Chemistry

Degree options in the Faculty of Science

MChem (Integrated Masters Degrees)
Chemistry
Chemistry with External Placement
Chemistry with Medicinal Chemistry
Chemistry with Medicinal Chemistry and External Placement
Materials Chemistry
Materials Chemistry with External Placement

MChem “With” Degrees
Honours in which the majority of the course deals with the first named subject:
Chemistry with French
Chemistry with French and External Placement
Chemistry with Mathematics

MSci (Joint Integrated Masters Degree)
Chemistry and Physics

BSc (Single Honours Degrees)
Chemistry
Chemistry with Medicinal Chemistry
Chemical Sciences
Materials Chemistry
Biomolecular Science (with School of Biology)

BSc (Joint Honours Degrees)
Chemistry and Geology
Chemistry and Mathematics

BSc “With” Degrees
Honours in which the majority of the course deals with the first named subject:
Chemistry with French
Chemistry with French (With Integrated Year Abroad)

Entrance Requirements

Obtaining the following grades will not guarantee you a place as we consider all aspects of every application, including the Personal Statement.

First Year Entry
SQA Highers: AAAB (including A in Chemistry)**
GCE A-Levels: AAB (including A in Chemistry)
International Baccalaureate Points: 35 including HL6 in Chemistry

Second Year Entry
SQA Advanced Highers: AB (including A in Chemistry) and AB in two other Highers**
GCE A-Levels: AAA (including A in Chemistry)
International Baccalaureate Points: 37 including HL6 in Chemistry

** For BSc and MChem degrees – in addition to Chemistry, one further Higher must include Mathematics, Biology, Computing Science or equivalent, Geography, Geology, Physics, Psychology.
Preference may be given to candidates offering strong science qualifications.

Additional Entrance Requirements may be specified for Joint Honours and Biomolecular Science degrees.

For full Faculty Entrance Requirements, see page 53.

For degrees combining more than one subject, the subject with the higher Entrance Requirements determines the grades you need. You will also need to meet any further subject-specific Entrance Requirements as outlined on their pages.

For further country-specific qualifications and pre-degree foundation programmes see:
www.st-andrews.ac.uk/study/international

Do I need previous knowledge of this subject? – Yes, see above.

Subject enquiries

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www.st-andrews.ac.uk/chemistry
“The School offers multiple opportunities to get involved within the local community through their outreach programme and Communication and Teaching in Science module. The outreach programmes aim to make science fun and approachable for school-aged pupils and allows you to showcase not only your knowledge but your personality. This experience has shown me that you can be the person capable of answering questions instead of just asking them!”

Amber (Dundee, Scotland)

Features

* All laboratory classes are held in state-of-the-art facilities opened in Summer 2010.
* Students in the School thrive with 75% gaining First or 2.1 degree classifications in their final degree.
* Integrated Masters courses can include one-year placements in industry or in leading academic research laboratories in the UK, Europe and North America.
* A variety of Chemistry modules that allow you to exercise flexibility in your course selection.
* Two major degrees are offered, the BSc and the MChem, with a final decision made upon entry into third year.
* A number of Joint Degree programmes (with Mathematics, Physics, French and Geology) are also offered, as is the Biomolecular Science degree that combines Chemistry and Biology.
* There is an active student-based Chemical Society which hosts guest speakers and organises social events throughout the year.
* In the UK Research Excellence Framework 2014, EaStCHEM, the Edinburgh and St Andrews research school for Chemistry, was ranked top in Scotland with 28% of its output rated as ‘world leading’ (4*).
* As a School we pride ourselves on our educational and research achievements and place particular emphasis on offering modern programmes that address the challenges of the twenty-first century.

MChem or BSc?

We offer a range of exciting and stimulating degree programmes that allow students to develop skills in a variety of areas key to the future needs of society. The MChem degree is tailored to the intending professional chemist who plans to enter the chemical sector or carry out postgraduate study upon graduation. This degree gives you the best possible training for a career in chemistry. The course lasts either four (with direct entry into second year) or five years.

The BSc course provides a comprehensive academic and practical training to equip graduates for a wide spectrum of careers whether in science-based industries or other fields such as teaching, management or finance. The course lasts for three years (with direct entry into second year) or four years.

Direct entry into second year

It is possible to enter directly into the second year of study, resulting in either a four-year MChem or a three-year BSc. This option is offered to students with excellent Advanced Higher, A-Level or IB qualifications. For Joint Degree subjects, entry into second year is less straightforward as requirements must be met for all subjects involved. The Chemistry and Physics MSci degree has no direct entry to second year due to the number of pre-Honours modules needed in this programme as well as timetabling issues that result. We would be delighted to discuss the possibility of direct entry into the second year with any prospective students.

What will I study?

