Summer Research Internship

RSC Missing Elements Grant

Supported by the RSC Missing Element's grant, the School of Chemistry at the University of Edinburgh is addressing the key themes of the RSC Missing Element's report.

Summer 2025 will be the second round of an undergraduate summer research internship programme for Black and minoritised ethnic students.

We are committed to promoting racial equality and diversity within the chemical sciences, and applications are now open for undergraduate students to join our world-leading researchers this summer.

What is the opportunity?

An 8-week paid summer internship, working on a project based in a research group in the School of Chemistry, University of Edinburgh. You will be guided by a supervisor, working at the cutting edge of research, expanding your practical abilities, and improving your problem-solving and science communication skills.

Why apply?

Completing a summer internship means you will engage in real academic research during a key stage of your undergraduate degree. This opportunity will prepare you for undertaking future research projects and allow you to grow in confidence, helping you to navigate the research environment. This additional experience can set you apart from other applicants during your post-graduation job search as you will be able to add this experience to your CV and discuss it at future interviews.

Projects, dates and funding.

You will select your project preferences from the available projects listed at the end of this document. You are encouraged to contact the supervisors listed if you wish to know more about the research before selecting. The 8-week project could run end of May-beginning Sept, with preference for May-July dates, suitable dates to be agreed between successful student and supervisor.

The current pay rate is UE03.1, at **£14.20/hour (35-hour weeks, Mon-Fri).** If required, there is additional financial support towards accommodation during this internship. Travel costs to and from Edinburgh would be covered for the successful applicant.

Application Deadline Tuesday 4th March 2025 by 12 noon.

Who is eligible?

- ✓ Full time undergraduate students in the latter years of a chemistry degree in the UK, e.g., 3rd year of a 4 or 5 year degree or 2nd year of a 3 year degree.

- ✓ Students who self-identify as Black or minority ethnic, based on EUSA campaign definition. Summarised as, *students including those of African, Asian, Arab and Afro-Caribbean descent, those from other minority ethnic groups including Jewish and Gypsy, Roma and Traveller (GRT) students, and those who identify as being mixed race or having multiple ethnicities.*

- ✓ We strongly encourage applications from students who are typically underrepresented in higher education, for example those from disadvantaged backgrounds (e.g. low income backgrounds, attended a school with low progression to higher education, free schools meals recipients), first in their family to go to university, care-experienced and young adult carer students, estranged students, student with asylum seeker or refugee status, students who have come to study Chemistry *via* a college route or access course, and students with disabilities.

How to Apply

Project Selection

- Read the project summaries, around the subject area, and feel free to contact the supervisors listed if you wish to know more.
- You must select **at least two projects** you would like to work on, and note these in the application form.

Application

- Application form - https://forms.office.com/e/ncUcPvaizT
- Deadline Tuesday 4th March 2025, 12 noon.

Interview

- Soon after the closing date, students will be shortlisted for interviews held online on Monday 24th or Tuesday 25th March.

Internship Awarded

- The successful applicant will be informed *via* email.
- The student will then liaise with their supervisor to agree on specific dates of their internship.

Any personal information shared during the application process will be treated confidentially by the interview panel.

Application Deadline Tuesday 4th March 2025 by 12 noon.

Through the application or interview, applicants should be able to demonstrate the following essential skills and attributes:

- Great communication skills.
- Self-motivation; and ability to work well with minimal supervision.
- A commitment to professional standards of conduct and safe working practices.
- Resourcefulness and the ability to think on one's feet.
- Ability to work independently and as part of team.
- Proficiency in planning, organisation, problem solving and multi-tasking skills to complete the project in a timely and efficient manner.

In the event of two applicants having the same experience and performance at the interview we will give priority to people who have no previous experience in working in laboratory settings other than teaching labs.

Email any questions to Dr Jenny Gracie (jenny.gracie@ed.ac.uk).

Application Deadline Tuesday 4th March 2025 by 12 noon.

THE UNIVERSITY of EDINBURGH
School of Chemistry

ROYAL SOCIETY OF CHEMISTRY

Summer Student Internships 2025

Available research projects supported in the school of chemistry,

1. Coding a "reagent bot"
2. Examining electron delocalisation in non-covalent interactions
3. Enhancing the appearance of silicon solar panels with luminescent dyes
4. Targeting the synthesis of a Ca(I) dimer
5. Translation Software in Chemistry Education
6. Chemical Analysis of Low-Alcohol Beer
7. Time-resolved Imaging of Photochemical Reactions in the Atmosphere

1. Coding a "reagent bot"

Dr James Cumby - james.cumby@ed.ac.uk

Most synthetic chemistry starts with writing a balanced chemical equation. For inorganic materials, however, there are often multiple choices of starting reagents to give the same product. Manually writing (and balancing) these equations is tedious, and needs an automated approach to enable robotic synthesis. The goal of this project will be to develop Python software that can plan reactions with minimal human input, and ultimately tell a robot how much of each compound to weigh out.

