BIOCHEMISTRY
Canterbury
Kent is one of the UK’s leading universities, ranked 23rd in The Guardian University Guide 2017. In the Research Excellence Framework (REF) 2014, Kent is ranked 17th* for research intensity, outperforming 11 of the 24 Russell Group universities.

World-leading research

The School of Biosciences at Kent ranks among the most active in biological sciences in the UK, with research funding of around £5 million per year. Outside bodies have commended the School for its research, which is acknowledged to attain international levels of excellence. In the REF 2014, all of our research was judged to be of international quality, and, based on our results in the REF, we were ranked 7th in the UK for research intensity in the Times Higher Education (THE).

Biochemistry deals with the way that living organisms function at the molecular level. It is an expanding subject in which rapid technological advances will have a great impact on health, economic, social and environmental issues, and our degree programmes reflect this diversity. The research in the School is focused on understanding systems and processes in the living cell. It has a molecular focus and crosses disciplines from biochemistry to microbiology and biomedical science.

Our research feeds directly into our teaching, providing exciting and relevant final-year projects, well-equipped and well-resourced laboratories, ensuring that you learn the most up-to-date science possible.

Teaching excellence

The School of Biosciences was awarded the maximum score of 24 from the Quality Assurance Agency for Higher Education, achieving full marks in areas such as the design and delivery of teaching materials, and the support and guidance we give our students. The assessors concluded that the School offers ‘well-designed, flexible and coherent degree pathways, taught by dedicated and enthusiastic staff, well-matched to the syllabus and clearly informed by industry and research’.

This reputation for teaching excellence is reflected in the National Student Survey. For example, in Biochemistry, Kent has been rated as one of the top ten UK universities in five of the last seven years for overall course satisfaction. In the most recent survey (2015), 96% of our Biochemistry students reported that they were satisfied with their course, putting the School in 7th position nationally.

The School also has a reputation for innovation. Two of our academics, Dr Dan Lloyd and Dr Peter Klappa, have recently won...
You have the option to spend a year studying abroad (see p10). This is a fantastic opportunity for personal development and provides an added insight into your subject while experiencing a new cultural environment. We have an international community on campus, with 31% of academic staff coming from countries outside the UK and students representing 148 nationalities.

Summer Vacation Studentships
We offer Summer Vacation Studentships, giving you the possibility of a paid eight-week research project in one of the School's research labs during the summer vacation after the second year. The studentships are optional and do not contribute to your final degree result, but they provide an ideal opportunity to experience the excitement of research first hand and to gain valuable skills that will be useful to you when seeking employment or further study at the end of your degree.

Alternatively, you could apply to join the International Genetically Engineered Machine (iGEM) project. This is an international competition for undergraduate students interested in synthetic biology (www.igem.org/about). In the last three years, our iGEM teams have won medals including gold in 2015. For more details, see p20.

Our Summer Vacation Studentships and the iGEM team are funded in part from money given to us by our alumni (The Stacey Fund) and all of our students are eligible to apply.

A successful future
We have excellent links with a number of employers and can offer you support in finding a work placement during your degree. A year working in the pharma or biotech industry, in the NHS, or in a range of other businesses gives you the opportunity to earn a salary and gain relevant work experience to significantly enhance your employment prospects. You can look for a research-based placement, or one that provides another type of graduate-level training, such as management or information technology. See p8 for details.

Professional recognition
All of our biochemistry degrees are accredited by the Royal Society of Biology (RSB), and our four-year Sandwich degree has been awarded Advanced Accreditation due to its inclusion of a substantial period of professional practice. Accreditation is an important certification of approval and employers are increasingly looking for students with accredited degrees to ensure the relevance and quality of their undergraduate training. More information about RSB accreditation can be found on the Society’s website: www.rsb.org.uk/students

A global outlook
According to the Times Higher Education (THE), Kent is ranked in the top 10% of the world's universities for international outlook. Our School has an international reputation and collaborates with research groups throughout the UK, mainland Europe and beyond.
SUPERB STUDENT EXPERIENCE

Based on a scenic campus, you have the use of modern teaching labs, with state-of-the-art technology.

World-class study facilities
Our recently refurbished teaching laboratories ensure that you have an excellent environment in which to develop your practical skills. The School of Biosciences attracts a large research budget, which allows us to provide an excellent research infrastructure. If you choose to do laboratory research as part of your final-year project (see p21), you will work alongside our internationally renowned research scientists, using the same high-level technology.

In 2013/14, over £2 million was spent upgrading the School. Academic facilities on campus are excellent. The newly extended Templeman Library has extensive print and electronic collections specifically aimed at supporting the subject areas taught at Kent. Electronic resources include e-journals, e-books, databases, reference resources and newspaper archives. There is also a range of study support services for help and advice.

Thriving scientific community
The School collaborates with research groups throughout the UK and mainland Europe. It has excellent links with local employers such as GlaxoSmithKline (GSK), MedImmune, Eli Lilly, Lonza, Aesica Pharmaceuticals, Sekisui Diagnostics, Cairn Research and Public Health England.

