Workshop and Curriculum Map for

Lifelab™

Key Stage 3, Key Stage 4 and Post-16

Lifelab is a purpose-built suite of teaching laboratories where we offer over 40 different curriculum-linked workshops.

We offer workshops to school and educational groups which are linked to the National Curriculum and QCA schemes of work.

Lifelab Workshop/Curriculum Map

The matrix below shows the workshops we currently offer for Key Stage 3 and 4 and Post-16.

Workshops	KS3	KS4	16+
Animal Adaptation	✓	(✓)	x
Bacteria Investigation	✓	x	x
Boomerang Maths	x	✓	✓
Changes of State & Gases Around Us	(✓)	x	x
Chemical Change & Colour	✓	x	x
Chromosomes & Counselling	x	✓	✓
Chromosomes & DNA	(✓)	✓	(✓)
Codebreaker: World War Two	✓	x	x
Colour & Light	✓	x	x
Dark Matter: What's the Evidence?	x	x	✓
Darwin - Only a Theory?	x	✓	(✓)
Darwin's Worms	✓	(✓)	(✓)
DNA & Species	(✓)	✓	✓
DNA Discovery	✓	✓	(✓)
DNA Fingerprinting	x	x	✓
Drugs & Sport	✓	✓	✓
Fantastic Fossils	✓	(✓)	x
Forces & Motion in Space	✓	x	x
Forensic DNA	(✓)	✓	✓
Forensic Investigation	✓	(✓)	x
Gas!	✓	x	x
Genes in a Bottle	(✓)	✓	✓
Genetic Engineering	x	✓	✓
Greenhouse Gas Investigation	(✓)	✓	✓
Hair!	x	✓	✓
Hair Colour	x	✓	✓
How Do We Know That the Earth is Rotating?	✓	x	x
How Old Is the Universe?	x	✓	✓
Introduction to Microbiology	x	(✓)	✓
Jumping Bugs Investigation	✓	x	x
Karyotyping & Genetic Counselling	x	x	✓
Lip Balm to Hand Cream: Chemical Engineering	✓	✓	✓
Malaria, Sickle Cell Anaemia & Natural Selection	x	✓	✓
Mediaeval Armour	✓	x	x
Micro-organisms	✓	x	x

Continued overleaf

Version: 28/06/2011

Workshops continued	KS3	KS4	16+
Nits and Scalp Disorders	✓	✓	✓
Organic Food Investigation	x	✓	✓
PCR: A Question of Taste	x	x	✓
Planetarium – Stars through the Seasons	✓	✓	✓
Plastics & Recycling	✓	x	x
Psychology of Face Recognition	x	✓	✓
Reversible & Irreversible Changes	✓	x	x
Rubbish Rockets	✓	(✓)	x
Science of Cookery	x	✓	✓
Skin!	x	✓	✓
Sound Matters!	✓	x	x
Sound of Science	✓	(✓)	x
Speed, Weight & Rocketry	✓	x	x
Sting Neutralisation Investigation	✓	(✓)	x
Stuarts: Microscopia	✓	x	x
The Story of DNA	✓	✓	✓
Tudor Medicine	✓	x	x
Vaccination: Jenner & Smallpox	✓	✓	x

KEY: ✓ = suitable, x = unsuitable

Workshops

Animal Adaptation (1 hour)
Investigate the ways that that marine animals keep warm in icy water, how elephants keep cool when it is hot and how animals avoid their predators using camouflage. For older groups, this will include discussion of the ways that heat is transferred.

- Suitable for KS3

Bacteria Investigation (1 hour)
Galloping food poisoning! Can you identify the cause and work out the right antibiotic to treat it? Go beyond simple plates in this exciting bacteriological investigation.

- Suitable for KS3

Boomerang Maths (1 hour)
The solutions to some problems require more than a pencil, paper and knowledge of algebra. Boomerangs are a case in point and students have fun collecting data to achieve empirical solutions to problems that are still puzzling research mathematicians.

