UNIVERSITY OF BATH

Widening Participation Summer Schools Review 2017

Version 1

Contents

Version 1: to be updated with 2017 event evaluation findings

Overview and Aims

Overview of summer schools

The Widening Participation Office (WPO) at the University of Bath offers three five day residential summer schools for Year 12 A-level students planning to take an Engineering, Science or Social Sciences degree. The summer schools provide an immersive experience of university life, combining academic lectures, project work, social and leisure activities.

Throughout the week students complete an attainment raising group project in a selected topic:
Engineering: Chemical, Civil, Electrical or Mechanical Engineering
Science: Biology, Chemistry, Computer Science, Maths or Physics
Social Sciences: Education, Psychology, Social Sciences and Politics.

Aims of the summer schools

The summer schools are designed to meet the aims defined in the NERUPI evaluation framework (see page 7). As an intensive activity, and with the students on campus all week, students take part in sessions and experiences across the five aims embedded in the framework:

- Develop students' understanding by contextualising subject knowledge;
- Develop students' study skills and capacity for academic attainment and successful graduate progression;
- Develop students' confidence and resilience to negotiate the challenge of university life and graduate progression;
- Develop students' capacity to navigate Higher Education and graduate employment sectors and make informed choices;
- Develop students' knowledge and awareness of the benefits of higher education and graduate employment.

See page 8-10 for more details about how the summer schools meet these aims.

Structure of the summer schools

The main focus of week is to develop the students' academic attainment through group projects on topics that enhance the A-Level curriculum and broaden students' understanding of the subject area through contextualisation of A-Level learning. During the week the students attend two academic lectures and ten hours of project sessions led by University of Bath academics and PhD researchers. Each day students also attend an Information and Guidance session (talk or workshop) to develop their understanding of course and placement opportunities, the application process and personal statements. In order to familiarise them with the campus and facilities students stay in our halls of residence, use student catering facilities and attend a range of club and society taster sessions. (See page 14 for more details about the structure of the summer schools).

Student Outcomes

In 2014 – 2016 the WPO ran a combined STEM (Science and Engineering projects) Summer School and in 2015,2016 a Social Sciences Summer School. In 2017 a new Engineering Summer school was run in addition to a separate Science Summer School. Below is the data from 2014-2016 of STEM and Social Sciences Summer Schools.

Most Summer School students apply to high tariff unis

UCAS Strobe data show us that for Summer Schools and the cohort On Track to Bath programme, where the aim is to support students to apply to at least one high tariff university, 86% of those applying to HE applied to at least one high tariff university. 72% applied to at least one medium tariff university and 40% to at least one low tariff university.

Applications to Bath increased in 2017 from 2016 from both Social Sciences and STEM Summer Schools.

Nearly half of the STEM Summer School students in the past two years have applied to Bath.

- Out of the 2014 cohort (48), 16 students applied to the University of Bath and were offered places (33%), 4 went firm (8%) and 2 enrolled on Physics and Chemistry courses (4%).
- Of the 48 students who came on the 2015 Year 12 STEM Summer School 21 applied to Bath for Autumn 2016 (44%). Of those, 18 were made offers (38% of all students attending) and 13 went firm (27%). 9 students came to Bath (19%).
- Of the 48 students on the 2016 Year 12 STEM Summer School 23 applied to Bath for Autumn 2017 (49%). Nearly all had offers (45% of attendees) and 5 went firm (11%). For those who did not select Bath as their firm choice for 2017 entry, competitor institutions were: Oxford, Cambridge, Manchester, Exeter, York, Durham & Bristol. A few had unconditional offers from Birmingham.
- From the 2016 Social Sciences Summer School 7 of the 44 attendees applied to Bath (16%), 4 of those were made offers (9%) and 1 went firm with us but did not enrol. In 2016 5 of the 47 attendees applied to Bath (11%), 4 were made offers (11%), and 1 went firm.

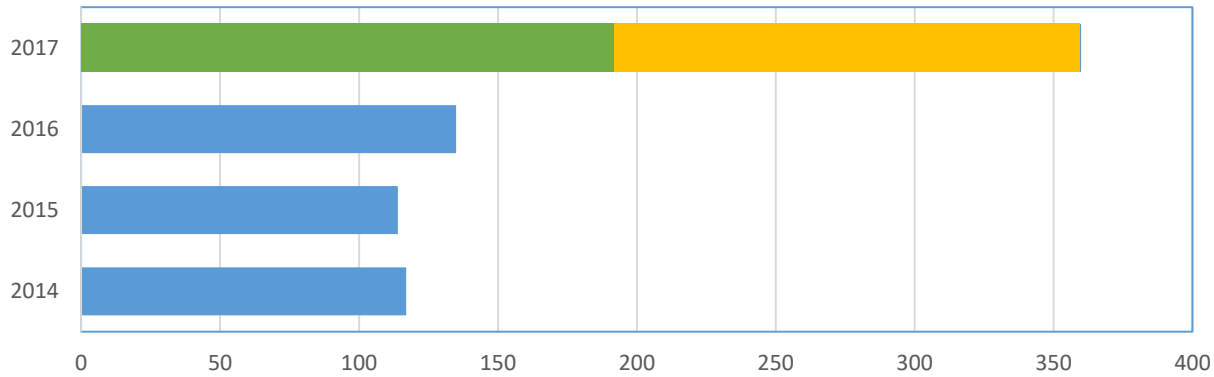
Our first Higher Education Access Tracker (HEAT) dataset shows us that:

- Twice as many students from low progression areas attending one of our events or programmes went on to university compared with the average for LPN students in the counties surrounding the university.
- High attaining, high disadvantaged students who participated in WPO programmes were more likely to go on to HE than the same type of student attending programmes at other HEAT member universities.
- Students who participated in Bath WPO activities were much more likely to go to a high tariff university than disadvantaged students nationally, and more likely to go on to a high tariff university than a medium or low tariff university.
- Bath has admitted 600 students who have participated in outreach with other HEAT member universities highlighting the value to the sector of each other's outreach work.

Applicant Numbers

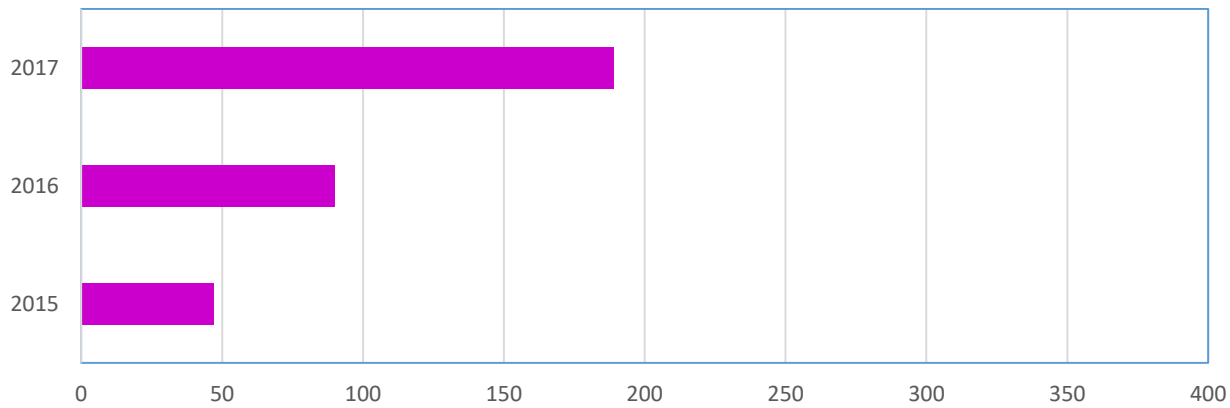
From 2014-16 the WPO ran a combined STEM summer school with both Science and Engineering project strands. To extend the opportunity to a greater number of students in 2017 two separate summer schools were delivered. Based on previous experiences a more focussed marketing strategy was employed to target a larger number of schools and as a result applications increased considerably. There were 360 applications to the Science and Engineering Summer Schools in 2017, with 184 applying for Science Summer School (green) and 176 for Engineering (orange).

Applications to Science (green), Engineering (orange) and STEM (blue) Summer Schools 2014-2017



From 2015 the WPO has offered a Social Sciences Summer School with a number of thematic project strands. Using the same marketing strategy to broaden the schools targeted, applications in 2017 increased considerably. There were 189 applications to the Social Sciences Summer School in 2017.

Applications to Social Sciences Summer Schools (purple) 2015-2017



All three of the summer schools had 48 places available in 2014-2016 and 60 places available in 2017. Applicants were selected using the criteria on the following pages.

Applicant Geography and WP Criteria

Location of applicants and participants at the 2017 summer schools

As a nationally recruiting university it is important that Bath does not restrict its outreach work to the local area. The summer schools recruit nationally and provide an opportunity for students further away from the University to experience Bath. Information about the summer schools is only sent to schools outside the local region and, as can be seen below, there are very few applications from the local region with a high proportion of applications from London.