Research Group Website: www.cumby.chem.ed.ac.uk

2. Examining electron delocalisation in non-covalent interactions

Prof. Scott Cockroft - scott.cockroft@ed.ac.uk

This is a physical organic chemistry project that will employ organic synthesis to obtain model compounds for examining intramolecular interactions. By using NMR spectroscopy, these molecular designs will enable the measurement of interactions involving electron delocalisation that blur the lines between non-covalent and covalent bonds. There may also be scope to employ computational chemistry in this project to examine the electronic nature of such interactions (depending on the interests of the student).

Research Group Website: http://www.cockroft.chem.ed.ac.uk
Research Paper: http://dx.doi.org/10.1002/anie.202005739

Application Deadline Tuesday 4th March 2025 by 12 noon.

3. Enhancing the appearance of silicon solar panels with luminescent dyes

Prof. Neil Robertson - Neil.Robertson@ed.ac.uk

Photovoltaic panels are essential to decarbonising the energy sector and are becoming ever more common in our cities. Their dull, dark appearance however can be a barrier to uptake on building facades and other locations where they are highly visible. We have developed a method to enhance their appearance, without decreasing efficiency, by printing luminescent dyes onto an added plastic covering. The panel appearance could thereby include public artwork, company logos, advertisement, decoration etc. So far we have demonstrated this method on individual 12.5x12.5 cm^2 cells, and we now seek to demonstrate the application of our films to a full-scale solar panel. The project will involve collaborative work with Edinburgh College of Art to ink-jet print attractive patterns onto plastic film and apply this to a solar panel, working towards implementation in a real-world public setting.

Research Paper: https://doi.org/10.1039/D3TA00734K

4. Targeting the synthesis of a Ca(I) dimer

Dr Jordann Wells - j.a.l.wells@ed.ac.uk

While Mg(I) compounds have found synthetic utility as convenient reducing agents, their heavier Ca(I) analogues are as yet unreported. In this project, you will develop new calcium(II) complexes with aminophosphine ligands and investigate the reactivity to form the first calcium-calcium bond. You will use Schlenk line techniques and inert atmosphere gloveboxes to synthesise and handle your compounds, and use NMR spectroscopy (^{1}H, ^{31}P) and crystallography to characterise them.

Relevant papers: https://www.science.org/doi/epdf/10.1126/science.abf2374
https://onlinelibrary.wiley.com/doi/full/10.1002/anie.202111385
https://www.science.org/doi/10.1126/science.1150856

5. Translation Software in Chemistry Education

Dr David August - David.August@ed.ac.uk

Recent developments in AI and translation software have opened up communication for millions of people round the world. From desktops to hand-held devices, we can now enjoy free, reliable and real-time translation of all manner of communications including books, emails, videos or even live in-person conversations. However, as access to these tools improves, what are the impacts on chemistry education? From one perspective – international students can now access language support to aid with lectures and coursework, on the other hand – students have less incentive to practise the language skills essential for exam success. This project will involve gathering data through student surveys or in-person focus groups to analyse the impact of translation software on the student experience.

Supervisor Profile: https://edwebprofiles.ed.ac.uk/profile/dr-david-august
Relevant Paper: https://doi.org/10.1080/21568235.2016.1172248

Application Deadline Tuesday 4th March 2025 by 12 noon.

6. Chemical Analysis of Low-Alcohol Beer

Prof. Colin Pulham - C.R.PULHAM@ed.ac.uk

This project will involve collaboration with a small local brewery that is focused on producing high-quality, low-alcohol beers with distinctive flavours. The aim of this project is to use advanced analytical instrumentation to identify key components (flavour compounds, carboxylic acids, sugars, pH, alcohols, metal ions, inorganic and organic anions) contained within a selection of beers produced by the brewery. A range of analytical techniques will be used including NMR, mass spectrometry, HPLC, UV-visible spectroscopy, and ICP-Optical Emission Spectroscopy. The quantification of species within the beer will be correlated with properties such as flavour, colour, shelf-life, and nutritional value - this research will inform the brewery about different approaches that can be taken to optimise the quality of the beers. There will also be opportunities to visit the local brewery and learn at first-hand about the production of low-alcohol beer together with the challenges and excitement of running a small start-up company.

7. Time-resolved Imaging of Photochemical Reactions in the Atmosphere

Dr Alice Green - alice.green@ed.ac.uk

Modern laser technology allows us to directly measure molecular dynamics with femtosecond (10^{-15}s) timing resolution, the timescales over which the fastest nuclear motions at the heart of photochemical reactions occur. Recent work in my group has used this laser technology (specifically at international X-ray free-electron laser facilities) to experimentally study the ultrafast photochemistry of small organic carbonyl molecules with spectroscopy and structural imaging techniques. These species are of particular interest due to their presence in the earth's atmosphere. Consequently, we need to be able to fundamentally understand and model their light-driven chemistry. Within this project, you will help to analyse a rich dataset that has emerged from these recent state-of-the-art experiments. As well as learning about the specifics of how these complex experiments are performed and what they can teach us about molecular photochemistry, you will develop a range of data analysis and programming skills.

Supervisor Profile: https://edwebprofiles.ed.ac.uk/profile/alice-green

Application Form - https://forms.office.com/e/ncUcPvaizT

Application Deadline Tuesday 4th March 2025 by 12 noon.