UNIVERSITY of York

Chemistry Admissions

NEWSLETTER February 2021

Excellent NSS 2020 Results

We're delighted to learn that our chemistry students rated their learning experience highly in the National Student Survey, and are some of the happiest in the UK.

The Department of Chemistry has received 91% for 'Overall Satisfaction' in the 2020 National Student Survey (NSS). The Department placed first out of the surveyed Russell Group universities in six of the eight individual areas:

- Teaching on my Course
- Learning Opportunities
- Academic Support
- Organisation and Management
- Learning Support
- Learning Community

Head of Department, Professor Duncan Bruce said: "We really believe that the Department of Chemistry in York is a unique learning community in which staff and students work together at the frontiers of the subject. We are delighted to see that our students value this rather special environment, appreciate the learning opportunities and resources we provide, and rate our teaching as some of the very best in the country."

We are top in six of the eight assessed areas.

The NSS is a nationwide survey of final-year students in higher and further education that encourages them to give honest feedback about a variety of aspects of their university experience, including their department and course. This helps prospective students to make informed choices and also influences real change in future students' experiences, from institution-level to course-level.

As a whole, the University of York scored 85.39% for 'Overall Satisfaction', which sits above the national average of 82.65%. Of the Russell Group universities included in the survey, the results position York as first for 'Academic Support' and 'Learning Opportunities', and second for 'Teaching on my Course'.

Royal Society of Chemistry Awards for Chemistry Academics

Three scientists from the University of York's Department of Chemistry have received prestigious Royal Society of Chemistry (RSC) awards.

Dr Glenn Hurst has been named the winner of the RSC's Higher Education Teaching Award - the fourth member of the chemistry department at York to win the award. Professors Paul Walton and Gideon Davies have been awarded the RSC's Rita and John Cornforth Award.

Dr Hurst won his award for impactful work in green chemistry teaching resulting in national and international renown, and particularly for the innovative use of social media in higher education. His work is centered around using innovative approaches to help students engage with and contextualise chemistry with an emphasis on green and sustainable chemistry, helping them address real-world problems as outlined by the United Nations Sustainable Development Goals.

The Walton-Davies team won their award for ground-breaking research into the extraction of sugars from cellulose to provide a rich source of sustainable biofuel known as cellulosic bioethanol. Cellulose is naturally resistant to breaking down into its constituent sugar molecules, which hinders its use as a feedstock for bioethanol. However, the team has focused research on a group of enzymes called lytic polysaccharide monooxygenases which significantly enhance the breakdown of cellulose, enabling it to be used as a feedstock for fuel production.

Department of Chemistry retains position in the UK top five

In rankings released this week the Department continues to be among the UK's most highly regarded departments for the subject of Chemistry. The Department is ranked 5th in the UK in the Complete University Guide 2021.

Published annually since 2007, the Complete University Guide ranks 130 UK universities, 14 Arts, Drama and Music colleges and conservatoires, and 70 subjects by quality measures important to students.

The Department's ranking is based on a range of measures including graduate prospects, student satisfaction and research quality.

Complete University Guide

Drilling down into final year research opportunities

An overview of our final year projects – how they are organised and what is involved

MChem Year Abroad

We support students in various ways both prior to, and during, placements at a university abroad. Students in years 1 and 2 are invited to attend information sessions at the start of each academic year. This gives an overview of the programme and what students need to do to prepare. Students interested in spending a year in a country where English is not the first language are encouraged to take part in language courses via the LFA (Languages for All) programme. The Department covers the fees for these courses for students enrolled on the MChem (Abroad) scheme. At the end of year 2, students submit their preferences for the different destinations/research topics. The MChem (Abroad) coordinator works with students during year 3 to organise nominations for placements. The focus is on finding placements and research projects that fit with students' interests. Although some destinations can be oversubscribed, the Department uses a transparent/fair system to make decisions on nominations. It is usually possible to secure placements for most students interested in the programme at one of the destinations they are keen to visit. The coordinator offers support to students preparing to spend year 4 abroad, with assistance from our Centre for Global Programmes.