Chemistry is a vibrant and exciting central science that interfaces with biology, physics, mathematics, medicine and geology, and we offer appropriate modules highlighting the importance of these interfaces. It is fundamental to many important sub-disciplines such as biochemistry, molecular biology, nanotechnology and atmospheric science in which we also offer specialised teaching. Everything around us involves Chemistry, from the making of new materials to understanding biological systems, the food that we eat, the medicines which keep us healthy, ensuring the purity of the water we drink and the air that we breathe. The chemical and allied industries – fuels, pharmaceuticals and fragrances – are the most important manufacturing industries to the UK economy, recording trade surpluses of more than £4.8 billion each year. These industries employ large numbers of chemists in research, development, sales, marketing and management. The intellectual training (i.e. numeracy and problem-solving skills, team work, communication) obtained in studying for a degree in Chemistry is also ideal for a career in areas outside the chemical sciences.

“It was quite a challenge going straight from college directly into second year Chemistry. However, the excellent teaching standards and world-class facilities really helped me cope with the demands of degree-level Chemistry. What’s more, living in a town with such an eclectic mixture of stunning surroundings, quaint traditions and diverse cultures really makes me glad I chose to study at St Andrews.”

Cindy (Plymouth, Montserrat, West Indies)
Indicative programme information

First Year
This consists of six modules and you will study three modules of chemistry and three other modules, one of which may be a further chemistry option. Modules include: Inorganic and Physical Chemistry (CH1401 and CH1402); Organic and Biological Chemistry (CH1601); optional module: The Impact of Chemistry (CH1301). For the remainder you can choose modules from a wide variety of subjects and venture into something completely new.

Second Year
Second year consists of four modules. You will take three chemistry modules and one module from another School. Modules include: Inorganic Chemistry (CH2501); Organic Chemistry (CH2601); Physical Chemistry (CH2701). If you enter directly into second year, you will also complete a short introductory module covering essential 1000-level material and an introduction to laboratory work.

After completing the modules in first and second year you decide on your final degree choice (e.g. MChem or BSc) and enter the Honours class.

First two years of Chemistry degrees*

<table>
<thead>
<tr>
<th>Semester 1</th>
<th>Semester 2</th>
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<tbody>
<tr>
<td>CH1401 (core)</td>
<td>CH1601 (core)</td>
</tr>
<tr>
<td>CH1301 (optional)</td>
<td>CH1402 (core)</td>
</tr>
<tr>
<td>20-credit module in any subject</td>
<td>20-credit module in any subject</td>
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Second Year
Four modules each of 30 credits
– three core Chemistry modules: CH2501 Inorganic Chemistry 2
CH2601 Organic Chemistry 2
CH2701 Physical Chemistry 2

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<th>Semester 1</th>
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<tr>
<td>CH2501</td>
<td>CH2601 and CH2701 (Joint Degrees: one of CH2601 or CH2701 and an additional module from another subject)</td>
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<tr>
<td>30-credit module in any subject</td>
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Honours (third, fourth and fifth years)
In the Honours years you will study a combination of compulsory and optional modules, depending upon your degree choice. For the MChem programmes there are opportunities to apply for an external placement. Both BSc and MChem students will undertake at least two research projects in one of our highly-rated research groups.

Sample Honours module titles:
- Organometallic Chemistry
- Advanced Ligand Design
- Mechanism in Organic Chemistry
- Carbohydrate and Nucleic Acid Chemistry
- Statistical Mechanics and Computational Chemistry
- Blockbuster Solids
- Energy Conversion and Storage
- Mini Chemistry Group Project
- Individual Chemistry Research Project

Integrated Masters (MChem) Degrees
The following degrees are also available as BSc Honours degrees.

Chemistry
Initially, you will study core Chemistry modules. In later (Honours) years you will study both core, compulsory modules reflecting key areas of chemistry and also more specialist modules chosen from a diverse range of chemistry topics. The “Chemistry” degree provides you with a very broad chemical knowledge; alternatively you may choose to specialise by selecting one of the degree options outlined below. MChem students may apply to spend their fourth year on industrial placement at a company at the forefront of chemical research and development.

Chemistry with Medicinal Chemistry
Chemistry with Medicinal Chemistry focuses on the important interface of chemistry with biology and medicine. In Honours years the content of this degree consists of modules at the chemistry/biology interface, providing training both in chemistry and biomolecular sciences. The MChem includes the opportunity to apply to undertake a placement of eight to thirteen months’ duration in the pharmaceutical or agrochemicals industry.

Materials Chemistry
Materials chemists seek to understand the interrelationships between the composition, structure, microstructure and properties of solids in order to design and develop new materials for example, semiconductor processing and fabrication; energy and IT; biomaterials; catalyst materials; ‘smart coatings’; and nanotechnology. In Honours years the content of this degree consists of modules at the interfaces of Chemistry, Physics, Engineering and Materials Science. MChem students have the opportunity to apply to undertake a placement in their fourth year; all students will undertake a research project which can be undertaken in one of our materials-related research groups.