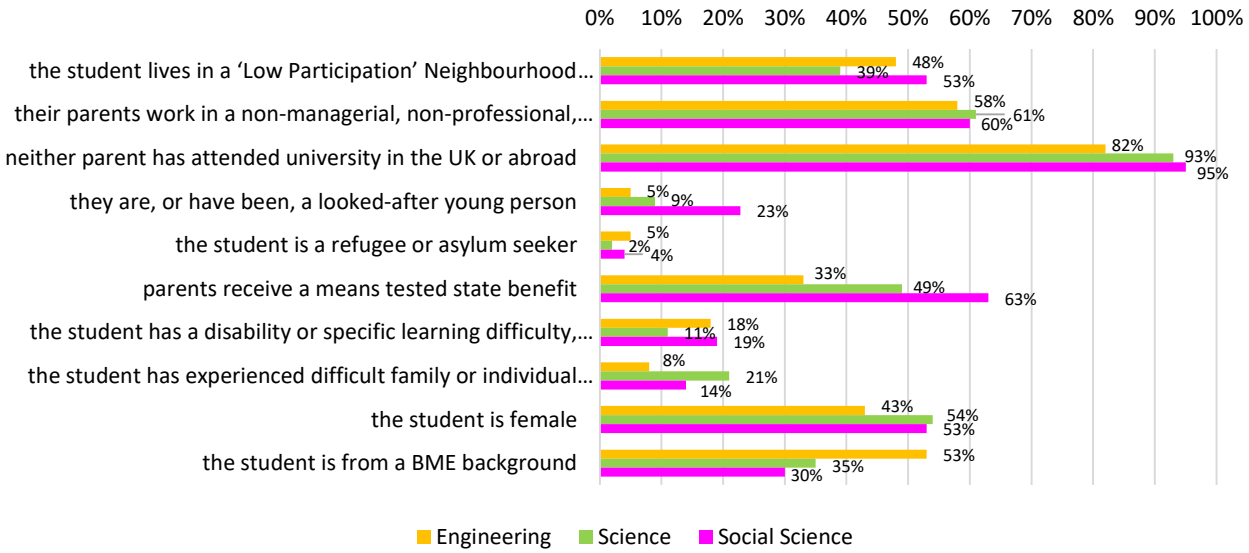
Applicants

Engineering
Science
Social Sciences

Participants

Participants at the summer schools

All the students attending the summer schools met the relevant academic criteria and at least one of the WP criteria set out on page 5. Below is a breakdown of the percentages of students attending the summer school that met each criteria.



Selection, Monitoring and Evaluation

Monitoring participant data
Various data are collected from applicants to select participants who will most benefit from the summer schools. Participant characteristics are monitored to assess and demonstrate success in attracting students who fulfil the targeting criteria.

Eligibility
Eligibility for the summer schools is based on two sets of criteria – academic and WP. The academic requirements are based on the offer for relevant courses at the University of Bath, meaning students could potentially receive an offer to study at Bath.

Academic criteria:
Engineering: students must be 'high achieving' (mostly A*s, As and Bs at GCSE), must all be studying Maths A level and also Physics, Chemistry or Electronics – depending upon the project area chosen.

Science: students must be 'high achieving' (mostly A*s, As and Bs at GCSE) and must be studying the subject of the project plus another Science or Maths (or Further Maths in the case of Maths projects)

Social Sciences: students must be 'high achieving' (mostly A*s, As and Bs at GCSE) and be studying at least three L3 courses including at least one that contains essay writing as part of the assessment.

WP Criteria:
Students must meet at least one of the following criteria:
- the student lives in a 'Low Participation' Neighbourhood (LPN) as defined by home postcode
- their parents work in a non-managerial, non-professional, non-technical occupations
- neither parent has attended university in the UK or abroad
- they are, or have been, a looked-after young person
- the student is a refugee or asylum seeker
- parents receive a means tested state benefit.

Selection, Monitoring and Evaluation

Other considerations include:

- the student has a disability or specific learning difficulty, such as dyslexia
- the student has experienced difficult family or individual circumstances that have affected their performance in exams or the likelihood of their going to university.

Students are prioritised by the number of key WP criteria they meet, other considerations and their academic ability whilst also ensuring a representative balance of demographic factors such as gender and ethnicity within each summer school.

Tracking

Students taking part in our intensive activities are monitored in our admissions data to see if they have applied to the University of Bath and also undertake our own follow-up surveys. Participants are tracked using HEAT which records each time they engage with an outreach activity. HEAT then links this with UCAS data to record progression to higher education.

Impact of activities

Whilst tracking can indicate the long-term impact of outreach, it cannot capture the success, experiential impact or learning outcomes of individual activities or programmes. This is assessed through the NERUPI Framework, which has been developed here at Bath and is now being used by a consortium of universities nationally. The Framework has been designed to provide a robust theoretical and research-evidence base for the aims of Widening Participation interventions, and a clear rationale for the types of programmes that are designed and delivered. It also encourages university staff engaged in Widening Participation activities to think more strategically and reflexively about interventions therefore following OFFA/HEFCE guidance, and rationalises evaluation processes across programmes of activities to improve the quality of data and more effectively demonstrate impact.

Evaluation Framework

The Evaluation Framework is based on academic research into the reasons for lower participation of some socio-economic groups has been examined to draw out the key areas necessary for successful transition into higher education. Five areas are identified as set out below.

Each of these key aims has been expanded to produce a set of sub-objectives in the form of learning outcomes for each age group.

SOCIAL AND ACADEMIC CAPITAL		HABITUS	SKILLS CAPITAL	INTELLECTUAL & SUBJECT CAPITAL
PROGRESSION CURRICULUM		STUDENT IDENTITIES	SKILLS CURRICULUM	KNOWLEDGE CURRICULUM
KNOW	**CHOOSE**	**BECOME**	**PRACTISE**	**UNDERSTAND**
Develop students' knowledge and awareness of the benefits of higher education	**Develop students' capacity to navigate Higher Education sector and make informed choices**	**Develop students' confidence and resilience to negotiate the challenges of university life**	**Develop students' study skills and capacity for academic attainment**	**Develop students' understanding by contextualising subject knowledge**

For more details on the Framework please see:

Hayton, A and Bengry-Howell, B (2016) Theory, evaluation and practice in widening participation: A framework approach to assessing impact, London Review of Education, Vol 14, no 3

The NERUPI group includes the universities of Bath, Bath Spa, Exeter, Oxford, Oxford Brookes, Plymouth and Sheffield.

Evaluation Framework Elements covered by Summer Schools

The summer schools have a focus on supporting attainment through the skills curriculum and knowledge curriculum areas of the framework:

Aim 5 UNDERSTAND	Enable students to	Summer School content
Develop students' understanding by contextualising subject knowledge and supporting attainment	(a) Situate existing knowledge within wider fields of knowledge and apply to other contexts	
	Extend awareness of the wider applications of knowledge	Research Projects, Academic Lectures
	Locate existing knowledge within wider fields of knowledge and other contexts	Research Projects, Academic Lectures
	Enhance understanding through collaborative projects, which extend knowledge and challenge assumptions	Research Projects, Academic Lectures
	(b) Situate existing knowledge & interests within the context of university degree programmes and academic disciplines	
	Relate existing knowledge and interests to university subject areas and degree programmes	Research Projects, Academic Lectures
	Understand how knowledge can be developed within university subject areas and academic disciplines	Research Projects, Academic Lectures
	(c) Supporting attainment	Links with AS and A level curricula

Aim 4 PRACTISE	Enable students to	Summer School content
Develop students' study skills and capacity for academic attainment and successful graduate progression	Enhance academic skills through collaborative projects that develop capacity for critical thinking, independent research and self-directed learning	Research Projects
	Enhance capacity for independent learning, self-directed study and enterprise	Research Projects
	Enhance capacity for creative problem solving and decision making	Research Projects
	Enhance communication and presentation skills using different mediums.	Research Projects, presentation at exhibition
	Enhance critical thinking skills through experimentation, reflection, analysis, synthesis and evaluation	Research Projects, Academic Lectures
	Enhance research skills and gain experience of independent research	Research Projects
	Enhance project planning skills and expertise in designing, implementing and evaluating a small-scale project	Research Projects
	Enhance group work skills and capacity to lead and work collaboratively	Research Projects

Evaluation Framework Elements covered by Summer Schools

The summer schools also include elements which meet aspects within the other three areas of the framework:

Aim 3 BECOME	Enable students to	Summer School content
Develop students' confidence and resilience to negotiate the challenge of university life and graduate progression	Anticipate challenges they will face in Higher Education and make a successful transition to university	Experience of academic and social uni life
	Gain a positive first-hand experience of student life and a university environment	Students live on campus for a week
	Become familiar with learning and teaching approaches in Higher Education	Lectures from academic staff, Undertake Research Projects in undergraduate facilities
	Engage with academic and personal support mechanisms at the University of Bath	
	Interact with academic staff and other university employees	Lectures from academic staff, Undertake Research Projects, Work closely with academics and PhD students
	Interact with other students on programme, Student Ambassadors and current University of Bath students.	Students all live in halls, eat and socialise together, Students work in Research groups, Liaise with Summer School Ambassadors
	Participate in challenging educational activities which are stimulating and motivating	Interactive lectures, Research project groups led by academic/PhD student
	Celebrate in the achievements of students from similar backgrounds who have progressed to the University of Bath	Contact with WP ambassadors
	Access the information, advice & guidance they need to make a successful transition to the University of Bath/other selective university	Talks include outline of services provided, supplementary information given to students, follow up support through social media