MChem Year in Industry

Our recruitment process for year 4 placements starts in the Summer Term of year 2. A handbook is issued containing details of at least thirty regular placement companies. Students research these companies to find out the sort of chemistry they do and their location (companies are based throughout the UK and some in western Europe). At the end of the Summer Term students select their 8 favourite companies and register their interest in the scheme. After the summer exams we organise CV writing and interview sessions so that students can brush up on these skills. Over the vacation, students prepare CVs/supporting letters for their chosen companies and submit these at the start of year 3. The Department attaches a reference from the College tutor, then forwards this information to the companies, who hopefully offer our students interviews, starting in October. New companies usually become available throughout the year. It is a competitive process and we cannot guarantee every student will secure a placement (students will always have the opportunity to complete their MChem degree at York if they change their mind or if they don't secure a placement) – on saying this, we typically place around 50 students per year.

BSc Projects including Chemical Communication

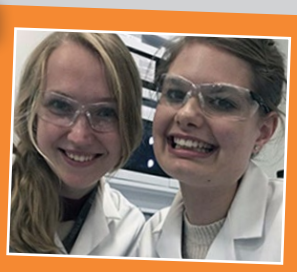
Our BSc research projects give our students the opportunity to do an original piece of work, covering a wide spectrum of different types of research, from the synthesis of novel compounds, to designing new analytical methods, to completely non-lab-based projects. One option for our final year BSc chemistry students who are considering a career such as teaching, is to undertake a Chemical Communication project in place of a more traditional lab-based research project. There are two styles of project to choose from. One is school-based, in which a student spends a minimum of ten days across two terms in a local secondary school, observing and helping with (mainly) chemistry and other science lessons. The second style of project involves designing and running an outreach event for visiting school groups. The activities that the participants take part in are based on areas of chemistry research at the University of York. The chemical communication projects have been running for 15 years, and several of our former students are now teacher mentors for our current cohort. If a student is considering teaching, this is an excellent way for them to dip their toe in the water to see if this is the career for them.

MChem Year in York

Our research projects are 'real world', open-ended and as tailor-made and individualised as possible. By the end of year 3, many students will have clear, informed ideas about their research interests/future plans, and we offer and support a wide range of projects supervised by academic staff. We start the process with an introduction session, early in Spring of year 3. Students then explore opportunities for projects by talking with academic staff. If students have suggestions of their own, we are usually able to accommodate these. At the end of the Spring Term, students submit four project choices, in order of preference. Typically, we assign at least 90% of projects according to first or second preferences. When oversubscription issues arise, the module coordinator brokers the best possible alternatives between students and academic staff, but we never assign projects that did not feature on the students' project choices. Assignments are usually completed around the middle of the Summer Term, when the module coordinator shares all choices and final assignments to ensure maximum transparency. Students are asked to contact their project supervisor(s) to discuss the latest developments/plans, and collect reading for the summer, to prepare for a smooth start in the next academic year.

Research highlights

Undergraduate projects leads to publication success

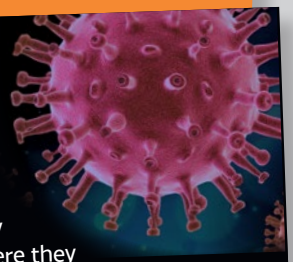


Laura Berga and Isobel Bruce (both MChem 2020) achieved publication of their ground-breaking project work in the international journal Cellulose in the September following their graduation. Cellulose is a key component of biomass but utilising it is a challenge. Strong hydrogen bonding makes it insoluble in many solvents. Ionic liquids can readily dissolve cellulose, but there are many challenges with using them, such as their high costs, sensitivity to water and difficulty to regenerate the solvents after their use. Their research project, supervised by Dr Seishi Shimizu, shows the challenges of cellulose dissolution.