Kent Extra
Kent Extra is an excellent way to get more from your time at university. It provides opportunities to enhance your knowledge, learn new skills and improve your CV. You can do this in many ways, for example, by attending one of our summer schools; by volunteering; or by taking a Study Plus course in an area that interests you. For details, see www.kent.ac.uk/kentextra

Beautiful green campus
Our campus has plenty of green and tranquil spaces, both lawns and wooded areas, and is set on a hill with a view of the city and Canterbury Cathedral. For entertainment, the campus has its own cinema, theatre, concert hall and student nightclub. It has a reputation for being a very friendly university with a cosmopolitan environment. There are many restaurants, cafés and bars on campus and there’s also a sports centre and gym.

Everything you need on campus is within walking distance, including a general store, a bookshop, banks, a medical centre and a pharmacy. From campus, it’s a 25-minute walk or a short bus-ride into Canterbury.

Attractive location
Canterbury is a lovely city with medieval buildings, lively bars and atmospheric pubs, as well as a wide range of shops. The attractive coastal town of Whitstable is close by and there are sandy beaches further along the coast. London is under an hour away by high-speed train.
Christine Rubin is in her final year, studying for a degree in Biochemistry with a Year Abroad.

Why did you choose Kent?
I looked at a lot of universities but I got a nice feeling when I came to Kent. It was nearer to home than some I was looking at. Originally, I thought I’d like to be further from home, but after talking to people in the School and meeting people who were also coming to the University, I wanted to come here.

How is the course going?
Really well. I didn’t know how I’d feel about doing Biochemistry because it’s not a subject you can take at A level. I had studied biology and chemistry and they are subjects I like, so I thought I’d take them a bit further. It turned out to be one of the better decisions I’ve made.

What about the lecturers?
They all lecture on subjects they are expert in. Our lecturers conduct their own research and teach us about their research-specific knowledge. Having read their papers, I realise the importance of the research and the credibility of the professors.

What do you think about the level of support?
You can talk to the lecturers if you’ve got a problem and they always respond to emails. The people on my course are like-minded and the peer support is strong. I have a really good set of friends and we talk through any problems.

Which modules have you enjoyed the most, and why?
All the biochemistry students do a proteins module. It was really challenging but it’s one I have got the most out of. The coursework was difficult, you had to put the time in, but it’s better to be pushed outside of your comfort zone.

How did you find the Year Abroad? Where was this undertaken?
I went to the University of California, Santa Cruz – where they developed software to assemble a draft of the human genome during the Human Genome Project in 2000. The campus was in the middle of a redwood forest. At Kent, we have rabbits hopping around but they have deer and raccoons! It was great for me. I’m on the Kent equestrian team and when I went to the Santa Cruz campus, I joined their Hunter-Jumper team and got to travel all over the States, taking part in competitions. California is an amazing place.

How do you think it will help you in your studies and future career?
I have come back 100% more confident. It has made me really good at time-management, not least because of all the paperwork and processes you need to go through to get there. I got such a lot out of it and, having another year of studying and being taught from a different perspective, I now have a much broader knowledge base, which has helped me enormously this year.

What are the facilities like on campus?
The biosciences facilities are really good. I have access to facilities in the School and can do anything I need to for my final-year project. I love the new library extension, I practically live there. You can always find somewhere to work.

What kind of career do you hope to follow when you leave?
The year abroad made me realise that I don’t necessarily want to stay in the UK. Now that I’ve lived in another country for a year, I know I can go anywhere, put down my roots and I’ll be fine. I’ve applied for a graduate scheme with AstraZeneca in Boston, USA. I’ve applied for a lot of different things: I could work in industry, research or academia – I’ve also looked at going down a legal route as a patent attorney because I’d still be applying my biochemistry degree.

What advice would you give to someone coming to Kent?
If there’s something you’re interested in and a career you want to look at then definitely go for it. A lot of people are pressurised at school into going to university for the sake of it. Take your time and think about what you’re doing, choose something you really love and get the most out of it.
Kent equips you with essential skills to give you a competitive advantage when it comes to getting a job. Your employment prospects after leaving Kent are excellent; over 95% of Kent students who graduated in 2015 were in work or further study within six months.

Master key skills
As well as providing a first-rate academic experience, we want you to be in a good position to face the demands of a competitive job market. Nowadays, employers are looking for a range of key transferable skills and you are encouraged to develop these within your degree programme. Dealing with challenging ideas, thinking critically, the ability to write well and present your ideas clearly are all important skills that you gain at Kent.

Common career paths
From the School of Biosciences, about 30% of our graduates go straight into scientific jobs: typically into research and technical support in hospital or industrial labs, scientific writing, clinical trials, scientific sales and support, and science communication.

About 40% of our graduates go on to take a higher degree to become senior scientists. The most common route is to gain an MSc in a more specialised area or a PhD by joining an established research group for three or four years. We offer a number of taught MSc courses, including Biotechnology and Bioengineering, Cancer Biology, Drug Design, Infectious Diseases, Reproductive Medicine, and Science Communication as well as MSc and PhD programmes by research. A number of students each year train to join the teaching profession and a good degree can qualify you for graduate-entry medicine. The remaining 30% of our graduates go on to work in non-scientific areas. The skills you gain in your studies are in high demand in a range of careers.