Evaluation Framework Elements covered by Summer Schools

Aim 2 CHOOSE	Enable students to	Summer School content
Develop students' capacity to navigate Higher Education and graduate employment sectors and make informed choices	Evaluate course, student finance & graduate opportunities and make informed choices that align with personal interests and career aspirations	Student Finance and budgeting talk
	Evaluate different types of Higher Education Institution in terms of personal interests and career aspirations	Choosing and Applying Talk
	Compare degree courses and study options across a range of universities	Engineering at Bath Talk
	Engage effectively with the UCAS process and generate and submit a strong university application	Personal Statements Talks/workshops incl. Choosing and applying
	Compare student finance, budgeting support and student employment opportunities across a range of universities	Finance Talk

Aim 1 KNOW	Enable students to	Summer School content
Develop students' knowledge and awareness of the benefits of higher education and graduate employment	Investigate social & leisure opportunities at the University of Bath & other universities	Social activities in cafes and Sports Training Village, sleeping in University accommodation
	Discover course and placement opportunities at the University of Bath and opportunities at other universities	Admission Tutor talk and Q+A session, Liaising with Summer School Ambassadors Talk about placements
	Find out about research areas, expertise and facilities at the University of Bath and new areas of development	Welcome Talk, Lectures from academic staff, working with PhD students on project, Liaising with Summer School Ambassadors
	Explore social and leisure, and extra-curricular opportunities at the University of Bath	Extra-curricular activities, Student Union Talks
	Discover career benefits of Higher education and the employment opportunities for University of Bath graduates.	Talks about placements and choosing and applying to university, Finance Talk, Liaising with Summer School Ambassadors
	Find out about academic and information services, facilities and resources at the University of Bath	Welcome Talk and Tour, Liaising with Summer School Ambassadors

Evaluation Findings

Evaluation methods
A range of methods are used to evaluate the summer schools. These include: pre and post student surveys; evidence of attainment such as research posters/films and questions about learning outcomes; reflective discussions with students; observation by experienced evaluators; feedback from staff, academics and ambassadors. Questions throughout are focussed on measuring the extent to which students are gaining expertise in the different areas identified by the Framework.

PROGRESSION CURRICULUM (KNOW)
Questions are asked to measure increases in knowledge of HE – understanding of the processes and structures. Example question to students: How would you rate your knowledge about the social aspects of university life? 96% of students on the Social Sciences Summer School in 2016 rated their knowledge as good or excellent after the Summer School.

Example quotes from Summer School students: *"I've really enjoyed the environment and looking around the teaching labs and sports facilities".*

"The information provided by lecturers and talking to admissions tutors has put new ideas in my mind about the way I should approach decisions in the future, such as applying for a course and striving for a worthwhile job".

PROGRESSION CURRICULUM (CHOOSE)
Questions are asked to measure students' ability to evaluate their options and choose the right course for them.
Example statements - students are asked how much they agree or not with questions like the following: "The Summer School has helped me to decide which course I want to study."

Example quote from Social Sciences Summer School student:
"I know more about university courses and how various processes work after talking to the PhD students and other academics."

STEM Summer School:
Knowledge of courses and placement opportunities – those responding excellent or good increased from 43% before the Summer School to 70% after.

Example quotes from STEM Summer School students
"The Summer School has confirmed that I really want to study Biology at university, specifically genetics and microbiology."
"The summer school has assured me that I definitely want to go to uni, but it's made me realise that a campus uni is not for me – I'd rather a city uni."

Evaluation Findings

KNOWLEDGE CURRICULUM (UNDERSTAND)
This area is the main area of focus for our summer schools. Each summer school includes a substantial component of project work. Projects are graded by academics at the end of the Summer Schools and prizes awarded to the best projects.

Academic input
Quote from Social Sciences Summer School Academic
"The students were very engaged and designed contemporary research projects that obviously reflect their interests and experiences (both in education and beyond). The posters that were produced were fantastic and very engaging with all of them using academic sources to support their ideas".

Academics are impressed by many of the students. Example academic quotes:
"They all grasped the concepts really well, and some of them went over and above that - showing knowledge I would associate with undergrads."
"There were some fantastic students in my project group."

Developing subject knowledge
We are hoping to stimulate students academically and inspire them to explore their subject further and motivate them to get even better grades at school.

STEM Summer School student quotes:
"I've discovered new things such as the ARM-MBED computer that I can follow my interest at home as an extra-curricular activity".
"The summer school has motivated me to get good grades."

Students are asked whether or not they have found the project work engaging. Example response: 86% of those on the Social Sciences Summer School 2016 agreed that the project work was interesting and engaging.

2016 Social Sciences student quote:
"The projects were very interesting and engaging." "The lectures as well as the project helped stimulate my engagement in the field of social science."

STEM 2016 student feedback
On the Physics strand the most frequent response to a question asking for the best thing about the week was "engaging experiments and practical work".

Evaluation Findings

STUDENT IDENTITIES (BECOME)
Students are asked a range of questions designed to measure the development of their ability to imagine themselves succeeding at a high tariff university. For example, to measure their understanding of how teaching and learning works at a university students were asked to rate their knowledge pre and post the event.

Students' knowledge of learning and teaching approaches at university increased (48% 'excellent' and 'good' in pre-evaluation; 78% 'excellent' and 'good' in post-evaluation).

Social Sciences Summer School analysis
Students overwhelmingly enjoyed the Summer School and felt their confidence to succeed at University increased through the event. In the post event questionnaire students' confidence to meet the challenge of university increased from 38% 'excellent' and 'good' before; to75% 'excellent' and 'good' afterwards.

Example student quote about increased ability to fit in at Bath:
"The summer school has made me realise that this university is one that I feel I could fit in, and I could see myself here."

SKILLS CURRICULUM (PRACTISE)
Students develop a range of study skills throughout the summer schools such as critical thinking, problem solving, independent research, analysis and evaluation skills. Academics are consulted to collect their views on the skills students have developed in the sessions they have designed in conjunction with WPO staff. In post-event feedback from the Social Sciences and Science 2017 Summer Schools all academics for example thought that their sessions developed students' critical thinking, group work, communication and independent learning skills, but only 50% thought their sessions really developed the students' evaluation skills. WPO Project staff will discuss this feedback in our Summer School de-briefing sessions.

STEM Summer School student quote:
"I feel I have gained more skills for starting University such that I may be in a better position than others applying to University"

Academic staff learning
The academics on the summer schools gain skills through sharing their research to a younger audience. Example quotes:
"I learnt about trying to make sure the students were engaged and make sure the lectures were interactive."
"I gained experience working with a diverse range of students, developed ability to communicate academic research is an engaging way to young people."

Structure of the Summer Schools

Academic Projects
Students select a project stream before arriving at the summer school and take part in 10 hours of projects over two days. The projects are designed and run by academic staff in collaboration with the summer school lead from the WPO, the projects are also supported by PhD students and ambassadors with subject knowledge. Students work in the undergraduate facilities and on many occasions are undertaking first year undergraduate activities. All the projects are designed to support A-Levels and build students' knowledge of the subject through contextualisation of A-Level knowledge.

At the end of the week the students prepare a research poster (see pages 22, 29 and 37 for examples) to present their work to their peers, academics and other members of the faculty. The posters are marked against an undergraduate mark scheme by a number of academics and a prize given for the 'best' project. The students also vote for their favourite poster which also wins a prize. (See page 17-37 for an overview of the projects from each of the summer schools.)

Academic Lectures
The academic lectures give students a real experience of a lecture through inspiring and information focused talks. The lectures are subject focused and support/extend A-Level learning.

Information and Guidance sessions
The Information and Guidance sessions are a mixture of talks and interactive workshops to support students' applications to higher education. They are run by members of admissions, recruitment and WPO staff.
(See pages 38-39 for more detail about the Information and Guidance sessions.)

Social Activities
The social activities support the formal learning during the week and give students a realistic experience of university. Students stay on the University campus alongside the Summer School Ambassadors who study subjects related to the summer school. Free time with the ambassadors is planned into the week so summer school students can talk informally with the ambassadors about their courses, their experiences and life at the University from an undergraduate student's perspective.

Students get to experience a number of the social spaces at the University including sports and catering facilities. They also get to experience the city through an open bus tour and free time in the centre of Bath accompanied by the Ambassadors.

Celebration
The students all receive a transcript (see page 16 for an example) and a certificate at the end of the week. The transcript highlights the key activities and skills the students have gained from taking part in the summer school, along with the information from the IAG sessions the students are able to use this as a foundation for a personal statement section.

General timetable of a Summer School

Monday	Tuesday	Wednesday	Thursday	Friday
	8:15 Breakfast	8:15 Breakfast	8:15 Breakfast	8:00 Breakfast
	9:15 Academic lectures	9:15 Academic lectures	9:15 Design posters	9:15 Meet admissions tutors
	10:00 Break	10:15 Break		10:00 Reflection / Personal statement writing workshop
	10:30 Introduction to projects	10:30 Project Session	11:15 Break	10:30 Break
	10:45 Project Session		11:30 IAG: Personal Statement planning workshop	10:45 Evaluation session
	12:30 Lunch	12:30 Lunch	12:30 Lunch	11:30 Project poster exhibition & certificate presentation
13:00 Arrival / Get to know Ambassador	13:30 Project Session	13:30 Project Session	13:30 IAG Session: HE Finance / Budgeting	13:00 Pick up luggage/ Goodbyes
14:15 Intro & Welcome Talk	15:30 Break		14:30 Trip into Town	14:00 Departure
15:00 Ice breakers/Team building	15:45 Project Session	16:00 Break		
16:15 Campus tours		17:00 How to design a research poster		
17:00 Check into rooms and free time	17:00 IAG Session: Choosing & Applying/ Intro to personal statements	18:00 Free time		
	18:00 Free time		17:30 return to campus	
18:00 What does the subject entail at Bath?	19:00 Dinner	19:00 Dinner	18:00 Free time	
19:00 BBQ	20:00 Fun SU Tasters	20:00 Open Top bus tour	19:30 Formal Dinner	
20:30 Quiz				
21:00 Free time in flat	21:30 Free time in flat	21:30 Free time in flat	21:00 Disco	
23:00 Lights out	23:00 Lights out	23:00 Lights out	23:00 Lights out	

Example Transcript

The candidate named below has completed the University of Bath's Engineering Summer School in 2017.

