



UNIVERSITY OF LEEDS



Leeds Festival of Science



SCHOOLS PROGRAMME

3 - 28 March 2018

Primary - Secondary - Post 16 - Teachers



@STEMatLeeds



www.leeds.ac.uk/festivalofscience



Leeds Festival of Science

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Cancellation Policy

Schools that cancel at short notice, or bring significantly fewer pupils than booked, may be excluded from future events.

Photography Policy

Photographs taken during these events may be used in future publicity and marketing. Schools will be informed of sessions where a photographer will be present and will be supplied with consent forms. The forms will need to be completed by students and parents/guardians and submitted on arrival at the festival.

The 2018 schools programme is full of exciting STEM events for Key Stage 2 to 5, involving science, maths, engineering and geography. Once more, our programme offers a selection of 'roadshow' sessions which can be brought into school, in addition to our popular 'on campus' events.

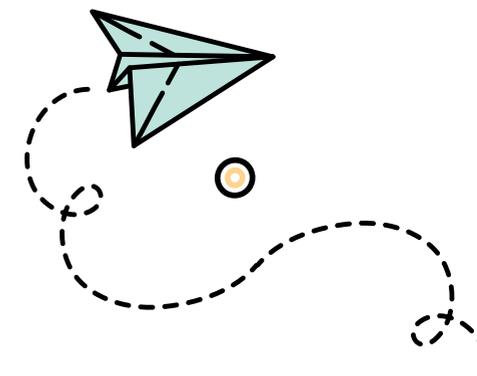
HOW TO BOOK

- 1 Select your activities**
 Browse our programme and shortlist all the events that interest you.
- 2 Complete the Request Form**
 Fill in the online form found on our website by Friday 2 February 2018 to request activities. Send your requests in as early as possible as we begin allocating places at the start of January. Please visit www.leeds.ac.uk/festivalofscience to find the request form.
- 3 Wait for allocations to be made**
 Allocations will be emailed to schools from 8 January 2018. You'll be provided with all the information you need for your Leeds Festival of Science booking!

GET IN TOUCH

Please contact us if you have any questions or would like to learn more about what's on offer during the Leeds Festival of Science!

-  **Leeds Festival of Science**
-  **@STEMatLeeds #LFoS18**
-  **festivalofscience@leeds.ac.uk**



PARTICLE ZOO

Learn all about the Big Bang, particles and the formation of the universe through our fun, interactive presentation.

Duration 1 hour
5 - 9 March AM or PM

Up to 30 pupils per school.
Suitable for years 5 & 6.

ROLLERCOASTERS!

Pupils will design and construct their own rollercoasters using Newton's Laws of Motion!

Duration 1 hour
5 - 9 March AM or PM

Up to 30 pupils per school.

FOSSIL HUNT!

Hunt fossils in the classroom with our expert palaeontologist! What did these creatures look like and where did they live?

Duration 1 hour
Tuesday 6 March PM
Monday 12 March PM
Thursday 15 March PM

Up to 30 pupils per school.
Leeds area only.
Suitable for years 3 to 6.

MY FOOD IS A RAINBOW

What gives food its colour and how does it affect the taste? What are superfoods and how are they good for us? Hear from food scientists and take part in some colourful experiments to get your taste buds going!

Duration 1 hour
Wednesday 7 March PM
Wednesday 14 March PM

Up to 35 pupils per school.
Can be run twice in the same school.
Leeds or Bradford only.

WHAT'S THE MATTER?

Explore the properties of solids and liquids and investigate some unusual materials that behave like both! Make slime and discover why it has such interesting characteristics.

Duration 1 hour
Thursday 15 March AM or PM

Up to 30 pupils per school.
Leeds or Bradford area only.



KS2 CAROUSELS

Carousel 1

SNAKES, SLUGS AND SPIDERS

Learn about different skeleton types by investigating these fascinating creatures.

MARBLE MAZES

Use your knowledge of forces and friction to build the ultimate marble maze.

Carousel 2

BEE IS FOR BIODIVERSITY

Learn about bees and biodiversity with our virtual hive, bee quizzes and games.

EARTH DETECTIVES

Explore how our Earth works, using clues from volcanoes and earthquakes.

Carousel 3

WHAT A GAS!

Visit our teaching labs to learn all about gases. Explore the properties and uses of carbon dioxide and make your own bath bombs!

WHAT'S IN MY KIWI?

Seeds? Juice? There's probably lots of stuff you've never seen before too. Can you collect the DNA from your kiwi?

Carousel 4

PARTICLE ZOO

Learn all about the Big Bang, particles and the formation of the universe through our fun, interactive presentation.

ROLLERCOASTERS

Pupils will design and construct their own rollercoasters using Newton's Laws of Motion!

Tuesday 13 March 9:45 - 11:45

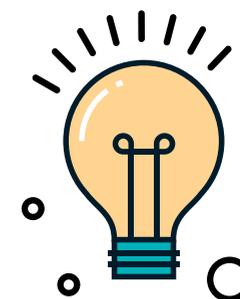
Up to 30 pupils per school.
Suitable for years 5 & 6.

DISCOVERY ZONE

A whistle-stop tour of interactive STEM activities, with at least 20 different stalls of hands-on science. Investigate the habitats of crayfish, find out about neurons, look at how your heart rate changes during exercise, and many other activities – all in one room! This is a fun, practical event for students and teachers alike. Early booking recommended!

Tuesday 27 March 9:45 - 11:45 or 13:00 - 15:00

Up to 30 pupils per school.



In the Museums

KS2 LIGHTS ON!

When Colonel Gascoigne installed electricity at Lotherton in 1903, he was one of the first people in the country to do so. Come and explore Lotherton Hall's original electric features, and learn why servants and ladies alike did not like the new technology. Learn to build circuits, and design your own electric features for the house.

5-27 March

Up to 35 pupils per school.

This one hour workshop consists of 30 minutes learning about the original electric features around the house and the history of domestic electricity, and 30 minutes of practical activities.

Venue: **Lotherton Hall**

£45 per workshop, plus **£1** per pupil site entry for non-Leeds LEA schools.