Mastering the structural chemistry of a new gallium catalyst

A team led by Dr John Slattery discovered that a wide range of gallium-containing compounds can, in fact, be isolated from catalytically-active solutions of 'gallium(I) triflate'. This catalyst is simple to prepare and has been shown to promote carbon-carbon bond forming reactions, key steps in the formation of valuable molecules such as pharmaceuticals, agrochemicals and polymers. Careful structural analysis in collaboration with Dr Adrian Whitwood demonstrated that this seemingly simple catalyst is actually a complex mixture of compounds containing gallium in several different oxidation states.

Possible broad spectrum drug treatment for viruses on the horizon

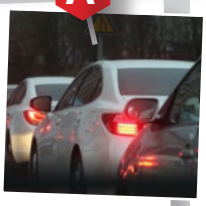


Researchers from York and Melbourne have shed new light on how viruses like hepatitis B, dengue and SARS-CoV-2 hijack a cell paving the way for potential anti-viral drugs to stop the virus in its tracks. Like products on a factory assembly line, all proteins pass through 'quality control' checkpoints where they are inspected before they are transported to their destination to carry out their functions. The researchers showed that some viruses could hijack this manufacturing and distribution process in the cell. The virus can use the cell's machinery to copy their DNA or RNA and produce the proteins they need to make copies of themselves and take-over their host. Research demonstrated that viruses tend to harness a step in this process where sugar molecules coat newly assembled proteins. The team was able to develop inhibitors to block an enzyme that trims, checks, and modifies the sugar-coating process, which can disrupt the viruses' ability to hijack the pathway.

Compounds synthesised in York could provide clue in the hunt for new treatments against Coronavirus

Researchers at York have synthesised compounds that can bind to one of the key proteins in the COVID-19 virus. The discovery could pave the way for new drug treatments to fight the virus. The team, led by Professor Peter O'Brien, made the discovery as part of their research programme synthesising 3-dimensional molecular 'fragments' for use in drug discovery. Professor O'Brien said "It was great to see our 3-dimensional fragments turn up as hits in this screen.

York academic leads UK government effort to understand impact of air pollution changes during Covid-19 crisis



A York academic is leading a national scientific advisory group calling for scientists and researchers to share their data on air pollution during the Coronavirus pandemic. The pandemic has seen unprecedented changes in living and working patterns and is likely to have had a significant, but as yet unquantified, effect on air pollution. Professor Alastair Lewis is the Chair of the UK Government independent science advisory group on air pollution.

York academics help uncover the oldest ever human genetic evidence

Genetic information from an 800,000-year-old human fossil tooth has been retrieved for the first time. The study retrieved the oldest human genetic data set from a tooth found in Spain belonging to the species Homo antecessor. By using a technique called mass spectrometry, researchers sequenced ancient proteins from dental enamel, and therefore more confidently determined the position of Homo antecessor in the human family tree. Dr Marc Dickinson and Professor Kirsty Penkman from the Department of Chemistry analysed ancient proteins to determine if the protein was original. Dr Dickinson said: "Finding original organic material, which has survived for millions of years is fascinating. It is incredible that these samples are still able to provide scientific information".

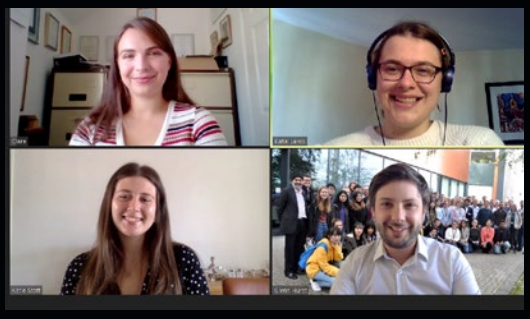
Vitamin boost for green solvents

Naturally-occurring analogues of vitamin C have been used to form deep eutectic solvents for the first time. These environmentally-friendly solvents may have applications as natural antifreezes or antibacterial agents. Deep eutectic solvents (DESs) are formed when two solid materials mix to give a liquid phase. If the two solids are environmentally-friendly, then the resulting solvents are one of the most promising green technologies to emerge in recent years.