[NAME]

As part of the programme they were part of the Civil Engineering stream and have completed/attended:

1) An independent research project with University academics.

Involving:

- Planning and designing a solution to an identified issue in a new building
- Experience of undergraduate laboratory facilities
- analysing and evaluating research findings
- designing and creating an exhibition (based on 1st year undergraduate criteria) to disseminate the project process and findings
- academic assessment and feedback.

Which has developed:

- skills in implementing and evaluating a small scale project
- critical thinking skills through experimentation, reflection, analysis, synthesis and evaluation
- creative problem solving and decision making skills
- group work skills and the capacity to lead and work collaboratively
- confidence in using laboratories and university facilities
- experience of independent research
- communication and presentation skills.

2) Workshops to support:

- personal Statement writing skills
- knowledge of university finance
- university applications through bespoke information and guidance from University of Bath admissions tutors.

Skills and experience gained in support of transition to university:

- first-hand experience of university and living as a student on campus
- experience of a range of learning and teaching approaches in Higher Education
- interaction with university staff and current students.

Engineering Summer School Projects

Chemical Engineering Project

Aims

The aim is to give students an experience of Chemical Engineering at Bath. Through a number of research linked undergraduate projects students will use the facilities to develop their practical skills and knowledge of what studying Chemical Engineering is like.

Project Overview

In this project students will get an experience of different areas of Chemical Engineering through four practical activities:

- Coffee biodiesel as an alternative fuel
  (students will extract coffee oil from coffee and produce biodiesel through transesterification)
- Using microalgae for phosphate and nitrate removal from municipal waste water
  (students will set up six different bioreactors with microalgae and waste water and will track the phosphate levels over time)
- Production of bioethanol by yeast fermentation
  (students will ferment yeast, monitor cell growth analyse the amount of bioethanol produced)
- Reverse Osmosis – A separation process to purify water
  (students will use multiple membranes to identify the criteria for purifying salt water)

Curriculum links

These projects will support the practical and theoretical elements of the Chemistry A-Level. Key areas of the A-Level chemistry curriculum that will be supported include:
Kinetics
Reaction mechanisms
Alcohol production
Carboxylic acids and esters
Organic synthesis

Skill development

These projects will support the development of the following soft skills:
Critical thinking
Self directed learning
Group work and collaboration
Analysis

Preparation for first year UG study

All the practical experiments are based on first year undergraduate experiments. Students will work in the undergraduate laboratories using techniques required throughout a Chemical Engineering degree.

Lead Academic

Dr Chris Chuck

Civil Engineering Project

Aims

To give a group of students with an interest in civil engineering an insight into the complexity and interest of the discipline.
To give the students an insight into the richness and breadth of their own potential.
To encourage and inspire students to pursue civil engineering into Higher Education.

Project Overview

Students will carry out a realistic design exercise in small groups, planning and designing a bridge to span two buildings at the University. The project will demonstrate the central importance of creativity, and to show how physical and mathematical modelling helps in the exploration of possibilities and the development of proposals. Students will explore the application of geometry and mechanics to this real problem and make a physical model of their final proposal.

Curriculum links

The project will build upon and aid students' understanding of concepts covered in A-level maths/mechanics, such as equilibrium and distribution of forces, and in A-level physics, such as properties of materials.

Skill development

Team-working and delegation of tasks.

Idea generation and refinement of design through to completion.

Technical sketching with annotations.

Physical three-dimensional model-making.

Problem-solving through the application of mathematical and physical theory learnt at an A-level to a real-world situation.

Preparation for first year UG study

Students will experience undergraduate laboratories and facilities and the development of structural models which will support first year learning.

Lead Academic

Dr Paul McCombie

Electrical Engineering Project

Aims

The aim is to give students an experience of the Electrical Engineering course at Bath through a practical activity. They will work on both areas of Electrical Engineering – hardware and software design – in the undergraduate laboratories to build their knowledge of Electrical Engineering

Project Overview

The students will create a simple circuit to monitor heartbeat by detecting the level of reflected IR light when the finger is placed over the sensor. The students will have to design the amplification stage to interface the system with a single board computer (Raspberry Pi) that will be used to live plot the heartbeat.

Curriculum links

The projects support the Physics A-Level with:
Basics of electricity
Circuits
Resistivity

Skills development

This project will support the development of the following soft skills:
Critical reflection
Self-directed learning
Group work and collaboration
Communication
Analysis

Preparation for first year UG study

Students will be introduced to the standard test equipment set up used in the undergraduate teaching facilities.
Students will have to work on their own to solve problems. Promoting and encouraging lone working, critical analysis and problem solving skills.
Students will be asked to perform both hardware design and software design tasks, both of which are aspects expected of 1st year (and beyond) students.

Lead Academic

Dr Chris Clarke

Mechanical Engineering Project

Aims

Through two practical activities students will develop their knowledge of Mechanical Engineering. The projects will build on knowledge gained in the students' A-Level Physics to provide them with an experience of undergraduate study at Bath.

Project Overview

Heart pump

This project will require students to design, manufacture, test, and evaluate a centrifugal ventricular assistive device (heart pump). Concepts of the engineering design process for pumps, fluid dynamics, and centripetal motion will be taught. Results and conclusions will be presented in a poster.

Dolphin fin

The students will create a prosthesis for a dolphin's dorsal fin which needs replacement. Concepts of engineering design and aerodynamics will be presented. Results will be illustrated in a poster.

Curriculum links

The projects will support practical and theoretical elements of the A-Level Physics curriculum:
Topic 1: Working as physicist
Topic 4: Materials
Topic 6: Further mechanics
development of practical skills, foundations of Physics, measurements and their errors.

Skills development

These projects will support the development of the following soft skills:
Critical thinking
Project design
Group work and collaboration
Communication
Analysis

Preparation for first year UG study

Students will spend time in the a university lab learning operating procedures and performing tasks as a group, both of which occur during the first year of an undergraduate degree. The use of CAD and engineering software to aid in engineering is also part of an undergraduate degree. Fluid dynamics is a first year module at Bath, so concepts learned in this project will support learning when at Bath.

Lead Academic

Prof Richie Gill

Example Student Poster

Exploring the Practical Uses of Potential Dividers in Heart Rate Monitors

Aut. Kelechi Stewart, George Vernon
Aff. STEM Summer School 2016

UNIVERSITY OF BATH

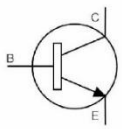
Introduction:

Potential divider circuits are an essential part of any circuit, in that they allow potential to be split variably at any given junction, as according to the resistances of each path through the circuit. This is described by V1/V2 = R1/R2. The project designed and built for this exploration consists of two parts: the detector circuit, based on an ARM-MBED computer which processes the input from a photodetector as the perceived intensity of the infrared LED varies with blood flow, and the amplifier circuit, which amplifies the output voltage from the ARM-MBED to a level suitable for the speaker. (~5 V peak, ~80 mA pulses.)

Method (Amplifier):

Before selecting any particular resistor values for the potential divider circuit, we had to ensure that certain values were constant, and this involved calculating the exact resistance which would ensure that the voltage across the base and emitter* of the BC337 transistor were 0.6V. We selected this transistor at this stage of the circuit because it is low cost and produces low electrical noise, which is essential as any interference at this stage would be exponentially amplified through the speaker. The amplifier circuit is shown to the right.

** The purpose of a BJT (Bipolar Junction Transistor) is to convert a very small amount of current transmitted to the base into a very large amount of current which is collected through the collector pin and "pushed out" through the emitter when the transistor is powered across the base and emitter.*
The diagram labels the base, collector and emitter as B, C and E respectively.



[1]. See references.

Method (Detector):

The detector circuit consists of an infrared LED and phototransistor which detects the fluctuation in received wavelengths from the LED when blood pulses through a finger placed on the detector. This result is a sine wave of voltage with peaks that are processed by the ARM-MBED. *Right: Complete circuit with detector and amplifier.*

The ARM-MBED runs a simple program that detects when the sine wave is at a peak by comparing the amplitude of the wave to the average amplitude, and when the difference exceeds a certain value of 0.03 V, a voltage sine wave is applied to the amplifier circuit via the output pin, powering the speaker. The program then waits for a short while (10 ms) before continuing so that it does not apply multiple sine waves to the speaker during the same heartbeat while the input sine wave is still higher than the average.

