RSC response to the APPG on Students Call for Evidence Commission on Students in Higher Education

About the RSC

With around 60,000 members and a knowledge business that spans the globe, the Royal Society of Chemistry (RSC) is the UK's professional body for chemical scientists, supporting and representing our members and bringing together chemical scientists from all over the world. Our members include students and researchers in universities, teachers, regulators and those working in both large multinational companies and small and medium enterprises.

We welcome the opportunity to contribute to this call for evidence as a professional body with a significant student membership and many members working in higher education. Much of our work is relevant to the Commission on Students in Higher Education, including efforts to increase diversity and inclusion within the discipline, accreditation of chemistry degree courses, and our exploration of skills gaps within chemistry and the needs and expectations of employers now and in future. We will detail these elements below in relation to the three themes of the call for evidence.

For any further details, or if we can be of any more assistance to the commission, please contact us at policy@rsc.org.

Summary

Chemistry skills underpin many of the sectors emerging in the Government's Industrial Strategy and Missions, including kickstarting economic growth, making Britain a clean energy superpower and life sciences.

The chemistry sector is projected to grow faster than the overall labour market in the next decade, but to deliver the Government's ambitions and to fill the new roles created by the growth of the sector, the right talent pipeline is vital. Chemistry degrees are a major pathway for the sector and chemistry employers are dependent on the practical, digital and sustainability skills and knowledge that chemistry degrees provide. Universities are incorporating this into their curriculums, however, the cost of delivering STEM degrees has outstripped the income universities receive from student fees and government grants, such as Strategic Priorities Grant which has not kept pace with inflation.

The financial sustainability crisis in higher education is forcing universities to take difficult decisions and we have recently seen cuts and closures to chemistry provision in the UK. We are starting to see "cold spots" emerge where no provision of the subject is available within a reasonable travel time. This is restricting choice and impacting some groups of students more than others, especially students from low

socioeconomic backgrounds. Decision-making at institutional level may not always consider how local course closures or mergers will affect skills provision across the UK, nor the research and innovation capability and capacity at the UK-wide level in the long term.

Section 1: Access & student outcomes

Providing support for students

A core principle underpinning the work of the RSC is our belief that for the chemical sciences to prosper, they must attract, develop and retain a diverse range of talented people. Inclusion and diversity is a pillar of our organisational strategy. As a professional and membership body, and a leading voice for the chemistry community, we have a responsibility to promote inclusivity and accessibility in order to improve diversity. We take an evidence and data-based approach, listen to the lived experiences of our communities and act. We have designed and developed multiple interventions to drive change in the culture of chemistry and its ethical practice.

One of the mechanisms through which we provide support for students is the Chemists' Community Fund[1] (CCF), which is accessible to all students on RSC accredited undergraduate and postgraduate degree courses in the UK and Republic of Ireland. Through the CCF, we offer support for students via, for example, the Student Hardship Grant, help on managing debt and budgeting, and through our student wellbeing support services[2].

In addition, the CCF funds many other initiatives, grants and programmes such as the RSC Bullying & Harassment Helpline, a mentoring programme for Black and Minority Ethnic students Destination STEMM, RSC Grants for Carers and Assistance Grants[3]. It also funds further research such as our work on Socioeconomic Inclusion (SEI) which aims to enhance inclusive access and progression in the chemical sciences, starting from undergraduate education and extending to postgraduate studies and careers in academia and industry.

Students from low socioeconomic backgrounds are underrepresented

The RSC's Socioeconomic Inclusion (SEI) landscape analysis, based primarily on quantitative analysis of Higher Education Statistics Agency (HESA) data, indicates that individuals from low Socioeconomic backgrounds (SEBs) are underrepresented and disproportionately experience barriers to progression within the chemical sciences[4].

[1] https://www.rsc.org/membership-and-community/chemists-community-fund/
[2] https://www.rsc.org/membership-and-community/chemists-community-fund/student-support/
[3] https://www.chemistryworld.com/opinion/my-assistance-dog-gave-me-the-confidence-to-start-a-phd/4020422.article
[4] https://www.chemistryworld.com/webinars/empowering-voices-advancing-social-mobility-in-the-chemical-sciences/4019372.article

These students are:

- Significantly less likely to attend Russell Group or non-Russell Group universities compared to post-1992 universities, have higher dropout rates, and are less likely to achieve a 2:1 or first-class degree.
- Disproportionately burdened by financial pressures, compounded by the rising cost of living and the long-term impacts of COVID-19.
- Anecdotally, students from low SEB face even greater challenges within chemistry due to the time-intensive nature of the subject and limited career flexibility.