Enhancing the visualisation of aromatic molecules

A computational method developed in York provides an easy way of visualising the aromaticity of important polycyclic aromatic hydrocarbon molecules and gives new insights into their bonding. Dr Peter Karadakov from York, working with Professor Brett VanVeller and Bryan Lampkin from Iowa State University in the USA have developed a method to create a better visualisation of aromaticity in polycyclic systems.

Using TikTok to teach chemistry



Recently graduated BSc Chemistry students Clare Hayes and Katie Stott performed research into developing new and innovative methods to aid with chemistry education and public dissemination, as part of their research project under the supervision of Dr Glenn Hurst and Dr Katie Lamb. By utilising a systems thinking approach to contextualise theoretical concepts, Clare and Katie created new learning resources including a YouTube video on carbon dioxide utilisation, which won a CO2Chem video prize.

A major component of this research involved investigating the use of the mobile phone application TikTok for teaching chemistry as well as a public dissemination tool. Systems thinking has been used with numerous online teaching tools and mobile phone applications. Previous work at the University of York has highlighted how Snapchat can be used to facilitate contextualization of undergraduate chemistry and led to the creation of "Green Tycoon", a free mobile phone application that teaches fundamental green chemistry principles to undergraduates. Considering the recent transition to online teaching due to COVID-19, the use of social media to aid teachers with chemistry teaching and communication is now extremely important.

Using an online TikTok account, "The Chemistry Collective", 16 chemistry outreach and educational videos (15-60 seconds long) were created, reaching approximately 8,500 views.

2020 Award Winners

Dr Jamie Blaza
Future Leaders Fellowship (UKRI)

Professor Simon Duckett
Gunther Laukien Prize

Professor Ian Fairlamb
Royal Society Industry Fellowship

Dr Glenn Hurst
RSC Higher Education Teaching Award

Professor Kirsty Penkman
Blavatnik Foundation Young Scientist Award for Chemistry

Professors Paul Walton and Gideon Davies
RSC Rita and John Cornforth Award

By royal appointment

The pioneering work of the University of York's Structural Biology Laboratory (YSBL) in the Department of Chemistry has received royal recognition at a prestigious ceremony at Buckingham Palace. Vice-Chancellor Professor Charlie Jeffery formally received the Queen's Anniversary Prize on behalf of the Laboratory at a ceremony in the Ballroom of Buckingham Palace on Thursday 20 February. Professor Jeffery was presented with a medal, engraved with the Queen's signature, while Professor Tony Wilkinson, current leader of YSBL, collected a scroll on behalf of the University. The prize, the highest national honour awarded in UK further and higher education, is for the work of

YSBL over the past 40 years in studying protein molecules. It is unique in the honours system in that the honour is conferred on an institution rather than an individual. Professor Jeffery said: "This award is a fantastic achievement and richly deserved".

Online chemistry course proves highly effective

A free online course developed by the Department of Chemistry has been shown to have excellent educational outcomes, with positive student attitudes, high levels of learner engagement and a significant impact on students making the transition to university. The four runs of the Exploring Everyday Chemistry (eeDc) course have attracted over 15,000 students from a wide range of backgrounds. Students visited around 232,000 steps, completed almost 203,000 of them and posted over 10,000 comments. Evaluation of the four course runs demonstrated very positive student feedback, as evidenced by weekly learner experience ratings. Distinctively, the study also analysed the impact of the course on university applications to study Chemistry at York. In 2018, over 20 per cent of applicants mentioned the online course in their UCAS applications, as a way of demonstrating evidence of commitment beyond the standard pre-university curriculum.

