Kent is one of the UK’s leading universities and is ranked among the top 20 universities in the UK in The Guardian University Guide 2014. All of our academic schools produce world-class research, and Kent is rated as internationally excellent, leading the way in many fields of study. Kent’s School of Physical Sciences offers a dynamic and diverse environment for your studies.

Chemistry is central to understanding the world around us and the UK has world-leading research expertise across the breadth of this subject. This enables the UK to be a key player both in advancing chemical knowledge and in addressing key societal challenges in areas including human health and meeting the world’s increasing energy demands.

World-leading research
Research within the School of Physical Sciences (SPS) at Kent was highly rated in the most recent national Research Assessment Exercise; our Functional Materials Group was ranked second in their assessment unit. With seven new research active academic staff members, we have injected additional vitality and diversity into the team to ensure our chemistry courses are continually evolving to cover the most topical and industrially relevant advances in the chemical sciences.

At Kent, we give you the opportunity to get involved in our cutting-edge research. In your final year of study, you join a research group and choose a project from the wide range of industrially relevant topics that are available. These may include:

- inorganic chemistry: materials with magnetic, superconducting or insulating properties; inkjet-printable materials for solar cells
- organic chemistry: porous materials for greenhouse gas capture or high-throughput drug synthesis; self-assembly of polymers for display devices and drug delivery
- physical chemistry: heavy metal extraction from soil; radio-pharmaceuticals for site specific imaging
- theoretical and computational chemistry: nanomaterials for energy storage, nanomedicine, catalysis.

Inspirational teaching
Chemistry at Kent is distinctive; our modules are designed to give you a solid foundation of organic, inorganic and physical chemistry and are taught within contextual frameworks of important contemporary issues. These ‘chemistry in context’ modules enable you to develop an appreciation of the application of chemistry within areas such as: medicinal (drug) chemistry, computational chemistry, fires, explosions and disasters and forensic chemistry.

Teaching within the School is highly rated and has done consistently well in the annual National Student Survey. This means that you are
taught by some of the best teachers in the country and also have access to excellent student support and first-class learning resources.

We also have strong collaborative links with a number of industrial partners who participate in our year in industry programme. In addition, the School is a key player in several international research networks.

**Flexible entry levels**

A Foundation Year course is available for students who do not have the appropriate background for direct entry into the standard three-year degree programme. The Foundation Year, which includes lectures in chemistry and mathematics, together with practical laboratory classes, is taught entirely on the Canterbury campus, and successfully caters for students with a wide range of backgrounds and experience. If you pass the Foundation Year programme, you are automatically granted a place on Stage 1 of one of our chemistry degree programmes.

**Professional recognition**

All our chemistry degree programmes have been developed in consultation with the Royal Society of Chemistry (RSC).

**Supportive academic community**

We want our students to feel that they are part of the academic community at Kent, and welcome the contributions they make. When they arrive, all of our students are assigned a personal tutor, who is available both as an academic guide and for general help with any pastoral issues. The assigned academic will mentor their respective students throughout their degree to ensure a supportive continuity for the duration of the programme.

**A global outlook**

Kent is known as the UK’s European university because of its strong links with top-ranking continental European institutions, our UK locations close to the European mainland and our postgraduate centres in Paris, Brussels, Athens and Rome.

Our student and staff community come from a diverse range of backgrounds and from all over the world, which helps to create a dynamic environment and gives your studies an international context.

**A successful future**

As well as providing a first-rate academic experience, we want you to be in a good position to face the demands of a tough economic environment. During your studies, you will have developed key transferable skills considered essential for a successful career.

For more information on the careers help we provide at Kent, see p6 or visit our Employability web page at www.kent.ac.uk/employability
SUPERB STUDENT EXPERIENCE

Our campus at Canterbury provides a stunning location for your studies and offers first-class academic and leisure facilities.

First-class facilities
Students who choose to study Chemistry have access to an outstanding range of state-of-the-art equipment. There has been a recent investment of £1.8 million, and a further £12.5 million investment has been announced. We have newly refurbished teaching laboratories with first-class equipment, complemented by a well-equipped analytical services lab, which is used for undergraduate teaching and research.

Excellent study resources
The study resources on campus are excellent. The Templeman Library has extensive print and electronic collections specifically aimed at supporting the courses and subject areas taught at Kent. There are also over a thousand PCs on campus and a range of support services for help or advice.

Kent’s Student Learning Advisory Service provides information and advice on all aspects of effective learning and study skills, and is available to all students from the time they arrive at the University.

See www.kent.ac.uk/learning for more information.

International community
Kent has a diverse, cosmopolitan student community with 140 nationalities represented on campus.

