



BIRMINGHAM CITY  
University

# STEM

..... City .....

Courses and careers in science, technology, engineering and mathematics.



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## Postcard subjects

Engineering

Computing

Built Environment

Digital Technology

Biomedical Engineering

Diagnostic Radiography/Radiotherapy/  
Medical Ultrasound

Speech and Language Therapy

Paramedic Science

Operating Department Practice

Nursing

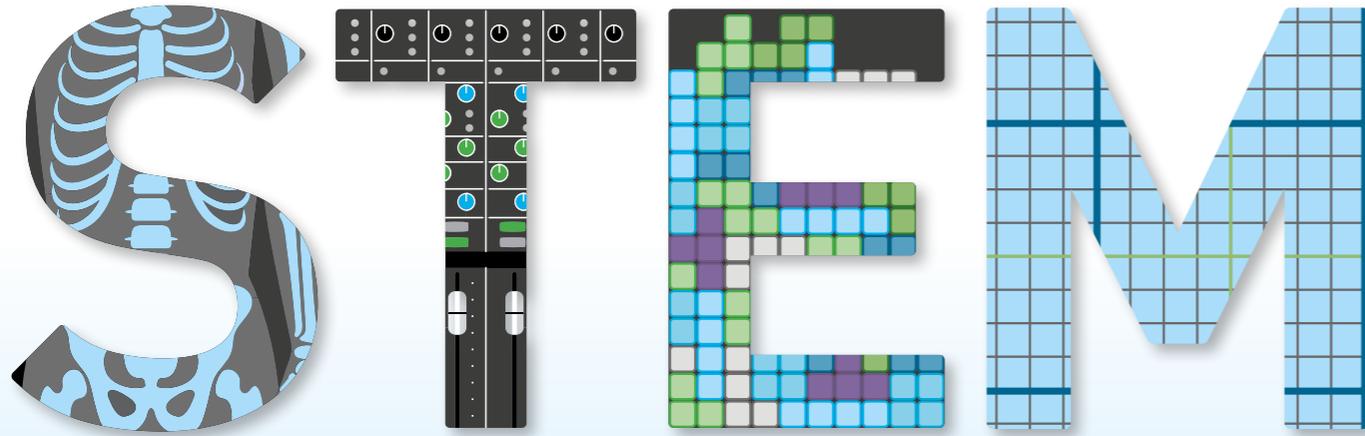
Midwifery

Sports, Exercise Science and Therapy

Biomedical Science

Nutrition Science

# What is...?



1

The letters **STEM** stand for science, technology, engineering and mathematics. Almost everything in life relies on these to keep things working.

2

We use all these subjects in everyday life all the time. Why not read the story on the next page to find out how?

3

Almost every job uses science, technology, engineering and mathematics in some way. How do you use **STEM**?



Joe tried to give up STEM for his New Year's resolution – think it can be done? Think again!

“The alarm clock I previously used to wake me up each morning had been designed with STEM, so I had to simply hope I would wake up on time. The central heating couldn't be used, meaning my house was freezing!



“Upon leaving, I had to hope no one would break into my house, as I had to leave the door unlocked due to the mechanism within it being engineered.



“I then walked to work, as buses were forbidden, plus I couldn't use mathematics to work out the bus timetable. My watch and phone also had to be boycotted as both have been programmed with technology.

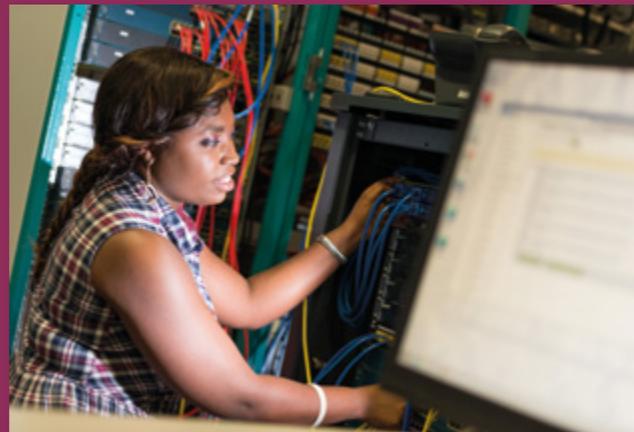


“I kept falling ill, as I couldn't take medication, and hospitals were no-go areas as everything they do involves STEM.



“Ultimately, I decided I needed STEM back in my life!”

# STUDY A STEM SUBJECT AT >BIRMINGHAM CITY UNIVERSITY<



**BIRMINGHAM CITY**  
University

## About us

Birmingham City University is a large and modern institution, with top-class teaching, world-leading research and well-established links with employers.

Our STEM provision includes courses in areas such as Computing, Engineering, Digital Technology, the Built Environment, Health and Sport.

Whatever you are studying, we are always investing to provide the most modern equipment possible. Our libraries provide access to over 62 million resources including books, journal articles, ebook chapters and conference proceedings, while IT access is available at all sites, with learning material available online 24 hours a day.

In addition, there are many specialist resources for individual courses, ensuring you get the right practical experience to accompany the teaching you receive.

### Our campuses

Nursing and other health-related courses are based in a £30 million building at our City South Campus in Edgbaston. Our students here learn in the most realistic settings – from a mock operating theatre, hospital wards and working ambulance to a fully-equipped birthing room and virtual radiotherapy suite.

