
Science and Engineering

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No Smoke Without Fire

.....

Learn more about the chemistry of fireworks with this laboratory activity and presentation on metals in fireworks. You will examine the different colours produced in fireworks alongside a discussion of absorption/emission spectroscopy. This will be demonstrated through use of standard flame tests and participants will have the opportunity to produce sparklers or a smoke bomb.

Venue:

Staffordshire University,
Stoke-on-Trent

Subject:

Chemistry

When:

Available on request throughout
the academic year

Number of students:

Up to 20 places available

Year groups:

Year 10 - Year 13

Making Scents of Nature

How do we make things smell nice? Learn how by taking part in this laboratory activity on the wide variety of scent compounds found in nature and how they're made by chemists every day for use in soaps, perfumes, deodorants, household cleaning products and foods.

Participants will be provided with a range of scent samples to identify from a range of sources. Students will also take part in a practical activity in where they will extract scent compounds from a seasonal fruit, spice or plant material (Option A) or alternatively, synthesise esters to produce a variety of scents (Option B).

Venue:

Staffordshire University,
Stoke-on-Trent

Subject:

Chemistry

When:

Available on request throughout
the academic year

Number of students:

Up to 30 places available

Year groups:

Year 7 - 9 (Option A)
Year 10 - 13 (Option B)

The Louder you Scream... the faster we go!

.....

This is a one hour workshop activity led by academic staff with support.

Roller-coasters are designed using a range of principles relating to energy and forces. This activity will give you an understanding of how engineers utilise these to develop the thrilling rides that push you to the limit.

Venue:

Staffordshire University, Stoke-on-Trent campus or at your own venue on request.

When:

Available on request throughout the academic year

Number of students:

Up to 15 places available

Year groups:

Year 9 - Year 13

Additional information:

This activity can be linked to other Engineering activities.

Fantastic **Plastics**

Is all plastic bad? What can we use instead of plastic? This hands-on activity (and presentation for Year 9-11) involves making bioplastics and learning how we can use them for a range of new applications. The session will highlight the need to move away from traditional plastics due to environmental concerns and demonstrate to pupils the wide range of plastics that are now available, including ones they can make at home. The main activity in this session will use materials that are readily available such as potato, vinegar and glycerol to create a plastic with a range of properties; alternative activities for younger pupils include creating an gel water "bubbles" and slime.

Venue:

Staffordshire University,
Stoke-on-Trent

Subject:

Chemistry

When:

Available on request throughout
the academic year

Number of students:

Up to 30 places available

Year groups:

Year 5 - Year 11

Fast and Curious... fuelling cars for the future!

.....

This is a one hour workshop activity led by academic staff with support.

Utilising the fuel cell cars (hydrogen) and solar energy is the future. This activity will help you understand issues and opportunities related to this and give an insight into how vehicles may develop in the future.

Venue:

Staffordshire University, Stoke-on-Trent campus or at your own venue on request.

When:

Available on request throughout the academic year

Number of students:

Up to 15 places available

Year groups:

Year 9 - Year 13

Additional information:

This activity can be linked to other Engineering activities.

Chariot racing with SPHERO - engineering, creativity and fun!

.....

This is a one hour workshop activity led by academic staff with support.

Engineers need to work together, communicate and be creative. This activity promotes innovation whilst working in small groups to an engineering design brief.

Venue:

Staffordshire University, Stoke-on-Trent campus or at your own venue on request.

When:

Available on request throughout the academic year

Number of students:

Up to 15 places available

Year groups:

Year 9 - Year 13

Additional information:

This activity can be linked to other Engineering activities.

Automotive Race-Car Preparation

.....

This is a one hour workshop activity led by academic staff with support.

Get hands-on with our racing vehicles, help us to set them for their next race and learn about the importance of adjustments that can increase performance.

Venue:

Staffordshire University,
Stoke-on-Trent campus.

When:

Available on request throughout the academic year

Number of students:

Up to 15 places available

Year groups:

Year 9 - Year 13

Additional information:

This activity can be linked to other Engineering activities.

Flight Simulation

.....

A 60 minute workshop, introducing the university's professional flight simulator. A Boeing 737 will be sitting at an airport. Students will be shown around its flight deck and the main instruments and systems will be explained.

Depending on the age of the students, it will either be started up from a completely shutdown state using a checklist, or it will already be powered up and just the engines will need starting. It will then be flown to demonstrate a short 20 minute flight, with a taxi, take-off, approach and landing.

Students will then have a chance to handle the aircraft and try taking off and landing, depending on numbers and time available.

Venue:

Staffordshire University,
Stoke-on-Trent campus.

When:

Available on request throughout
the academic year

Number of students:

between 6 and
12 places available

Year groups:

Year 9 - Year 13

Additional information:

This is of interest to students interested in flying, engineering, aircraft, or even those who just want to know what goes on in the flight deck before a flight.

Mammal trapping, and tracking

.....

A hands-on activity on the University's nature reserve and in the lab. Students will be searching for tracks and signs of mammals on the nature reserve, check some humane mammal traps that have been pre-set, and hopefully see some small mammals close up before they are released. This will be supplemented by a laboratory-based activity where students will examine and identify signs of British mammals, such as skulls, hair, droppings and feeding remains, using identification keys and guides. Suitable outdoor clothing and shoes will need to be worn on the nature reserve.