Beautiful green campus
Our campus is set in an exquisite location. It has plenty of green and tranquil spaces and is on a hill giving a view of the city of Canterbury and its Cathedral. The campus has its own cinema, theatre and a student nightclub.

Kent has a reputation for being a very friendly university with a cosmopolitan environment. There are many restaurants, cafés and bars on campus as well as a sports centre and gym. Everything you need on campus is within walking distance, including a general store, an off-licence, a bookshop, banks, a medical centre and a pharmacy. From campus, it’s a 20-minute walk or a short bus-ride into town.

Attractive location
Canterbury is a lovely city with medieval buildings, lively bars and atmospheric pubs, as well as a range of shops. The attractive coastal town of Whitstable is close by, and there are sandy beaches further down the coast. London is just under an hour away by train.

DID YOU KNOW?
Canterbury is consistently rated as one of the safest university cities in the UK in The Complete University Guide.
A SUCCESSFUL FUTURE

Kent equips you with essential skills to give you a competitive advantage when it comes to getting a job. We are consistently in the top 20 of graduate starting salaries and, six months after graduation in 2012, only 6% of Kent graduates were without a job or a further study opportunity.

Good career prospects
Our graduates go into areas such as government agencies, consultancies, emergency services, local authorities, contract laboratories, research or further vocational training.

We plan regular employability events with input from local chemical and pharmaceutical industries. These events are designed to inform students of possible career options and to give guidance on CV writing and interview skills.

Gain transferable skills
The skills you gain through the degree also equip you for a range of jobs where the ability to analyse problems and combine disciplinary perspectives is required. Your degree will therefore open up a range of specialised opportunities, without closing off access to more general opportunities.

Careers advice
The University’s Careers and Employability Service can give you advice on how to choose your future career, how to apply for jobs, how to write a good CV and how to perform well in interviews and aptitude tests. It also provides up-to-date information on graduate opportunities before and after you graduate. For more information on how Kent helps you plan for your future career, go to www.kent.ac.uk/employability
CHOOSING YOUR DEGREE PROGRAMME

Not sure which programme to choose? Here’s a quick guide to the chemistry degree programmes we offer.

Chemistry BSc (Hons)
Our distinctive three-year programme covers fundamental chemistry and develops students’ knowledge at the forefront of the field with our ‘chemistry in context’ modules. In your third year, you undertake a mini research project.

Chemistry with a Year in Industry BSc (Hons)
This programme covers the same content as the three-year BSc (above) with the benefit of an industrial placement year between your second and final years, to gain professional experience and enhance employability.

Chemistry MChem
This four-year programme builds an advanced knowledge of contemporary chemistry; year four modules are focused on the diverse range of research interests of the academic staff. In your fourth year, you undertake an extended research project, which represents 25% of the total marks for the MChem degree.

All three programmes prepare you for professional employment or further study.

Teaching and assessment
Laboratory classes emphasise different aspects of the subject and are assessed by written reports. Problem-solving seminars also play an important role in our teaching programme and are usually integrated within the lecture programmes.

Assessment is by examinations and coursework, with coursework marks typically accounting for 30% of your overall degree classification.

Further information
For further information on our degree programmes, please contact:
School of Physical Sciences, Ingram Building, University of Kent, Canterbury, CT2 7NH
T: +44(0)1227 823759
F: +44(0)1227 827558
www.kent.ac.uk/physical-sciences/prospective/undergraduate/chemistry

“The teachers in the School are highly qualified and have very effective ways of teaching difficult chemistry topics in an interesting and easily understood way. The level of support is remarkable – the staff truly care about the students and work their hardest to support them through the degree programmes.”

Rebecca Tanney
Forensic Chemistry
STUDYING AT STAGE 1

Stage 1 is the first year of your degree programme. It provides you with the broad base of knowledge on which chemistry is founded.

All students take the following modules:
- Chemical Reactions
- Chemical Skills
- Computational Skills
- Disasters
- Fundamental Chemistry for Physical Scientists and Bioscientists
- Introduction to Biochemistry and Drug Chemistry
- Molecules, Matter and Energy.

Modules: Stage 1

Chemical Reactions
You are introduced to core scientific chemical concepts, terminology, theory and conventions. Areas covered include: chemical equations and stoichiometry, chemical reactions in solution, reaction kinetics and activation energies, acid and base chemistry, and mathematical tools for chemists. Hands-on laboratory experimentation is a key component of this module. (Lab component.)

Chemical Skills
You complete a set of experiments in a laboratory to develop your knowledge of safety procedures as well as your lab skills. In addition, you study mathematics for chemists, the periodic table and inorganic chemistry of s and p blocks, redox chemistry, computer modelling and writing reports. (Lab component.)