On the same site, our new courses in Sport and Life Sciences will be housed in a state-of-the-art £41 million

building, alongside our School of Education, from 2017. Facilities will include dedicated physiology and biomechanics laboratories, nutrition labs, sports therapy clinics and a sports performance centre.

Millennium Point, a landmark building situated in one of the largest regeneration zones in the UK, is home to the workshops, laboratories and teaching spaces used by students on courses from our Faculty of Computing, Engineering and the Built Environment. Facilities include noise and vibration cells, a robotic laboratory, recording studios, computer networking laboratories and workstations with the latest industry-standard software.



Ark St Alban's Academy learner using digital technology kit.

## Did You Know?

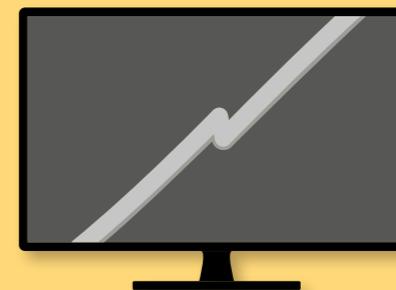
1 72 per cent of all UK businesses rely on people with STEM skills (Ready to Grow, CBI Education and Skills Survey).

2 Graduates earn £160,000 more than non-graduates in their working lifetime, with STEM graduates earning nearly £250,000 more (Engineering UK Report 2011).

3 STEM has aided the invention of a number of products – the snowboard, the world's first Ferris Wheel, the first laser and even the slippery part of a water slide.

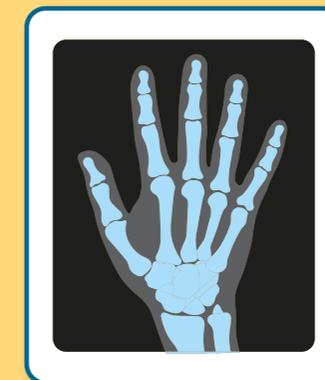
4 Engineers play a key role in the theme park industry, getting involved in designing, building, lighting and controlling crowd flow.

5 Interactive television is made possible by engineers, who are involved in all aspects of interactive technology.



6 The technological advances made by engineers in energy, materials, structures and computers have made space travel possible.

7 From identifying broken bones to disease, the X-ray is one of the most useful medical advances in history, as well as the oldest form of imaging.



8 The fastest-growing form of communication is the internet – it took radio broadcasters 38 years to reach an audience of 50 million; it took the internet four.

9 A diamond will not dissolve in acid. The only thing that can destroy it is intense heat.

10 Bioengineers are creating a new and exciting medical technology, which will help surgeons reconstruct facial birth defects.

## STEM AT > IRONBRIDGE <

Ironbridge is a World Heritage Site, due to the global impact of its industrial past. The collections and programmes based at the Ironbridge Gorge Museums provide schools with the chance to see and take part in some of the scientific advances that have taken place over the past 300 years.

Enginuity, a hands-on national design and technology centre, tells the story of the resources, processes, scientists, engineers and entrepreneurs that made Ironbridge famous. It highlights the importance and relevance of STEM subjects to economic and social success.

Then there are the workshops at Coalport and Jackfield, where the end product is a combination of the skills of the maker and the science that turns clay and minerals into pieces of art.

**STEM is at the heart of what Ironbridge was, and still is, all about.**

Solve a historical crime with modern science



See inside with the X-ray machine



## STEM AT > THINKTANK <

Birmingham-based science museum Thinktank aims to inspire future generations about STEM and fuel a fascination with science.

Whether we know it or not, science shapes our daily lives. At Thinktank, the aim is to explain how and why it does, through its collections, talks and lively demonstrations.

The museum's team of learning officers will provide engaging talks and workshops, bringing science and engineering alive, inspiring young people with creative and fun ways to learn about STEM.

Richard Winter, a learning officer at Thinktank, describes what he loves about his role: "The most rewarding part of the job is the lightbulb moments when our demonstrations and experiments help children to make sense of the science and engineering that they learn in school, and the number of children who leave the museum buzzing about how much fun science is."



## STEM AT > RAF MUSEUM COSFORD <

The Royal Air Force Museum Cosford keeps aviation heritage alive. The museum conserves aircraft and associated exhibits, and ensures its apprentices have the unique skills and development they need.

It helps budding engineers by providing apprenticeship opportunities. Two of their heritage aircraft engineering apprentices, Sam Evans and Matthew Treanor-Cartwright, have been interested in engineering since an early age.

"I have always been interested in mechanical things and how they work," said Matthew, while Sam got stuck in as soon as he could. "It wasn't long before I was helping my stepfather fix things," he said. "Early exposure to this practical work is what steered me to applying for engineering apprenticeships."

Now both working within the same role, Matthew and Sam are enjoying what their apprenticeship has taught them. "The work is

quite varied, and you get to learn a variety of skills, working with some specialist tools," said Sam. Matthew has loved the challenge, and has found a variety of work to do. "We restore, conserve and maintain vintage machines," Matthew explained. "We also manufacture new parts and repair battle-damaged aircraft."

So, would they both recommend an apprenticeship? "Yes, it's a great career path," said Matthew. Sam agrees: "You get the best of both worlds, and it really sets you up to find further employment."