- Suitable for capable KS4 and post-16

Changes of State & Gases Around Us (1 hour)
How are gases different to solids and liquids and what different properties do they have? Discover some of the world's smelliest gases and explore density, colour and changes of state through hands-on activities and demonstrations.

- Suitable for lower KS3

Chemical Change & Colour (1 hour)
Starting from a clear colourless liquid, students carry out a sequence of reactions which result in a wide variety of colour changes and other exciting (but safe) reactions. Students make their own indicator then use this to test a variety of household chemicals to discover if they are acids or alkalis.

- Suitable for Lower KS3

Chromosomes & Counselling (1¼ hours)
Find out how we can see chromosomes, discover how they control gender and find out about the effect of some common chromosome anomalies. Hands-on activities lead into a structured ethical discussion.

- Suitable for KS4 and post-16

Chromosomes & DNA (1 hour)
What are chromosomes? What is DNA? Where do we find them and how can we see them? Students extract DNA from kiwi fruit and examine garlic chromosomes.

- Suitable for KS4, bright KS3 and as an introduction to genetics at higher levels

Codebreaker: World War Two (1 hour)
How did the Enigma machine work and what was the importance of Bletchley Park? Learn how to create and crack codes and attempt to solve a wartime ethical dilemma in a structured dialogue activity.

- Suitable for KS3

Colour & Light (1 hour)

Why are there only seven colours in the rainbow? Why do we only need three primary colours? What happens when we look at familiar objects under coloured light? A series of hands-activities to explore the KS3 light curriculum in a fun way.

- Suitable for KS3

Dark Matter – What's the Evidence? (1 hour)

Over 90% of the mass of our universe is in the form of unseen Dark Matter. Determining its nature would solve of the biggest problems in modern cosmology. This workshop introduces students to the experimental evidence for its existence. Using real astronomical images students measure the rotational speed of galaxies and hence calculate the mass acting at their centre. They then estimate the mass of the visible stars and calculate the percentage of matter that is visible. Students also estimate the mass of invisible material in clusters of galaxies from arcs of light caused by gravitational lensing of the light from high redshift objects beyond the cluster. The workshop will then consider what form the Dark Matter might take and will draw parallels with the evidence for and acceptance of other theories such as gravitational attraction, the particulate theory of matter, quantum mechanics and relativity. Can be combined with an education planetarium.

- Suitable for post-16

Darwin - Only a theory? (1 hour)

Darwin's theory of evolution by natural selection is probably the single most important Victorian idea – so why is it still so controversial? Students use dialogue activities to explore Darwin's theory and the historical ideas behind it and decide for themselves how modern day criticisms of evolution should be answered.

- Suitable for KS4

Darwin's Worms (1½ hours)

Open ended investigation at its best. Students are shown a mass of wriggling worms and invited to suggest the kind of questions they would like to answer about them. The class discuss which questions could be answered (ethically!) by experiment. Groups chose their favourite question then carry out their own investigation to provide the answer using the wide variety of lab equipment provided.

- Suitable for KS3 and above

DNA & Species (1½ hours)

How do we know when a species is new to science? The recently discovered Pink Iguana from the Galapagos is used as a case study - students use gel electrophoresis to obtain DNA fingerprints of field samples to see if their specimen matches a known species of iguana or is a new species.

- Suitable for KS4 and post-16. Possibly suitable for able KS3

DNA Discovery (1 hour)

What does DNA look like? Where can you find it? How can you get it out? A hands-on experience which reveals the DNA at the heart of living things. The workshop includes a practical exercise to explore how DNA is inherited.

- Suitable for KS3, KS4 and possibly for some post-16

DNA Fingerprinting (2½ hours)

Recreate the work of forensic scientists and analyse crime scene and suspect DNA samples. A chance for students to use restriction enzymes to digest DNA and gel electrophoresis to analyse the restriction products to compare DNA samples taken from suspects with DNA found at the scene of the crime.