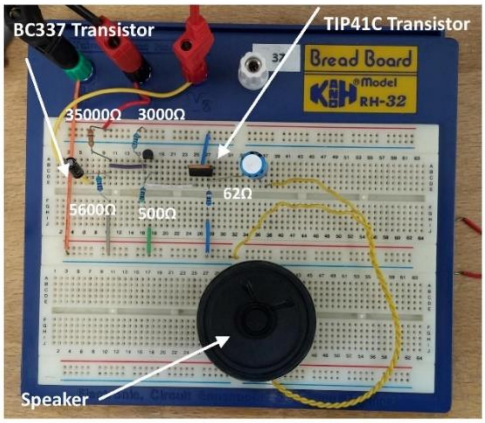
The phototransistor operates in a very similar way to the power transistors in the amplifier circuit, except for that instead of being enabled when a small voltage is produced across the base and emitter, the phototransistor is enabled by photons of light. The transistor, of course, is binary in nature, so to receive a continuous wave (technically a simulated continuous wave represented with discrete data points) the circuit employs the use of a capacitor which receives charger when the transistor is disabled, and dissipates its charge when the transistor is on. The amount of charge released depends on for how long the transistor is on or off, and therefore the characteristics of the wave. The ARM-MBED interprets this by turning on a different number of LEDs (shown in blue on the board) to correspond with the total charge released. *Right: Phototransistor.*

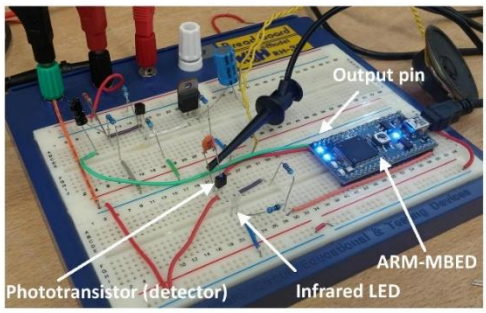
Conclusion:

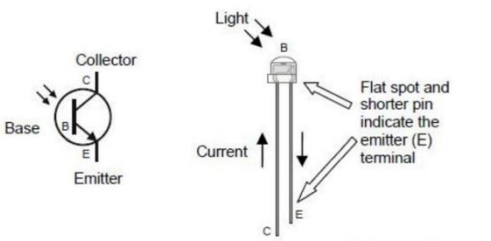
Over the course of a few hours we were able to use potential dividers to control voltage over a circuit and precisely drive active components. We programmed an ARM controller using mathematical methods in C++ to process the wave data continuously and output a discrete signal useful to a human in the form of sound and light.
We came to these conclusions:

- Using basic concepts ranging from Ohm's law to Kirchoff's laws we were able to build a complex device with real world applications.
- We used our mathematical and physical understanding of circuits to debug errors in the circuit with the multimeter probes seen in the picture of the complete circuit.

Ve+ **Ve-** **Ve+ ***
**(Sine wave generator simulated input)*



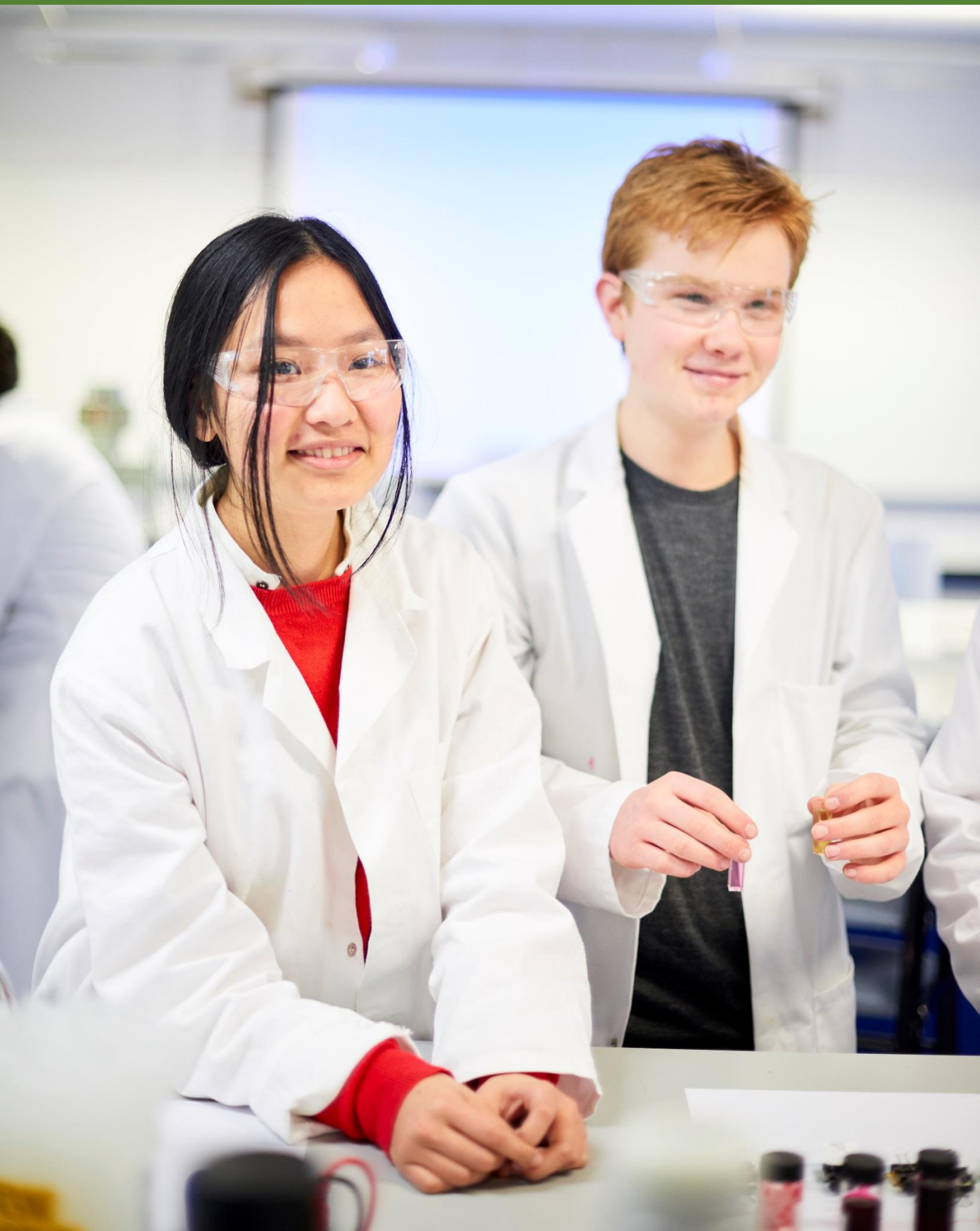




[2]. See references.

References:
[1] http://www.engineersblogsite.com/what-is-a-transistor.html
[2] http://learn.parallax.com/tutorials/robot/shield-bot/robotics-board-education-shield-arduino/chapter-6-light-sensitive-15

Science Summer School Projects



Biology Project

Aim

The aim is to give students an experience of the different areas of study within the Department of Biology and Biochemistry at the University of Bath.

Project Overview

Students take part in three projects:

Project 1: Genetics

How flies medicate against infection. The students will perform mating trials and trials to test whether females left overnight with different natural compounds are more likely to mate. As flies mate the data are collected and analysed.

Project 2: Genomics

Students will identify the source of the Avian Immunodeficiency Virus (AIV) discovered in the UK. Using the University's Tarr lab, students will collect DNA sequences from databases, assemble them into a multi-sequence alignment and then use those to infer an evolutionary tree that will tell us the country of origin for the UK AIV outbreak.

Project 3: Biochemistry

In this project students use analytical techniques to estimate the amount of Vitamin C excreted in their urine after they have taken a large test dose.

Curriculum links

The projects support the practical and theoretical elements of the A-level Biology curriculum in key topics including:
Development of practical skills in biology
Biodiversity, evolution and disease
Biochemistry

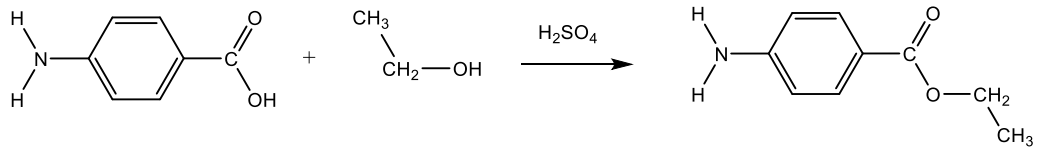
Preparation for first year UG study

These projects will prepare students for study in the following programmes offered at Bath: Biology / Biomedical Sciences / Biochemistry. In particular, the following units - Practical and Research skills (BB10213 and BB10216)

Lead Academics

Dr Momna Hejmadi
Dr Chris Todd
Dr Alex Jefferies
Dr Nick Priest

Chemistry Project



4-amino benzoic acid ethanol ethyl 4-amino benzoate

Aim

The aim is to give students experience of working in an undergraduate chemistry laboratory and for students to use some tools and apparatus that are not usually available in school laboratories. Through practical work, talks and tours the students will get an experience of university life as a chemistry undergraduate, they will be guided by two demonstrators who are working for their doctorates in Chemistry as well as two undergraduate students studying for their degree. Students will have the opportunity to chat with them about their degrees, their work and their time at university.

Project Overview

In this project students will synthesise a compound – ethyl 4-amino benzoate, better known as benzocaine – and perform a range of analytical measurements to assess how pure their compound is. Students may have encountered benzocaine themselves as it is used as a surface local anaesthetic for pain relief in antiseptic lotions, sore throat and mouth sprays and after-sunburn products.