This is further exacerbated by the financial crisis in the UK higher education sector. As a result, student hardship has worsened, with cuts to grants and loans offering little relief. Moreover, while overall undergraduate enrolment has increased, chemistry enrolments have fallen significantly since 2017/18 (although we are starting to see small increases over the most recent two years), particularly at post-92 universities, which have traditionally served underrepresented students. This poses serious risks to the diversity of the chemical sciences, undermining the resilience and innovation of the UK workforce. In the face of growing global competition and documented pressures on UK industries, this is a direct threat to national prosperity.

Although our landscape analysis has uncovered significant issues it has also highlighted gaps in the current understanding of SEI. SEI is a complex and multi-faceted issue, which makes it challenging to understand and it is often overlooked within broader diversity and inclusion efforts.

Data and evidence are key to our SEI approach, and it is imperative that we fully understand the socioeconomic inequalities that underpin these challenges. Without robust evidence, professional bodies, policymakers, education sector, and governments cannot take informed action. The RSC is currently carrying out quantitative and qualitative research aiming to understand how SEB affects undergraduate students in the chemical sciences at higher education institutions across the UK. We expect to publish our findings later this year and would be happy to share our findings in due course.

Regional disparities in the provision of chemistry

In recent years the financial pressure on universities has, in some cases, led to cuts and closures to chemistry provision in the UK. We have been monitoring the health of chemistry provision in higher education to understand where students can study and whether there are any barriers emerging.

Research shows that many undergraduate students often choose to study close to home, especially students from disadvantaged or minority groups[5], and as outlined already, it is expected that this will have heightened due to the impacts of increased cost of living. Cuts and closures to chemistry provision therefore restrict choice and will affect some groups of students more than others.

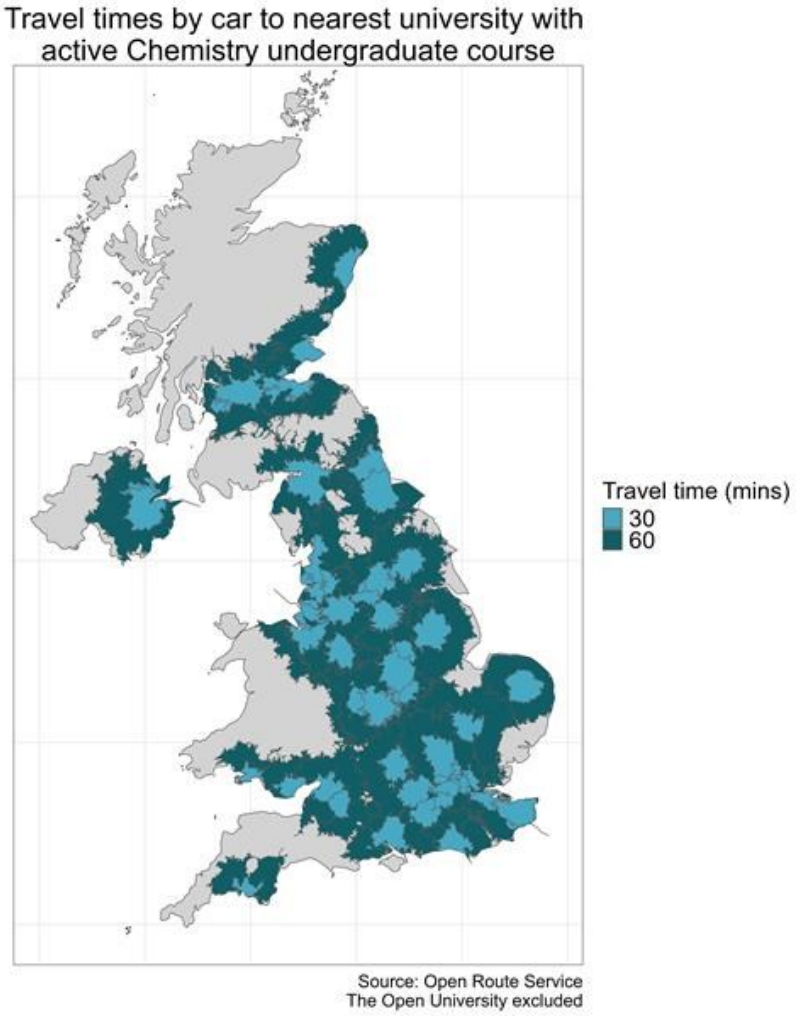
Some of the institutions that either have already announced cuts and closures to chemistry, or are believed to be at risk of doing so, have strong track records in supporting underrepresented groups to achieve degrees. The RSC has long campaigned to improve representation and diversity in the chemical sciences, and we are concerned that these current issues could result in lost progress towards this goal. The recent announcement from the University of Bradford closing its chemistry department is a key example[6].

