

Course Information Sheet for entry in 2023-24: DPhil in Inorganic Chemistry



About the course

This is a research degree leading to the award of a DPhil in Inorganic Chemistry.

Inorganic chemistry research at the University of Oxford covers the entire spectrum of the discipline, with subject areas including:

- Synthetic solid-state chemistry
- Electronic properties of solids
- Computational materials chemistry
- Order and disorder in functional materials
- X-ray crystallography
- Homogeneous and heterogeneous catalysis
- Synthetic main-group chemistry
- Synthetic organometallic chemistry
- Coordination chemistry of the *f* elements
- Supramolecular chemistry
- Energy materials chemistry
- Functional molecular interfaces
- Computational inorganic chemistry
- Chemical biology
- Design of anti-cancer drugs
- Genetic modification of iron haem enzymes
- Protein dynamics
- Electron spin resonance spectroscopy
- Magnetic field effects.

The major focus of the course is the research project, and a typical week will therefore be devoted mostly to lab work (in its broadest definition), supplemented by literature surveys, preparation of reports and group meetings. During the first year, in addition to starting work on your research, you will be encouraged to follow training courses chosen from the vast number offered by the department and the Mathematical, Physical and Life Sciences (MPLS) Division Graduate School, and it is recommended that you attend at least three of these. The department also hosts a variety of seminar series, some of which feature invited speakers from around the world.

Supervision

The allocation of graduate supervision for this course is the responsibility of the Department of Chemistry and it is not always possible to accommodate the preferences of incoming graduate students to work with a particular member of staff. Under exceptional circumstances a supervisor may be found outside the Department of Chemistry.

You will join a research group supervised by one or more members of the Department of Chemistry, sometimes in collaboration with other departments. You should normally expect to meet your supervisor or a senior member of the research team on a weekly basis. In the case of students who require specific help to adjust to an academic programme or to a new range of skills, the supervisor will work with them to ensure that they have additional support.

Assessment

You will be admitted as a Probationary Research Student and at the end of the first year you will undergo a Transfer of Status assessment, which is to ensure that you have the potential to gain a doctorate. This assessment will be made on the basis of a report and oral examination.

Research proceeds with quarterly reporting throughout the next two years, and there is the opportunity to follow further courses during this period. By the end of the third year you must pass the Confirmation of Status assessment, which is to ensure that you are on track to complete the thesis within a reasonable time.

The degree is examined by thesis and oral examination by two examiners, one of whom is normally from Oxford and one from elsewhere.

Changes to courses

The University will seek to deliver this course in accordance with the description set out above. However, there may be situations in which it is desirable or necessary for the University to make changes in course provision, either before or after registration. These may include significant changes made necessary by a pandemic (including Covid-19), epidemic or local health emergency. For further information, please see the University's Terms and Conditions (<http://www.graduate.ox.ac.uk/terms>) and our page on changes to courses (<http://www.graduate.ox.ac.uk/coursechanges>).

EPSRC iCASE studentships

The Department of Chemistry, supported by EPSRC, iCASE and a number of industrial partners, is offering two, fully-funded studentships in a range of research areas. Both projects are offered on both a full-time and part-time basis.

The studentships include the opportunity to undertake a work placement with the industrial partner listed for each project. To comply with EPSRC Industrial Case conditions, no application fee will be charged to apply for any of the projects listed below.

More information about iCASE studentships can be found on the UKRI website.

The *How to apply* section of this page provides further information about the application process and links to the application form.

Project 1:

More sustainable biocatalytic imine reductions to chiral amines with hydrogen-driven NADPH recycling operated in batch and continuous flow

Supervisor and Industrial Partner

Professor Kylie Vincent and AstraZeneca

Description

Biocatalytic imine reductions are a valuable component in the synthetic tool-box for synthesis of chiral amines for pharmaceuticals or other fine chemicals. Imine reductase enzymes depend on nicotinamide cofactors, usually NADPH, for hydride transfer to an enzyme-bound imine substrate, and conventional approaches for regenerating NADPH during these reactions usually rely upon glucose as the reductant. Use of the C6 sugar for a single hydride-transfer makes the overall process atom-inefficient in contrast to metal-catalysed hydrogenations where H₂ is added across the C=N double bond giving no by-product. This project exploits approaches that fall neatly between these alternatives, offering the chiral and functional-group selectivity of biocatalysis alongside the atom-efficiency of H₂-driven hydrogenation reactions. As well as replacing glucose by H₂ as atom-efficient reductant, our approach also avoids a pH change associated with the cofactor recycling step, thereby simplifying the process chemistry. In conjunction with industrial partner AstraZeneca, we seek to develop a robust platform for more sustainable, H₂-driven NADPH recycling to support application of imine reductases for generation of chiral amines.