To book:

E: Emily.Nelson@leeds.gov.uk

T: **0113 37 82969**



KS2, KS3, KS4 WILDLIFE WORLD

We offer a range of hands-on educational workshops designed to bring the school curriculum to life. In all of our sessions your class will be introduced to bio-artefacts (skulls, eggs and skins) and live invertebrates which relate to the subject they are learning about.

The sessions ALL include:

45 minute classroom workshop

45 minute interactive walking tour including observing animals feeding.

Session length: 90 minutes.

5-27 March

Up to 35 pupils per school.

Venue: **Lotherton Hall**

£65 per workshop, plus **£1** per pupil site entry for non-Leeds LEA schools.

To book:

E: parkseducation@leeds.gov.uk

T: **0113 3367553**

KS2

Leeds Museums Discovery Centre is offering the following sessions:

COLOUR OF NATURE

How is colour used in nature? By looking at colourful museum collections we will explore colour used in attracting a partner and to warn others. We will also make a spectroscope to see the colours all around us.

FLIGHT OF THE IMPOSSIBLE

Nature gives us one solution, but was another provided by a Yorkshire man? Sir George Cayley designed the first flying machine. We will look practically at weird and wonderful designs for flight.

POWER OF WATER OR BALLOON RACERS

Rocket fuel or car fuel? Explore Newton's 3rd Law of motion in practical, fun and possibly messy activities.

SMART MATERIALS

What are they, what use are they, and are they really that clever? Looking at several smart materials and using practical activities to explore their properties and determine how we could use them.

WHO IS BRAINIER?

Looking at human evolution by measuring skull capacity of Neanderthal and human craniums.

Monday 12 March

Wednesday 14 March

Friday 16 March

Up to 35 pupils per school.

Each session is 2 hours long.

First come, first served.

Venue: **Leeds Museums Discovery Centre**

£65 per session

To book:

E: Andrew.kyrover@leeds.gov.uk

T: **0113 3782102**

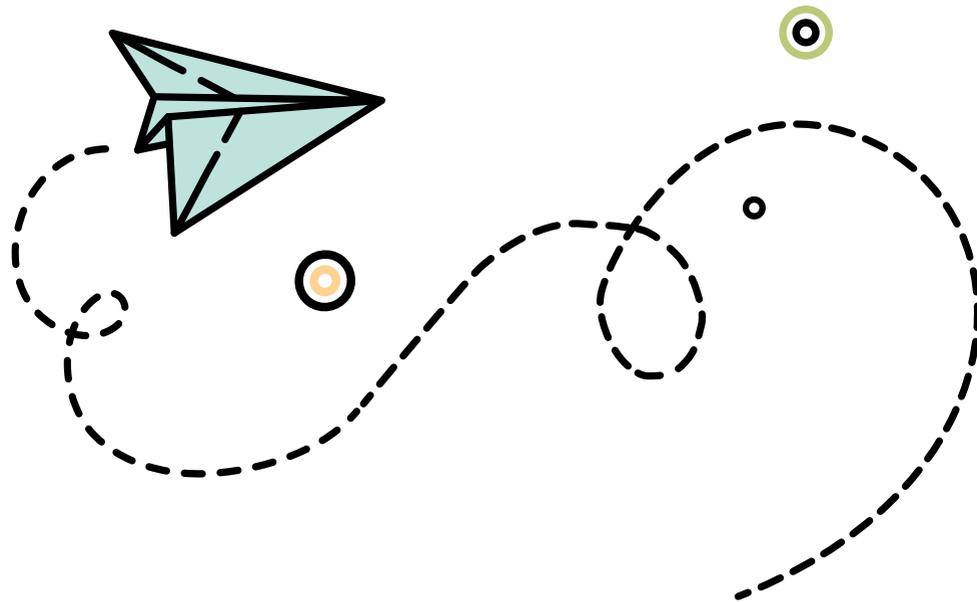


ORIGAMI ORGANELLES

The cell is a complicated structure but one that tells a story of how we go from DNA to walking, talking humans. This session looks at the key components of a mammalian cell – its ‘organelles’ – to show how one works. Students build origami structures of each of these organelles and come together to create whole cells from their results.

Duration 1 hour
5-16 March AM or PM

Up to 30 pupils per school.



STRATEGIES OF SIMPLE GAMES

There is a family of games called Nim and although their rules are simple, their strategy can be surprisingly subtle. We will play some games, discover some strategies, and also use mathematics to analyse these games.

Duration 1 hour
Mondays and Wednesdays 5-14 March AM or PM
Fridays 9-16 March PM

Up to 50 pupils per school.
Flexible timing, 1 to 2 hours.
West Yorkshire only.



VIRTUAL REALITY INSIDE OUR SCIENCE

Using our own smartphones, dive inside the world of science, taking a look at the technology behind, and the world created by, virtual reality. Pupils will use basic VR glasses to learn about the technology and then experience virtual reality videos. Topics are flexible but our most available session involves looking inside the human body and its cells – please ask for more details on topics.

Duration 1 hour
5-16 March AM or PM

Up to 30 pupils per school.



WHAT DO DOCTORS AND NURSES DO? AN INTRODUCTION TO HEALTH CAREERS

This session looks at the various professions within the National Health Service, inspiring pupils to think about the various skills and attributes required to be successful in these careers. Through various group activities, students will develop an understanding of the wide range of health careers available and the pathways into them.

Duration 1 hour
5 - 28 March AM or PM

Up to 30 pupils per school.
Can run multiple sessions in the same school.
Flexible timing, 45 minutes to 1 hour.



A PURER POUR: THE SCIENCE OF DRINKABLE WATER

How do you know if water put before you is drinkable? Practise your lab skills as you experiment with ways of cleaning up water and how to test if it is drinkable.

Duration 1 hour 30 minutes
Wednesday 7 March AM or PM
Thursday 15 March AM or PM

Up to 30 pupils per school.

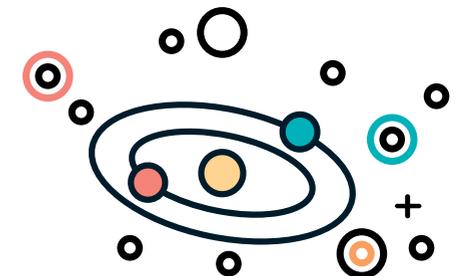


SUBATOMIC LEGO

Explore the Big Bang from quarks to protons and neutrons using LEGO in a fun, interactive workshop.