## STEM AT > DRAYTON MANOR PARK <

STEM is an essential component of running a successful theme park, including designing and operating rollercoasters. These are bought from manufacturers who employ scientists and mathematicians to design new rides.

Rollercoasters operate due to a careful balance of potential and kinetic energy, which changes around the track. If the balance of these forces was wrong, then the rollercoaster would use up the kinetic energy too early and stop halfway around the track.

STEM is also important for deciding what materials to create rollercoasters from. For instance, the wheels are coated with polyurethane, because it can withstand the high temperatures generated through friction between the wheels and the track.

All rollercoasters and rides are controlled by a PLC (Programmable Logic Controller). Anything unsafe, such as a harness not locking properly, is highlighted on the control panel and the ride is paused.

Before the park is opened, every ride is checked extensively by engineers. They also perform winter checks, disassembling every ride, which is why theme parks close over the winter.

STEM is employed in every aspect of a theme park, from designing and building a rollercoaster, to running and maintaining it throughout its lifetime.

By following a career in STEM, you could find yourself working in major theme parks across the world!



# JARGON BUSTER

**Academic** – Study that is not aimed at a specific job or career.

**Apprenticeships** – Learning while working in a job. An apprentice learns from someone who has a particular skill, and is often paid to do so.

**Aviation heritage** – The history of flying and operating aircrafts.

**Bachelor's degree** – The academic qualification gained from a university or an equivalent educational provider. For example, BSc stands for Bachelor of Science.

**Biochemistry** – The study of chemicals within living things.

**Bioengineers or biomedical engineer** – Applying engineering ideas to a medical setting such as humans, animals or cells.

**Building Information Modelling (BIM)** – An interactive computer model of a building where many people can share information about the design, what it's made of, building it or operating it; a bit like a computer game with lots of players working together.

**Cinematographer** – The Head of Department who is responsible for the look of the film, in terms of camera and lighting.

**Clapper board** – Used in filmmaking and video production to synchronise sound and image. It also marks certain parts in a scene.

**Collaborate** – To work together with others to achieve a goal.

**Computed Tomography (CT) scanning** – Using X-rays to create images or scans of inside the body.

**Defibrillator** – A machine which can control the heart with the use of an electric current.

**Diagnosis** – Finding out the cause of a problem or illness by looking at what is wrong.

**Efficient** – Working in the best way, with minimum waste.

**Faculty** – A group of related departments and/or courses in a university.

**Further education (FE)** – Education after the age of 16.

**Graduate** – Someone who has successfully completed a degree at a university or an equivalent educational provider.

**Higher education (HE)** – Education usually after the age of 18. This tends to refer more to the type of qualification that will be gained, for example a degree.

**Kinetic energy** – Energy which is created as a result of movement. Wind is an example of this energy.

**Magnetic Resonance Imaging (MRI)** – Using magnetic fields and radio waves to make pictures of organs and the body's insides.

**Manipulate** – To control in a skilful way.

**Master's degree** – A further degree, which is the next level after a Bachelor's degree. For example, MSc stands for Master of Science.

**PhD (Doctorate or Doctor of Philosophy)** – The highest level a student can study after completing a Bachelor's and Master's degree. The term philosophy does not refer solely to the field of philosophy but is used in a broader sense; it means that you are a master of your subject.

**Physiology** – Someone or something's normal behaviour which allow them to function.

**Polyurethane** – A manmade finish which includes things like paints, varnishes, adhesives and foams.

**Postgraduate** – A term referring to someone who is studying for a further degree after gaining an initial degree qualification.

**Potential energy** – Stored energy, which an object has because of its position or state. For example, a bike at the top of a hill has potential energy.

**Professional** – Someone who is highly skilled in a certain area.

**Radiation** – Releasing electromagnetic energy as waves or particles.

**Technician** – Someone who looks after special equipment or does

practical work in a laboratory.

**Telecommunications** – Communication over a distance via a method such as telephone or broadcasting.

**Ultrasound** – A technique used to see inside the body, for example to view broken bones or a baby in the womb.

**Undergraduate** – A university student who has not yet completed a Bachelor's degree, or a student who is working towards a Bachelor's degree.

**Virtual Reality and Simulation Initiative** – A three-dimensional digital image or environment which can be used in a way that is similar to real life.

**Vocational** – Leading to a job or skills relevant to a career.

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# ENGINEERING

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Engineers are at the heart of manufacturing and maintaining car engines, as well as making them fuel efficient. But there's a lot more to engineering than that – by becoming an engineer, you could design aircraft wings, medical applications (such as hip and knee joints), buildings or machines!

Engineering involves the use of mathematical and scientific knowledge to invent, design, build and maintain. You could be working on anything from industrial structures to systems, parts, tools and machines. It is a wide subject area, and covers a range of more specialised subjects such as mechanical and electronic engineering.

In the 21st Century, engineering offers job opportunities in areas such as automotive engineering,

medical applications, biomechanics, aerospace, motorsports, banking, finance and even cycling!

In Formula One, one second can make all the difference. Behind every good racing driver is a great team of engineers, making sure that the car is performing the best it can.