Students will synthesise benzocaine using an esterification process, follow the reaction by TLC and after work-up will analyse the purity of their sample using IR, HPLC, MS, NMR (all covered in the A-Level curriculum)

Curriculum links

Esterification under reflux (Yr 12/13 syllabus)
Infra Red (Yr 12)
Recover, purify sample (Yr 13 practical)
NMR spectra (Yr 13 syllabus)
computational model, look at shapes and properties. (extension of Yr 13 syllabus)
Support with the practical qualification of the A-Level

Preparation for first year UG study

This preparation and analysis is a simplified version of a first year practical workshop at Bath. Experience of equipment such as NMR that most students will not have used will prepare them well for their first year study.

Lead Academic

Prof Gareth Price

Computer Science Project

Aim

The aim is to give students an overview of the different areas of computer science at University of Bath. Students will get experience of hardware and software development.

Project Overview

Students will work in the new undergraduate facility for hardware development using Arduino computers to design and develop a solution to an everyday problem. Students will get an introduction to Arduino systems and will use that knowledge to design and program a piece of hardware that will support people in their everyday lives.

Curriculum links

The projects support the Computing and Computer Science curriculum with areas including:
Fundamental programming
Fundamentals of computer systems

Preparation for first year UG study

These projects are based on a first year undergraduate project. Development of programming skills will support learning in first year study.

Lead Academic

Dr Fabio Nemetz

Maths Project

Aim

The aim is to give students an experience of different types of maths (pure and applied) at university through curriculum focused sessions. Support with the different admissions tests (e.g. STEP) for students will support their progression to highly selective universities.

Project Overview

Students will take part in a number of different areas of Maths:

Progression support

Students will be given information about the different admissions tests to selective universities (e.g. STEP) and will take part in a workshop where they will get to experience the questions in the tests.

Problem Solving (Pure)

Students will be introduced to the problem solving mind-set and will get to take part in a number of problem solving workshops including the technique of "double counting" by which you derive equations by counting the same thing in two or more different ways.

Applied Maths

Students will use cutting edge Maths techniques and python (on a Raspberry Pi) to predict the weather in their local environment.

Curriculum links

The projects support A Level Maths in the following topics:
Mathematical argument, language and proof
Mathematical problem solving
Proof

The projects support A Level Further Maths In the following topics:
Mathematical argument, language and proof
Mathematical problem solving

Preparation for first year UG study

These sessions will give the students the experience of different techniques covered in a university degree. Experience with programming will support the first year course at Bath.

Lead Academics

Prof Chris Budd
Prof Geoff Smith

Physics Project

Aim

The aim is to build skills and competency in A Level Physics through engagement with three undergraduate level projects.

Project Overview

Students will investigate properties of light and research the viability of manipulating light to create an 'invisibility cloak'. They will perform three demonstrations taken from 1st year undergraduate labs looking at diffraction, a method for measuring the velocity of light, and using the Michelson interferometer. They will also take part in a complementary lecture/problems class and a tour of some of the Department's research labs.

Curriculum links

The project will support the practical and theoretical elements of the Physics A-Level.
In particular it will support the topic of waves covering areas such as:
qualitative treatment of polarisation and diffraction/path difference, phase and coherence, interference/Quantum and nuclear physics/photons and particles/photon model to explain observable phenomena/evidence supporting the photon model/wave-particle duality, particle diffraction

Skills development

These projects will support the development of the following skills in the Physics A-Level:
develop competence and confidence in a variety of practical, mathematical and problem solving skills
use theories, models and ideas to develop scientific explanations Group work and collaboration
carry out experimental and investigative activities, including appropriate risk management, in a range of contexts
analyse and interpret data to provide evidence, recognising correlations and causal relationships
the use of SI units and their prefixes
the limitations of physical measurements

Preparation for first year UG study

Students will become familiar with the undergraduate lab setting and some of the equipment used. They will be given a very open question to research and explore in their own way. They will be introduced to some of the research that takes place in the Physics Department.

Lead Academic

Nerys Shah

Science Summer School

Example Student Poster

Synthesis and Analysis of Benzocaine

Benzocaine has been found in 1890 but was introduced to the market in 1902. It is used by the public as a local anaesthetic. It is found in antiseptic lotions and sore throat and mouth sprays, to relieve pain and discomfort. The organic name known for benzocaine is ethyl 4-amino benzoate.

Figure 1: 4-aminobenzoic acid.

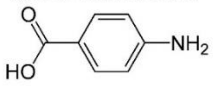


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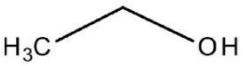
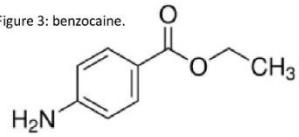
Figure 2: ethanol.



H_2SO_4

Figure 3: benzocaine.



Method

We used 4-aminobenzoic acid and ethanol, with sulfuric acid as a catalyst (*a substance which increases the rate of reaction without getting used up or effecting the product*). These are set up in a heating mantle with a condenser where it is left to reflux between 1-4 hours. (*reflux is a process of constant boiling and condensing to ensure all the organic material has been reacted and we can produce a maximum yield*).

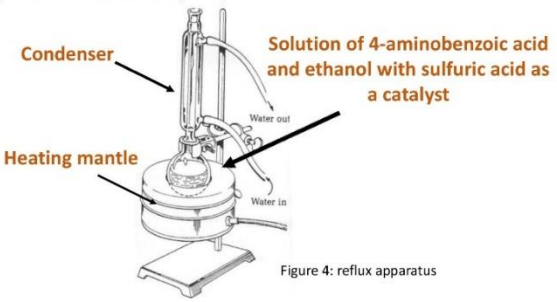
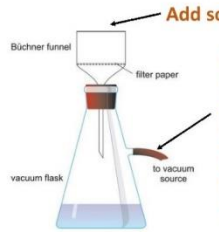


Figure 4: reflux apparatus

We left the solution to reflux for 3 hours then let it cool. Once cooled we added sodium carbonate in small portions where we observed effervescence (which showed the release of CO_2) , and the formation of a precipitate. The precipitate was collected using a vacuum filtration system.



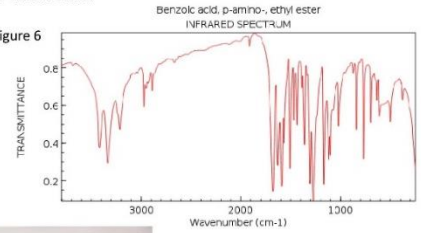
Vacuum source, used to draw out all the moisture from the precipitate and leave the formation of benzocaine white powder on the filter paper ready for collection and drying in the oven

Figure 5: vacuum filtration system

Infrared Spectroscopy:

This is a process used to identifying the product, as different bonds absorb different frequencies of radiation which, using the wavenumber (cm^{-1}), allows us to see which bonds are present in the molecule.

Figure 6



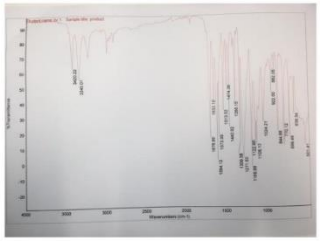


Figure 7

When comparing our Infrared Spectroscopy (figure 7) to that of pure benzocaine (figure 6) , we can identify that the peaks are in very similar spaces, showing we have synthesised benzocaine.

Nuclear Magnetic Resonance

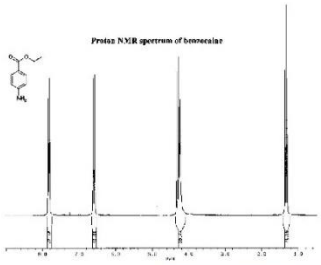


Figure 8

NMR allows us to identify different functional groups and the position of them in the molecule.

Figure 8 shows the NMR of pure benzocaine, and when we compare this with our NMR of our product (figure 9) we can observe that the peaks are have very similar ppm to that of benzocaine.

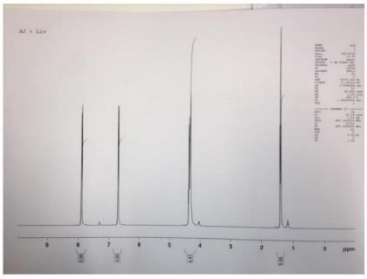


Figure 9

Results

Melting point of pure 4-amino benzoic acid /°C	193°C
Melting point of pure benzocaine /°C	90°C
Melting point of our product /°C	88°C

Table 1: Recordings of melting points.

Mass of 4-amino benzoic acid /g	1.3658g
Theoretical mass of product /g	1.6449g
Mass of product obtained /g	1.2362g
Yield of benzocaine /g	75.15%

Table 2: Recording of masses use and produced, with the calculated yield,

Alessandra James and Olivija Norvilaite

References

Figure 1:https://commons.wikimedia.org/wiki/File:4-aminobenzoic-acid-skeletal.png
Figure 2:http://www.emdmillipore.com/US/en/product/Ethanol-96%25,MDA_CHEM-159010
Figure 3:http://www.sigmaaldrich.com/catalog/product/sial/112909?lang=en&region=US
Figure 4:http://www.organicchem.org/oc2web/lab/exp/lp/lpreflux.html
Figure 5:http://www.tokecity.com/forums/archive/index.php/t-51946.html
Figure6http://www.chemistry.mcmaster.ca/~chem2ob3/nhw_temp/old_old_labmanual/2001_exp4.html
Figure8: http://webbook.nist.gov/cgi/inchi?ID=C94097&Type=IR-SPEC&Index=4

Social Sciences Summer School Projects

Education and Social Equality

Aim

The aim is to develop students understanding of, and skills in, research methodology. Through active learning within their chosen topic and utilising key steps in the process of research students learn to develop key skills for successful study of Social Sciences at university.