Duration 1 hour
12, 14 – 16 March AM or PM

Up to 30 pupils per school.



POP MATHS QUIZ

Pupils compete in teams of six in this pub quiz style maths competition. For more information visit www.stem.leeds.ac.uk/popmaths All schools welcome to apply (maximum of two teams per school).

Saturday 3 March 11:00 - 13:00

Up to 12 pupils per school.
Suitable for years 7 & 8.



POLE TO POLE: LIFE AT THE ENDS OF THE EARTH

This is a chance for students to meet polar scientists, ask them questions about living at the poles, dress up in both modern and early-explorer clothing, run experiments on climate change and sea level rise, and learn the difference between the Arctic and Antarctic by using large 3D jigsaw puzzles to piece together the continents and see what is underneath the ice.

Monday 19 March 10:00 - 12:00 or 13:00 - 15:00



HESCO ENGINEERING CHALLENGE

Groups of students will compete in two hands-on activities, both based on an internationally sold product made in Leeds. Reverse engineer the product and explore the features that help it to do its job, then set up a manufacturing line to produce replicas in as short a time as possible. The winning team will be awarded a small prize.

Monday 19 March 10:30 - 12:00

Friday 23 March 10:30 - 12:00

Wednesday 28 March 10:30 - 12:00

Up to 32 pupils per school.



THE GREAT LEEDS BUILD OFF

Pupils will work in teams in a race against the clock to recreate a 3D design using specific materials. This workshop will be a test of team work, communication and problem solving, as each member of the team has a different role, replicating the way the engineering industry works.

Monday 19 March 13:00 - 14:00

Friday 23 March 13:00 - 14:00

Wednesday 28 March 13:00 - 14:00

Up to 32 pupils per school.
Suitable for years 8, 9 & 10



HOW DO VOLCANOES WORK?

Investigate how a volcano works with practical experiments that use simple but spectacular model volcanic eruptions. Find out what factors control how a volcano behaves and what type of magma is erupted. Discover all this and more in our state-of-the-art Earth Visualisation Laboratory.

Tuesday 20 March 10:00 - 12:00 or 13:00 - 15:00

Wednesday 21 March 10:00 - 12:00 or 13:00 - 15:00

Up to 30 pupils per school.



PROOF OF THE PUDDING

Explore the challenges and chemistry of the M&S Melting Middle Chocolate Pudding! Find out more about how this iconic product was developed, learn about the chemistry of baking, develop your own pudding product ideas, make your own ice cream... and yes, there will be a pudding taste test!

Wednesday 21 March 10:00 - 12:00 or 13:00 - 15:00

Thursday 22 March 10:00 - 12:00 or 13:00 - 15:00

Tuesday 27 March 10:00 - 12:00 or 13:00 - 15:00

Up to 30 pupils per school.

This workshop involves tasting an M&S Melting Middle Chocolate Pudding. This product is not suitable for people with a nut allergy, an alternative will be provided. Please notify us at the point of booking if this will affect your group.



EVERYDAY CHEMISTRY

Experience life as a chemist with some hands-on practical activities. Then sit back and enjoy the show as we look at the chemistry in our shopping basket!

Thursday 22 March 10:00 - 13:00

Up to 35 pupils per school.



WEATHER AND WATER: DEMISTING THE SCIENCE OF OUR ATMOSPHERE

This interactive session will allow participants to investigate the many processes that make our weather. Come and get involved with hands-on demonstrations, including making a cloud in a bottle and amazing supercooled water.

Thursday 22 March 10:00 - 12:00 or 13:00 - 15:00
Friday 23 March 10:00 - 12:00 or 13:00 - 15:00

Up to 40 pupils per school.

Why not make a day of it? See 'The ups and downs of life in the freezer: A tale of two poles', on the right.

 **CHEMISTRY. GEOGRAPHY. PHYSICS**

ROBO RACERS

Participants will learn how to write computer code to allow them to control robot racing buggies. They will learn how to control the speed and direction of motors and read infra-red (IR) sensors. This will enable them to program the buggies to follow a line around a race track. The event will finish with a race with prizes for the team whose buggy completes a lap of the track in the fastest time.

Friday 23 March 10:00 - 14:00

Up to 12 pupils per school.
 Suitable for year 9.

 **ALL SCIENCES**

THE UPS AND DOWNS OF LIFE IN THE FREEZER: A TALE OF TWO POLES

Two scientists describe their adventures at Earth's extremities. Dr Ryan Neely went UP to the top of the Greenland Ice Sheet to fire lasers into the sky to study clouds, whilst Dr Anna Hogg travelled DOWN to western Antarctica and used a ground-penetrating radar to investigate one of the fastest glaciers in the world.

Friday 23 March 10:30 - 12:00 or 13:00 - 14:30

Why not make a day of it for KS3 & 4? See 'Weather and Water', to the left.

 **BIOLOGY. CHEMISTRY. GEOGRAPHY. PHYSICS**

DISCOVERY ZONE

A whistle-stop tour of interactive STEM activities, with at least 20 different stalls of hands-on science. Investigate the habitats of crayfish, find out about neurons, look at how your heart rate changes during exercise, and many other activities – all in one room! This is a fun, practical event for students and teachers alike. Early booking recommended!

Wednesday 28 March 9:45 - 11:45 or 13:00 - 15:00

Up to 30 pupils per school.

 **BIOLOGY. CHEMISTRY**

HOW DO WE USE DNA?

DNA is the fascinating basis for all life, and yet there is a lot we don't know about it, despite great advances in technology in the last few decades. Gel electrophoresis is used by scientists the world over to investigate DNA - learn about how and why we use this technology in this hands-on session.

Duration 1 hour
5 - 16 March AM or PM

Up to 30 pupils per school. West Yorkshire only. Multiple sessions in the same school may be possible.