York scientist part of team awarded £8m to unravel breakdown of carbohydrates

A team of scientists – including an academic from York – has been awarded more than £8m (9.1m euros) for a major research programme into how enzymes work on complex sugars. The research, funded by the European Research Council (ERC), is expected to have major implications for improving human health in the fight against diseases and finding green solutions to energy production. Professor Gideon Davies will work with Dr Carme Rovira from the University of Barcelona and Professor Hermen Overkleeft from the University of Leiden to form the "Carbocentre" synergy team. They will develop novel chemical entities to study the enzymes involved in the synthesis and breakdown of carbohydrates and design compounds that inhibit and visualize each of the glycol processing enzymes – eventually applying them in the areas of biomedicine and biotechnology. Many viruses, including Influenza and Covid-19, use carbohydrates (glycans) for cellular entry and as part of their structure. Professor Davies said: "Carbohydrates (glycans) have mind-boggling chemical diversity. They are the most abundant and diverse class of biomolecules on Earth. It's a great honour to obtain this European funding, especially at this time. Our collaborative work will provide truly disruptive technologies for health (cancer, genetic disease and viral invasion)".

Meet a tutor

Professor Kirsty Penkman teaches core and option modules to our undergraduate students. Her research involves developing methods to chemically analyse complex samples. She focuses particularly on the analysis of biomolecules found in fossils - and what they can reveal about an organism's life and death.

Chemistry can take you anywhere. I've always loved the sciences, but I'm also fascinated by archaeology and geology. At A level I had been thinking about taking history, but the timetable was awkward, so I ended up doing sciences and maths. I really fell in love with chemistry at that point - I think because it sits as the central science, reaching out to answer all sorts of other questions in other fields.
It wasn't until the final year of my degree that all of my interests suddenly clicked into place, when I was lucky enough to work on a project in an archaeological research lab. A couple of months in I knew that I'd found the perfect job for me - using chemistry to help understand the past.

Finding solutions

Working with fossil material is analytically very challenging. The molecules that you are interested in are incredibly low in concentration. They are often badly degraded, and there is a whole load of other stuff in there - both organic and inorganic, original and contamination - that will complicate your analysis.
The trick is being able to isolate the part you want to look at without altering it in the process. The challenge makes it so interesting from my point of view as an analytical chemist, and so supremely satisfying when you do eventually get your data!

Through the looking-glass

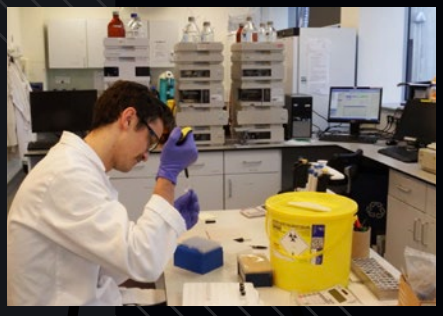
My colleagues and I use liquid chromatography and mass spectrometry to understand the chemistry of biomolecular degradation. We've gained insights not only into the past, but also into degenerative diseases.
We've developed a technique for dating samples by tracking the breakdown reactions of fossil protein trapped in crystal time-capsules. One set of key reactions is the change in chirality of amino acids, which shift to their mirror images over time. This method covers the last 3 million years. It's a period that is particularly challenging to date, but it's critical for understanding both climate change and human evolution.

Sharing knowledge through teaching

I love teaching at York - from the great discussions in tutorials, to the buzz of a workshop, to the excitement of seeing the first data from an undergraduate project. I'm motivated by the enormous practical applications of chemistry, which are woven through the core lectures, helping you to see the authentic applications of what you are learning. It's exciting to be able to design a course focusing on the latest and most important science, and to see my students fired up by it. I'm also a big fan of using peer-supported learning: the engagement, professionalism and collegiality that the students show in their constructive feedback to each other is inspiring.