## Think about:

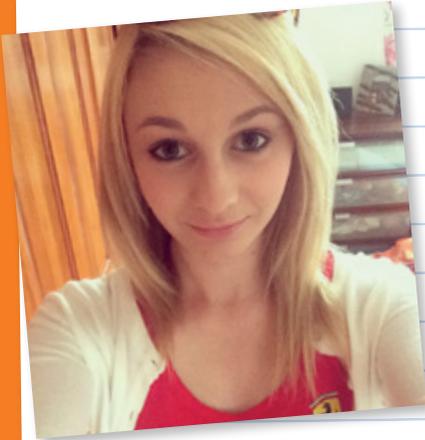
- Who designs the winning car?
- Who thinks about the aerodynamics?
- Who captures and analyses race data to improve aerodynamics, suspension and engine performance?

The answer to all of those questions is engineers! All of these jobs would be done by highly-skilled, trained engineers who can assist and give a great team that extra edge.



## Sophie Vernon

### Engineering student



Having gained an interest in engineering subjects while at school, Sophie came to Birmingham City University to build the expertise she needs for a future career. As a student ambassador, she represents the interests of her fellow students on the course, and promotes the benefits of the University to younger students.

“My secondary school was an all girls’ school, and we were always encouraged to do things that other girls may not. This

lead me to taking an A Level in a subject called resistant materials, which included a lot of engineering design, as well as practical skills such as wood and metalwork. I was encouraged by my teachers to take a look at engineering courses, and when I saw Birmingham City University covered motorsports, I knew it was for me.

“The facilities are state-of-the-art and relevant to industry – for example, the software we use for designing on our course is used by 80 per cent of engineering companies, so it’s likely your first job will require it.

“The industry is 90 per cent male dominated, but don’t let that put you off – let that encourage you to change that figure. I feel that women bring a different and fresh approach to the ever-changing world of engineering. If you asked me three years ago what I would be studying at university I would have never said engineering, but look at me now.”

# COMPUTING

The majority of jobs need some computing skills. Studying computing gives you the ability to think outside the box and learn how to solve problems; skills that are an advantage in many fields.

At Birmingham City University, the focus is not just on learning facts. It's also about learning how to think in a creative but logical way. Computing is a subject for anyone who loves a puzzle, making it a really dynamic and exciting industry to work in.

Another rewarding side of computing is the technology you get to use. Professionals in this field are using cutting-edge resources constantly in their jobs as a way of giving themselves a competitive advantage. Computing students are in demand, earning good salaries and thriving in an area they enjoy.

This means that you are not only working with the latest kit, but you can also apply your skills to many different industries. These skills can take you

## DID YOU KNOW?

- The first computer mouse designed in the 1960s was made of wood!
- An early version of Microsoft Word included a pinball game 'Easter Egg', a hidden activity snuck in by software developers. Can you find any other software with hidden Easter eggs?!

anywhere from big-name firms like Microsoft or Cisco, with whom we have fantastic links, to industries like fashion, sports and media. Where could you picture yourself?

One last thing about computing is that it's a great subject if you like to get hands-on when you learn something. At Birmingham City University, we focus on learning by doing – it's faster, easier to remember and you won't get bored!



## Faye Rathbone

### BSc (Hons) Computer Science 2015

**BSc (Hons) Computer Science student Faye Rathbone has achieved a considerable amount during her time with Birmingham City University. Her successes include being shortlisted for Entrepreneurial Student of the Year 2015, and she's now set to work in Dubai for British Petroleum (BP).**

“When I came to an Open Day at the University, I was attracted to the course structure as I found out we were not just being taught computer programming, we were also being taught networking, business and industry-standard programming.

“For my course, the facilities are perfect. We have access to all types of computers, including 24-hour access to Apple Mac labs, which has been very beneficial during my final year.

“As a whole, the University is committed to guiding you into your career, and we are given so many opportunities to gain work experience. I took part in a four-week work placement with Jaguar Land Rover, as well as working with Siemens for a year alongside my studying. Both were hugely

beneficial as they gave me an insight into real-life work.

“I was shortlisted for Entrepreneurial Student of the Year 2015 and was given lifetime membership for Birmingham City University Students' Union, due to my service throughout my four years of study.

“I graduate this year and plan to study a Master's degree, before moving to Dubai for five years to work for BP.”



# BUILT ENVIRONMENT

Have you ever thought about the places you live and study in? Can we build new buildings in a way that is affordable but comfortable and efficient for people to use? Can we build them to a design which saves energy? How do we avoid delays? These are all questions which people who study built environment subjects explore and try to answer.

Making places work well isn't just about building sites or architects. Civil engineers and architectural technologists decide what materials to use, what structures should look like and whether they'll last. Building surveyors study old and new buildings to keep them in use. Quantity surveyors work out how much everything will cost, from a million tonnes of steel right down to 20 toilet seats.

Construction managers make sure things are built on time, safely. Planners decide where we might need new housing or schools in the future,

while real estate surveyors calculate who will buy or rent buildings and how much they will pay. Together, people in these professions create the places we live and keep them running.

But how do these people work together? A new digital tool, Building Information Modelling (BIM), brings all designs, costs and processes together. Using 3D imaging, you can fly through a building to look at all its details before it gets built, spot problems, and update and share information instantly.

## DID YOU KNOW?

These skills are highly valued by employers. Recent research conducted by the Construction Industry Training Board said that the UK's construction industry needs 36,000 new recruits each year to cope with demand.



## Rafal Daszczyszak

BSc (Hons) Architectural Technology 2014

Rafal Daszczyszak may have graduated from Birmingham City University in 2014, but his alliance with the University didn't stop there. Now working as the Building Information Modelling Information Manager for Willmott Dixon, in 2015 he was involved in phase two of the University's £260 million campus development project.