- Suitable for post-16

Drugs & Sport (1½ hours)
Join the drug squad and use spectrophotometry to test "urine" samples from Olympic athletes and discover whether they have been using performance-enhancing drugs. How sure are you of your results? Then join an ethics committee to decide on who has been cheating and what length of ban should be imposed.

- Suitable for KS3, KS4 and post-16

Fantastic Fossils (1 hour)
What is a fossil and how does it form? Students explore their own thoughts through discussion and undertake hands-on activities which investigate erosion, deposition and sedimentological processes. Students undertake a stratigraphic exercise to discover what we can learn from fossils.

- Suitable for KS3, KS4 lab available on request

Forces & Motion in Space (1½ hours)
Everyone wants to be an astronaut but how do we get into space? Perform hands–on experiments using sensors and data capture to explore Galileo's classic experiment measuring the speed of falling objects, investigate the effects of air resistance and design and launch your own rocket. Can be combined with an education planetarium.

- Suitable for KS3

Forensic DNA (1½ hours)
Create DNA fingerprints to help solve a vicious crime. Students use gel electrophoresis to compare crime scene and suspect DNA samples. This workshop uses the same techniques as 'DNA & Species' but in a forensics context.

- Suitable for KS4 and post-16. Possibly suitable for able KS3.

Forensic Investigation (1 hour)
Check out the realistic crime scene and become a forensic scientist. Investigate shoeprints, use magnifiers to study fingerprints, microscopes to study fibres and chromatography to investigate ink to find out who committed the murder.

- Suitable for KS3 and some KS4

Gas! (1 hour)
Darwin was nick-named 'Gas' in his early teens because of his interest in making gases. This workshop gives students a chance to make and test several gases themselves and observe some of the more spectacular demonstrations of the properties of gases.

- Suitable for Lower KS3

Genes in a Bottle (1¼ hours)
Learn where DNA comes from and what it's for, sample your own cheek cells, extract the DNA and then precipitate and bottle it to make a unique necklace to take home.

- Suitable for KS3, KS4 and post-16

Genetic Engineering (1½ hours)
Genetic engineering for beginners. Students learn about the techniques and applications of genetic engineering, insert foreign genes into bacteria and see the result! We recommend that most groups insert the β-gal gene, which reliably produces easily-visualised blue bacterial colonies. For groups studying gene regulation and operons who wish to insert a gene that requires activation, we can use the pGLO system. This contains the GFP gene under the control of the Ara operon and successfully transformed bacteria glow green under UV light.

- Suitable for able KS4, post-16 and higher

Greenhouse Gas Investigation (2 hours)

How does the Greenhouse Effect work and what will it do to our planet? Use sensors and sun lamps to investigate which is the worst Greenhouse Gas. The workshop includes a final plenary session where students identify the best ideas for experimental design.

- Suitable for able Year 9 and above

Hair! (1 hour)

What is hair? What is it made of? How can hair have colour? Why do we have hair? How does hair grow? How strong is hair? How does pH affect hair strength? Are all shampoos the same pH? Discussions and hands-on experiments to understand the science of hair and hair treatment.

- Suitable for KS4 and above

Hair Colour (1¼ hours)

What are hair dyes and how can we use them safely? Explore why hair is coloured and the physiology of natural and coloured hair, make a diazo hair dye and play Jenga to understand how hair dyes can be carcinogenic. The session ends with a dialogue activity to identify how hair can be coloured safely.

- Suitable for KS4 and above

How Do We Know That the Earth is Rotating? (1 hour)

Many Science Centres have a Foucault's pendulum but without some investigative work with a small turntable, a pendulum on a stand and a model person, the experiment is incomprehensible to most students. With the appropriate background in place, setting up a giant pendulum then watching it appear to move is a 'Eureka!' moment.

- Suitable for KS3

How Old is the Universe? (1 hour)

Students look at some of the spectacular deep field images recorded by the Hubble Space Telescope. They then discover how they can use size and spectra to calculate the relative distances and velocities of a number of galaxies. These results are then used to calculate a value for the Hubble constant and finally to determine a value for the age of the Universe.