Valuable insights

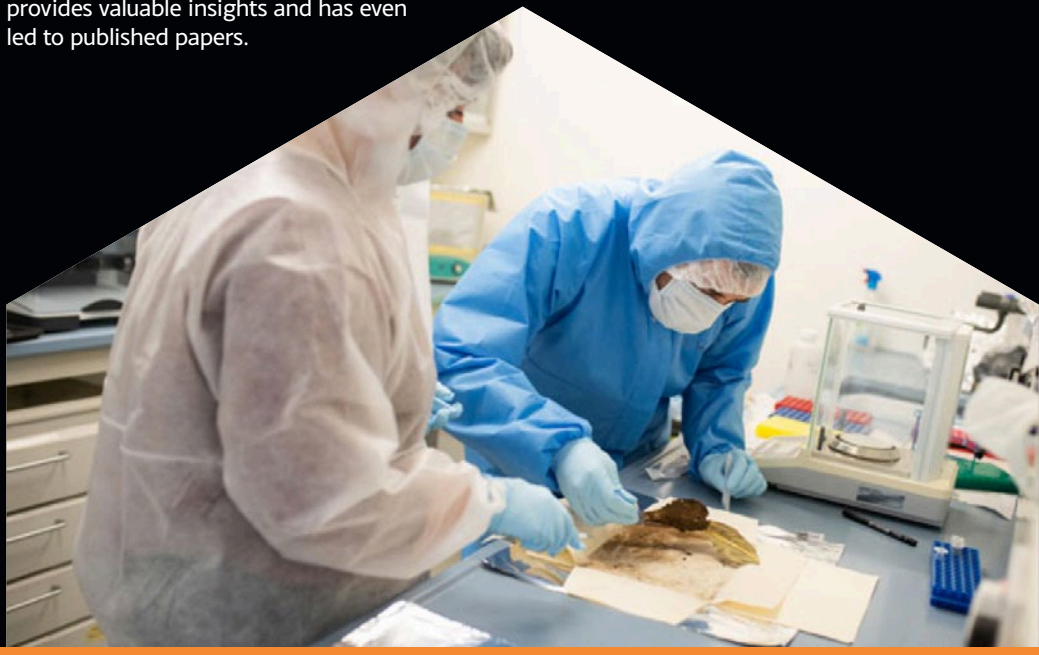
The research project in your final year lets you really focus on an area you're interested in. You'll work with one of our research labs, helping them to ask broader questions. Our students' work provides valuable insights and has even led to published papers.



Through data, we can see our assumptions confirmed or overturned - either way the science and our understanding is moving forward. Sometimes it's not until your whole dataset is processed that you start to see the beauty of the overall pattern. Other times you get a chromatogram straight off the printer and you can immediately see its importance. I have been found hopping around the lab in excitement at just the first glimpse!

Science as a reflection of society

I have a young daughter so I've been working part-time for a few years now. It's still unusual for an academic scientist to work part-time, but my colleagues have offered loads of encouragement and support. Having to think harder about what I do and when I do it has actually resulted in some really creative approaches to my work, so I am really pleased to have had the opportunity.
There have been huge advances in awareness of equality and diversity issues in science. I feel incredibly lucky to be working in a department where these issues are taken seriously. Science advances through new ideas, and the greater the diversity of backgrounds and perspectives we can encourage into the field, the better chemistry we will do.