Project Overview

In this project students will explore the relationship between education and various socio-economic factors, including; earnings, income, (un)employment, profession, class, marriage/partner-education, deprivation/poverty, crime (street, area, domestic), alcohol/drug-use, anti-social behaviour and gender and examine how each has an impact on outcomes.

Curriculum links

AQA Sociology A-level Education with Research Methods
Stratification and Differentiation with Theory and Methods

OCR Sociology A-Level have a module on Researching and Understanding Social Inequalities and one on Debates in Contemporary Society with a focus on crime and education

CIE Sociology A-Level
Theory and Methods and one on Education

Skill development

These projects will support the development of the following soft skills:

Critical thinking, Problem Solving, Critical Reflection, Self-Directed Learning, Independent Research Project Design, Group Work/Collaboration, Communication, Analysis, Evaluation.

Preparation for first year UG study

The projects are designed to employ undergraduate level practices in research including narrowing down to a question, researching relevant literature, identifying data and identifying interesting hypothesis. Students are asked to design a research poster and are given a first year undergraduate mark scheme as a marking criteria.

Lead Academic
Dr Matt Dickson

From Barbie to Grand Theft Auto

Aim

The aim is to develop students understanding of, and skills in, research methodology. Through active learning within their chosen topic and utilising key steps in the process of research students learn to develop key skills for successful study of Social Sciences at university.

Project Overview

In this topic students will explore gender representation in video games and analyse how this may effect gamers, game play and game development. Students will look at the range and type of games played by males and females and examine the relationship between this and the types of gender representations they portray. Students will produce graphics and tables to demonstrate their research and data.

Curriculum links

AQA GCE AS and A Level Specification Psychology A
Unit 1 – PSYA1 Cognitive Psychology, Developmental Psychology and Research Methods
Unit 3 – PSYA3 Topics in Psychology
Unit 4 – PSYA4 Psychology in Action and Research Methods

Skill development

These projects will support the development of the following soft skills:
Critical thinking, Problem Solving, Critical Reflection, Self-Directed Learning, Independent Research Project Design, Group Work/Collaboration, Communication, Analysis, Evaluation.

Preparation for first year UG study

The projects are designed to employ undergraduate level practices in research including narrowing down to a question, researching relevant literature, identifying data and identifying interesting hypothesis. Students are asked to design a research poster and are given a first year undergraduate mark scheme as a marking criteria.

Lead Academic

Dr Richard Joiner

Migration and its Consequences

Aim

The aim is to develop students understanding of, and skills in, research methodology. Through active learning within their chosen topic and utilising key steps in the process of research students learn to develop key skills for successful study of Social Sciences at university.

Project Overview

In this project students will explore factors behind various types of migration and look at patterns of migratory movements and the impact they may have on the countries of origin and destination. Students will obtain and analyse data and compare it against economic theories and literature.

Curriculum links

Cambridge International AS and A Level Economics
3.2 .1 Basic economic ideas and resource allocation -
32. 2The price system and the micro economy

AQA AS AND A-Level Economics
Unit 3 - The labour market
Unit 4 - The national and international economy

AQA A-level Citizenship Studies
Identity, Rights and Responsibilities
Immigration and emigration: factors influencing migration
An appreciation of trends and patterns in migration since 1945.
Origins and destinations
A historical understanding of change and continuity

Skill development
These projects will support the development of the following soft skills:
Critical thinking, Problem Solving, Critical Reflection, Self-Directed Learning, Independent Research Project Design, Group Work/Collaboration, Communication, Analysis, Evaluation.

Preparation for first year UG study

The projects are designed to employ undergraduate level practices in research including narrowing down to a question, researching relevant literature, identifying data and identifying interesting hypothesis. Students are asked to design a research poster and are given a first year undergraduate mark scheme as a marking criteria.

Lead Academic
Dr Joanna Clifton-Sprigg

The Future of the United Kingdom

Aim

The aim is to develop students understanding of, and skills in, research methodology. Through active learning within their chosen topic and utilising key steps in the process of research students learn to develop key skills for successful study of Social Sciences at university.

Project Overview

In this project the students will consider the health of the United Kingdom as a political entity. They will investigate topics such as; Identity and Nationalisms, Brexit and General Election Results. Students will analyse data and literature to use as evidence within their projects.

Curriculum links

AQA A-Level Government and Politics
Unit 1 - People, Politics and Participation
Unit 2 - Governing Modern Britain
Unit 4B - Political Issues: Ideologies in Action

Pearson Edexcel Level 3 Advanced GCE in Politics
Component 1: UK Politics and Core Political Ideas 7
Component 2: UK Government and Non-core Political Ideas 22
Component 3: Comparative Politics

Skill development
These projects will support the development of the following soft skills:

Critical thinking, Problem Solving, Critical Reflection, Self-Directed Learning, Independent Research Project Design, Group Work/Collaboration, Communication, Analysis, Evaluation.

Preparation for first year UG study

The projects are designed to employ undergraduate level practices in research including narrowing down to a question, researching relevant literature, identifying data and identifying interesting hypothesis. Students are asked to design a research poster and are given a first year undergraduate mark scheme as a marking criteria.

Lead Academic
Dr David Moon

Social Sciences Summer School

The Politics of Representation

Aim

The aim is to develop students understanding of, and skills in, research methodology. Through active learning within their chosen topic and utilising key steps in the process of research students learn to develop key skills for successful study of Social Sciences at university.

Project Overview

In this project students will look at how media representations of identities has an impact on perceptions of certain groups and how that, in turn, has consequences for behaviour between different groups in society. Students will analyse different types of media and examine a broad range of sources.

Curriculum links

AQA AS and A-level Sociology

3.1 Education with Methods in Context
Education
Culture and Identity
Health
4.1 Education with Theory and Methods
Topics in Sociology
Culture and Identity
Health
The Media

Skill development
These projects will support the development of the following soft skills:

Critical thinking, Problem Solving, Critical Reflection, Self-Directed Learning, Independent Research Project Design, Group Work/Collaboration, Communication, Analysis, Evaluation.

Preparation for first year UG study

The projects are designed to employ undergraduate level practices in research including narrowing down to a question, researching relevant literature, identifying data and identifying interesting hypothesis. Students are asked to design a research poster and are given a first year undergraduate mark scheme as a marking criteria.

Lead Academic
Dr Jess Francombe-Webb

Example Student Poster

To what extent, does gender (male/female), socio-economic class and ethnic background affect an individual's attainment in relation to academia?

UNIVERSITY OF BATH

Introduction:
It has been of great controversy that those from disadvantaged backgrounds should be, on occasion, given lower offers from academic institutions. As a collaborative unit, we set out to determine whether there is any basis for this leniency within society and if so, acknowledge and note which groups are at grand risk. Literature points us towards three main categories when considering our question: gender, ethnicity and socio-economic class. However, some researchers have taken the vantage point that the effectiveness of a school can have a profound effect on attainment (Hamnetta et al., 2007, p.1263).

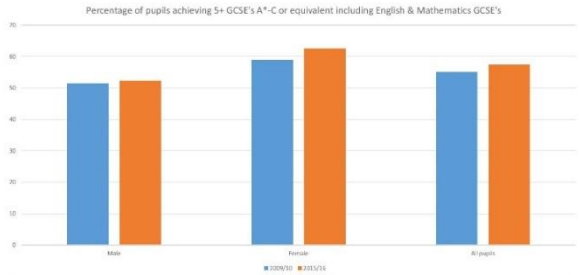
Aim:
Investigation of the differing but interrelated factors (gender, ethnicity and socio-economic class), which may ultimately contribute to GCSE outcomes of UK students.

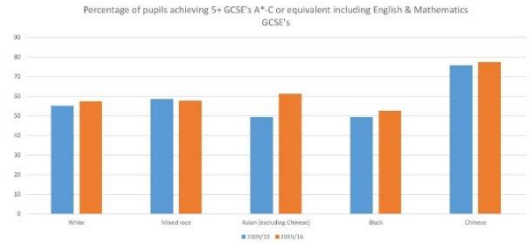
Hypothesis:
There will be a significant difference in the GCSE grades achieved between different genders, ethnicities and socio-economic groups.

Method:
We collected secondary data, which means it was collected from other sources in order to find national GCSE results. Our source was the Office of national statistics, where we found data dating all the way back to 2009, this meant we were able to identify trends over time. Using secondary data was quick and easy, so it saved a lot of time. Government collected data is also often representative as it usually involves large samples.

Gender:
- Girls are superior in the academic circle in the majority of GCSE subjects.
- However, there are four exceptions: Chemistry exhibits no gender difference, and in Physics and Biological Sciences, boys perform higher
- Minor gender differences (in girls' favour) tend to be in Science/Maths subjects.

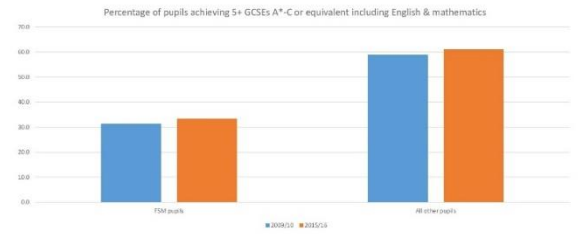
Ethnicity:
- The Chinese ethnic group have consistently over performed compared to other ethnic groups with little change over the years.
- The lowest percentage is unfortunately still given to the Black community, however, in previous years they were on par with the Asian community.
- The ethnic group with the greatest change is the Asian ethnicity gaining an ~10% increase within 5-6 years.