Computational Skills
Computers in chemistry, including computer modelling and molecular graphics, is becoming ever more important. This module equips you with the skills you need in this growing area. The module covers: programming languages, the modular design of programs, the Unix operating system, including file handling, text editors, directories and basic utilities and edit-compile-run cycles. You spend part of your time working in a computer laboratory.

Disasters
Chemistry in context
In this module, you study particular cases in which disasters occur (for example, shipping disasters, the Chernobyl explosion, earthquakes), either as a result of human participation or in the natural course of events. You explore how science is integral to the understanding and mitigation of such events. Note: this module constitutes the writing component required by the Royal Society of Chemistry.

Fundamental Chemistry for Physical Scientists and Bioscientists
This module introduces and revises the basic concepts of organic and bio-inorganic chemistry. You study functional group organic chemistry, reaction mechanisms and spectroscopy of organic molecules. (Lab component.)

Introduction to Biochemistry and Drug Chemistry
Chemistry in context
With an organic chemistry perspective, you cover the fundamentals of biochemistry including enzyme reactions, protein chemistry, DNA, lipids and carbohydrates. The areas are underpinned by chemical phenomena such as thermodynamics and intermolecular interactions. This is followed by exploring the nature of drugs, how they work and are discovered, and their misuse.

Molecules, Matter and Energy
The objectives of this module are to introduce and revise the basic concepts of chemistry, including atomic and molecular structure, properties of gases, liquids and solids, and thermodynamics.
STUDYING AT STAGE 2

Stage 2 is the second year of your degree.

You take the following modules:
- Chemical Identification Techniques
- Inorganic and Materials Chemistry
- Materials and Solid State Chemistry
- Numeracy Skills for Physical Scientists
- Organic Reaction Mechanisms
- Polymeric and Organic Materials
- Spectroscopy and Bonding
- Thermodynamics and Kinetics.

Materials and Solid State Chemistry
The arrangement of atoms and defects in a solid governs its properties. Here, we cover the crystal structures of solid materials, including close-packed structures and simple binary solids. Bonding in solids is discussed, including ionic and molecular crystals, band theory, defects and non-stoichiometry. Zeolite structures, synthesis and applications are covered, as well as transport and reactivity of solids and solid-state reactions. (Lab component.)

Spectroscopy and Bonding
We cover a variety of techniques used to understand the structure, properties and identification of molecules. Areas studied include: electronic transitions in molecules – visible/UV, spectroscopy; calculation of energy levels, quantisation and selection rules; microwave spectroscopy – rotation of molecules, energy levels and transitions; vibrations of molecules – infrared spectroscopy; group theory, molecular orbital theory and Huckel theory. Modelling chemical systems is also covered, including ab initio methods, Hartree-Fock and density functional theory. In practical classes you see the techniques in action. (Lab component.)

Inorganic and Materials Chemistry
You develop your understanding of the periodic table and of the chemistry of d- and f-block elements and their compounds as well as the chemistry of polymers and fibres. You prepare, purify and analyse inorganic compounds using techniques such as ion-exchange chromatography and infra-red and uv-vis spectroscopy in laboratory sessions. (Lab component.)

Numeracy Skills for Physical Scientists
You are trained in quantitative chemical analysis including: trace analysis, quality control, accuracy and precision, probability and statistics. The module is supported by hands-on analytical chemistry laboratory sessions. (Lab component.)

Organic Reaction Mechanisms
You study organic reactions and materials encountered in organic chemistry in depth. In particular, you look at the organic chemistry of functional groups such as alcohols, ethers, carbonyl, amines and alkyl halides. You also look at carbon-carbon forming reactions and strategies for synthesising target molecules. (Lab component.)

Polymeric and Organic Materials
Chemistry in context
Plastics and rubbers are important classes of material. Here, the chemistry of polymeric materials is explored. Specifically, the structure and nomenclature of organic and inorganic macromolecules are covered, as well as polymer synthesis via radicals, ionic molecules and condensation reactions. The physical, chemical and mechanical properties of polymers, including light-emitting polymers and liquid crystals, are also discussed. (Lab component.)

Thermodynamics and Kinetics
The speed (kinetics) and energetics (thermodynamics) of a reaction are of central importance in chemistry. Here, we cover equilibrium constants and predicting the feasibility of reactions, electrochemical cells, colligative properties including elevation and depression of melting and boiling points and zero, first, second and third order reaction kinetics. Experiments help to cement understanding. (Lab component.)
If you are studying on our BSc programmes, Stage 3 is the final year of your degree; for MChem students, Stage 3 is your third year of study.