The University of Bradford has a proud history of providing teaching for students from minority ethnic backgrounds who may not want or be able to travel distances away from home. We are concerned that the absence of a chemistry programme in the city could prove detrimental to diversity in the sector locally. Further, the numbers of students on degree apprenticeships at the University of Bradford outstripped full-time students in recent years. Loss of this department means the number of providers offering science degree apprenticeships across the UK is now alarmingly low and geographically uneven. At a time when the country and industry needs more diverse routes to attract new talent into the chemical sciences, including towards realising its future growth potential, this decision represents a regrettable regression.

We are starting to see "cold spots" where no provision of the subject is available within a reasonable travel time (see map in figure 1). This issue is emerging in East Yorkshire and the Humber with the closure of the University of Hull's chemistry department, and in North Wales with the closure of Bangor University's department. Other potential closures, particularly of lower-entry tariff institutions, could further worsen this picture.

[5] https://www.suttontrust.com/our-research/home-and-away-student-mobility/
[6] https://www.chemistryworld.com/news/chemistry-courses-to-be-shut-down-at-the-university-of-bradford/4021218.article

Figure 1 – A map indicating the provision of chemistry in higher education. 30- and 60-minute driving ranges are indicated.



[Note: This map provides a good picture of accessibility to chemistry courses, but has some limitations, notably it does not take into account other factors which impact access in any given geography such as departmental capacity in terms of courses and staff, public transport links and accessibility, and entry tariffs. The Open University is excluded from this map as it offers distance learning.]

Impacts on the local areas and other subjects

In addition to impacting student choice and access, the closure of chemistry departments and courses has the potential to limit the skills that students can develop in their local area as well as impact the ability of the university to contribute to regional and local skills development, with knock-on impacts for employers of chemistry graduates in these regions.

It can also have detrimental impacts for other science and engineering departments, including medicine and dentistry, which need chemistry to continue providing excellent

teaching and research. Our research into the future skills need within the discipline shows that science and industry are getting more interdisciplinary[7]. Chemical scientists represent one important aspect of the R&D ecosystem, and a loss of chemistry skills and research will harm research and innovation across the UK STEM industries.

Disability and accessibility

Disabled people are underrepresented in the chemical sciences[8], both at student level and, even more starkly, at academic staff level. Losing out on the potential of this group means we are not producing the best chemistry, chemistry that everyone can contribute to and benefit from. Addressing this at the education stage can have a key impact on this 'leaky pipeline' effect.

Our evidence shows that there is often a perception that disability is incompatible with working in chemistry, especially in laboratories, which discourages disabled students from even studying chemistry. There are many reasonable accommodations that can be made, starting with attitudinal and procedural, to allow disabled people to thrive in chemistry. For example, if colleges and universities adopt a proactive approach to providing accommodations this can reduce the burden of self-advocacy[9].

Not all disabilities are visible and our research shows one of the most common type of disabilities chemists disclose is neurodiversity-related conditions[10]. We know that rates of diagnosis of these conditions are increasing, especially in young people, making this an important issue to tackle. Simple accommodations such as allowing noise-reducing headphones or adjustable lighting to reduce overstimulation can greatly improve the experiences of disabled students and increase retention in studying chemistry.

Another type of disability that is increasing in prevalence is mental illnesses. We know this can have negative impacts for students – out of all disabled students those with mental illnesses have the lowest degree continuation and completion rates[11].