- Suitable for KS4 and post-16

Introduction to Microbiology (2 hours)

Sterile technique, plating, streaking, staining, microscopy… everything you need to know for the practical side of microbiology at A level and other post-16 courses.

- Suitable for post-16 and able groups at KS4

Jumping Bugs Investigation (1¼ hours)

Explore the ways that insects escape from predators then make jumping bugs to investigate what makes them jump highest. A full SC1 investigation.

- Suitable for KS3

Karyotyping & Genetic Counselling (2 hours)

This workshop gives students the chance to create karyotypes using our giant foam chromosomes. Students will consider methods of visualising chromosomes, major chromosomal anomalies and types of chromosomal mutation. Students will also have the opportunity to use computer karyotyping software to see how chromosomes are analysed by the NHS. The workshop also includes a structured discussion about the ethics involved in screening for chromosomal anomalies.

- Suitable for post-16

Lip Balm to Hand Cream: Chemical Engineering (1½ hours)

Make a lip balm and then consider how the formulation needs to be changed to make a hand cream. After choosing appropriate ingredients students make the hand cream too.

- Suitable for KS3 and above

Malaria, Sickle Cell Anaemia & Natural Selection (1 hour)

Explore the way malaria is transmitted and why it is such an important disease through hands-on activities and discussion. Discover the link between malaria and sickle cell anaemia and find out how natural selection can preserve characteristics that are not obviously beneficial.

- Suitable for KS4 and post-16

Mediaeval Armour (1 hour)

What's the best material for armour? Explore the range of weapons available to mediaeval soldiers and carry out an SC1 investigation to decide the best metal for making armour.

- Suitable for KS3

Micro-organisms (1 hour)

What makes us ill? How can the body defend itself against microbes? How can microbes help us? A yucky investigation of the world of microbiology with added slime.

- Suitable for Lower KS3

Nits & Scalp Disorders (1 hour)

Can you tell the difference between a bad hair day and a serious problem? Many medical conditions show symptoms on the scalp. Find out what can go wrong, how to recognise it and the advice you should offer when you spot a problem.

- Suitable for KS3 and above

Organic Food Investigation (1½ hours)

Is it true that factory farmed food is less tasty than organic produce? Separate the fact from fiction by carrying out experiments. The foods investigated will depend upon the season but are likely to include chicken, tomatoes and cake.

- Suitable for KS4, post-16 and adult groups

PCR: A Question of Taste (5 hours)

Our new PCR workshop in which we explore the links between students' phenotypic ability to taste PTC and their TAS2R38 (bitter taste receptor) genotype. We also examine the ability of chimpanzees to taste PTC which is an interesting example of convergent evolution. The workshop includes DNA isolation from cheek cells, Polymerase Chain Reaction (PCR), restriction enzyme digests, gel electrophoresis and a discussion activity about evolution and natural selection and as such is relevant to all courses with DNA technology or evolution content.

- Suitable for post-16 and above

Planetarium: Stars through the Seasons (1 hour)

Use our state-of-the-art planetarium to explore the night sky and its constellations on a tour of the most important astronomical features through the year.

- Suitable for KS3 and above

Plastics & Recycling (1½ hours)

Discover the properties of plastic materials and learn how they can be recycled. In this workshop, students will recycle plastic to make giant paper clips by injection moulding and make their very own key ring from recycled plastic board.

- Suitable for KS3

Psychology of Face Recognition (1 hour)

How good are we at recognizing faces? Can you recognize a genuine smile? How can we help people recognize faces when giving evidence? What else can we learn from faces? In this workshop, developed in conjunction with world expert Prof Vicki Bruce of Newcastle University's School of Psychology, we explore the problems we have with this most fundamental of human social abilities. From Galton's composites to modern e-fit, this workshop explores the background science and provides exciting examples to illustrate the problems as well as giving students a chance to design their own experiment.

- Suitable for post 16 and GCSE psychology groups

Reversible & Irreversible Changes (1 hour)

Students are invited into our purpose-built lab for an introduction to pratical chemistry. Learn how to use Bunsen burners safely, heat samples of exciting chemicals and observe how they change.