"I have always wanted to study abroad, and this was the first university that came up during the research process. My dream was to become a designer and architect, but typical courses take too long, so I decided to choose a more realistic option, the BSc (Hons) Architectural Technology course.

"My class was the first to use the new faculty building at Millennium Point. We went on tours around the area to learn about the construction industry, and I conducted a lot of research about the building. We had the opportunity to work collaboratively in similar conditions to existing projects.

"I really enjoyed studying Architectural Technology, and I know that I learned exactly what is necessary within the construction industry. I definitely want to continue my career in the industry and I hope that in the near future I will be able to set up my own company."



# DIGITAL TECHNOLOGY

Digital technology is constantly changing, requiring people to work in a variety of careers and fields. At Birmingham City University, our aim is to prepare students to succeed in a rapidly changing media environment.

## DID YOU KNOW?

- One in 11 of all UK jobs now fall within the creative economy (which includes publishing, music, design, games and TV).
- The 2015 James Bond movie, *Spectre*, set a world record for the largest film stunt explosion ever!
- In *Spectre*, over 1,500 extras were hired for the opening sequence set in Mexico City. This scene took around six months to put together and lots of special effects were used.

Understanding the science behind the technology allows our students to pursue a wide range of fascinating career paths. For example, students from our Music Technology degree have gone on to work in recording studios with bands, while our Sound Engineering and Production graduates work as live sound engineers.

Meanwhile, our Digital Media Technology graduates are developing websites and even running their own companies. Film Production Technology graduates can be found

behind the camera and editing films, while our Film Technology and Visual Effects graduates create exciting video trailers for computer games.

All of our students make use of a range of technologies. For example, you develop an understanding of a range of programming languages which could help you to create apps. You learn about the science of light and sound, or explore the technologies which enable us to capture, produce and discover music, film and digital media.

If you're the kind of person who likes to learn by doing, the approach in Digital Technology is very much for you – we're hands-on, allowing our students to explore the theory through practical activities.

If you have a passion for music, sound, digital media, film or visual effects and a curiosity for science, then a career in digital technology is the one for you!



## James Loffredo

### BSc (Hons) Film Technology and Visual Effects 2016

James came to Birmingham City University to pursue a career in TV and film. Having taken advantage of the state-of-the-art facilities at our Parkside Building, he has gained further experience by working for the BBC, assisting on the popular comedy *Still Open All Hours*.

"I chose Birmingham City University because the facilities at The Parkside Building were brand new, with the latest camera equipment and the largest TV studio within a university.

"During my time at the University, I've been lucky enough to build a relationship with the BBC, where I managed to gain work experience on the *Still Open All*

*Hours* Christmas special. I worked on location in Doncaster, where I helped with crowd control, supervised team members and watched over the production. I learned so much from that experience and it really boosted my confidence.

"To my delight, the BBC announced that they were bringing it back for a full series. This time, they were filming for two weeks and I managed to do a variety of tasks, including being a first assistant cinematographer. My duties for that role included loading the clapper board, maintaining the equipment and communicating with the camera operator.

"This led to the offer of a part-time job, working as a runner for the studio work of *Still Open All Hours* in London. I've stayed in touch with the BBC management, and I plan to go back for more work experience."



# BIOMEDICAL ENGINEERING

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**Engines, cars, factories... engineers are involved in these areas, but they are also needed in other sectors, such as the health service, where engineers help design and maintain technology that saves lives.**

A career as a biomedical engineer would suit anyone fascinated with how the body works, as well as biology and physiology. If you also have a passion for design or technology, this could be a great option for you.

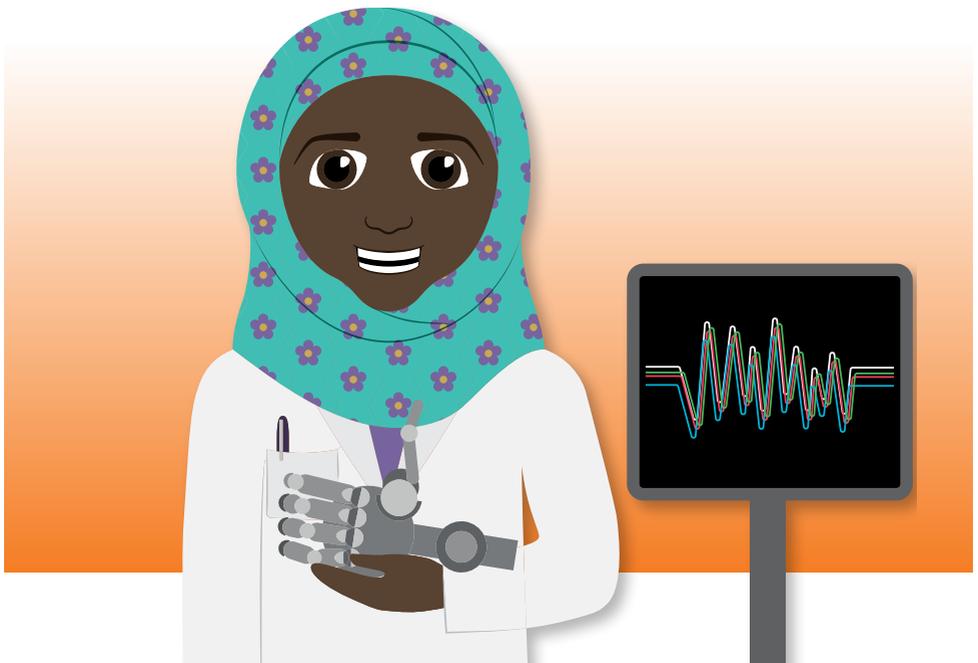
The aim is to integrate technology into the human body and to help medical professionals monitor and treat diseases.