Students are increasingly needing to work alongside studies

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[7] Future Workforce and Educational Pathways, RSC 2025, https://www.rsc.org/globalassets/22-new-perspectives/discovery/future-workforce-and-educational-pathways-interim-report/rsc-future-workforce-ep-report.pdf

[8] https://www.rsc.org/policy-evidence-campaigns/inclusion-diversity/surveys-reports-campaigns/disability-in-the-chemical-sciences/#who-identifies

[9] https://www.rsc.org/policy-evidence-campaigns/inclusion-diversity/surveys-reports-campaigns/disability-in-the-chemical-sciences/#self-advocacy

[10] https://www.rsc.org/policy-evidence-campaigns/inclusion-diversity/surveys-reports-campaigns/neurodiversity-in-chemical-sciences/#importance-of-neurodiversity

[11] https://www.officeforstudents.org.uk/publications/annual-review-2023/a-statistical-overview-of-higher-education-in-england/

The RSC's Higher Education Interest Group, which brings together academics in chemistry higher education[12], have observed:

The reality in 2024 is that part time work is essential for more than 50% students to be able to afford basic living costs whilst studying at university. Recommendations for students' budgets range between £900-£1,000 per month varying only slightly between cheaper and more expensive areas of the UK. Students have the option of means-tested maintenance loans with the expectation that the minimum loan (£4,767 for the next academic year) is supplemented by family household income. Students without access to that level of family wealth must work to be able to afford to live and eat at university. The pressure of part time work is increasingly impacting the time students have available to attend classes and undertake self-directed study. We are seeing this in attendance and engagement in our classes. We also note that some groups are being affected disproportionately more than others.

They also noted that the need for practical classes and high contact hours to complete a chemistry degree mean this is a pressing issue for chemistry students.

Section 2: Teaching standards

Higher education chemistry enables economic growth

Analysis of national statistics and job postings data by Lightcast for the RSC in 2023 projected the growth of the chemical sciences sector to be 30% faster than that of the overall UK labour market out to 2032[13]. This should create an additional 12,000 jobs in core chemistry roles and over 100,000 jobs in chemistry-centred industries, on top of existing roles that will need to be filled due to regular staff turnover.

The chemical sciences workforce is highly educated, with over 70% holding at least a bachelor's degree or equivalent – compared to around 40% of the overall UK workforce[14]. While we are also calling for expanded use of vocational routes into the sector, it remains the case that higher education and the degree route will continue to be the major path by which students gain skills in chemistry and go on to start chemical science careers. University capacity on chemistry courses will therefore be crucial to fill these new roles created by the growth of the sector and realise the growth potential we have highlighted. This will be particularly important for sectors driving green innovation

[12] https://www.rsc.org/membership-and-community/connect-with-others/through-interests/interest-groups/higher-education/

[13] The Future Chemistry Workforce and Educational Pathways: an Interim Report (p12), Lightcast for RSC (2023), https://www.rsc.org/globalassets/22-new-perspectives/discovery/future-workforce-and-educational-pathways-interim-report/chemistry-future-workforce-and-education-pathways-data-report.pdf

[14] Lightcast for RSC (p29), *ibid*

and better health, with these employers especially dependent on a workforce possessing graduate-level chemistry skills.

Teaching practical skills is an integral part of chemistry education

Among the key skills being imparted through chemistry teaching in higher education are the practical skills that allow students to effectively conduct chemistry work, going on to do this in research and industry. The RSC's 2022/23 Accreditation Criteria Review received almost 800 responses from students, industry and academics[15]. The responses showed that 95% of industry respondents considered practical skills to be important or very important to graduate outcomes, with 98% of students considering practical skills to be important to them. A survey of R&D leaders in organisations including at pharmaceutical and agrochemical companies, Contract Research Organisations (CROs) and Contract Development and Manufacturing Organisations (CDMOs) that employ organic chemistry PhD graduates provides further evidence of the importance of practical chemistry education in universities for UK industry.[16] In addition to laboratory skills, digital teaching and learning infrastructure is also vital, with employers increasingly seeking digital and data skills, alongside a high-level understanding of the underlying chemistry that these digital tools are analysing.

This practical teaching (in both wet and digital labs) is an integral part of chemistry education, hence being required by our degree accreditation criteria. These state that accredited programmes should include a minimum of 300 hours of practical experience[17].