In recent years, our students have found employment in publishing, marketing, recruitment, police and social work, accountancy and sales.

Professional experience
Students who choose to take a Sandwich Year/Professional Year (see p16) often find this extra experience enhances their job prospects. They gain work experience, insight into available professional pathways, and useful skills. A year abroad can also provide valuable experience and an additional opportunity for personal development.

Many of our students develop professional skills and gain hands-on experience through Kent’s wide range of voluntary work opportunities. We also offer Summer Vacation Studentships, paid positions in the School, available during the summer after your second year (more information p3).

Careers advice
Kent's award-winning Careers and Employability Service can give you guidance in areas such as 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 details, go to www.kent.ac.uk/employability
GRADUATE PROFILE

Holly Kew graduated in 2010 with a BSc in Biochemistry. During her Sandwich Year, she worked as an Industrial Research Trainee at Pfizer. She now works as a Clinical Research Associate (CRA) at the pharmaceutical company Novartis.

What attracted you to Kent and to this particular programme?
I liked the campus, it felt like its own ‘village’, and was impressed by the amenities; there really is everything you need. I was completely sold by the Biosciences Open Day; the students I met seemed genuinely happy to be studying at Kent, backed up by the excellent results from the student satisfaction survey. The labs were well equipped too.

How were your studies?
A lot of our lecturers were active researchers and would sometimes include their current studies in the lecture material. There was also a good balance between lectures and lab work. The final-year project was a great opportunity to put your previous lab work/theoretical knowledge into practice and it encouraged independent thinking.

How did you find the course?
I loved it! The syllabus was a great mix of theory and practical work. Our work in the labs helped to reinforce the theory as well as teach us valuable practical skills and how to work together. We occasionally had ‘guest lecturers’ – hospital doctors and biomedical scientists – who helped us to understand the application of what we were learning.

Did the course live up to your expectations?
The course exceeded my expectations – the modules were well defined, with well-designed assignments that helped us to understand if we had truly absorbed what we’d been taught in lectures.

What about your lecturers?
They were fantastic, so supportive and they genuinely wanted to see their students succeed. They are passionate about their areas of expertise, which rubs off on students. They teach the modules that are closest to their areas of research so, for inquisitive minds, you can always find out more from them if you wish.

What was the level of support like in your studies?
Excellent. Lecturers were always happy to answer questions and everyone was assigned a personal tutor, not necessarily one of your lecturers, who you could go to in confidence about any course-related issues or personal matters that were affecting your studies. My personal tutor was instrumental in encouraging me and helping me to secure my Sandwich Year at Pfizer; it was the best decision I made.

How did you find university life in general?
It was great! There were plenty of extra-curricular activities to break up the studies. I think I grew up a lot. We had plenty of fun along the way and I have some brilliant memories.

How did Kent help you with your career plans?
The work experience during my Sandwich Year helped me to secure my first graduate job as a scientist for a small biotechnology company. I gained a lot of confidence at Kent and realised that I was interested in research, but didn’t necessarily want to work in a lab.

What are you doing at the moment?
I work as Clinical Research Associate (CRA), specialising in neuroscience clinical trials. I love my job because I work independently from home and make my own arrangements to visit doctors and nurses at hospitals and GP surgeries to set-up, monitor and close-out clinical trials. It’s great seeing clinical research in ‘action’ and very rewarding to see the improvement in patients’ health.

How do you see your career progressing?
Perhaps I’ll look at a role in clinical trial project management.

Any advice for someone thinking of studying at Kent?
Go for it, 100%! I had an amazing time, felt so well supported and gained an excellent degree.
CHOOSING YOUR PROGRAMME

Not sure which programme to choose? Here’s a quick guide to the degrees on offer within the School of Biosciences.

The following degrees are available in biochemistry:

Biochemistry
Biochemistry deals with the way living organisms function at the molecular level. How do living organisms work? How are they built, controlled, repaired and supplied with energy? Biochemistry is an ideal degree if you want to enter a research career in a life sciences area. The degree is taken over three years, full-time.

Biochemistry with a Sandwich Year
This degree is a four-year, full-time, course with a paid work placement in a research-based activity (Sandwich Year) between the second and final year of study. This can be in the UK or abroad. You can apply for this programme directly, or you can choose to transfer in year two, Stage 2, if you have a good level of achievement at Stage 1 (an overall average of 65% is required; see p17 for more details on eligibility).

Biochemistry with a Professional Year
There are an increasing number of opportunities for students to acquire professional training in non-scientific areas (e.g., management). This four-year programme allows you to spend a year away from the University between your second and final year to take full advantage of such an opportunity. This programme does not have a separate UCAS code, but you can transfer to it (if a suitable placement is found) during your second year. The eligibility criteria are identical to the Sandwich Year option (see p17 for details).

Biochemistry with a Year Abroad
This four-year, full-time, programme allows you to spend a year abroad between your second and final year, giving you a fantastic opportunity to immerse yourself in another culture. As for the Sandwich and Professional Year options, this programme is available to students who achieve an overall average of 65% at Stage 1, or you can apply for this option directly.