You could work for the NHS or a private company. In either case, your work can be extremely varied and rewarding. You could be maintaining equipment or training someone to use it safely,

or you could be at the forefront of research and design, organising clinical trials for the latest technology that could improve people's lives.

On any hospital ward, you will see hundreds of examples of work completed by biomedical engineers. Blood pressure machines, pulse oximeters and the defibrillators that restart patients' hearts are all prime examples. Engineers also work on anything from hip replacements to brain implants that aid people with Parkinson's disease.

You work directly with patients and see how your work impacts their lives. You would also work with other medical professionals, as well as legal and intellectual property experts that help patent designs and distribute the technology around the world.



### Three examples of amazing biomedical engineering:

A retinal implant placed in the eye to help blind people see again. This piece of technology has to integrate with the body's nervous system!

The 'voice' of Steven Hawking and the equipment he uses to control his speech was developed by a biomedical engineer. It is the only one of its kind!

The first written account of an artificial limb was made around 500 BC. A prisoner escaped from his chains by cutting off his foot, which he later replaced with a wooden substitute.

Do you know your binary alphabet? Spell your name in the space below.

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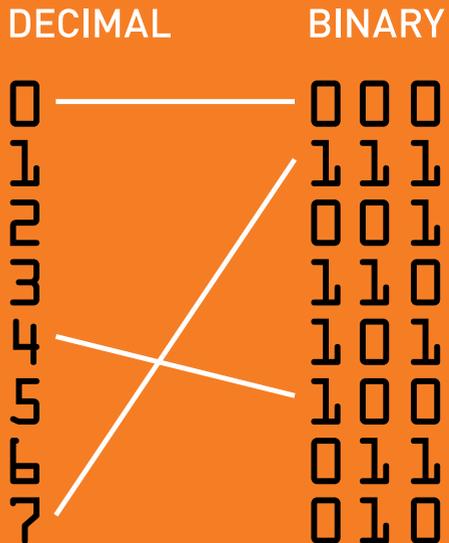
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## BINARY MATCHING

Binary only uses the numbers 0 and 1. Using the numbers which are already matched, can you figure out the rest?



Answers: 0 = 000, 1 = 001, 2 = 010, 3 = 011, 4 = 100, 5 = 101, 6 = 110, 7 = 111

# DIAGNOSTIC RADIOGRAPHY/ RADIOTHERAPY/MEDICAL ULTRASOUND

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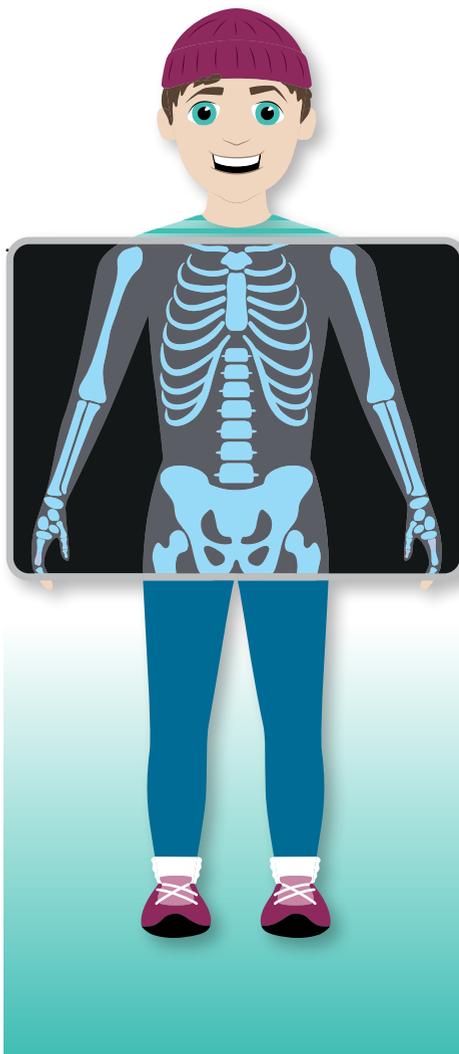
Radiography uses the science of radiation to produce pictures of tissues and organs inside the body. Radiographers are responsible for equipment that would not be out of place in an episode of *Star Trek!*

Ultrasound uses high-frequency sound waves to look at organs and structures inside a body. It is most often used to examine a developing baby in a pregnant woman's body. Medical ultrasound (also known as diagnostic sonography or ultrasonography) is used to see inside the body, looking at structures such as tendons, muscles, joints, vessels and internal organs.

The role of a radiographer is vitally important to other members of a healthcare team – the diagnosis from their images can influence a patient's treatment and care. As a radiographer, your job is to take high-quality images of organs, limbs and other body parts, to allow a wide range of diseases to be diagnosed.