 **BIOLOGY**

VIRTUAL REALITY INSIDE OUR SCIENCE

Using our own smartphones, dive inside the world of science, taking a look at the technology behind, and the world created by, virtual reality. Pupils will use basic VR glasses to learn about the technology and then experience virtual reality videos. Topics are flexible but our most available session involves looking inside the human body and its cells – please ask for more details on topics.

Duration 1 hour
5 - 16 March AM or PM

Up to 30 pupils per school.

 **BIOLOGY**

A PURER POUR: THE SCIENCE OF DRINKABLE WATER

How do you know if water put before you is drinkable? Practise your lab skills as you experiment with ways of cleaning up water and how to test if it is drinkable.

Duration 1 hour 30 minutes
Wednesday 7 March AM or PM
Thursday 15 March AM or PM

Up to 30 pupils per school.

 **CHEMISTRY**

LEEDS LOVES STEM

Our student ambassadors will give a presentation and answer questions about their degree subject, career paths and their experiences of studying at the University of Leeds.

These talks are a chance for your pupils to find out more about specific STEM subjects and opportunities in higher education. They allow pupils to explore some of the options available for further study and would be ideal for pupils making decisions about which subjects to study at a higher level.

Duration 1 hour
Wednesdays 7 - 28 March AM or PM

 **ALL SCIENCES**

SPECTROSCOPY IN A SUITCASE

Explore the analytical technique of UV-Vis spectroscopy using visible light to investigate different concentrations of a drug in solution. In this hands-on session pupils will use this technique to work out if a crime has been committed.

Duration 1 hour
Thursday 8 March AM or PM
Tuesday 13 March AM or PM

Up to 20 pupils per school.
 Leeds or Bradford only.
 Could be run twice in same school if required.

CHEMISTRY. PHYSICS

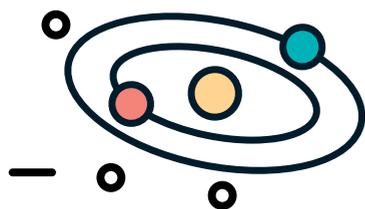
SUBATOMIC LEGO

Explore the Big Bang from quarks to protons and neutrons using LEGO in a fun, interactive workshop.

Duration 1 hour
12, 14 - 16 March AM or PM

Up to 30 pupils per school.

PHYSICS



DESIGNING A MEDICINE

Help our researchers on their quest to develop anti-cancer medicines, using mass spectrometry data. We can extend the workshop to 2 hours to include computer modelling if required.

Duration 1 hour
Wednesday 14 March PM
Monday 19 March AM or PM

Up to 30 pupils per school.

CHEMISTRY

WHO WANTS TO BE A MARINE SCIENTIST? LIFE ON THE HIGH SEAS

Marine Scientist Clare Woulds spent several months conducting research at sea, in locations ranging from the tropical Indian Ocean to sites off the Antarctic Peninsula. She will give a talk about marine science at sea, illustrated with her photographs, followed by a question and answer session.

Duration 1 hour
Tuesday 20 March AM or PM
Wednesday 21 March AM or PM

Up to 60 pupils per school.
 West Yorkshire only.

BIOLOGY. CHEMISTRY. PHYSICS

CRYPTIC CHALLENGE

Work in teams to crack the codes and discover how maths is right at the heart of cryptography.

Wednesday 14 March 10:00 - 12:00 or 13:00 - 15:00

Up to 32 pupils per school.

MATHEMATICS

YEAR 10/11 BIOLOGICAL SCIENCES DAY

Students are invited onto campus for a day of practical Biological Sciences, getting hands-on with sophisticated DNA technology, researching camouflage in evolution, or learning about dimorphism in flowers. Expect to come away with advanced knowledge in two of these areas!

Monday 19 March 10:00 - 15:30

Up to 30 pupils per school.

BIOLOGY

THE GREAT LEEDS BUILD OFF

Pupils will work in teams in a race against the clock to recreate a 3D design using specific materials. This workshop will be a test of team work, communication and problem solving, as each member of the team has a different role, replicating the way the engineering industry works.

Monday 19 March 13:00 - 14:00
Friday 23 March 13:00 - 14:00
Wednesday 28 March 13:00 - 14:00

Up to 32 pupils per school.
 Suitable for years 8, 9 & 10

DESIGN & TECH. PHYSICS. ENGINEERING

FOOD SCIENCE TASTER DAY

Get hands-on in our food science laboratories to find out how science plays a crucial role in our understanding of food and nutrition. Speak to food scientists, attend a taster lecture, have a go at spectroscopy and test your taste buds in our sensory booths!

Tuesday 20 March 9:45 - 14:00

This is for individual students or accompanied groups of up to 6 per school.

Interested students should apply online at www.stem.leeds.ac.uk/foodscience/tasterday

BIOLOGY. CHEMISTRY. PHYSICS

PROOF OF THE PUDDING

Explore the challenges and chemistry of the M&S Melting Middle Chocolate Pudding! Find out more about how this iconic product was developed, learn about the chemistry of baking, develop your own pudding product ideas, make your own ice cream... and yes, there will be a pudding taste test!

Wednesday 21 March 10:00 - 12:00 or 13:00 - 15:00
Thursday 22 March 10:00 - 12:00 or 13:00 - 15:00
Tuesday 27 March 10:00 - 12:00 or 13:00 - 15:00

Up to 30 pupils per school.

This workshop involves tasting an M&S Melting Middle Chocolate Pudding. This product is not suitable for people with a nut allergy, an alternative will be provided. Please notify us at the point of booking if this will affect your group.

CHEMISTRY. DESIGN & TECH

*Check out
the Museum
workshops for
KS2, KS3, KS4
on page 6*

WEATHER AND WATER: DEMISTING THE SCIENCE OF OUR ATMOSPHERE

This interactive session will allow participants to investigate the many processes that make our weather. Come and get involved with hands-on demonstrations, including making a cloud in a bottle and amazing supercooled water.

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Up to 40 pupils per school.
 Why not make a day of it? See 'The ups and downs of life in the freezer: A tale of two poles' below.

CHEMISTRY. GEOGRAPHY. PHYSICS

THE UPS AND DOWNS OF LIFE IN THE FREEZER: A TALE OF TWO POLES

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Friday 23 March 10:30 - 12:00 or 13:00 - 14:30

Why not make a day of it for KS3 & 4? See 'Weather and Water' above.