Chemistry with French
We offer both four-year BSc and five-year MChem Chemistry with French degrees giving you the opportunity to study Chemistry whilst simultaneously enhancing your proficiency
“The flexible degree structure at St Andrews, which even gives the opportunity for external placement, allows you to really focus on the subjects you are interested in and provides a unique learning experience. Lecturers are very friendly and always approachable, and the focus on practical chemistry during the whole degree greatly develops laboratory skills. The fact that it is an international School, in a student-driven town just adds to the overall experience.”

Daniel (Moralzarzal, Madrid, Spain)

with French. In each case, there is an option to apply to spend an integrated year in a French-speaking country (e.g. France and parts of Belgium, Switzerland and Canada).

Chemistry with Mathematics
This degree (MChem only) allows students to incorporate Mathematics content in their Honours years.

Single Honours BSc Degrees

Biomolecular Science
St Andrews has a world-class research record in working at the interface between chemistry and biology in areas including new treatments for flu, tropical diseases and cancer. The degree programme interlinks chemistry, medicine and biology and builds on our research strength in this area. Its aim is to equip students with the skills required for modern biomolecular and biotechnology industries. Students will gain expertise in chemical synthesis, enzyme kinetics, structural biology and molecular biology. The degree offers a unique opportunity to blend modules from Chemistry and Biology throughout all four years. The first two years consist of a common core of subjects in biochemistry and chemistry; the third and fourth years specialise in modules that balance chemistry and biology.

Chemical Sciences
This chemistry-based programme offers more flexibility to study some modules in the Honours programme in a range of other subjects. These can be other sciences, social science or business-related subjects.

Study beyond St Andrews
In 2016 - 2017, as an integrated part of the MChem courses, the School of Chemistry will assist students in applying for eight- to thirteen-month placements in leading industrial research laboratories in the UK, Europe and North America. Typically, you may join a research and development group within a company and receive a salary for the duration of your placement. It is also possible for the placement to be carried out in an overseas academic institution. In 2016 - 2017 the School of Chemistry will have exchange links with the University of Bonn and the Ecole Nationale Supérieure de Chimie de Lille (ENSCL). For options available during your intended period of study, see:

www.st-andrews.ac.uk/studyabroad/outgoingstudents

For further information about eligibility, the application and selection process, and costs involved, please see:

www.st-andrews.ac.uk/studyabroad

An alternative option is the St Andrews Abroad programme. For more information see page 46.

Typical class sizes and teaching information

First Year: lectures 90 - 160, labs 20 - 40, tutorials 6 - 10
Second Year: lectures 80 - 90, labs 40 - 50, tutorials 5 - 7
Honours: lectures 10 - 60, labs 50 - 60, tutorials 6

Lectures are typically supported by small group tutorials and students very quickly feel that they are valued and become an integral part of the School. All of our lecture courses have web-based support materials and additional teaching support is given in selected topics, for example mathematics, as we recognise that there is a wide diversity in the background of the students entering our chemistry programmes.

Typical methods of assessment
For all our 1000- and 2000-level modules the assessment is made up of 60-70% written examinations combined with 30-40% coursework covering laboratories, tutorials and transferable skills exercises. For 3000-, 4000- and 5000-level modules, the assessment is either by written examination in the case of lecture-based modules, or coursework including written reports, oral presentations and oral examinations for laboratory, workshop and research project modules.

RSC Accreditation
All MChem degree programmes are accredited by the Royal Society of Chemistry (RSC), as are five of our BSc programmes: Chemistry, Chemistry with Medicinal Chemistry, Chemical Sciences, Chemistry with French, Chemistry with French (WIYA).

Careers

Chemistry graduates have never been more in demand and they are keenly sought by major companies but there are also exciting opportunities in a new generation of innovative grassroots companies. Our chemists follow a diverse range of careers (see below), as employers recognise the quality of the training encountered in a Chemistry degree. St Andrews Chemistry graduates are highly employable and have gone on to find success in a wide variety of careers in industry and business including (amongst many others):

• Professional chemists in the chemical and pharmaceutical industries
• Teachers
• Forensic scientists
• Various careers in the food industry (including brewing)
• Management consultancy
• Marketing and advertising
• Patent lawyers
• Journalism and the media
• Finance (Accountants and Investment bankers)

Our recent graduates are engaged in many diverse roles, including as an intern at the European Patent Office, as a research scientist at a company involved in enhanced oil recovery in western Canada, as a pharmaceutical development scientist at Reckitt-Benckiser, as an audit assistant at KPMG and as a regional liaison officer for the Royal Society of Chemistry.


See also page 36 for details of the University’s Careers Centre.