Venue:

Staffordshire University,
Stoke-on-Trent campus

When:

Throughout the year
as requested

Number of students:

10-15 students

Year groups:

Y9 to 13

Additional Information:

2.5 hrs session run in a morning.
Please note, this won't be
available on Mondays.

Gel electrophoresis

.....

A hands on opportunity for students to carry out analysis of DNA by agarose gel electrophoresis. 2-3 hr session.

Each organism has a specific sequence of nucleic acid and molecular biology techniques have been developed to use this in order to identify these organisms. In this workshop, students will try some of the molecular biological techniques used to identify different types of organisms. They will get hands on with the process of molecular diagnosis that includes DNA extraction, PCR and gel electrophoresis.

Venue:

Staffordshire University,
Stoke-on-Trent

When:

Throughout the year as required

Number of students:

15-20 students

Year groups:

Year 11-13

What is the concentration inside a cell

.....

A visual activity using a sucrose density gradient to determine the concentration of solutes inside a plant cell in comparison to sugar solutions. Concentrations can be in terms of number of spoonful of sugar, compared to popular fizzy drinks rather than molarities, depending on what has been covered in the curriculum. The density gradient is created in a 100 ml measuring cylinder by the students using prepared sugar solution some of which are coloured with food dye. Plant tissue used is taken from the root tips of germinated seeds.

Venue:

Staffordshire University,
Stoke-on-Trent

When:

Throughout the year

Number of students:

Max. of 20 students

Year groups:

Year 9-13

Additional Information:

2.5 hr session.

Gram staining

.....

In this 1.5 to 2 hr session, students will be working on a gram staining technique in order to differentiate groups of bacteria depending on their cell wall constituents. Students will get hands-on with microscopy and basic microbiological techniques used to identify bacteria. In order to assess their learning, they will be provided with a task to differentiate unknown organisms. In this workshop students will develop skills and competencies of visualising gram positive and gram negative bacteria using oil immersion microscopy. The session will be wrapped-up by a demonstration of already prepared slides.

Venue:

Staffordshire University,
Stoke-on-Trent

When:

Throughout the year

Number of students:

About 30

Year groups:

Year 12-13

Monitoring yeast cell metabolism **and death**

.....

All cells require energy and this is acquired through the nutrients they consume. Different carbon sources are used by cells to generate ATP using metabolic pathways such as glycolysis, fermentation, oxidative phosphorylation and fatty acid oxidation. If cells do not produce enough ATP they will inevitably die. Students will monitor fermentation, mitochondrial activity and cellular viability in yeast as a way of understanding metabolism, enzymes, experimental design and data analysis.

Venue:

Staffordshire University,
Stoke-on-Trent, or at your venue

When:

Throughout the year as requested

Number of students:

15-20 students

Year groups:

Year 9-13

Additional Information:

2 - 2.5 hr session.

Why Study **Biological Science**?

.....

This session will present the breadth of study available within the Biological Sciences. We will cover the broad range of opportunities available, both during a student's academic journey and onwards into their working career. We will investigate how Biological Science underpins many career pathways and how the knowledge and skills developed in this field will leave students well positioned for the future.

Venue:

Can be delivered at your location

When:

Throughout the year

Number of students:

30 students

Year groups:

Year 9 to 13

Transform your open space office to a **biophillic cell office**

.....

Integrate Green infrastructure (GI) into an open space office design, considering the aspects of staff wellbeing and ecosystem services of GI (includes a little tour to show GI in the University). Students will be learning ecosystem service of green walls and the aspects of sustainable building design.

Venue:

Can be delivered at Staffordshire University, Stoke-on-Trent, or (without the tour) at your location.

When:

Throughout the year

Number of students:

20 students

Year groups:

Year 9 - 13

Additional Information:

2 hr session.

An interactive workshop in Bioethics

.....

A thorough understanding in bioethics is crucial in studying life sciences and related disciplines, as it is ethical discernment. During this 1-1.5 hrs workshop students will be interactively engaging in Problem Based Learning (PBL) with a focus on ethics in medical and environmental biology. Students will be given an insight to bioethics including the aspects of use of biological specimens or human participants in research/practical sessions.

Venue:

Can be delivered at your location

When:

Throughout the year

Number of students:

20-30 students

Year groups:

Year 9-13

Vector borne diseases workshop

.....

This workshop takes the concept of a crowded planet as a starting point then works with the problems that infectious diseases have in this situation. There is a breakout workshop for the students to get hands on looking at prepared slide of bacteria and parasites and also at some dead specimens of mosquitoes that act as vectors for medically important diseases.

Venue:

Can be delivered at your location or at Staffordshire University, Stoke-on-Trent.

When:

Throughout the year

Number of students:

20-30 students

Year groups:

Year 9 - 13

Additional Information:

1.5 hr session.

Exploring cells and **cell biology**

.....

This will take the form of a presentation on the form and function of the cell and disorders related to dysfunction. Posters, placards and matching cards will be used for consolidation activities. It will tail off by highlighting careers linked to cell biology. The session will also highlight careers in cell biology.

Venue:

Can be delivered at your location or at Staffordshire University, Stoke-on-Trent.

When:

Throughout the year

Number of students:

20-30 students

Year groups:

Year 9-13