**BIOLOGY. CHEMISTRY.
GEOGRAPHY. PHYSICS**

HOW DO WE USE DNA?

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Duration 1 hour
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ALL SCIENCES

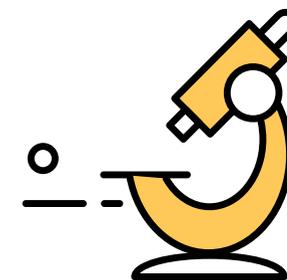
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Duration 1 hour
Thursday 8 March AM or PM
Tuesday 13 March AM or PM

Up to 20 pupils per school.
 Leeds or Bradford only.
 Could be run twice in same school if required.

CHEMISTRY. PHYSICS



LEGO PARTICLE PHYSICS

Particle physics can be a bit tricky... Using LEGO, it's easy to see how quarks form so many different particles.

Duration 1 hour
12, 14 - 16 March AM or PM

Up to 30 pupils per school.

PHYSICS

PLAYING DICE WITH EPIDEMICS

During this session, we will explain how probability theory and random processes can be used in order to mathematically and computationally simulate epidemics in real life. This can help to assess the efficacy of control strategies for avoiding the spread of a given disease among individuals in a population.

We will make use of an original series of video games, "Hospital Infections", in which we simulate the spread of an infectious disease within patients in a hospital ward.

Duration 1 hour
13 - 16 March AM or PM

Up to 30 pupils per school.
Ideally students would have access to computers/ tablets to fully engage in activities.

MATHEMATICS

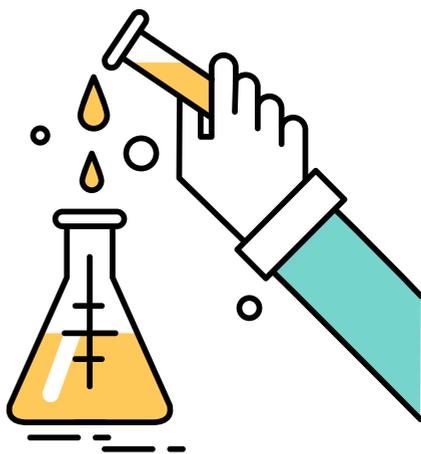
DESIGNING A MEDICINE

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Duration 1 hour
Wednesday 14 March PM
Monday 19 March AM or PM

Up to 30 pupils per school.

CHEMISTRY



PSYCHOLOGY TASTER DAY

This event gives students a taste of what it's like to study Psychology at the University of Leeds. Led by current students and academic staff, students will get the opportunity to sample mini-lectures and workshops, showcasing elements of the undergraduate course and research taking place at Leeds.

Wednesday 7 March 10:00 - 16:00

Suitable for year 12.
This is for individual students or accompanied groups of up to 20 pupils per school.
Bookings open in January 2018. For eligibility criteria and booking details, please visit www.healthsciences.leeds.ac.uk/events/psychology-taster-day-2

ALL SCIENCES

YEAR 12 BIOLOGICAL SCIENCES DAY

Students are invited onto campus for a day of practical Biological Sciences, getting hands-on with sophisticated DNA technology and spectrophotometry to diagnose patients, and researching how drugs can be detected in sport. There will also be the chance to pose questions to experts in the field. Expect to come away with undergraduate-level experience in the area!

Monday 19 March 10:30 - 15:30

Up to 30 pupils per school.

BIOLOGY

FOOD SCIENCE TASTER DAY

Get hands-on in our food science laboratories to find out how science plays a crucial role in our understanding of food and nutrition. Speak to food scientists, attend a taster lecture, have a go at spectroscopy and test your taste buds in our sensory booths!

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Thursday 22 March 10:00 - 12:00 or 13:00 - 15:00
Tuesday 27 March 10:00 - 12:00 or 13:00 - 15:00

Up to 30 pupils per school.
Please notify us of participants with nut allergies at time of booking.

CHEMISTRY. DESIGN & TECH

YEAR 12 PHYSICS TASTER DAY

Join us as an undergraduate student for the day! You'll attend a lecture, solve challenging problems during a workshop and complete an undergraduate-level lab session.

This is a great opportunity for A level students studying both Maths and Physics to experience university life and see what it's like to study in higher education.

Wednesday 21 March 10:00 - 14:00

Interested students should apply online at www.stem.leeds.ac.uk/physics/tasterdays

PHYSICS. MATHEMATICS

KEY STAGE 5 MATHS DAY

Choose one of the 3 options below and then attend our W. P. Milne Sixth Form lecture (see page 21). Suitable for maths A Level students.

OPTION A HANDS-ON MATHEMATICS, TALKS AND TOUR

Activities include creating chaos and exploring the maths of soap bubbles in a 'hands-on mathematics' session, campus tours, and talks about studying mathematics at Leeds.

Wednesday 21 March 11:00 - 14:20

This event is in collaboration with the Yorkshire Branch of the Mathematical Association.

OPTION B UNTANGLING KNOT THEORY

It's not only mountaineers, scouts, and sailors who study knots, but also mathematicians. In fact, knot theory has turned out to be an extraordinarily deep subject – the fundamental question of determining whether two knots are the same turns out to be surprisingly difficult. This subject also has numerous and diverse applications, from the knotting of our own DNA to quantum physics. In this session we will meet several mathematical techniques for analysing and classifying different knots.

Wednesday 21 March 10:30 - 12:30

Followed by an optional talk about studying maths at university or campus tour.

OPTION C MATHS AND MAGIC

It is possible to shuffle a pack of cards so that the cards from two halves are perfectly alternated. While this shuffle looks perfectly fair, it is almost as unfair as you can get! The shuffler can work out the destination of each card and, with a bit of thought, can deal winning hands of cards effortlessly. The possibilities of using this in card magic or to cheat are immense! In this talk we will look at this "perfect" shuffle and the interesting mathematics behind it. (Involves audience participation.)

Wednesday 21 March 12:00 - 13:00

ARE LARGE DATABASES GOOD FOR YOUR HEALTH?

