

Science websearch

- Websites are checked as close to printing as possible – however, website addresses do change.
- Inclusion of a website does not imply that ASE endorses the content of the site.
- Sites are suggested on the basis of ‘take a look, you might find something interesting and useful’ – we have not read every page on every website listed.
- Some sites may involve subscriptions and/or payment for download of material.

Please send details of any websites you have found or produced to the *Science websearch* editor, David Moore, at ssreditor@ase.org.uk. We would also be interested in hearing about how you have used websites that have appeared in *Science websearch* in your educational setting.

In this issue we are looking at the contributions that universities can make to GCSE, A-level and IB examinations. Universities offer a range of useful information that is readily accessible at school standard. We shall be considering the content from a number of different universities; however, please be aware that the inclusion of any particular university in these articles does not mean that the material it provides is any better (or any worse) than the material provided by universities not mentioned. There are too many to look at every single one of them! Universities like to be seen to be inclusive, so don't be put off by the inclusion of two major universities in the examples below – the material is open to anyone.

Start by checking out your nearest university: use their search engines to look for ‘Outreach’, ‘Public Lectures’ or ‘STEM’, as these generally give the best and easiest way to access relevant material. Be aware though that you will get an awful lot of responses if you search on ‘STEM’ and the university has a biology department! Most universities hold public lectures and so, unless you want to travel great distances, it is best to try your local university first. Some universities will also loan equipment and expertise in operating it, or arrange for small groups to visit the university to try out a specific technique first-hand. Some of these are noted below.



<https://explore.org/about>

This site is the ‘Home of Big Questions’. The site looks at topics beyond those covered in the classroom and is designed to help promote curiosity and broader thinking. It is suitable for ages 11–18. Each Big Question has a number of interactive questions and videos. At the time of writing the Big Questions include ‘*Is sleeping more important than studying?*’, ‘*Is it OK to clone a human being?*’ and ‘*Are explosions always destructive?*’, among many others. Even some of the topics that do not seem particularly scientific are always interesting and, whatever the topic, the material

is always covered in a useful and informative way. There are a number of routes through each topic, so to explore it fully could take quite a while. This might be just the site for a student to have a look at while wanting a break from normal in-depth studying and classwork, but where they will still learn a lot.



www.birmingham.ac.uk/undergraduate/preparing-for-university/stem/STEM-resources.aspx

www.birmingham.ac.uk/teachers/pupil-opportunities/index.aspx

The first of these links goes to pages from the University of Birmingham that look at some of the most common biology, chemistry and physics A-level practical

experiments in order to help students understand the importance of practical skills, as well as enabling them to do well in the laboratory. Each of the experiments considered contains links to a video explaining how the activity is performed as well as to a linked podcast. There is also plenty of theoretical material both on the page and throughout the video. This site would be excellent preparation for exam revision, as well as giving students confidence about their own practical abilities. Current topics covered are: membranes, mitosis and meiosis, species diversity, electrophoresis, enzyme reaction rates, antimicrobial agents, acid–base titration, chemical reaction rates, preparation of an organic solid, electrochemical cells, electrical properties, emf and internal resistance, investigating gravity, interference effects, Young's

modulus, capacitors, ionising radiation and simple harmonic motion. The link for teachers, might be worth exploring as it gives a list of opportunities and activities for students at primary, secondary and post-16 level for those schools near to Birmingham and also for schools and colleges nationwide.



www.cardiff.ac.uk/chemistry/engagement/chemistry-captured
<http://sites.cardiff.ac.uk/curriculum-support/all-activities>

The first of these links goes to a page from the Public Engagement section of the School of Chemistry that gives direct access to 17 video clips prepared by Cardiff University in collaboration with the Royal Society of Chemistry and the Gatsby Science Enhancement Programme. Originally these were published on two DVDs and distributed to all schools in the UK; however, these electronic links may prove to be more convenient, particularly if emailing the relevant links to students. Cardiff also has a large amount of curriculum support material for the sciences, any of which would be of interest should you have easy access to Cardiff University. A comprehensive list can be found via the second link.



www.myheplus.com/post-16

HE+ is a site that is designed to get your students thinking and to help them explore subjects beyond the strict rigour of the exam curriculum. Although the site does cover curriculum material, it takes the knowledge further and expands on it. On opening the site,

one is presented with 18 subtopics, ranging from biology and chemistry through to engineering and veterinary medicine. Clicking one of these topics then leads to further pages complete with links explaining what that subject is like to study at university, links to relevant pages from professional bodies, and then links to actual activities that students can carry out (usually in the form of pdf files). These activities may be theoretical, covering and extending syllabus material, or they may include practical activities that can be carried out at home, for example *Chemistry – chromatography* (following all relevant safety advice). If necessary, answers to activities are also provided. This site is well worth recommending to students, whether they are thinking of applying to Cambridge University or not.



www.qub.ac.uk/schools/SchoolofChemistryandChemicalEngineering/BusinessCareers/Outreach

www.qub.ac.uk/schools/SchoolofMathematicsandPhysics/Discover/Outreach

Queen's University Belfast hosts a number of events throughout Northern Ireland that are applicable to school students, ranging from open days, chemistry at work talks and exhibitions. The School of Physics and Maths page also allows you to listen to the music of Pi!



www.kcl.ac.uk/events/series/daniell-lectures

For those with access to London, there are a large number of chemistry events suitable for A-level standard and above. An example is given in

the link above. The Daniell lecture is always presented by a prestigious speaker and can act as an excellent way to encourage pupils and expose them to eminent scientists.