Chemistry practical teaching relies on postgraduate students

As noted by the RSC Higher Education Group[18], undergraduate chemistry practical education relies on postgraduate students in paid employment as teaching assistants, demonstrators, or subject tutors, and doing unpaid supervision of undergraduate project work in research labs. Postgraduates taking on these roles is both beneficial to the postgraduates themselves, for example through the acquisition of valuable experience and development of employability skills, and it is beneficial for the department since it reduces the burden of teaching and supervision on academic and technical staff and provides an intermediary, "friendly-face" of teaching for students. The undergraduate student experience is therefore different depending on whether they

[15] In this survey, 181 responses were from students.
[16] RSC Organic Chemistry Community PhD Graduate Skills Survey 2023 https://www.rsc.org/membership-and-community/connect-with-others/join-scientific-networks/subject-communities/organic/organic-chemistry-community-news/2023/phd-graduate-skills-survey/
[17] RSC Accreditation of Degree Programmes, https://www.rsc.org/globalassets/03-membership-community/degree-accreditation/accreditation-of-degree-programmes.pdf
[18] https://www.rsc.org/membership-and-community/connect-with-others/through-interests/interest-groups/higher-education/

are educated at a university with an abundance of high-quality postgraduate student teachers or one with few or none.

Section 3: Student funding

The cost of teaching a chemistry degree has outstripped funding

As outlined in the previous section, a high-quality chemistry education, which includes developing students' practical, digital and data skills, is needed for the future workforce and to enable economic growth. However, the costs of delivering this have outstripped the funding received per student[19]. [More information and data on the costs can be found in the appendix at the end of this response.]

Universities are increasingly reliant on top-up sources of income to subsidise the cost of teaching and research. Universities receive some additional funding through grants distributed by the Office for Students such as the Strategic Priority Grant (SPG) which supports high-cost subject provision. This is a vital source of income to make up some of the difference, however the SPG has not kept pace with the increasing costs[20].

While it varies between universities, many also rely on surplus-making activities such as the teaching of international students, whose fees are not capped, to make up the difference. [See the appendix for further information on international students.] While international student fees have been an important and agile form of income for universities in recent years, overreliance on this funding stream is inherently high-risk and unsustainable as it is reliant on other factors such as wider policy decisions around immigration and geopolitics. Without international student fees or alternative sources of revenue to make up the shortfall, higher-cost subjects such as chemistry are at risk of restricting student numbers, reduced quality of teaching and learning, and potentially closure of departments, as universities make difficult decisions.

A strategic, UK-wide and long-term approach is needed

Universities are acting to put themselves on a more sustainable financial footing. However, decision-making at institutional level may not always consider how local course closures or mergers will affect skills provision across the UK, nor the research and innovation capability and capacity at the UK-wide level in the long term. It is critical that the Government acts to ensure that chemistry research and innovation continues to benefit local economies and chemistry education providers remain available across the UK to train our future chemistry workforce.

[19] https://www.russellgroup.ac.uk/sites/default/files/2025-02/RG_University_business_model_education_Aug2023.pdf
[20] E.g., https://www.russellgroup.ac.uk/news/strategic-priorities-grant-2024-25

Appendix: Additional data and information

Degree costs and income streams

The Russell Group estimates that in 2022/23, it costs on average £14,000 to educate a student studying a STEM subject in England. Using Consumer Price Index (CPI) inflation data, we estimate that it is even higher than this now, likely over £15,000 for a typical chemistry degree per student per year, although this may vary between universities. .

Fees for UK students are capped at £9,250. The Office for Students provides additional support for high-cost subjects (like chemistry) through its Strategic Priority Grant and via the very high-cost STEM funding. In 2024, the funding rate per student for chemistry from the Strategic Priorities Grant was £1,737[21]. This indicates that there is a potential deficit between the cost of teaching a chemistry degree versus what the university receives of at least £4,000 per student.