(W P MILNE LECTURE FOR SIXTH FORMERS)

The big increase in computing power over recent years has made it possible to routinely record large volumes of information about our daily lives (and especially our health). Statistics is the essential tool for making sense of the huge quantities of data available. There are many exciting challenges – often the data that are missing or poorly recorded are at least as informative as the data that are present. The real strength of such databases comes when they are linked together to see the bigger picture, but how do we do this, and should we worry that our privacy is being invaded? In this talk we look at these issues through examples ranging from goals in world cup football to survival following a heart attack.

Wednesday 21 March 14:30 - 15:30

This event is held in collaboration with the Yorkshire Branch of the Mathematical Association and can be booked independently of the options above.

MATHEMATICS

AUDIOLOGY, CARDIAC PHYSIOLOGY AND DIAGNOSTIC RADIOGRAPHY TASTER DAY

Have your students ever considered the physics and maths involved in producing an x-ray? How about the chemistry involved in blood clotting and cardiac arrest? This event showcases the practical science elements of the Audiology, Cardiac Physiology and Diagnostic Radiography courses here at Leeds. Led by academic colleagues, students will have the opportunity to take part in taster workshops and lectures in these three course areas, as well as ask questions of our admissions tutors.

Thursday 22 March 10:00 - 16:00

Suitable for year 12. Individuals only. Bookings open in January 2018. For eligibility criteria and booking details, please visit www.healthsciences.leeds.ac.uk/events/audiology-cardiac-physiology-and-diagnostic-radiography-taster-day-2/

BIOLOGY. CHEMISTRY. MATHEMATICS. PHYSICS



BRINGING THE OUTSIDE IN: GEOLOGICAL MAPPING IN VIRTUAL LANDSCAPES

White, fluffy clouds sail across the blue, sunlit sky. Birds sing, sheep graze, seagulls bounce off the beach(!) and flies buzz around the dead sheep. Explore a virtual landscape, discover rock outcrops and create your own geological map.

Thursday 22 March 13:00 - 15:00

Suitable for all, but particularly relevant to Geology and Geography A level students.

COMPUTING. DESIGN & TECH. GEOGRAPHY. GEOLOGY

THE UPS AND DOWNS OF LIFE IN THE FREEZER: A TALE OF TWO POLES

Two scientists describe their adventures at Earth's extremities. Dr Ryan Neely went UP to the top of the Greenland Ice Sheet to fire lasers into the sky to study clouds, whilst Dr Anna Hogg travelled DOWN to western Antarctica and used a ground-penetrating radar to investigate one of the fastest glaciers in the world.

Friday 23 March 10:30 - 12:00 or 13:00 - 14:30

BIOLOGY. CHEMISTRY. GEOGRAPHY. PHYSICS

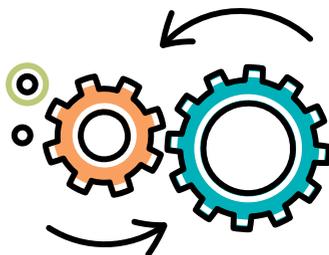
NURSING, MIDWIFERY AND SOCIAL WORK TASTER DAY

This event brings to life elements of the Nursing, Midwifery and Social Work programmes at the University of Leeds. Students will have the opportunity to meet our academics in subject taster sessions, speak to our current students and have a tour of our campus and clinical skills facilities. Finally, they'll hear from our admissions staff, who will explain the application process and more about the benefits of studying at the University of Leeds.

Friday 23 March 9:30 - 15:30

Suitable for year 12. This is for individual students or accompanied groups of up to 20 pupils per school. Bookings open in January 2018. For eligibility criteria and booking details, please visit www.healthsciences.leeds.ac.uk/events/nursing-midwifery-and-social-work-taster-day

ALL SCIENCES



EXPERIMENT IN A BOX

This session is aimed primarily at KS2 teachers (KS1 and 3 are also welcome!) Come and find out more about the Experiment in a Box project, launched by the University of Leeds in 2017 and funded by the Royal Society of Chemistry. Try your hand at some of the experiments and gather ideas for new ones to take back to the classroom. We hope you enjoy it as much as the children!

Free of charge but places must be booked in advance. Visit www.stem.leeds.ac.uk/eib for more information.

Refreshments provided.

Wednesday 7 March 16:00 - 17:45

ALL SCIENCES



ENRICHING THE TEACHING OF A LEVEL MATHEMATICS

A STUDY DAY FOR TEACHERS

A day of study workshops to help teach KS5 mathematics. Includes lunch.

TEACHING MECHANICS: ASSUMPTIONS, MISCONCEPTIONS AND NEWTON'S LAWS

This workshop will cover basic assumptions, misconceptions and Newton's Laws in the teaching of mechanics. There will be many activities used that can be taken very easily directly into the classroom.

USING RICH TASKS FOR TEACHING A LEVEL MATHEMATICS

We will work together on some rich tasks offered by Underground Mathematics and consider the different ways in which the resources could be used to develop students' mathematical thinking. We will also discuss how classroom video clips can be used for teacher professional development.

Saturday 10 March 11:00 - 15:00

The day is run in conjunction with the Yorkshire Branch of the Mathematical Association. For more details and to register for the study day please e-mail [Alan \(A.Slomson@leeds.ac.uk\)](mailto:Alan.A.Slomson@leeds.ac.uk). **Registration fee £10** (includes lunch).

MATHEMATICS

ROCKS AND FOSSILS: EARTH SCIENCES FOR PRIMARY SCHOOL TEACHERS

Dinosaurs and volcanoes are popular subjects among children of primary school age, and are a good introduction to broader science topics. If you are a primary school teacher with no previous experience of earth sciences, this will give you the opportunity to learn about this fascinating subject, and to incorporate it into your teaching.

Thursday 15 March 15:30 - 18:30



ARE LARGE DATABASES GOOD FOR YOUR HEALTH?

(W P MILNE LECTURE FOR SIXTH FORMERS)

The big increase in computing power over recent years has made it possible to routinely record large volumes of information about our daily lives (and especially our health). Statistics is the essential tool for making sense of the huge quantities of data available. There are many exciting challenges – often the data that are missing or poorly recorded are at least as informative as the data that are present. The real strength of such databases comes when they are linked together to see the bigger picture, but how do we do this, and should we worry that our privacy is being invaded? In this talk we look at these issues through examples ranging from goals in world cup football to survival following a heart attack.