Radiotherapy looks at the treatment of cancer. Most of us have been exposed to radiation in the form of an X-ray at the dentist or hospital. Just like the X-rays at the dentist's surgery, radiation therapy is painless. Unlike a typical X-ray, the radiation isn't used to create a picture of the internal parts of the body. Instead, radiation therapy delivers higher doses of radiation to kill cancer cells and shrink tumors.

Students on these courses at Birmingham City University get lots of hands-on experience by using state-of-the-art equipment, including virtual reality cancer treatment technology.



## DID YOU KNOW?

- 48 per cent of all admissions to NHS hospitals would go undiagnosed without the help of a diagnostic radiographer.
- X-rays were discovered in 1895 by Wilhelm Conrad Röntgen, who received the first Nobel Prize in Physics in 1901. Since then, 14 Nobel Prizes have been awarded to 23 individuals in physics, chemistry and medicine for their important discoveries using X-rays.
- The human skeleton is composed of 270 bones at birth – this total decreases to 206 bones by adulthood after some bones have fused together.

## QUIZ

- 1 Where in the body would you find the femur?
  - a) Skull
  - b) Ribs
  - c) Pelvis
- 2 Which diagnostic scan gives some of the highest radiation doses in diagnostic radiography?
  - a) Fluoroscopy
  - b) MRI Scan
  - c) CT Scan
  - d) Ultrasound Scan
- 3 Which is the most common examination performed in an X-ray department.
  - a) Abdominal X-ray
  - b) Lumbar Spine X-ray
  - c) Foot X-ray
  - d) Chest X-ray
- 4 Which part of your skeleton protects your brain?
  - a) Skull
  - b) Ribs
  - c) Pelvis
- 5 How many bones are there in the adult human body?
- 6 How many bones are there in your foot?
- 7 What mineral keep your bones strong and healthy?
- 8 What does chemotherapy treat?

Answers: 1. Hip to the knee, 2. CT Scan, 3. Chest X-ray, 4. Skull, 5. 206, 6. 26, 7. Calcium, 8. Cancer

# SPEECH AND LANGUAGE THERAPY

Speech and language therapists (SLTs) work closely with babies, children and adults who have various levels of speech, language and communication problems, and with those who have difficulty swallowing, drinking or eating. This means you will need to learn about how the body and the mind works, as well as how we communicate as humans.

There are over one million young people with some form of speech, language and communication difficulty such as:

- Speech delay and disorder
- Language delay and disorder
- Autistic spectrum disorders (difficulties in social interaction and communication)
- Cerebral palsy (movement disorders)
- Stammering or stuttering.

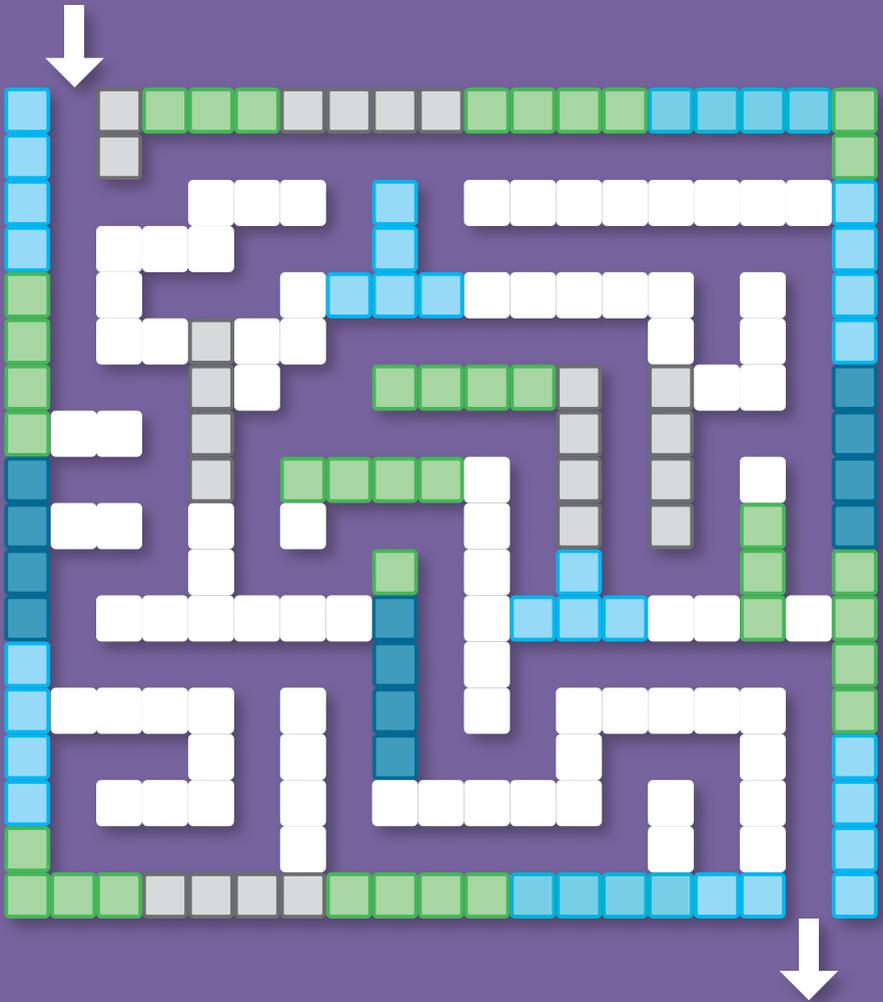
As an SLT, you will need to be able to show a lot of patience and be able to communicate in lots of different ways, some of which is through games and fun therapies. No two days would be the same as you could be working with babies, children or adults in hospitals, homes, schools and in the prison service.

