



University  
of Glasgow

# Chemistry

## Undergraduate study



The University is part of the Scottish research pooling initiative, ScotCHEM. This is a major collaborative venture for the sharing and enhancement of resources for chemistry research in Scotland.



## Choose Glasgow

### Introduction

The University of Glasgow is rated as one of the top 100 universities in the world (*Times Higher Education QS World University Rankings*).

All of our students study for degrees that are recognised and respected by employers throughout the world, but we can guarantee you will receive a lot more besides. Some of the key benefits of student life at Glasgow are

#### Satisfied students

Our students report high levels of satisfaction with their studies. According to the independent National Student Survey, an impressive 90% of the University's final-year students rated themselves as satisfied with their course in 2009, well above the national average of 81%.

#### Flexible course choices

We offer more than 900 degree programme combinations and our flexible system allows you to study a broad range of subjects during your time at university and, in many cases, makes it possible to delay choosing specialist subjects until the end of second year.

#### Teaching based on research

Glasgow is a research-led university, which means that you will be taught by academics at the forefront of knowledge in their subject areas.

#### A student experience worth having

You will take away more than a degree from Glasgow. Over the last 550 years our students have built up a fantastic array of initiatives to keep you engaged, entertained and energised. The result is a student experience to be proud of. We have

- four award-winning student media teams
- over 100 clubs and societies
- two undergraduate student unions
- sporting facilities for all levels of fitness
- a study abroad and exchange programme that offers opportunities to study across the world as part of your undergraduate degree.

*'Glasgow is an exciting place, rich in culture, groaning with history, but most of all I found it to be welcoming.'*

Laura Sayers graduated in 2001 and is a BBC Radio 1 producer

### Our campus

The University's compact main campus combines grand historical buildings with up-to-the-minute facilities. It's centred on a neo-gothic building with a spire offering breathtaking views across the city.

### Come and visit us

#### Open Day

[www.glasgow.ac.uk/openday](http://www.glasgow.ac.uk/openday)

In June and September we hold an Open Day to allow you, your family and teachers to visit us on campus and see a little of the city.

Open Day allows you to speak to academic staff, find out more about courses, tour the facilities, visit student accommodation and see for yourself what life would be like as a student at Glasgow. If you have a long way to travel you can also stay in one of our student residences.

#### Alternative visiting arrangements

Open Day is the best way for you to get a comprehensive picture of what being a student here would be like. However, if for any reason you can't make it on that date, then we will be able to make alternative arrangements. To find out more visit: [www.glasgow.ac.uk/afternoonvisits](http://www.glasgow.ac.uk/afternoonvisits)

#### Applicants' Visit Day

At Glasgow we go the extra mile. If you receive an offer of a place at Glasgow, we will invite you to visit us before making your final decision. Applicants' Visit Day usually takes place in March. Details will be sent to you together with your offer of a place.

### Where can I find out more?

Visit our website for more information: [www.glasgow.ac.uk/chemistry](http://www.glasgow.ac.uk/chemistry).

If you have any questions about any aspects of our programmes you can send them to: [ug-enquiries@chem.gla.ac.uk](mailto:ug-enquiries@chem.gla.ac.uk).

We offer **employability and professional development training** to all our students in years one and two of their degrees.



[www.glasgow.ac.uk/chemistry](http://www.glasgow.ac.uk/chemistry)

Chemistry is a science with a well-developed theory base, which is central to modern life and which continues to make advances in, for example, new materials, antibiotics, semiconductors and trace analysis. It is the science of molecules and materials:

- how to make them
- how they react and interact
- how to detect, separate and identify them
- how to find their structures and shapes.

## Chemistry

### Degrees: BSc, MSci

#### Typical offer

- Highers** ABBB, preferably with two science subjects
- A-levels** ABB, preferably with two science subjects
- IB** 32 points including two science subjects

For entry requirements visit [www.glasgow.ac.uk/undergraduate/degrees/entryrequirements](http://www.glasgow.ac.uk/undergraduate/degrees/entryrequirements)

Many of our degrees have common first and second year chemistry courses. You make your choice of degree at the end of your second year. It is also possible for you to study for a Joint Honours degree, combining one of the chemistry options with another subject.

#### What can I expect in first year?

In your first year you will study Chemistry 1 with two other subjects. Chemistry 1 involves lectures and problem sessions or tutorials in a one-hour period each day, together with a three-hour laboratory each week. The topics covered include:

- The periodic table and main group chemistry
- Transition metal chemistry
- Organic chemistry
- Chemical kinetics
- Theoretical chemistry
- Chemical energy changes
- Aqueous equilibria and pH
- Macromolecules.