Wednesday 21 March 14:30 - 15:30

This event is held in collaboration with the Yorkshire Branch of the Mathematical Association.



ROADSHOW PROGRAMME OVERVIEW

Audience	Time	Activity	Page
MONDAY 5 MARCH 2018			
KS4/KS5	AM or PM	How do we use DNA?	13,17
KS3	AM or PM	Origami organelles	8
KS2	AM or PM	Particle Zoo	4
KS2	AM or PM	Rollercoasters!	4
KS3	AM or PM	Strategies of simple games	8
KS3/KS4	AM or PM	Virtual reality inside our science	9,13
KS3	AM or PM	What do doctors and nurses do? An introduction to health careers	9
TUESDAY 6 MARCH 2018			
KS2	PM	Fossil hunt!	4
KS4/KS5	AM or PM	How do we use DNA?	13,17
KS3	AM or PM	Origami organelles	8
KS2	AM or PM	Particle Zoo	4
KS2	AM or PM	Rollercoasters!	4
KS3/KS4	AM or PM	Virtual reality inside our science	9,13
KS3	AM or PM	What do doctors and nurses do? An introduction to health careers	9
WEDNESDAY 7 MARCH 2018			
KS3/KS4	AM or PM	A purer pour: the science of drinkable water	9,13
KS4/KS5	AM or PM	How do we use DNA?	13,17
KS4/KS5	AM or PM	Leeds loves STEM	13,17
KS2	PM	My food is a rainbow	4
KS3	AM or PM	Origami organelles	8
KS2	AM or PM	Particle Zoo	4
KS2	AM or PM	Rollercoasters!	4
KS3	AM or PM	Strategies of simple games	8
KS3/KS4	AM or PM	Virtual reality inside our science	9,13
KS3	AM or PM	What do doctors and nurses do? An introduction to health careers	9
THURSDAY 8 MARCH 2018			
KS4/KS5	AM or PM	How do we use DNA?	13,17
KS3	AM or PM	Origami organelles	8
KS2	AM or PM	Particle Zoo	4
KS2	AM or PM	Rollercoasters!	4
KS4/KS5	AM or PM	Spectroscopy in a suitcase	14,17
KS3/KS4	AM or PM	Virtual reality inside our science	9,13
KS3	AM or PM	What do doctors and nurses do? An introduction to health careers	9

ROADSHOW PROGRAMME OVERVIEW

Audience	Time	Activity	Page
FRIDAY 9 MARCH 2018			
KS4/KS5	AM or PM	How do we use DNA?	13,17
KS3	AM or PM	Origami organelles	8
KS2	AM or PM	Particle Zoo	4
KS2	AM or PM	Rollercoasters!	4
KS3	PM	Strategies of simple games	8
KS3/KS4	AM or PM	Virtual reality inside our science	9,13
KS3	AM or PM	What do doctors and nurses do? An introduction to health careers	9
MONDAY 12 MARCH 2018			
KS2	PM	Fossil hunt!	4
KS4/KS5	AM or PM	How do we use DNA?	13,17
KS5	AM or PM	LEGO particle physics	18
KS3	AM or PM	Origami organelles	8
KS3	AM or PM	Strategies of simple games	8
KS3/KS4	AM or PM	Subatomic LEGO	9,14
KS3/KS4	AM or PM	Virtual reality inside our science	9,13
KS3	AM or PM	What do doctors and nurses do? An introduction to health careers	9
TUESDAY 13 MARCH 2018			
KS4/KS5	AM or PM	How do we use DNA?	13,17
KS3	AM or PM	Origami organelles	8
KS5	AM or PM	Playing dice with epidemics	18
KS4/KS5	AM or PM	Spectroscopy in a suitcase	14,17
KS3/KS4	AM or PM	Virtual reality inside our science	9,13
KS3	AM or PM	What do doctors and nurses do? An introduction to health careers	9
WEDNESDAY 14 MARCH 2018			
KS4/KS5	PM	Designing a medicine	14,18
KS4/KS5	AM or PM	How do we use DNA?	13,17
KS4/KS5	AM or PM	Leeds Loves STEM	13,17
KS5	AM or PM	LEGO particle physics	18
KS2	PM	My food is a rainbow	4
KS3	AM or PM	Origami organelles	8
KS5	AM or PM	Playing dice with epidemics	18
KS3	AM or PM	Strategies of simple games	8
KS3/KS4	AM or PM	Subatomic LEGO	9,14
KS3/KS4	AM or PM	Virtual reality inside our science	9,13
KS3	AM or PM	What do doctors and nurses do? An introduction to health careers	9

ROADSHOW PROGRAMME OVERVIEW

AUDIENCE	TIME	ACTIVITY	PAGE
THURSDAY 15 MARCH 2018			
KS3/KS4	AM or PM	A purer pour: the science of drinkable water	9,13
KS2	PM	Fossil hunt!	4
KS4/KS5	AM or PM	How do we use DNA?	13,17
KS5	AM or PM	LEGO particle physics	18
KS3	AM or PM	Origami organelles	8
KS5	AM or PM	Playing dice with epidemics	18
KS3/KS4	AM or PM	Subatomic LEGO	9,14
KS3/KS4	AM or PM	Virtual reality inside our science	9,13
KS3	AM or PM	What do doctors and nurses do? An introduction to health careers	9
KS2	AM or PM	What's the matter?	4
FRIDAY 16 MARCH 2018			
KS4/KS5	AM or PM	How do we use DNA?	13,17
KS5	AM or PM	LEGO particle physics	18
KS3	AM or PM	Origami organelles	8
KS5	AM or PM	Playing dice with epidemics	18
KS3	PM	Strategies of simple games	8
KS3/KS4	AM or PM	Subatomic LEGO	9,14
KS3/KS4	AM or PM	Virtual reality inside our science	9,13
KS3	AM or PM	What do doctors and nurses do? An introduction to health careers	9
MONDAY 19 MARCH 2018			
KS4/KS5	AM or PM	Designing a medicine	14,18
KS3	AM or PM	What do doctors and nurses do? An introduction to health careers	9
TUESDAY 20 MARCH 2018			
KS3	AM or PM	What do doctors and nurses do? An introduction to health careers	9
KS4	AM or PM	Who wants to be a marine scientist? Life on the high seas	14
WEDNESDAY 21 MARCH 2018			
KS4/KS5	AM or PM	Leeds Loves STEM	13,17
KS3	AM or PM	What do doctors and nurses do? An introduction to health careers	9
KS4	AM or PM	Who wants to be a marine scientist? Life on the high seas	14
WEDNESDAY 28 MARCH 2018			
KS4/KS5	AM or PM	Leeds Loves STEM	13,17
KS3	AM or PM	What do doctors and nurses do? An introduction to health careers	9