All students take the following modules:

- Analytical Chemistry
- DNA Analysis
- Fires and Explosions
- Medicinal Chemistry
- Topics in Functional Materials
- Topics in Synthetic Chemistry.

BSc (only)
- Research Project Laboratory

MChem (only)
- Advanced Project Laboratory

**Modules: Stage 3**

**Analytical Chemistry**

Here, you are introduced to a variety of modern techniques used to understand the structure, properties and potential applications of materials. Analytical techniques include: atomic emission/absorption spectrometry, high-performance liquid chromatography (HPLC), capillary zone electrophoresis (CZE), ion chromatography, mass spectrometry and gas chromatography (GCMS), electro-analytical chemistry, optical microscopy, electron microscopy.

**DNA Analysis**

*Chemistry in context*

Here, you are introduced to a variety of advanced chemical techniques within the contextual framework of DNA profiling. You therefore gain not only an understanding of advanced chemistries, but also how they impact upon important areas. Topics include, for example: DNA sequencing, genetic fingerprinting case studies, interpretation of DNA profiles and statistical evaluation of data. (Lab component.)

**Fires and Explosions**

*Chemistry in context*

An excursion into the chemistry of fires and explosions. For fires, we look at combustion, flashpoints and ignition temperatures, while for explosions we study burning and detonation, primary and secondary explosives, analysis of explosive residues and the molecular design of explosives. Kinetics and thermodynamics are used to help you to understand fire and explosion phenomena.

**Medicinal Chemistry**

*Chemistry in context*

Have you ever wanted to understand how drugs are made and how they work? This module introduces you to drug design (combinatorial chemistry) and drug action within the body. Specific examples include opiates (heroin and morphine), anti-HIV drugs and antibacterials and neurotransmitters such as nicotine, organophosphate poisons, cocaine, LSD and amphetamines.
Topics in Functional Materials

*Chemistry in context*
The chemistry of materials is widely exploited in technologically important areas including catalysis, batteries, fuel cells and storage (hard disks). In this module, you learn about the fabrication and crystal growth of materials, the structure of nanomaterials, glasses and molecular crystals, molecular motion in solids, defect chemistry and diffusion, and liquid crystals. Properties include: ferroelectricity, pyroelectricity, piezoelectricity and magnetic behaviour. Analytical techniques including X-ray Absorption Spectroscopy (XAS) and experimental techniques for characterising solid surfaces and interfaces are also covered. Atomistic simulation, used to design and understand materials properties, is introduced. (Lab component.)

Topics in Synthetic Chemistry

*Advanced organic chemistry*
Advanced organic chemistry topics are covered to enable you to synthesise complex molecules. The other half of the module introduces you to ways in which advanced materials are fabricated. Topics include: carbon-carbon bond-forming reactions, Aldol, Heck, Wittig, Michael, Stille, Suzuki reactions; Diels-Alder and frontier orbital reactions.

Materials synthesis is covered including: sol-gel and hydrothermal synthesis to control size and shape of nanoparticles, functionalisation and stabilisation, catalyst design and synthesis. Solid-state reactions are introduced as well as high-pressure synthesis to prepare novel materials. (Lab component.)

Research Project Laboratory (BSc Only)

In this module, you undertake a mini-project. A brief introduction stating the topic to be investigated is given, and then you are required to design and assemble the experimental apparatus, and plan and execute suitable measurement protocols. Experimental and computational projects are also available.

Advanced Project Laboratory (MChem only)

You gain hands-on experience of a range of advanced laboratory methods to understand the structure and properties of materials. Techniques include atomic absorption spectroscopy, NMR spectroscopy, X-ray fluorescence, X-ray diffraction, Raman spectroscopy and UV-vis/fluorescence.
STUDYING AT STAGE 4

Stage 4 is the final year of study for MChem students.

All students take the following modules:

• Advanced Inorganic and Organic Materials
• Advanced Physical Chemistry
• Chemistry Research Project
• Physical Science Research Planning
• Substances of Abuse.

Modules: Stage 4

Advanced Physical Chemistry

Chemistry in context
Computer modelling is an important branch of modern chemistry and is routinely performed in partnership with experiment. It is therefore vital for students to understand the capabilities and limitations of modelling and experimental approaches. In this module, you gain a critical understanding of advanced physical chemistry within a computer simulation and experimental laboratories. Techniques include: atomistic simulation and molecular dynamics, Born-Oppenheimer and self-consistent field approximations, Hartree-Fock theory, density functional theory (DFT) and perturbation theory.

(Exercise component.)

