




Raising aspirations and attainment in science, engineering and maths
(STEM subjects)

The following are some examples of the work that Russell Group universities are doing with schools and colleges to raise aspirations and attainment in STEM subjects.

 <p>UNIVERSITY OF BIRMINGHAM</p>	<p>The RAISE (Raising Aspirations in Secondary Education) Programme provides a large scale event for each year group for school pupils aged 11 to 16. More than 2500 students participate each year. Most events are aimed at increasing enthusiasm for science. The programme includes:</p> <ul style="list-style-type: none"> • Year 7 Christmas Lecture (2009 – ‘Am I an Ape’ – linked to Darwin and Evolution, and ‘Hot and Cold’ Physics Lecture) • Year 8 Easter Lecture • Year 9: Physics Big Quiz and Biology Quiz (teams from local schools compete for an annual trophy) • Year 10: Science Festival – a day of interactive science related activity linked to National Science Week • Year 11: STEM Summer School – 3 days/2 nights for 50 students interested in studying Engineering and Physical Sciences in the Sixth Form.
 <p>University of BRISTOL</p>	<p>Access to Bristol is a scheme designed to widen participation in higher education and create opportunities for post-16 students in the South West to study science courses at the university including Biomedical Sciences, Earth Sciences, Engineering, Mathematics and Natural Sciences. The university also has a Mobile Teaching Unit which goes to schools and colleges to provide on-site access to state of the art science facilities, and hands-on anatomy and physiology demonstrations. The university’s outreach prospectus also enables primary and secondary schools to request talks in school by academics across a range of science and engineering subjects.</p>

 <p>UNIVERSITY OF CAMBRIDGE</p>	<p>The University of Cambridge leads the Millennium Mathematics project. This national project seeks to raise aspirations amongst pupils studying Maths in schools by providing support and training for teachers and pupils themselves. This includes the Fast Forward Maths project – a series of residential events at Cambridge for pupils in Years 9-10 from disadvantaged schools in greater London. The project is in collaboration with Goldman Sachs, and NRICH, which has its own dedicated website with resources for both students and teachers (http://nrich.maths.org/).</p>
<p>Imperial College London</p>	<p>As an institution specialising in science and medical education and research, Imperial aims to take a leading role in increasing awareness among young people of the importance and excitement of science, and to offer practical help in these subjects. To give one example, the INSPIRE¹ programme aims to increase the number of talented scientists entering the teaching profession. It is a 9-month programme for post-doctoral scientists, PhD-, or MSC-graduates in the physical sciences and engineering. It offers a 7-month PGCE (in conjunction with Canterbury Christchurch University), and a further 2 months of INSPIRE activities with school children, including master classes, science clubs, workshops, demonstration lectures and university visits.</p>
	<p>King's College London delivers a wide range of STEM outreach activities, including taster days, masterclasses, summer schools, homework clubs and student shadowing. Student Ambassadors provide maths support to year 11 students in local homework clubs and over 100 students visit King's to experience a taste of university life and study through the year 12 'Uni for a Day' sessions focused on Biomedical Science and Physics. Over the course of three weeks in November 2009, 270 year 12 Gifted and Talented students from state schools across London shadowed undergraduate students for half a day, attending their lectures and tutorials and experiencing what student life is actually like. 14 academic departments including Physics, Maths, and Engineering participated in the scheme.</p>

¹ INSPIRE is sponsored by the Foyle Foundation, the Ogden Trust, the Royal Commission for Exhibition of 1851 and participating schools.



The University of Leeds runs **The Leeds Festival of Science** – an extended 20 day event for national science and engineering week where approximately 3,000 pupils (KS2-5) visit the university for activities aimed to inspire and enthuse by demonstrating the importance and relevance of science, engineering and technology in their lives.



University of Liverpool has developed the **National Primary Network** which enables higher and further education institutions around the country to work with primary schools to build the education and cultural capacity of young people and their families. The programme uses the very successful Professor Fluffy resource activity pack to raise awareness of the impact of education on improving career and life opportunities. The project has also developed a series of activities linked to KS2 national curriculum including campus visits days focusing on Engineering, Physics, Chemistry and Biology.

At secondary level, the university runs two STEM specific events. The first is called '**Choose Science**' and is a three day programme for 100 Year 9 students that aims to showcase the many exciting careers that a STEM qualification can lead to. The event is specifically timed for pre-GCSE options to highlight the importance of taking double/triple sciences at GCSE level. The university also runs an annual residential summer school ('**Dangerous Science**') which gives 140 Year 10 students the opportunity to take part in hands-on activities across the Faculty of Sciences. Last year, after attending the event, 96% of students said the idea of going to university was more appealing and 92% said they had found out about options and courses they didn't know about before. The event has also been successful in attracting more boys to attend.



The University of Manchester works with the Ogden Trust to run a programme which enables science and engineering PhD students to act as ambassadors for higher education, through **Science in Residence** placements in local schools. It also provides laboratory practical sessions for young people from KS1 to KS5 in its museum and delivers a large programme of exciting hands-on STEM activities across the North West including an aerospace 'Hovercraft Challenge', 'Physics Tricks' and a 'Making Maths at Manchester' Summer School.