- Suitable for lower KS3

Rubbish Rockets (1 hour)

Make a rocket from scrap paper, fire it and see how it flies. Compare it with your friends'. How can you make yours fly better? The workshop ends with a grand rocket launch to identify the most successful designs. This workshop meets CDT and Science targets as well as promoting creativity.

- Differentiated for KS3 and KS4

Science of Cookery (1¼ hours)

What puts the bubbles into crunchy bars, meringues, sponges and bread? Discover the physical, biological and chemical science behind raising agents in this hands-on look at the science of the kitchen.

- Suitable for KS4, post-16 and adult groups

Skin! (1 hour)

What is the biggest organ in your body? You may be surprised to know that it is your skin. Find out about the important jobs it carries out, its structure and how it works. Then explore the ways it can go wrong and see how good you are at diagnosing skin disease. Hands on fun that will leave you itching! Suitable for all academic and vocational courses which require a knowledge of skin.

- Suitable for KS4 and post 16

Sound Matters! (1 hour)

How loud is too loud? Can your iPod really damage your hearing? In this workshop, students will find out about sound and hearing. They will discover the dangers of loud sounds and experience what it might be like to have hearing damage. At the end of the event, students will produce a poster to warn their friends about the dangers of loud noises.

This workshop was developed in collaboration with the Manchester Museum of Science & Industry with the support of the University of Salford and the University of Southampton.

- Suitable for KS3

Sound of Science (1 hour)
Check out the difference between noise and music in this workshop where students explore the relationship between volume and amplitude and investigate what controls pitch in musical instruments. Loads of noise, lots of fun.

- Suitable for KS3 and some KS4

Speed, Weight and Rocketry (1½ hours)
How can we get into space? Use sensors to measure the muzzle velocity of a spring cannon and discover the relationship between speed and distance travelled. The graph obtained can be extrapolated to estimate escape velocity. Experience the gravitational pull of different planets and then create chemical rockets and launch them for a workshop that ends with a bang.

- Suitable for Year 8 and above

Sting Neutralisation Investigation (1¼ hours)
Check out the venom from bees, wasps, nettles and scorpions then investigate possible cures to see which are effective and the dose required to neutralise them. Straightforward chemistry in an exciting investigative context.

- Suitable for KS3 and as revision for KS4

Stuarts: Micrographia (KS3)
How can we see things that are really small? Make a simple microscope in the same way as microscope pioneer Antoni Van Leeuwenhoek and then explore the work of Stuart scientist Robert Hooke and his monumental book *Micrographia*.

- Suitable for KS3

The Story of DNA (1 hour)
James Watson famously claimed to have discovered the secret of life when he discovered the structure of DNA in February 1953 but what information was needed to make the discovery? Explore the chemical work of Erwin Chargaff and the X-ray diffraction studies of Rosalind Franklin with hands-on activities before attempting to pull it all together in the same way as Watson and Crick. The workshop sets the discovery of the structure of DNA into its scientific and social context and concludes with a structured dialogue activity to explore the benefits that have arisen since the structure was discovered.

- Suitable for KS3 and above

Tudor Medicine (1 hour)
What did Tudor plague doctors really know about infectious diseases? Learn about the bubonic plague and other diseases of the time and the medicines and herbal remedies used to treat them and use Francis Bacon's 'scientific method' to carry out an SC1 investigation into the growth of micro-organisms. The workshop concludes with a dialogue activity about medicine in the past, now and in the future.

- Suitable for KS3

Vaccination: Jenner & Smallpox (1 hour)
How was vaccination invented? Find out about Edward Jenner and the first vaccines and learn how smallpox was eradicated. This dialogue-based workshop explores the scientific and ethical issues surrounding vaccination in the past, today and in the future.

- Suitable for KS3 and KS4

We can also produce customised workshops to meet the needs of your students.
Please phone (0191) 243 8211 to discuss your requirements.