All our year abroad exchanges are with universities where the teaching is in English, so you do not need a foreign language qualification to take this option. Currently, we have exchanges with 16 universities including eight in North America, four in Canada, two in Europe (Amsterdam and Istanbul) and one each in Hong Kong and Malaysia (see www.kent.ac.uk/goabroad/ opportunities for an up-to-date and complete listing).

The subjects you study during your year abroad complement your programme at Kent and the extra year allows you to study a wider range of topics than is possible on a three-year degree course.

Other degree programmes
The following degrees are also available within the School of Biosciences, with options to study abroad or take a Sandwich/Professional Year:

Biology
Biology is the study of living organisms and their interactions with the environment. You investigate a wide variety of life forms, ranging from viruses and bacteria to complex animals and plants. The degree provides a broad survey of the various biological disciplines but with a focus on modern molecular techniques. It includes cell and molecular biology, evolution, genetics, infection and immunity, microbiology, anthropology, conservation and the physiology of animals and plants. Our Biology degrees are accredited by the Royal Society of Biology.
Biomedical Science

Biomedical Science at Kent explores the biochemical processes that occur in the human body, and how they change in diseases such as cancer and infection, and how these diseases can be identified and treated. It offers graduates a chance to put scientific knowledge into practical use within the NHS, the pharmaceutical industry or medical research. Our Biomedical Science degrees are accredited by the Institute of Biomedical Science (important for those who wish to work in the NHS) and the Royal Society of Biology.

Bioengineering

This is a cross-disciplinary course between the Schools of Biosciences and Engineering and Digital Arts. The programme is designed to train the next generation of engineers who will be required to build increasingly complex and integrated systems for medical and industrial use. Approximately 30% of the programme is provided by the School of Biosciences.

International students

If you are applying from outside the UK and without the necessary English language qualifications for direct Stage 1 entry, you may be able to take the Biosciences strand of the Kent International Foundation Programme (IFP). You will need strong results in your national school-leaving qualifications in biology and chemistry, which will be assessed on an individual basis. For more details, see www.kent.ac.uk/ifp

Need more information?

For more information on Biology, Biomedical Science, or Bioengineering, see www.kent.ac.uk/ug or download the relevant leaflet at www.kent.ac.uk/studying/leaflets

“I went to Berkeley, the University of California, one of the top 10 universities in the world. I was taught by a professor who had worked in Janeway’s lab; he coined the phrase the immunologist’s ‘dirty little secret’, referring to the puzzle of how immune responses start. I made many friends from around the world, travelled a lot and had a really brilliant year.”

Hannah Bridgewater
Biochemistry with a Year Abroad
STUDYING AT STAGE 1

Stage 1 is the first year of your degree programme. First-year modules provide a broad survey of various biological and chemical disciplines, including biochemistry, cell and molecular biology, microbiology and physiology.

Teaching is via lectures, tutorials, supervisions and laboratory classes.

Most Stage 1 modules are assessed by 50% coursework and 50% examination. You need to reach a satisfactory standard to move on to the second year. However, no Stage 1 marks are carried forward to your final degree result.

Please note that this module list is not fixed as new modules are always in development and choices are updated yearly. Please see www.kent.ac.uk/ug for the most up-to-date information.

Compulsory modules:
- Biological Chemistry B (double module)
- Enzymes and Introduction to Metabolism
- Genetics and Evolution
- Human Physiology and Disease 1
- Introduction to Biochemistry
- Molecular and Cellular Biology 1
- Skills for Bioscientists.

Modules: Stage 1

**Biological Chemistry B**
The principles of chemistry are an essential foundation for biochemistry. Building up from the atomic level, this module introduces periodicity, functional groups, compounds and chemical bonding, molecular forces, molecular shape and isomerism, and chemical reactions and equilibria, enabling you to understand the importance of organic chemistry in a biological context.

**Enzymes and Introduction to Metabolism**
You are introduced to metabolic pathways and the control of metabolism by changes in enzyme activity. It includes the rates of biological processes and the theoretical principles underlying them, the basic structure and function of enzymes and their kinetics. You perform enzyme assays to determine their kinetic properties and also study the key pathways of metabolism in animals and their control mechanisms.

**Genetics and Evolution**
Covering the basics of Mendelian genetics to the role of DNA, this module explores the historical views on evolution, the action of DNA, population genetics and speciation. You gain an understanding of Mendelian inheritance and the ability to predict the outcomes of mono- and dihybrid crossbreeding, as well as an insight into Darwin’s observations on the role of genetics in evolution.

**Human Physiology and Disease 1**
This module looks at the anatomy and function of normal tissues, organs and systems and their diseases. You consider the manifestation of various conditions at the level of cells, tissues and the whole patient, and discuss diagnosis, available prognostic indicators and treatments.

**Introduction to Biochemistry**
This module provides an introduction to biomolecules in living matter. It contrasts the simplicity of the basic building blocks of macromolecules (amino acids, sugars, fatty acids and nucleotides) with the enormous variety and adaptability of the different macromolecules they form (proteins, carbohydrates, lipids and DNA).

**Molecular and Cellular Biology 1**
Here, the key themes and techniques in molecular biology, genetics and eukaryotic cell biology are covered, including cell structure, the principles of the cell cycle and cell division, the control of living processes by genetic mechanisms and techniques for genetic manipulation.