Project 2:

Sustainable Polymer Chemistry – Designing Water Soluble and Degradable Polymers

Supervisor and Industrial Partner

Professor Charlotte Williams and Unilever

Description

The thesis will examine the chemistry of sustainable polymers. The focus is to synthesise new polyesters, polycarbonates and copolymers using monomers derived from renewable resources and carbon dioxide. Using recently developed catalysis methods from the Williams team, including carbon dioxide/epoxide and switchable polymerization methods, monomers such as lactones, lactide, cyclic carbonates, epoxides, anhydrides and carbon dioxide will be selectively polymerized. The project will focus on understanding the potential to exploit mixtures of monomers to make block sequence selective polymers and oligomers. A particular focus will be on the production of hydrophilic or amphiphilic polymers by exploiting natural chemical functionalities (i.e. functional groups found in Nature). The new materials will be fully characterized, including using spectroscopy, thermal and mechanical methods, and their properties in aqueous dispersions and solutions will be assessed. In collaboration with scientists at Unilever the materials will be assessed for applications in their

products. The stability and ability to trigger biodegradation of the polymers will be explored. The overall goal is to design and prepare new polymers to displace currently used pervasive petrochemicals in liquid formulations. The PhD will be aligned with the recently funded EPSRC Prosperity Partnership Clean Future which supports postdoctoral researchers and students in the Williams research team at the University of Oxford. For further information on research in the Williams research team, see the departmental website.

Funding for EPSRC iCASE studentships

iCASE students receive funding for a full EPSRC studentship for four years (full time equivalent). If you submit an eligible application for a studentship and you are successful, you will receive a stipend of at least £17,668 to cover living costs and expenses and your course fees will be paid on your behalf for the duration of your fee liability. More information about iCASE studentships can be found on the UKRI website.

Costs

Annual fees for entry in 2023-24

Fee status	Annual Course fees
Home	£8,960
Overseas	£29,700

Information about course fees

Course fees are payable each year, for the duration of your fee liability (your fee liability is the length of time for which you are required to pay course fees). For courses lasting longer than one year, please be aware that fees will usually increase annually. Information about how much fees and other costs may increase is set out in the University's Terms and Conditions (<http://www.graduate.ox.ac.uk/terms>).

Course fees cover your teaching as well as other academic services and facilities provided to support your studies. Unless specified in the additional cost information (below), course fees do not cover your accommodation, residential costs or other living costs. They also don't cover any additional costs and charges that are outlined in the additional cost information.

Graduate students who have reached the end of their standard period of fee liability may be required to pay a termly University and/or a college continuation charge.

The University continuation charge, per term for entry in 2023-24 is £572, please be aware that this will increase annually. For part-time students, the termly charge will be half of the termly rate payable by full-time students.

If a college continuation charge applies (not applicable for non-matriculated courses) it is likely to be in the region of £100 to £600 per term. Please contact your college for more details.

Additional cost information

There are no compulsory elements of this course that entail additional costs beyond fees (or, after fee liability ends, continuation charges) and living costs. However, please note that, depending on your choice of research topic and the research required to complete it, you may incur additional expenses, such as travel expenses, research expenses, and field trips. You will need to meet these additional costs, although you may be able to apply for small grants from your department and/or college to help you cover some of these expenses.

Living costs

In addition to your course fees, you will need to ensure that you have adequate funds to support your living costs for the duration of your course.

The likely living costs for 2023-24 are published below. These costs are based on a single, full-time graduate student, with no dependants, living in Oxford. We provide the cost per month so you can multiply up by the number of months you expect to live in Oxford.

Likely living costs for one month

	Lower range	Upper range
Food	£300	£470
Accommodation	£715	£860
Personal items	£180	£305
Social activities	£40	£90
Study costs	£35	£80
Other	£20	£35
Total	£1,290	£1,840

Likely living costs for nine months

	Lower range	Upper range
Food	£2,700	£4,230
Accommodation	£6,435	£7,740
Personal items	£1,620	£2,745
Social activities	£360	£810
Study costs	£315	£720
Other	£180	£315
Total	£11,610	£16,560

Likely living costs for twelve months

	Lower range	Upper range
Food	£3,600	£5,640
Accommodation	£8,580	£10,320
Personal items	£2,160	£3,660
Social activities	£480	£1,080
Study costs	£420	£960
Other	£240	£420
Total	£15,480	£22,080

When planning your finances for any future years of study at Oxford beyond 2023-24, it is suggested that you allow for potential increases in living expenses of 5% or more each year – although this rate may vary significantly depending on how the national economic situation develops.

More information about how these figures have been calculated is available at www.graduate.ox.ac.uk/livingcosts.

Document accessibility

If you require an accessible version of the document please contact Graduate Admissions and Recruitment by email (graduate.admissions@admin.ox.ac.uk) or via the online form (<http://www.graduate.ox.ac.uk/ask>).