Physical Science Research Planning

You develop a number of skills related to the planning and preparation of a research proposal. You learn how to search and retrieve information from a variety of locations (scholarly books, databases, websites etc). You also learn how to compile a professionally produced document such as a grant proposal for funding a research activity in an area of your choice. You present your grant proposal to members of staff and so develop your presentation and communication skills.

Substances of Abuse

Chemistry in context
In this module, you are given a comprehensive overview of common illicit substances of abuse, including regulation, synthesis and preparation, pharmacokinetics and forensic analysis. The module is underpinned by advanced organic chemistry, including asymmetric organic synthesis.
YEAR IN INDUSTRY

If you choose to follow a programme with a year in industry, this placement year is taken between Stages 2 and 3.

Finding a placement
Work placements are usually advertised nationally and students apply by sending in a CV or application form. We guide you through the process, giving you valuable feedback on the placements that are likely to enhance your career prospects, how to write a winning CV and how to hone your interview skills.

Salary and benefits
You usually work on placement for an entire calendar year. Salary and holiday entitlements vary according to the employer. However, many students find that they earn enough to be able to save some of their income, and this often helps them in their final year at Kent.

Study and career benefits
A work placement provides practical experience that can be put to good use in your final year of study. It gives you a sense of how the theory works in practice and improves your skills in many areas. It also allows you to evaluate a particular career path, and gain knowledge of the working environment.

In general, the year in industry is very popular with employers, because of the skills you gain. If your placement is a success, you may even be offered a job with the same employer after graduation.

Keeping in touch with Kent
To make sure you get the most out of the experience, you are assigned an academic supervisor who approves the company’s programme of work in consultation with your industrial supervisor. At the end, you write a report of the work you did during the placement and, on returning to Kent for your final year of study, present a lecture on your experiences. Your year in industry counts towards your final degree classification.
VISIT THE UNIVERSITY

Come along for an Open Day or a UCAS Visit Day and see what it is like to be a student at Kent.

Open Days
Canterbury Open Days are held in summer and autumn for potential students, and their families and friends, to have a look round the campus. The day includes a wide range of subject displays, demonstrations and informal lectures and seminars, and the chance to tour the campus with current students to view accommodation and facilities. For more information, see www.kent.ac.uk/opendays

UCAS Visit Days
UCAS Visit Days take place between December and April, and include a tour of the campus with a current undergraduate and a talk about University life. You also have the chance to talk to one of the academics and discuss any queries about the course. For more details, see www.kent.ac.uk/visitdays

Informal visits
You are welcome to visit the campus at any time. The University produces a leaflet that can take you on a self-guided tour and, in certain instances, you may be able to meet up with an academic member of staff. For more details, please contact the Information and Guidance Unit (see right).

Scholarships
For details of scholarships at Kent, see www.kent.ac.uk/scholarships

More information
If you would like more information on Kent’s courses, facilities or services, or would like to order another subject leaflet, please contact the Information and Guidance Unit.

T: +44 (0)1227 827272
Freephone (UK only): 0800 975 3777
E: information@kent.ac.uk

You can also write to us at: Information and Guidance Unit, The Registry, University of Kent, Canterbury, Kent CT2 7NZ.
Location
Canterbury

Award
BSc (Hons), MChem

Degree programmes
- Chemistry BSc (F107)
- Chemistry with a Year in Industry (F108)
- Chemistry MChem (F109)

Typical offer levels
ABB at A level; IB Diploma 34 points overall or 16 at Higher

Required subjects
A level Chemistry grade B plus GCSE Mathematics grade C; IB Chemistry 5 at HL and Mathematics 4 at HL or SL.

Year in Industry
See p13.

Professional recognition
All our chemistry degree programmes have been developed in consultation with the Royal Society of Chemistry (RSC).

Foundation year
Passing the foundation year programme guarantees you entry on to one of our chemistry degree programmes.

Offer levels and entry requirements are subject to change. For the latest information, see: www.kent.ac.uk/ug

Terms and conditions: the University reserves the right to make variations to the content and delivery of courses and other services, or to discontinue courses and other services, if such action is reasonably considered to be necessary. If the University discontinues any course, it will endeavour to provide a suitable alternative.

To register for a programme of study, all students must agree to abide by the University Regulations (available online at: www.kent.ac.uk/regulations).

Data protection: for administrative, academic and health and safety reasons, the University needs to process information about its students. Full registration as a student of the University is subject to your consent to process such information.

For the latest departmental information on studying Chemistry at Kent, please see www.kent.ac.uk/physical-sciences/prospective/undergraduate/chemistry
COME AND VISIT US

We hold Open Days at our Canterbury and Medway campuses.
For more information, see: www.kent.ac.uk/opendays