**Skills for Bioscientists**
You develop a range of skills including laboratory-based practical skills; the analysis and presentation of biological data; basic mathematical and statistical skills, as applied to biological problems; communication skills and note-taking and essay writing.
Kent was one of the first universities within the UK to have three-year degree programmes accredited by the Royal Society of Biology.
Stage 2 is the second year of your degree programme and your marks contribute towards the final grade of your degree. You develop the concepts previously covered by looking at the study of gene regulation, cell biology and metabolism.

There are seven compulsory modules:
- Cell Biology
- Gene Expression and its Control
- Human Physiology and Disease 2
- Infection and Immunity
- Metabolism and Metabolic Disease
- Metabolism and Metabolic Regulation
- Skills for Bioscientists 2.

You also take one of the following:
- Animal Form and Function
- Microbial Physiology and Genetics 1
- Pharmacology.

Please note that the module list is not fixed as new modules are always in development and choices are updated yearly. Please see www.kent.ac.uk/ug for the most up-to-date information.

Modules: Stage 2

Cell Biology
Reviewing the experimental approaches used to investigate the biology of the cell, this module highlights the similarities and differences between cells of complex multicellular organisms and microbial cells. Initially, it considers the functions of the cytoskeleton and cellular compartments, such as the nucleus. Later in the module, you examine the mechanisms by which newly synthesised proteins are secreted or shuttled to their appropriate cellular compartments.

Gene Expression and its Control
This module deals with the molecular mechanisms of gene expression and its regulation in prokaryotes and eukaryotes. This involves descriptions of how genetic information flows from DNA to RNA to protein, how this flow is controlled in specific tissues and cells throughout development and how it is disrupted in cancer cells.

Human Physiology and Disease 2
This module builds on Human Physiology and Disease 1 and covers in detail the remaining physiological systems of the body, namely reproductive, muscular, nervous and endocrine, and associated disorders, including infertility, cardiomyopathies and neurodegenerative diseases, such as Alzheimer’s and Parkinson’s disease.

Infection and Immunity
Here, you gain an understanding of the major diseases of infectious origin that colonise human body tissues. You cover the principles of epidemiology and look at medically important diseases such as the HIV virus and AIDS. You study the features and functions of immune cells and molecules used in the defence of the body against invading microorganisms.
Metabolism and Metabolic Disease
This module describes how errors in metabolic processes result in the development of human diseases such as phenylketonuria, gout, hypercholesterolemia, diabetes and porphyria.

Metabolism and Metabolic Regulation
This module describes the integration of the many chemical reactions underpinning the function of cells. For example, how cells make Adenosine Triphosphate (ATP) and use it to drive cellular activities, and how plant cells harvest energy from the sun in the process of photosynthesis.

Skills for Bioscientists 2
In this module, you further develop key skills in undertaking and communicating science. Focused around ‘mini-project’ work, you are introduced to new techniques and also planning and designing your own experiments for a short six-day project. You submit your work through an oral presentation and a project report. You develop skills in essay writing and report writing. In addition, there are presentations on careers to help you start thinking about your future options.

Animal Form and Function
You study the diversity of animal life throughout evolution, including elements of functional anatomy and physiology, such as circulation and gaseous exchange, the digestive system, the nervous system and reproduction.

Microbial Physiology and Genetics 1
This module includes a review of the structure and biosynthesis of bacterial and fungal cells, their key metabolic processes and their quest for food. You also study microbial growth, genome organisation and structure and mechanisms of DNA transfer.

Pharmacology
Here, you are introduced to the major concepts underpinning pharmacology – the study of drugs and their actions in cells, tissues and whole animals. You learn to describe the effects of drugs in cells and to relate the mechanism of drug action to their therapeutic intervention in disease.

“The opportunities to improve my practical skills are the most enjoyable thing about my course. I will be taking a summer vacation project at the end of this year and I cannot wait to learn how to plan my own experiments, while improving my knowledge of protein isolation and expression.”

Alisha Ockenden
Biochemistry
THE SANDWICH YEAR/PROFESSIONAL YEAR

If you choose to do work experience, it comes between Stages 2 and 3. Placements can either be research-based (Sandwich Year), or non-research-based (Professional Year) if training in other graduate-level skills, such as management, are offered during the year. The Professional Year does not have a separate UCAS code – you can transfer to this programme during Stage 2 if an appropriate placement is found.

Excellent links with employers
In the past, our students have taken Sandwich Year placements with employers such as GSK, MedImmune, Procter & Gamble, Eli Lilly and Lonza, and Professional Year placements with De Puy Synthes, Defence Science and Technology Laboratory (DSTL), Abcam and the NHS. The School has established excellent links with these employers, as well as many others.

Finding a placement
Work placements are usually advertised on the company’s website and you apply by sending in a CV or application form. We guide you through the process, giving you advice and feedback on how to write a winning CV and practice/guidance on how to be successful at interview.

Salary and benefits
Students usually work on placement for the entire calendar year. Salary and holiday entitlements vary according to the employer. However, most students find that they earn enough to avoid having to access their student loan during the year away, and some earn enough to be able to save some of their income.