#### What can I expect in second year?

In second year half your time will be spent studying chemistry and half is spent studying another subject. The chemistry at Level-2 builds on the first year course and involves the following topics:

- Molecular thermodynamics
- Organic stereochemistry
- Quantum mechanics, chemical bonding and symmetry
- Organometallic chemistry
- Main group chemistry
- Enols and enolates
- Spectroscopy
- Kinetics
- Aromatic chemistry
- Coordination chemistry

- Organic synthesis
- Biophysical chemistry
- Applied organic chemistry.

You will attend two three-hour laboratory sessions per week. These reinforce and extend the material in lectures and allow you to develop practical skills. Small-group tutorials are also held every two weeks with a member of staff. Finally, we have two interactive teaching units that concentrate on ethical, environmental and financial issues in chemistry. These are designed to help you develop team working and presentation skills.

#### What happens next?

If you successfully complete the courses in first and second years, you may progress to Honours. At the end of second year you decide what degree programme to follow for your third and fourth years and, in the case of the MSci programmes, for fifth year as well. The MSci degree is ideal if you intend to pursue a career as a professional chemist. If you do not wish to study to Honours level, there is provision for graduating at the end of Level-3 with a designated degree.

Each degree programme has a set of core courses that all students must take. In addition, you select a number of optional courses from topics at the frontiers of chemistry. These optional courses are subject to revision and will change as chemical research topics develop.

In third year, our laboratory classes help you gain the skills in modern chemistry techniques. The chemistry courses contain a roughly equal mix of organic, inorganic and physical chemistry, although you specialise in the optional courses.

The topics covered in the chemistry degree programme at Level-3 include:

- Mechanistic organic chemistry
- Organic synthesis
- Controlling stereochemistry
- Sugars and steroids

### Faster Route programmes

These might be of interest to you if you: are highly qualified at A-level or Advanced Higher level in relevant subjects; are motivated and keen to pursue an Engineering/Science degree with maximum concentration on the subject; wish to complete your degree faster than the normal time frame. For further information about entry requirements visit [www.glasgow.ac.uk/undergraduate/degrees/entryrequirements](http://www.glasgow.ac.uk/undergraduate/degrees/entryrequirements)



‘My course has amazing teaching, fantastic facilities and the experience is one I am never going to forget.’

**Julia Kennedy**, Chemical Physics student

## Choose Glasgow

- Reactive intermediates
- Main group chemistry
- Coordination chemistry
- Heterogeneous catalysis
- Organometallic chemistry
- Solid state chemistry
- Bio-inorganic chemistry
- Biomolecular interactions
- Quantum mechanics and symmetry
- Kinetics
- Spectroscopy
- Diffraction
- Photochemistry.

In your fourth year, you will do an extensive research project in our well-equipped research laboratories. You will also study a mix of core chemistry courses and options.

Core courses include:

- Organic spectroscopy
- Advanced organic synthesis
- Heterocyclic systems
- Colloids and macromolecules
- Statistical thermodynamics
- Metals in medicine
- Inorganic mechanisms
- Homogeneous catalysis.

Optional courses for chemistry currently include:

- Pericyclic reactions
- Polymers in organic chemistry
- Vibrational spectroscopy
- Metal oxides as advanced materials
- Biomolecular separations
- Electrochemistry.

It is possible to do an MSci in this subject involving a total of five years. The MSci degree offers the opportunity to spend a year in industry or doing research in a European university before returning for your final year of study.

### What are my career prospects?

A chemistry degree provides not only knowledge of the subject but also training in taking decisions, analysis of problems, communication, calculations, use of computers, recognition of patterns, abstract ideas and symbolism, precision and awareness of risks. Our graduates are employed as chemists working in research, process development or analysis, as well as in management, marketing, environmental control, patents or finance.

## Chemical Physics

**Degrees: BSc, MSci**

**Typical offer**

- Highers** ABBB, preferably with two science subjects
- A-levels** ABB, preferably with two science subjects
- IB** 32 points including two science subjects

For entry requirements visit [www.glasgow.ac.uk/undergraduate/degrees/entryrequirements](http://www.glasgow.ac.uk/undergraduate/degrees/entryrequirements)

Chemical physics is concerned with electrons, nuclei, atoms and molecules in all states of matter, and how they interact with their environment. This degree programme covers the area in which chemistry and physics overlap.

### What can I expect in first and second years?

In first and second years you will study chemistry, physics and mathematics, as for students intending to study chemistry or physics.

