www.iprd.leeds.ac.uk



“Postgraduate life at Leeds has given me the opportunity to participate in new and exciting research concerning the origins of life, teaching me the skills I will need for a career in research”

KATIE MARRIOT 3RD YEAR PhD STUDENT

SCHOLARSHIPS

The University also has a number of competitive scholarship opportunities available. It is advisable to make enquiries as early as you can and apply to all possible funding sources.

Some of the prestigious scholarships on offer include:

- Fully Funded International Research Scholarships that cover full payment of international tuition fees available to non-EU and UK applicants with an outstanding academic record
- University Research Scholarships available to EU and UK applicants with an outstanding academic record
- Endowed Scholarships in areas focused on Cancer, Neuroscience, Cardiovascular diseases and Colour Science
- Access to Learning Fund – funds are available for full-time and part-time UK students in financial hardship

Find out more at the Scholarships website: www.scholarships.leeds.ac.uk

FEES

The full-time Postgraduate UK / EU fees for 2012-13 are £3,732. As a general guide, fees for full-time international students for 2012-13 are £15,600. Please contact the School to confirm details. Fees for many of our students are paid through awards outlined above. The School also accepts self-funded applicants and candidates who secure independent scholarships onto our research degree programmes.

ACCOMMODATION

In addition to a wide variety of private sector accommodation to suit every budget, the University has its own residences. All University accommodation is within easy reach of the University and city centre.

If you are a full-time international Masters or research postgraduate student (i.e. you pay fees at the international rate) you are guaranteed a single place in University accommodation during your first year at Leeds, provided that you apply for accommodation following our online procedure. For further information please visit www.leeds.ac.uk/accommodation



Our staff are recognised through the award of numerous national and international prizes and fellowships



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Our staff collaborate extensively with multinational industries and research organisations and have collaborative links that span the globe

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