Study and career benefits
A research-based 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. Both research and non-research placements allow you to evaluate a particular career path and gain valuable knowledge of the working environment.

In general, work experience is very popular with employers because of the skills you gain in the workplace. If your placement is a success, you may even be offered a job with the same employer after graduation.
Keeping in touch with Kent

Your academic adviser maintains close contact with you during your year away from the University, checking on your progress and paying a visit to your workplace. All placement students come back to the School for a day halfway through the year to talk about their work with other students and staff. At the end of a Sandwich Year, your work is assessed by a presentation and written report and these contribute 10% to your overall degree mark. A Professional Year does not contribute to your final degree mark and instead is assessed on a pass/fail basis.

Eligibility for the Sandwich Year/Professional Year

A work placement is an option for all students who achieve 65% or more as an overall average in Stage 1 (typically 60% of the year group). If you take this option, you transfer in Stage 2 once a placement is found. If you apply directly for the Biochemistry with a Sandwich Year degree and meet the requirements of the offer made, then the 65% threshold does not apply; however, if you miss the requirements and we offer you a discretionary place, the 65% threshold will apply so that we can treat all our students fairly. The same criteria apply for entry to the Year Abroad programme.

Helen Grimsley is studying for a degree in Biochemistry with a Professional Year. She has now been offered a PhD position with Professor Michelle Garrett in the School of Biosciences. Here, she tells us about her experiences during her professional year.

‘My placement was with DePuy Synthes, part of Johnson & Johnson, the baby products company. The site manufactures bone cement in Blackpool, where I was working as a microbiologist. A lot of the work I was doing was making sure that the products were safe to go into a human body.

‘The tests I was doing had a direct impact on whether or not the product would go to market. Their training scheme is very good; they don’t just throw you in at the deep end and they give you different paths that allow you to progress or you can choose to go in a different direction.

‘You had to take on a lot of work because it was pretty fast paced and it’s a commercial business; so you had weekly targets to meet. I got a lot of organisational and time-management skills from the professional year. I enjoyed it because it puts you in a pressured situation and I find I get more done. I was doing so many different things: lab work and bench work that I can apply to my studies and future career. I was writing lab reports and investigations that can be applied to final-year work. It helps with my final-year project, where I maintain my lab book so that you can understand it at the end of the year.

‘I’m currently looking into whether a tat system from one organism can work in another. A tat system is a complex in the membrane that allows proteins to transport. If the project works, we will be able to produce proteins, like antibodies, more efficiently, giving the work an important industrial application.

‘All of the skills I have learnt on my professional year will be translational to my future career.’
STUDYING AT STAGE 3

Stage 3 is the final year of your degree programme. In addition to your compulsory modules, you also complete a Research Project that counts for a quarter of your marks at Stage 3.

Please note that this module list is not fixed as new modules are always in development and choices are updated yearly. Please see www.kent.ac.uk/ug for the most up-to-date information.

All students take the following compulsory modules:

- Biological Membranes
- Cell Signalling
- Proteins: Structure and Function (double module)
- Research Project (double module).

You also choose two from the following:

- Advanced Immunology
- Bioinformatics and Genomics
- Biology of Ageing
- Cancer Biology
- The Cell Cycle
- Frontiers in Oncology
- Integrated Endocrinology and Metabolism
- Neuroscience
- New Enterprise Startup.

### Modules: Stage 3

#### Biological Membranes

All cells and subcellular compartments are separated from the external milieu by lipid membranes, with protein molecules inserted into the lipid layer. The structure and function of these two components are diverse, ranging from selective translocation of molecules, regulatory functions and maintaining the structure of the cell. This module deals with aspects of each of these roles.

#### Cell Signalling

This module explores the diverse mechanisms used by cells to communicate. It covers a range of signalling molecules, including hormones and growth factors, the receptors upon which they act and the associated intracellular signalling pathways that lead to a cellular response.

#### Proteins: Structure and Function

You investigate the structural organisation of proteins and how protein structure relates to function. You cover topics including enzyme catalysis, ligand binding, protein folding and protein engineering. You also learn about the major biophysical techniques that underpin these studies (eg fluorescence, mass spectrometry, X-ray crystallography and NMR).

#### Research Project

You work independently on a research project, but have regular meetings with a supervisor who guides you through the process and provides advice and support. Your supervisor will be an academic whose research interests are related to your topic. See p21 for more details.
Advanced Immunology
Since the discovery of HIV, astonishing progress has been made in our understanding of how the immune system functions. This module reviews topical aspects of this subject, placing emphasis on the regulation of the immune response, as well as the role of dysfunctional immune systems in a variety of diseased states.

Bioinformatics and Genomics
The past decade has seen a massive increase in protein structure and genome sequence information. This module investigates how modelling can be used to predict protein function and how genetic variants identified in the genome sequences can be analysed for their ability to cause disease. Lectures teach you the theory and the bioinformatics analyses are carried out in computer workshops.

Biology of Ageing
This module reviews the importance of studying ageing, and the organisms and methods used to do so. It considers how organisms age, and provides a detailed understanding of the processes and molecular mechanisms that govern ageing.