### What happens next?

If you successfully complete the courses in first and second years, you may progress to Honours. In your third and final years you will study physical chemistry, including nanoscience and some inorganic chemistry, together with physics courses, including electromagnetism and others.

Your final year research project can be taken in physics or chemistry.

MSci students can choose to spend a year's placement working in a relevant industry.

This degree programme is recognised by the Royal Society of Chemistry and accredited by the Institute of Physics.

### What are my career prospects?

Our graduates are employed in industry, commerce, government research and education. Many graduates proceed to research leading to a higher degree.

## Chemistry with Forensic Studies

**Degrees: BSc, MSci**

**Typical offer**

- Highers** ABBB, preferably with two science subjects
- A-levels** ABB, preferably with two science subjects
- IB** 32 points including two science subjects

For entry requirements visit [www.glasgow.ac.uk/undergraduate/degrees/entryrequirements](http://www.glasgow.ac.uk/undergraduate/degrees/entryrequirements)

This programme aims to produce professional chemistry graduates who have knowledge of some aspects of forensic and analytical science. It should be noted that if you wish to pursue careers in the forensic area you will also be required to do a postgraduate degree in forensic science. This degree provides you with the suitable background knowledge that will enable you to decide whether you wish to pursue forensic science as a career.

### What can I expect in first and second years?

In first and second years you will study the core chemistry courses for Level-1 and Level-2 described above.

### What happens next?

If you successfully complete the courses in first and second years, you may progress to Honours. In third year, forensic analytical laboratories replace some of the chemistry laboratories. Specific courses you will study in your final two years include:

- Forensic analysis
- Chromatography
- Inorganic analytical techniques
- Forensic analytical case studies.

Your final year project can be done in the forensic area. It is possible to do an MSci in this subject involving a total of five years. You will have the opportunity to spend a year specialising in analysis in industry or a forensic laboratory.

‘I went on work placement to Pfizer in Kent, which improved my CV. Now I’m going on to do a PhD, encouraged by the guidance and support I’ve received from staff.’

**Katherine Hamilton-Smith**, MSci Pharmacology

[www.glasgow.ac.uk/chemistry](http://www.glasgow.ac.uk/chemistry)

### What are my career prospects?

Our graduates are employed in the pharmaceutical, petrochemical, catalysis and cosmetic industries and environmental agencies as well as within the commercial sector including careers in banking, finance and management. Some of our graduates have also moved into careers involving patents, law, computing and publishing. Graduates wishing to pursue careers in the forensic area will usually undertake a postgraduate degree in forensic science.

## Chemistry with Medicinal Chemistry

**Degrees: BSc, MSci**

### Typical offer

<b>Highers</b>	ABBB, preferably with two science subjects
<b>A-levels</b>	ABB, preferably with two science subjects
<b>IB</b>	32 points including two science subjects

For entry requirements visit [www.glasgow.ac.uk/undergraduate/degrees/entryrequirements](http://www.glasgow.ac.uk/undergraduate/degrees/entryrequirements)

With the help of various pharmaceutical companies, this degree has been designed to produce medicinal chemists suitably trained to take part in the development of new drugs.

### What can I expect in first and second years?

In first and second years you will study the core chemistry courses for Level-1 and Level-2 described in the Chemistry section.

### What happens next?

If you successfully complete the courses in first and second years, you may progress to Honours. The third year course is identical to the Chemistry course except a course on Medicinal chemistry replaces the course on solid state chemistry.

In your final year a selection of Medicinal chemistry courses replace some of the chemistry courses. You will take:

- Industrial medicinal chemistry (presented by medicinal chemists from a local pharmaceutical company)
- Pharmacology
- Chemical biology.

It is possible to do an MSci in this subject involving a total of five years. You will spend a year in the pharmaceutical industry or doing research in a European university before returning for your final year of study.

### What are my career prospects?

Our graduates are employed in research in the pharmaceutical industry, forensic science and related areas. Many graduates also go on to postgraduate study or directly into employment in the chemical industry.

## The MSci degree

MSci placement degrees are offered in:

- Chemistry
- Chemistry with Medicinal Chemistry
- Chemistry with Forensic Studies
- Chemical Physics.

These are five-year degrees. Your fourth year is spent on placement either in industry, a research institute or in a European university. For an industrial placement you will do a research project supervised by both an industrial and academic supervisor. A wide range of industries take placement students both here and abroad. The European placements can be in France, Germany, Spain, Holland, Italy or the Czech Republic.

You will write a report on your placement year, which is assessed as part of your final degree classification. You will also give a presentation on your placement when you return in fifth year.