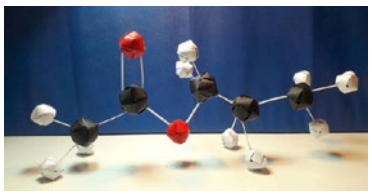
Professor Paul Walton receives Vice-Chancellor's Teaching Award

The award, which recognises excellence in teaching and learning support, was conferred at one of the 2020 graduation ceremonies. Professor John Robinson, Pro-Vice-Chancellor for Teaching, Learning and Students, wrote to Professor Walton: "The panel was impressed with your exceptional and sustained contribution to teaching within the department, including small group teaching innovations that have entered into the culture of the wider department. Your support for students and quality of feedback are exemplary; you are renowned amongst current and former students for going the extra mile to demonstrate what you are teaching in front of a packed lecture theatre. The Panel recognised the tremendous impact you have made on how teaching is organised and delivered in the department that is felt positively by all students and staff." In nominating Professor Walton for the Award, Dr Derek Wann said: "Throughout his career Paul has introduced innovations in teaching and learning that have gone on to become part of the furniture of the Department of Chemistry. The extent to which his teaching is valued is borne out in comments from students."

York chemistry undergraduates publish world-leading research paper

Work carried out by eight University of York Chemistry undergraduates results in a major publication in an international open access chemistry journal. The students, led by Professor Michael North and Dr Anne Routledge, investigated how physical and chemical characteristics associated with polymeric resins affect their ability to interact with 15 sustainable solvents. The work has been published in open access chemistry journal, ChemistryOpen. Understanding how polymers interact with solvents - especially with new, environmentally friendly and sustainable solvents - is a major challenge, with applications to areas as diverse as pharmaceutical synthesis, polymer synthesis, graffiti removal and plastic recycling. The complex 3D structure of polymers makes this a challenging area to study. The results of the students' work indicated that the chemical properties of the polymer had a larger influence on the solvent interaction than the physical properties. This is particularly important for the solid phase multi-step synthesis of pharmaceuticals (e.g. antiviral drugs) because the chemical properties of the polymer change as the synthesis proceeds. In particular, the results show that the optimal solvent may be different for each step of the synthesis.

The development of low-cost and non-hazardous methods for removing graffiti is an ongoing area of research. Image: Pixabay.



Free online course

A prizewinning contribution from a learner on our free online Chemistry course. The next course, which is designed to aid the transition from school/college to university, starts in June/July 2021. Ahead of this, the course is available as a self-guided course. For more details see: **www.futurelearn.com/courses/everyday-chemistry**.

Lockdown lectures

Take a look at our videos featuring academic staff that showcase how our world-leading interdisciplinary research influences our teaching – see www.york.ac.uk/chemistry/undergraduate/howtoapply/lockdown-lectures/

For example, in lecture 1, Dr Victor Chechik discusses his interest in detecting and studying radical intermediates, such as using EPR spectroscopy to probe hair bleaching. Our staff continuously push the boundaries of knowledge and their research informs what you learn.

USEFUL LINKS

Student Finance

www.york.ac.uk/students/finance/
www.gov.uk/browse/education/student-finance/

The University's Student Financial Support Unit will be able to help with any student financial queries that you may have.

Student Societies

https://yusu.org/student-life/clubs-and-socs

York University Students' Union (YUSU) offers an array of societies covering a huge range of activites ranging from the Murder Mystery Society to award-winning media societies.

Student Sports Clubs

https://yusu.org/student-life/clubs-and-socs

Enjoy more than 60 different sports clubs.

University Library

www.york.ac.uk/library/

The Library is open 24 hours a day, 7 days a week, 362 days a year.

Chemistry Review

www.york.ac.uk/chemistry/schools/chemrev/

Chemistry Review, a magazine for post-16 chemists, is commissioned and edited at York.

Departmental video links

https://www.york.ac.uk/chemistry/undergraduate/studentprofiles/student-talking-heads/

See our undergraduate students explain why they decided to study their Chemistry degree at York.

https://www.youtube.com/watch?v=3bQmh45rVhU

Our Life of a Chemistry Student video highlights the journey from preparing to study, to progression through the four years of our MChem degree.

Find out about the latest news in the department using twitter:
http://twitter.com/chemistryatyork

Admissions enquiries

please contact:
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Website: www.york.ac.uk/chemistry