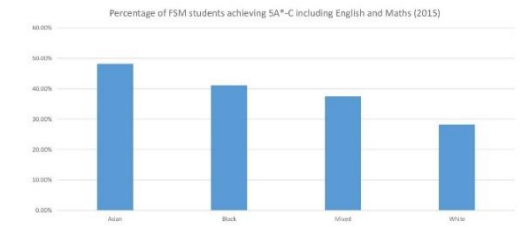




Socio-economic class:
- The results show that FSM pupils have continuously performed worse than all other pupils.
- This may be due to material deprivation or status frustration (Cohen 1956)
- It is also notable that there has been little change between compared years, which could show that previous strategies have not been working.

Afterthought?
Despite both having the highest university attendance rates overall and performing best in their GCSE's, only 39.2% of Chinese university attenders went to a Russell Group university, compared to only 13.2% of black African students. - The Sutton Trust





Limitations:
- Official statistics may reflect the biases of those in power the way things are measured may change over time, making historical comparisons difficult (As with crime statistics, the definition of crime keeps changing.)
- Documents may lack authenticity– parts of the document might be missing because of age.
- May be manipulated for political reasons – so may lack reliability

Findings and Conclusions:
It can be seen from our cross-sectional study that socio-economic class has the greatest impact on students chances of getting 5 A*-C GCSE grades. There is little variation between most of the ethnicities, however, those of Chinese descent deviate the greatest receiving the highest chances of gaining 5 A* - C GCSE grades. The most surprising result was seen in the Gender data, with girls having the greatest chance of gaining 5 A* - C GCSE grades by approximately 10% (2014-2015). With these results we can understand why those from disadvantaged backgrounds need careful consideration when making applications to Higher Education, which could lead to a HE Institution giving lower offers. Alternatively, some literature states that it may just be the 'effectiveness' of the school that affects how high students attain (Hamnetta et al., 2007, p.1263).

Sources:
Hamnetta, CH., Ramsden, MR., and Butler, TB., 2007. Social Background, Ethnicity, School Composition and Educational Attainment in East London. Urban Studies (Routledge), [Online]. 44(7), pp. 1263. Available at: http://web.b.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=1&sid=aa664665-e328-43ea-a36a-957b46edc13f%40sessionmgr104 [Accessed 28 June 2017].
Fernando Galindo-Rueda, Oscar Marcenaro-Gutierrez and Anna Vignoles, FG-R, OM-G and AV, 2017.
The Widening Socio-Economic Gap in UK Higher Education. National Institute Economic Review, [Online]. 190(1), pp. 77. Available at: http://journals.sagepub.com/doi/pdf/10.1177/002795010419000108 [Accessed 27 June 2017]

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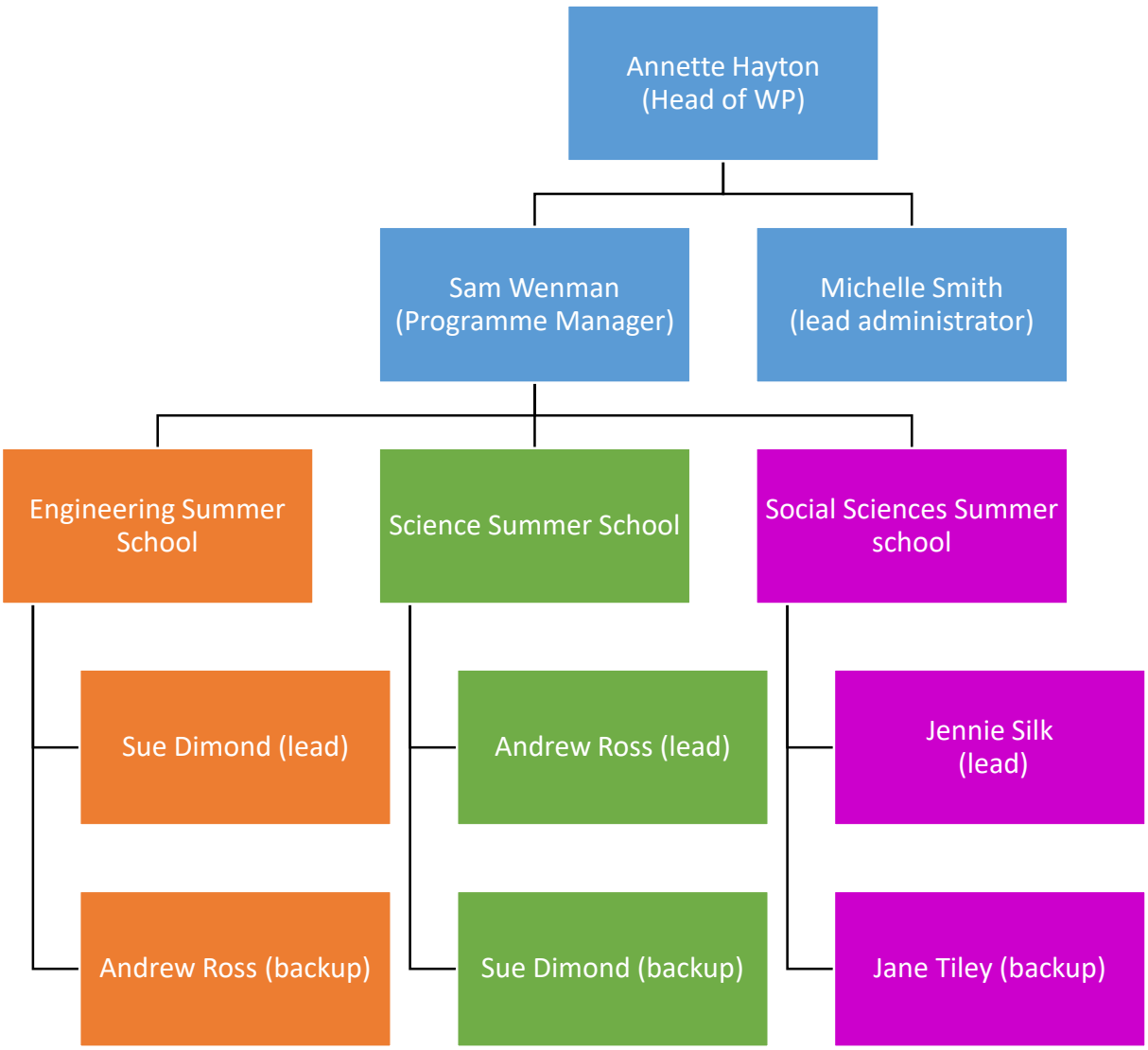
The Summer School Teams

Each summer school is run by a separate team with the Programmes Manager and Lead Administrator keeping an oversight over all summer schools.



Information & Guidance
Talks and Workshops

Information & Guidance Talks and Workshops

Throughout the week students attend talks and workshops which provide them with information and guidance to support their UCAS applications. Students are given factsheets and worksheets to accompany the sessions and to provide them with a resource pack to take home.

Aims

- To provide students with detailed information about relevant courses and placements at the University of Bath.
- To provide student with information to help them engage effectively with the UCAS process.
- To provide students with practical guidance on how to write an effective personal statement.
- To provide opportunities for supported reflection to allow students to make the most of their summer school experience in their UCAS applications.

Overview of the Sessions

Introduction to the relevant subject courses at the University of Bath.

This session introduces the students to the range of courses available at Bath. It details the differences between the courses, course content, teaching methods and placement opportunities. Grade requirements are also explained along with the skills, qualities and experience admissions would be looking for as part of an application.

Choosing and Applying

Students are given an overview of the UCAS process including; how to research courses, what to consider when choosing a course, the key dates in the admissions cycle and how to navigate the UCAS website.

An Introduction to Personal Statements

During this talk students find out how personal statements are used as part of the admissions process. They are told the character count limitations and given a suggested structure. We explore which aspects of students' experiences need to be evidenced and look at ways students can help themselves to stand out. Students are also given some guidance as to how to construct each paragraph to effectively demonstrate their strengths and suitability.

Overview of the Sessions (continued)

How to Plan and Write a Personal Statement

This practical workshop supports students to apply the knowledge they have gained in the previous sessions. They learn techniques to record relevant information from their course research and to link this to their own experiences. They are then given an opportunity to start writing their statements and get immediate feedback from staff.

Question and Answer session with Admissions Tutors

Small groups of students are given the opportunity to meet the Admissions Tutors from the relevant departments. This is a chance to find out about University of Bath courses in more detail, ask any outstanding or individual questions as well as add to their course research notes.

Student Finance

This talk gives an overview of how student finances work including: how and when to apply; how maintenance loan amounts are worked out; how much students can expect and how and when the money is paid. We also look at how and when repayments are made and what the current repayment amounts are. Students are also given information on the scholarships and bursaries that are available at the University of Bath. As part of this session one of our student ambassadors talks to the students about budgeting and looks at the real costs of university, along with top tips on how to start preparing for the costs of life at university the students also find out about employment opportunities whilst studying.

How to Make the Most of Your Summer School Experience

The final workshop is an interactive plenary session to help reflect on how to use their summer school experience effectively in their UCAS applications. They are given a transcript (see page 16 for an example) detailing the work they have completed during the summer school, they discuss how the different elements are relevant to a university application and then start writing their statements with support from staff and ambassadors.