International students

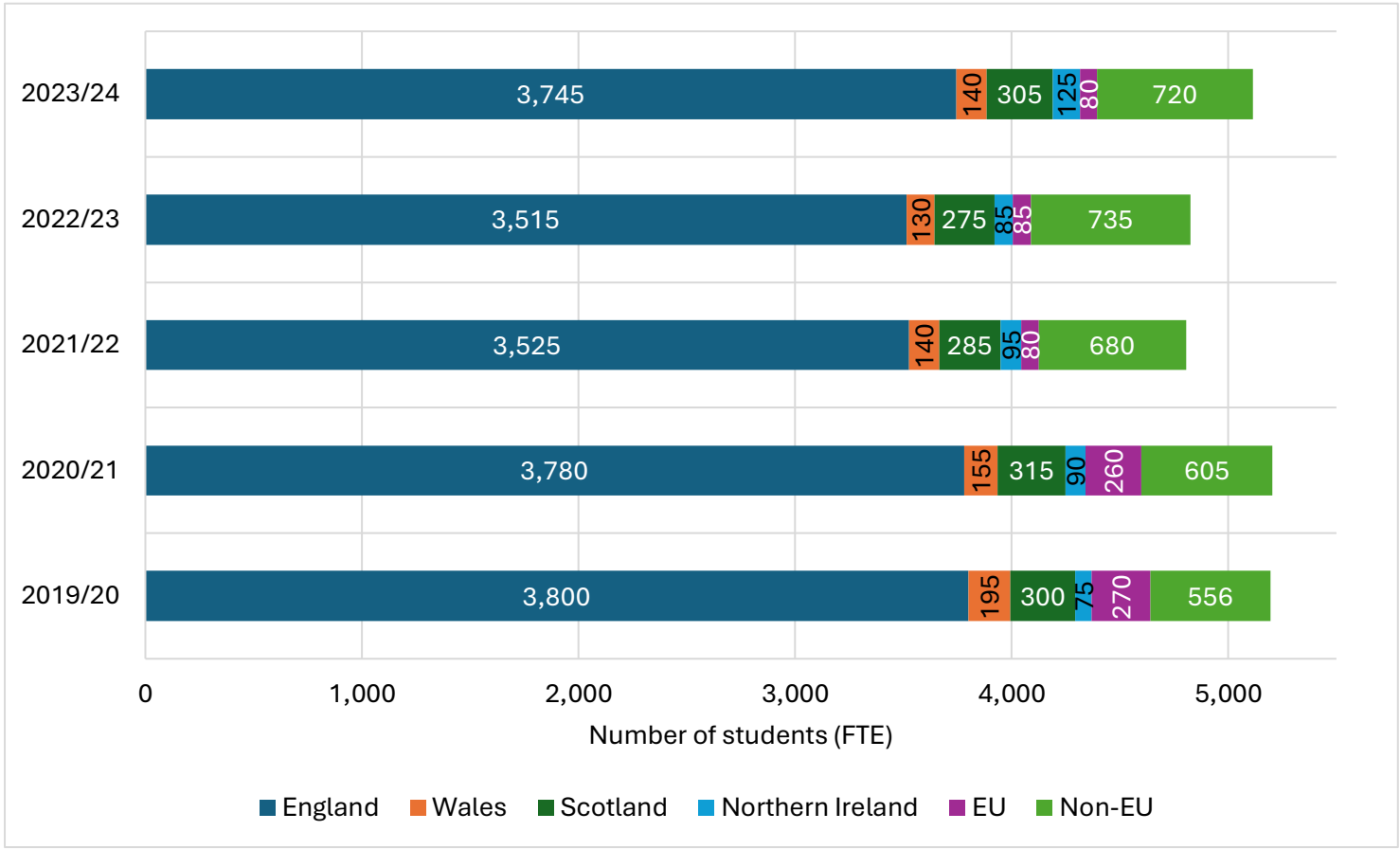
The annual student fees charged by universities in England to international students starting undergraduate chemistry courses in 2024/25 are typically around three times the £9,250 annual fee for domestic students in England and at some universities, significantly higher[22].

The number of non-EU international students starting undergraduate chemistry courses has grown in recent years, providing some critical fee income, though this is in the context of an overall fall in first-year chemistry undergraduates – partly driven by a decrease in students from the EU since they became subject to full international fees (see figure 2). However, in 2023/24, while there was an overall rise in number of students enrolling on a chemistry undergraduate course, largely driven by increases from students from the UK nations, international student numbers dropped slightly. These fluctuations will impact university finances.

[21] Chemistry falls in price group B which includes laboratory-based STEM subjects. The funding price group B subjects receive is based on a formular. In 2024/25, the funding rate per FTE student in price group B is £1,737. See https://www.officeforstudents.org.uk/media/2ptb3ono/guide-to-funding-2024-25.pdf

[22] RSC analysis of the websites of 15 English universities offering BSc in Chemistry or similar distributed around England.

Figure 2 – Analysis of HESA data showing all chemistry first year undergraduate enrolments by domicile between 2019/20 and 2023/24[23].



[23] Table 52, https://www.hesa.ac.uk/data-and-analysis/students/what-study