	<p>In collaboration with teachers in North East schools, Newcastle University has developed a Teachers' Toolkit (www.teacherstoolkit.org.uk) – a one stop shop that provides access to hundreds of free activities and curriculum-related resources. To support this extensive resource, the university offers schools the use of STEM Ambassadors – current students and recent graduates trained to deliver interactive science-based activities in schools. Students from under-represented groups interested in these and other subject areas can apply to the University through the PARTNERS Programme, a supported entry route designed to help students make the transition from school and college in to university.</p>
	<p>The University of Nottingham's Academic Enrichment Programme delivers a range of masterclasses, summer schools and revision sessions predominantly in STEM subjects. Over 2,000 young learners participate in around 40 STEM sessions each year. In addition the university hosts the area coordinators for the East Midlands' Further Maths Support Programme (FMSP) and Open Air Laboratory (OPAL) projects and places over around 150 STEM undergraduates in local schools to act as classroom assistants.</p>
	<p>The University of Oxford's Goal Medical Mentoring Project is a 6-week mentoring project with a full day at the university's Medical Sciences Teaching Centre at either end of the period. The most recent programme involved 49 participants from years 10 and 11 and 25 student mentors. After the project, 30 participants completed feedback forms. 23 participants stated they were more likely to study medicine thanks to the programme, and 26 said they were more likely to apply to the University of Oxford.</p>



Queen's University Belfast is dedicated to promoting opportunities and contributing to curricular enrichment. The Widening Participation Unit was instrumental in bringing the inaugural '**For the Inspiration and Recognition of Science and Technology**' (FIRST) International LEGO League event to Northern Ireland. The League aims to help develop tomorrow's innovators by introducing young people aged 9 to 16 years, to the fun of solving real-world problems by applying maths, science, and technology.

The Widening Participation Unit also offers a wide range of STEM focused activities targeting:

- *Mathematics* – mathematical challenges highlight the importance of maths as an essential skills base, both within academia and the employment sector.
- *Engineering* – year 11-12 students participated in a programme of practical 'hands on' activities, solving problems and applying engineering principles to solve set tasks.
- *Robotics* – upper primary pupils competed in robotics challenges using engineering, ICT and mathematics to enhance their problem solving, practical learning, and technological skills. Mentors from a local multinational engineering company teamed up with participant building links between industry and education.

The **Primary ConneXions** programme provides around 300 upper primary pupils with the chance to undertake science-based research and present their findings at a mini conference at the university.

The university encourages aspirations to high demand STEM areas of study. Examples include **Medics in Primary Schools**, which provides medical students with an accredited opportunity to deliver a healthy living programme to primary pupils.





The
University
Of
Sheffield.

University of Sheffield delivers a number of programmes targeting prospective maths and science students. For a number of years it has run the **Sheffield Outreach & Access to Medicine Scheme (SOAMS)**, which targets young people from under-represented groups from year 9 to year 13. On the strength of SOAMS, it then introduced '**Access to Dental Occupations; Practice and Tutoring**', a two year programme which gives students an insight into dental professions. For some years it has delivered programmes aimed at prospective engineering students, and now operates the **Science & Engineering Champions Scheme**, which allows current undergraduate and postgraduate students at the university to develop and deliver outreach activities and to develop resources for teaching staff in schools and colleges with short demonstrations that are interactive and engaging for the relevant age groups.

UNIVERSITY OF
Southampton

The **Sustainable Energy Scheme** run by the University of Southampton offers a chance for year 10 pupils across Hampshire and Isle of Wight to find out more about what engineering has to offer, both as a study option and a career. The young people work alongside university students and academic staff to explore different kinds of engineering during in-school and on-campus activities. They receive face-to-face and e-mentoring support from current engineering students and compete for the opportunity to design, build and race a Goblin electric car. The university also runs a major programme of activities as part of National Science and Engineering Week, and in 2009 its '**Science and Engineering Day**' won the inaugural Engineering and Technology Board Award for the UK's 'Best Engineering Event'.

	<p>UCL has been developing a pre-enrolment study support scheme, to include a parental component, aimed at gifted students from lower socio-economic groups and/or with little direct experience of higher education. The focus will be upon subjects of particular relevance to pursuing science and engineering degree programmes. The aim is to work with groups of students over a sustained period of time to help them to realise their full academic and personal potential. In developing this scheme UCL is drawing upon best practice from the United States where such programmes have been operating effectively for a number of years.</p> <p>UCL Museums & Collections also run many science outreach and summer schools including opportunities for students to carry out heart dissections or to extract and amplify their own DNA to test if they are morning or evening people.</p>
	<p>The University of Warwick hosts a Further Maths Centre, which offers a wide range of sessions and on-line resources facilitating the study of Mathematics. The Centre supports learners in schools who do not have access to support for Further Maths and provides an array of enrichment activities and professional development opportunities for students and teachers of mathematics respectively. The university also employs a 'teacher in residence' model in both the Chemistry and Physics departments to work with learners across the full age range to fire their interest in science and to enhance attainment.</p>

In addition, a number of Russell Group universities have recently introduced additional **online resources aimed at school pupils pursuing science courses**:

- The Metric programme at **Imperial College** consists of online activities, tutorials, self-test exercises, and residential tutorials for AS, A2 and first year undergraduates in mathematical subjects. The aim is to help students to achieve the grades they need to study at Imperial and help them progress when they arrive there.
- **University of Cambridge** offers online resources in a number of science subject areas, which aim to support learning, stimulate interest and raise students' aspirations in science subjects.
- The Periodicvideos website at **University of Nottingham** provides information for school pupils about chemistry through short videos about each element in the periodic table. It aims to inspire interest in chemistry and sciences amongst young people, and raise levels of attainment in science subjects.
- **UCL Museums & Collections** offer a range of downloadable resources to support the teaching of the Key Stage 3 and 4 Science Curriculum with lessons on genetics and geology.