In the year before going on placement you will be given additional training in the following topics:

- Applying for placements
- Intellectual property and ethics
- Presentation skills
- Biotransformations
- Frontiers of crystallography
- Protein structure.

The final year of the MSci programme involves advanced topics, many of which are separate from the BSc Honours final year lectures. MSci students also do a longer and more advanced final year research project. In the fifth year the MSci courses you will take include:

- Processing chemical data
- Heterogeneous catalysis
- Enzyme catalysis in organic chemistry
- Supramolecular architecture and self assembly

- Reactivity of organometallic compounds
- Asymmetric synthesis
- Nmr spectroscopy
- Concepts of electronic structure.

The option courses for MSci students are currently:

- Inorganic materials design
- Organometallics in synthesis
- Modern techniques in surface science
- Photosynthesis
- Advanced retrosynthesis
- Molecular magnetism
- Protein structure and engineering
- Total synthesis of natural products
- Applications of synchrotron radiation.

## Degree combinations

The following degree combinations are designed to produce graduates who specialise in theoretical chemistry.

### Chemistry & Mathematics and Chemistry & Applied Mathematics

**Degree: BSc, MSci**

In the first two years of these degree programmes you will study mathematics and chemistry.

If you successfully complete the courses in first and second years, you may progress to Honours. The third and fourth years involve half of the Chemistry Level-3 and 4 courses with an equal emphasis on organic, physical and inorganic chemistry, together with half of either the Mathematics or Applied Mathematics material.

It is possible to do an MSci in this subject involving a total of five years. You study material taken from the corresponding MSci degree programmes.

### Biology & Chemistry

**Degree: BSc**

This is a three-year BSc. This programme is designed to give you training in both chemistry and biology suitable for taking a postgraduate degree in teaching both these subjects.

In the first two years you study chemistry and biology. In third year you take selected parts of the biochemistry and chemistry degree programmes.

Environmental chemistry borders on biology, earth science and geography, making the **job prospects of chemists excellent**.

## Choose Glasgow

Studying environmental chemistry will provide you with a thorough training in the scientific basis behind environmental topics, allowing you to take an informed and balanced view of major environmental issues.

The need to produce food stocks to meet the demands of an increasing world population is a key problem today. Increases in production on the required scale necessitate a heavy commitment of scientific resources. However, the balance between food production and environmental protection is shifting in favour of the environment.

The same is true of the balance between industrial production and environmental protection, as the legacy of major environmental problems such as global warming, acid rain and water pollution are tackled. In developing countries there is a considerable need for an increase in agricultural production and industrialisation. Much is required of environmental chemists if these advances are not to be at the expense of the local or global environment.

## Environmental Biogeochemistry

**Degree: BSc**

### Typical offer

<b>Highers</b>	ABBB, preferably with two science subjects
<b>A-levels</b>	ABB, preferably with two science subjects
<b>IB</b>	32 points including two science subjects

For entry requirements visit [www.glasgow.ac.uk/undergraduate/degrees/entryrequirements](http://www.glasgow.ac.uk/undergraduate/degrees/entryrequirements)

Environmental biogeochemistry is about water:

- where it comes from
- what is in it
- where it goes to
- how it affects us and other living creatures as it moves around the planet.

In first year you will study courses in chemistry and earth science. You are also encouraged to study environmental science, where you will learn about a wide range of environmental issues taught by staff from different scientific disciplines. In the following year you will study environmental chemistry and earth science.

No single science covers the study of water. Environmental Biogeochemistry addresses this by providing a cross-disciplinary programme drawing on expertise from more than one university discipline.

In the first two years of this programme you will study Earth Sciences alongside the Chemistry courses for Level-1 and Level-2.

Increasingly the constant cycle of water is affected by human activities, adding to the already complex series of reactions which control the availability and quantity of water and hence its environmental and human health consequences. In examining this, we put the emphasis on analytical techniques, with hands on experience of a wide range of equipment. Fieldwork also plays a major part in the degree, examining the natural cycling of water and involving you directly in environmental issues.

In your final year, you will undertake a dissertation, the topic of which you can suggest on the basis of your own interests, and a laboratory project involving independent fieldwork, assessing water and sediment quality issues, and the likely consequences of natural or human-related changes.

## Environmental Chemistry & Geography

**Degree: BSc**

### Typical offer

<b>Highers</b>	ABBB, preferably with two science subjects
<b>A-levels</b>	ABB, preferably with two science subjects
<b>IB</b>	32 points including two science subjects

For entry requirements visit [www.glasgow.ac.uk/undergraduate/degrees/entryrequirements](http://www.glasgow.ac.uk/undergraduate/degrees/entryrequirements)

In the first two years of this programme you will study Geography alongside the Chemistry courses for Level-1 and Level-2.