Cancer Biology
In this module, you explore the molecular basis of cancer and how this knowledge may be used to develop new therapeutic strategies to tackle the disease in its variety of forms. Topics include the regulation of gene expression, the role of growth factor signalling, cancer stem cells, cell apoptosis, chemo-resistance, cell metastasis, tumour immunology, and targeted cancer therapies and clinical trial design.

The Cell Cycle
The precise regulation of the cell cycle is essential for all life. In this module, you explore how the current understanding of cellular reproduction emerged, with initial lectures describing the important breakthroughs in cell cycle research. You go on to study the key events that occur and how they are regulated by mechanisms conserved from yeast to man.

Frontiers in Oncology
You are introduced to the basic principles of cancer biology and cancer therapy. The module explains the characteristics of cancer and why the development of more effective anti-cancer therapies is so extremely challenging. The module includes interactive discussions on a number of recent scientific publications that highlight the important issues in cancer research today.

Integrated Endocrinology and Metabolism
This module focuses on the endocrine system, one of the two great control systems of the body. In conjunction with the nervous system, these two regulatory systems are responsible for monitoring changes in an animal’s internal and external environments and directing the body to make any necessary adjustments to its activities so that it adapts itself to these environmental changes.

Neuroscience
The molecular and cellular basis of the development of the nervous system from a simple sheet of neuroepithelial cells is discussed. You go on to investigate the molecules and mechanisms involved in the transmission of signals between nerve cells. Finally, you explore how the nervous system controls a variety of behaviours, such as learning, memory, sleep and dreaming.

New Enterprise Startup
This module examines the characteristics required for a business to succeed and the reasons for business failure. It covers business risks and uncertainties, skills required for business ownership, and sources of advice and support for businesses.
BIOSCIENCE WIN GOLD

Students from the School of Biosciences were part of a team that was awarded a gold medal in the International Genetically Engineered Machine (iGEM) Giant Jamboree in Boston in 2015. Here, some of the team talk about their project and explain what they gained from the experience.

A team of students from the Schools of Biosciences, Physical Sciences and Engineering and Digital Arts developed and presented a research project to iGEM, a worldwide synthetic biology competition, which encourages students to develop and test innovative solutions to global problems.

The Kent project, called Envirowire, investigated the feasibility of generating functional amyloid nano-wires, under the guidance of Dr Wei-Feng Xue and other academic and research staff within the School of Biosciences. Nano-wires formed from proteins made by bacteria provide a potential solution in the fabrication of biologically and clinically applied circuitry, with benefits including miniaturisation, improved efficiency, biocompatibility and use of renewable sources of energy and materials.

The team competed against 280 teams from around the world, including Cambridge, Cornell, Heidelberg, Tokyo and Sydney.

What did your project entail?
Katarina Pisani: We had to pick something that was feasible in the timescale. We used E.coli, a type of bacteria which is commonly used in labs for experiments and engineered it to produce nano-wires from an amyloid protein. We used the bacteria to produce circuits.

What are the benefits of using bacteria?
Alice Tomlinson: Nano-circuit boards usually use silver or copper nano-wires, but if you make a nano-wire from a protein, you eliminate the need for mining, which is bad for the environment. Copper, silver and gold are finite resources. E.coli can be grown in large quantities, so it’s more sustainable and can be made smaller and modified in many ways.

How would you describe the experience of competing in iGEM?
Suparna Thakali: our supervisor said iGEM is like a crash course in science, so if you want to go on to do a Master’s or a PhD, it’s like a mini research project. We were exposed to cutting-edge technology from hearing what techniques the other teams used. Katarina: it was nice at this stage of our study to realise the variety and freedom you have as a bioscientist; it gives you ideas about what you can do and makes you really excited about your studies. Alice: it’s hard to describe, but when you’re there and everyone is so hyped about their project, everyone’s buzzing.
In your final year of study, you complete an eight-week Research Project. You choose a project that interests you from a wide range of options.

There are three types of project on offer: laboratory-based (including bioinformatics-based projects), literature and data analysis (including business projects), or a communication project. If you choose a laboratory-based project, you work with other members of your supervisor’s research team and use equipment and facilities in their own research laboratory. Our research areas currently include: cancer biology and cancer therapies, bioprocessing and the development of novel therapeutics, genetic and prion diseases, reproductive medicine, synthetic biology, protein folding and structural biology, the biology of ageing, molecular motors, and pathogens and infectious disease.

Laboratory-based project

Laboratory projects are offered in all of the research areas of the school and involve techniques such as cell culture, gene cloning, microscopy, electrophoresis, spectroscopy, Polymerase Chain Reaction (PCR), recombinant protein expression, assay development, and so on. You carry out real research of interest to your supervisor and their research group. You have the possibility of seeing or discovering something for the very first time and may have your work published in a scientific journal.

Recent student projects include:
- The role of the cytoskeletal protein talin in promoting and regulating cell migration
- Engineering mammalian cells to produce larger yields of recombinant therapeutic protein ‘bio-drugs’ more efficiently and at lower cost
- Assessment of mitochondrial DNA loss in response to stress during the process of ageing.