CAMPUS PROGRAMME OVERVIEW

AUDIENCE	TIME	ACTIVITY	PAGE
SATURDAY 3 MARCH 2018			
KS3	11:00 - 13:00	Pop maths quiz	10
WEDNESDAY 7 MARCH 2018			
KS5	10:00 - 16:00	Psychology taster day	19
Teachers	16:00 - 17:45	Experiment in a box	23
SATURDAY 10 MARCH 2018			
Teachers	11:00 - 15:00	Enriching the teaching of A level mathematics: A study day for teachers	23
TUESDAY 13 MARCH 2018			
KS2	9:45 - 11:45	KS2 carousels	5
WEDNESDAY 14 MARCH 2018			
KS4	10:00 - 12:00 or 13:00 - 15:00	Cryptic challenge	15
THURSDAY 15 MARCH 2018			
Teachers	15:30 - 18:30	Rocks and fossils: Earth sciences for primary school teachers	24
MONDAY 19 MARCH 2018			
KS3	10:00 - 12:00 or 13:00 - 15:00	Pole to pole: Life at the ends of the Earth	10
KS4	10:00 - 15:30	Year 10/11 biological sciences day	15
KS3	10:30 - 12:00	HESCO Engineering Challenge	10
KS5	10:30 - 15:30	Year 12 biological sciences day	19
KS3/KS4	13:00 - 14:00	The Great Leeds Build Off	10,15
TUESDAY 20 MARCH 2018			
KS3	10:00 - 12:00 or 13:00 - 15:00	How do volcanoes work?	11
KS4/KS5	9:45 - 14:00	Food science taster day	15,19
WEDNESDAY 21 MARCH 2018			
KS3	10:00 - 12:00 or 13:00 - 15:00	How do volcanoes work?	11
KS3/KS4/ KS5	10:00 - 12:00 or 13:00 - 15:00	Proof of the pudding	11,16,19
KS5	10:00 - 14:00	Year 12 physics taster day	20
KS5	10:30 - 12:30	Untangling knot theory	20
KS5	11:00 - 14:20	Hands-on mathematics, talks and tour	20
KS5	12:00 - 13:00	Maths and magic	20
KS5	14:30 - 15:30	Are large databases good for your health? (W P Milne Lecture for sixth formers)	21,24

CAMPUS PROGRAMME OVERVIEW

AUDIENCE	TIME	ACTIVITY	PAGE
THURSDAY 22 MARCH 2018			
KS3/KS4	10:00 - 12:00 or 13:00 - 15:00	Weather and water: Demisting the science of our atmosphere	12,16
KS3/KS4/ KS5	10:00 - 12:00 or 13:00 - 15:00	Proof of the pudding	11,16,19
KS3	10:00 - 13:00	Everyday chemistry	11
KS5	10:00 - 16:00	Audiology, cardiac physiology and diagnostic radiography taster day	21
KS5	13:00 - 15:00	Bringing the outside in: Geological mapping in virtual landscapes	22
FRIDAY 23 MARCH 2018			
KS5	9:30 - 15:30	Nursing, midwifery and social work taster day	22
KS3	10:00 - 14:00	Robo racers	12
KS3/KS4	10:00 - 12:00 or 13:00 - 15:00	Weather and water: Demisting the science of our atmosphere	12,16
KS3	10:30 - 12:00	HESCO Engineering Challenge	10
KS3/KS4/ KS5	10:30 - 12:00 or 13:00 - 14:30	The ups and downs of life in the freezer: A tale of two poles	12,16,22
KS3/KS4	13:00 - 14:00	The Great Leeds Build Off	10,15
TUESDAY 27 MARCH 2018			
KS3/KS4/ KS5	10:00 - 12:00 or 13:00 - 15:00	Proof of the pudding	11,16,19
KS2	09:45 - 11:45 or 13:00 - 15:00	Discovery Zone	5
WEDNESDAY 28 MARCH 2018			
KS3	09:45 - 11:45 or 13:00 - 15:00	Discovery Zone	12
KS3	10:30 - 12:00	HESCO Engineering Challenge	10
KS3/KS4	13:00 - 14:00	The Great Leeds Build Off	10,15

MUSEUMS

Audience	Venue	Activity	Page
12, 14, 16 MARCH			
KS2	Discovery Centre	Colour of nature	7
12, 14, 16 MARCH			
KS2	Discovery Centre	Flight of the impossible	7
5 - 27 MARCH			
KS2	Lotherton Hall	Lights on!	6
12, 14, 16 MARCH			
KS2	Discovery Centre	Power of water or balloon racers	7
12, 14, 16 MARCH			
KS2	Discovery Centre	Smart materials	7
12, 14, 16 MARCH			
KS2	Discovery Centre	Who is brainier	7
5 - 27 MARCH			
KS2/KS3/KS4	Lotherton Hall	Wildlife world	6

Summer Schools

Join us at the University of Leeds to discover what it's like to study STEM at university!



Bioscience

26 - 27 JUNE

Y12

 1 night



Food Science

27 to 29 JUNE

Y12

 2 nights



Mathematics

27 to 29 JUNE

Y12

 2 nights



Physics

10 to 12 JULY

Y11

 2 nights

Visit www.stem.leeds.ac.uk/summerschools to learn more!

Alternative Formats

If you require any of the information contained in this guide in an alternative format, e.g. braille, large print or audio, please contact festivalofscience@leeds.ac.uk.

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