If you progress to Honours you will take a series of specialist courses. No single science covers the aspects taught in this programme. This is addressed by drawing on expertise from more than one University discipline. We provide an integrated approach to the physical environment via a study of:

- the structure of surface environments
- their dynamics
- their management for the sustainable use of resources.

There is a strong emphasis on analytical skills, with a research project in environmental chemistry being undertaken in your final year as well as a dissertation in geography. Fieldwork is an important part of the work of both disciplines. Also included in the course is training in skills such as:

- data handling
- report writing
- oral presentation.

### Can I study abroad?

The University has an extensive range of student exchange programmes with universities in Europe, North and South America, Canada and Australia. If you opt to study for an MSci, your placement year can be taken abroad.

### Studying in Europe

You can study at more than 250 universities all over Europe under the Erasmus programme. Erasmus is an EC exchange programme that enables students in 31 European countries to study for part of their degree in another European country. Exchanges can last from 3-10 months and study credit is transferred to your home university.

### Beyond Europe

The International Exchange Programme allows you to spend a year at institutions in Australia, Canada, Central & South America, Hong Kong, Japan, Korea, New Zealand, Singapore and the USA. All the institutions teach in English except Chuo University in Japan and those in Central & South America.

**The University holds a Study Abroad Fair every November. Information is also available on our website: [www.glasgow.ac.uk/studying/exchange](http://www.glasgow.ac.uk/studying/exchange).**



‘Scotland at its artsy, riotous, high-octane, good-time best.’

Lonely Planet



## City of Glasgow

### What is it like living and studying in Glasgow?

Named as one of the world’s top ten cities by independent travel guide *Lonely Planet*, Glasgow attracts the largest student population in Scotland. The city’s reputation for friendliness means that wherever you come from, you’ll soon treat it as your second home.

#### Music and nightlife

In an average week Glasgow hosts 123 bands, 72 classical composers, 49 choirs, 38 orchestras and 21 jazz bands. Renowned for discovering acts from Franz Ferdinand to Primal Scream, the city has fantastic venues for live music including King Tut’s Wah Wah Hut – voted UK’s best live venue by listeners of Radio 1 three years in a row.

More than 700 bars, pubs and nightclubs mean no two nights in Glasgow are the same. Whether you’re after a record-breaking 100-foot long bar where everyone can be a barfly (the Horseshoe), or a pub with a log fire, stuffed stags’ heads and kilted staff that’s as appealing as it is unpronounceable (Uisge Beatha), Glasgow has a venue to suit. Dance until you drop at the Subclub, or travel back to 1920s America at the Vegas clubnight on the Renfrew Ferry, it’s up to you.

#### Festivals

At least one festival every month of the year shows Glasgow loves to celebrate. Some of our favourites include Glasgow International Comedy Festival, Celtic Connections folk music festival, Glasgay, Piping Live!, Glasgow Film Festival and Aye Write!, the city’s book festival.

#### Culture

The city of Glasgow owns one of the richest collections in Europe, displayed in 13 museums and art galleries – and admission is free. You are spoilt for choice, with the city’s famous Burrell collection vying for attention beside Scotland’s most visited attraction, the Kelvingrove Art Gallery & Museum, located next door to the University.

#### Sport

The city will host the Commonwealth Games in 2014. Across the world people know Glasgow as home of Celtic and Rangers football clubs, but with no fewer than 27 public fitness centres including swimming pools, running tracks, 11-a-side pitches and tennis courts, you’re guaranteed to find something to get involved with, whatever your level of fitness.

#### Campus culture

Are you craving cosy campus living or do you prefer big city excitement. Whichever is your style, you’ll be impressed by the University’s excellent location in the compact West End. Just two miles from the city centre, with great bus and underground links, the West End has a reputation as the bohemian, trendy and cosmopolitan quarter of Glasgow.

### What our students say

‘Glasgow is such a diverse and vibrant city with lots to offer and a great social scene with a fantastic range of bars, clubs and music venues.’

Alexander Hutchison

‘I chose Glasgow because compared to the other cities I visited it just seemed like a much more lively place. I think the high student population makes it a very young city.’

Elizabeth Ritz

‘The campus at Glasgow is unbelievably beautiful. It’s hard to believe sometimes when walking down busy Byres Road and turning into University Avenue, that this Hogwarts is situated right in the heart of the West End.’

Beverley Simpson

‘Glasgow is very vibrant. The West End is like the village within the city.’

Sarah Gibson