Communication project

One of the key challenges facing scientists is to make their work interesting, accessible and relevant to the public. A communication project can develop these key skills and broaden your employment opportunities. Communication projects are offered in a wide range of topics or you can suggest your own. The topic will often be a poorly understood or controversial area of bioscience and the aim is not only to research the topic and write an up-to-date science report, but also to think about how you can explain your findings to a wider non-scientific audience. You give a presentation in a local secondary school and prepare a website or a written article for a newspaper or magazine.

Recent projects include:
- Sleep – a waste of time or an essential behaviour?
- Beyond genetics: how epigenetics controls your life
- Are sugary beverages a threat to global health?
- Are testes the only difference between males and females?

"Supervising final-year project students is one of the most rewarding aspects of working at Kent. It gives the students a real opportunity to get a taste of what research is like and is excellent preparation for future Master’s or PhD study."

Dr Ian Blomfield
Senior Lecturer in Molecular Microbiology
VISIT THE UNIVERSITY

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

Open Days
Kent runs Open Days during the summer and autumn. These provide an excellent opportunity for you to discover what it is like to live and study at the University. You can meet academic staff and current students, find out about our courses and attend subject displays, workshops and informal lectures. We also offer tours around the campus to view our sports facilities, the library and University accommodation. For further information and details of how to book your place, see www.kent.ac.uk/opendays

Applicant Days
If you apply to study at Kent and we offer you a place, you will usually be sent an invitation to one of our Applicant Days. You can book to attend through your online Kent Applicant Portal. The Applicant Day includes a presentation about the School and our degree programmes, a ‘taster’ lecture given by a member of academic staff on their research area, guided tours of the campus and University accommodation, and the opportunity to speak with both academic staff and current students about your chosen subject. For further information, see www.kent.ac.uk/visit

Informal visits
You are also welcome to make an informal visit to our campuses at any time. The University runs tours of the Canterbury and Medway campuses throughout the year for anyone who is unable to attend an Open Day or Applicant Day. It may also be possible to arrange meetings with academic staff, although we cannot guarantee this. For more details and to book your place, see www.kent.ac.uk/informal

Alternatively, we can provide you with a self-guided tour leaflet, which includes the main points of interest. For more details and to download a self-guided tour, go to www.kent.ac.uk/informal

Scholarships and bursaries
For details of scholarships and bursaries at Kent, please see www.kent.ac.uk/ugfunding

On the web
For the latest School information on studying biochemistry at Kent, please see www.kent.ac.uk/bio

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 us:
T: +44 (0)1227 827272
Freephone (UK only): 0800 975 3777
www.kent.ac.uk/ug
Location
Canterbury

Award
BSc (Hons)

Programme Type
Full-time

Degree programmes
Single honours (3 years)
- Biochemistry (C700)

Single honours (4 years)
- Biochemistry with a Sandwich Year (C702)
- Biochemistry with a Year Abroad (C703)

Offer levels
Biochemistry (C700): BBB at A level including biology and chemistry (both with practical endorsement from 2017); GCSE Mathematics at grade C. IB Diploma 34 points (or 15 at HL) IB Chemistry and Biology at HL5 or SL6, Mathematics at HL4 or SL4.

Biochemistry with a Sandwich Year/Year Abroad (C702/C703): ABB at A level including biology and chemistry (both with practical endorsement from 2017); GCSE Mathematics at grade C. IB Diploma 34 points (or 16 at HL) including Chemistry and Biology HL5 or SL6, Mathematics at HL4 or SL4.

Sandwich Year/Professional Year
You have the opportunity to undertake a one-year work placement between Stages 2 and 3. See p10 and pp16-17 for details.

Year abroad
You have the opportunity of spending a year studying abroad between Stage 2 and 3. See p10 for details.

Transfer between three- and four-year programmes
You can transfer to a four-year programme during Stage 2 if you achieve 65% or more as an overall average in Stage 1.

Progression requirements for Sandwich Year and Year Abroad applicants
If you miss the offer requirements for a four-year course but subsequently accept a discretionary place, you will be required to achieve 65% or more in Stage 1 to apply for Sandwich/Professional Year or Year Abroad opportunities. If 65% in Stage 1 is not achieved, you transfer to the three-year programme at the start of Stage 2.

Professional recognition
All of our biochemistry programmes are accredited by the Royal Society of Biology. Biochemistry with a Sandwich Year has Advanced Accreditation, recognising its extensive period of professional practice.

International Foundation Programme
Applicants from outside the UK and without the necessary English language qualifications may be able to take the Kent International Foundation Programme (FIP). See p11 for more details.

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

This brochure was produced in June 2016. The University of Kent makes every effort to ensure that the information contained in its publicity materials is fair and accurate and to provide educational services as described. However, the courses, services and other matters may be subject to change. For the most up-to-date information, see www.kent.ac.uk/ug and for full details of our terms and conditions, see www.kent.ac.uk/termsandconditions

For the University to operate efficiently, it needs to process information about you for administrative, academic and health and safety reasons. Any offer we make to you is subject to your consent to process such information and is a requirement in order for you to be registered as a student. All students must agree to abide by the University rules and regulations at: www.kent.ac.uk/regulations
COME AND VISIT US

To find out more about visiting the University, see our website:
www.kent.ac.uk/visit