THE UNIVERSITY
of EDINBURGH

www.chem.ed.ac.uk/public-engagement/schools

www.ed.ac.uk/biology/public/schools

For those with easy access to Edinburgh University, a range of excellent opportunities are available. The chemistry link gives access to pages about *Spectroscopy in a Suitcase* (in collaboration with the RSC), the ability for Scottish high school students to submit samples for NMR analysis, access to the labs for running Advanced Higher chemistry experiments, and much more – including 17 simple experiments that you can try in the classroom (these also include risk assessments). The Biology Department website also hosts a page of projects and events for schools – as well as links to external websites that help to promote the educational uses of biology.

Imperial College London

www.imperial.ac.uk/physics/outreach

Imperial College offers a number of talks and exhibitions suitable for those taking physics in schools. There are regular *A-level Project Open Days* (aimed at year 12 students who wish to know more about taking physics at degree level) and also *GCSE Project Open Days* (aimed at those GCSE students who plan to take physics at A-level and possibly at university). Imperial College also offers activities for students and teachers; see *Be inspired* then *Schools activities*. These can include activities at your own school or on campus. There are also links

on the page to a dedicated on-site laboratory, the *Wohl Reach Out Lab*, where subject experts can deliver STEM-based educational activities designed to raise aspirations and increase scientific literacy.



The University of Manchester

www.manchester.ac.uk/connect/teachers/teacher-events-resources/resources/20-minute-challenges

These 20-minute challenges have been developed by the University of Manchester to introduce students to a range of subject areas in an entertaining way. They can be used in the classroom or as part of an after-school activity. Full details are given and they generally need few resources. Although designed to be completed in 20 minutes, they can be extended and full details are given where appropriate. At the time of writing, these activities cover aspects of biology and physics.



www.swansea.ac.uk/science/community-engagement

A number of universities offer access to 'citizen science' programmes that they are connected with. On this page there are links to the *Seagrass Spotter* app and the *Amber Barrier Tracker* app. The *Seagrass Spotter* app allows information about the location of seagrass to be input in order to help scientists know about seagrass meadows in their area, and so aid with their conservation. The *Amber Barrier Tracker* allows the input of information about rivers and how their water courses are affected by barriers such as weirs and dams. Citizen science apps are a good way of connecting students with easily collected data and information that can often deliver meaningful results. Googling

'Citizen Science' is another way of rapidly accessing information about all the different types of projects that are available – be aware though that a vast number of readily available options obtained this way are from American resources.



<https://warwick.ac.uk/study/outreach/whatweoffer/>

The University of Warwick offers a number of activities for pre-16, post-16 and also subject-specific activities. This page gives access to a large number of other events and talks, which are either held at Warwick or, if your school is close, a member of the university can come to you. As with a large number of other universities, Warwick also offers summer schools for a more in-depth, immersive introduction to the university. The subject-specific activities generally give information about who to contact should further information be desired.



www.futurelearn.com/courses/food-production-agricultural-technology-plant-biotechnology/1
www.futurelearn.com/courses/teaching-biology-inspiring-students-with-plants-in-science

FutureLearn, partially owned by the Open University, provides a large number of courses that are open to all. Of special note is a course called *Improving Food Production with Agricultural Technology and Plant Biotechnology*. It runs for three weeks and is free to join. The content is designed for students aged 16–19 who are considering studying science at university or who are interested in one of the three areas covered by the course: plant biotechnology, agricultural technology and applied

food science. This course inspires students with real-life examples of how innovations in these areas are improving food production to tackle global food insecurity; it is made up of articles, discussions, videos featuring case studies and interviews with experts, quizzes and an interactive game. For teachers there is *Teaching Biology: Inspiring Students with Plant Science*, developed by Science and Plants for Schools (SAPS) and STEM Learning. Through inspirational examples and making links, the course demonstrates how plants can be used across the curriculum. You can sign up at *FutureLearn* to receive updates about when the next run of the course will be held.



www.bath.ac.uk/topics/research

Universities publish vast amounts of information about their current research online. Some of it may be too esoteric for use in schools, but with a bit of searching there are usually some snippets of information that may be useful in the classroom. Examples are given on this page from the University of Bath. At the time of writing, the page contained links to accessible information on a large number of topics, all written in a manner suitable for those in the sixth form and above, and all well worth investigating further.



Please note that the GCSE and AS science revision notes, as reviewed in the June 2018 issue of *SSR*, are no longer available on the Bangor University website.

Contributor

David Moore, editor of *Science websearch*, is a former teacher of chemistry at St Edward's School, Oxford.