## DID YOU KNOW?

- 50,000 people who have a stroke every year have speech and language difficulties.
- 700,000 people with dementia have speech language and communication needs.
- Up to 75 per cent of stroke survivors will have problems with swallowing immediately after the incident.



CAN YOU FIND YOUR WAY THROUGH  
THE TETRIS MAZE?



# PARAMEDIC SCIENCE

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How would you cope with being the first person on the scene of an accident? Paramedics attend emergencies including minor injuries, sudden illness, and casualties arising from road and rail accidents, criminal violence, fires and other incidents.

Paramedics provide immediate response to emergency medical 999 calls, and use ambulances, motorbikes, emergency response cars or bicycles to reach people who need help at the scene of an accident or emergency. They are responsible for assessing a patient's condition and providing essential treatment prior to hospital admission. This could include:

- controlling bleeding
- giving oxygen and drugs
- using a defibrillator
- spinal and traction splints
- setting up intravenous drips.

As well as working with emergency care assistants, you'll work with other ambulance service staff, such as control room operators. You'll also work with doctors and with the other emergency services, including the fire service and police.

## What's inside a paramedic's ambulance?

The inside of the ambulance is like a moving emergency room. Oxygen, a heart defibrillator, heart monitor and many of the drugs used in A&E are kept on board the ambulance.

### On board, you would find:

- a stretcher
- a defibrillator
- a first aid box
- oxygen tanks
- masks
- bandages
- a fire extinguisher.



## DID YOU KNOW?

Ambulances have been around for many years. Hundreds of years ago, horse and carts were used to transport patients. The first known record of a proper ambulance for emergency transport was by the Spanish in 1487. By the 20th Century, we had modern self-powered ambulances.

## A DAY IN THE LIFE OF A PARAMEDIC

**Andy McLachlan, who studied Paramedic Science, has taken to the world's most dangerous waters since graduating, helping keep ships safe from the threat of piracy.**

Since qualifying as a paramedic, Andy has split his time between working on ambulances in the UK and aiding ships in the Indian Ocean, working as a ship's medic and in an armed anti-piracy capacity.

"The paramedic qualification is highly regarded worldwide," Andy

said. "Whether it is entry to the NHS, private providers of health services or getting the chance to work abroad."

Already working as an ambulance technician, Andy came to Birmingham City University to move up to the next stage of his career – becoming a paramedic. He returned to the University in March 2014 to top up his qualification with the BSc (Hons) Paramedic Science degree.



# OPERATING DEPARTMENT PRACTICE

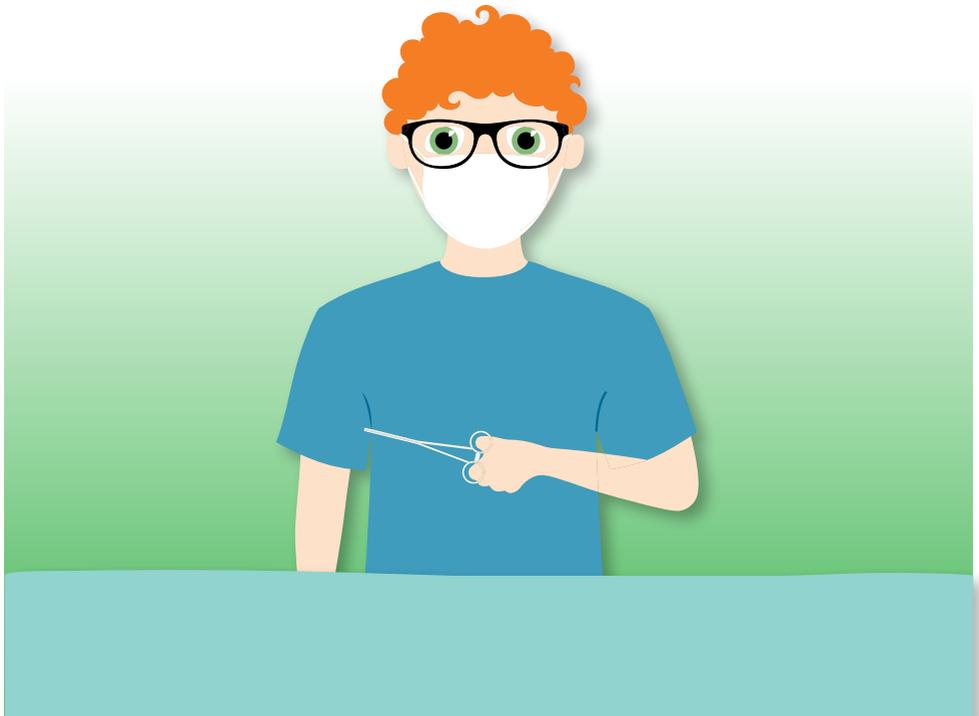
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Operating department practitioners (ODPs) are an important part of the healthcare team, working with surgeons, anaesthetists and nurses in theatre to ensure surgery is as safe and effective as possible. ODPs work in a wide range of areas, including transplant teams, orthopedic (muscle and skeletal) clinics and special care baby units.

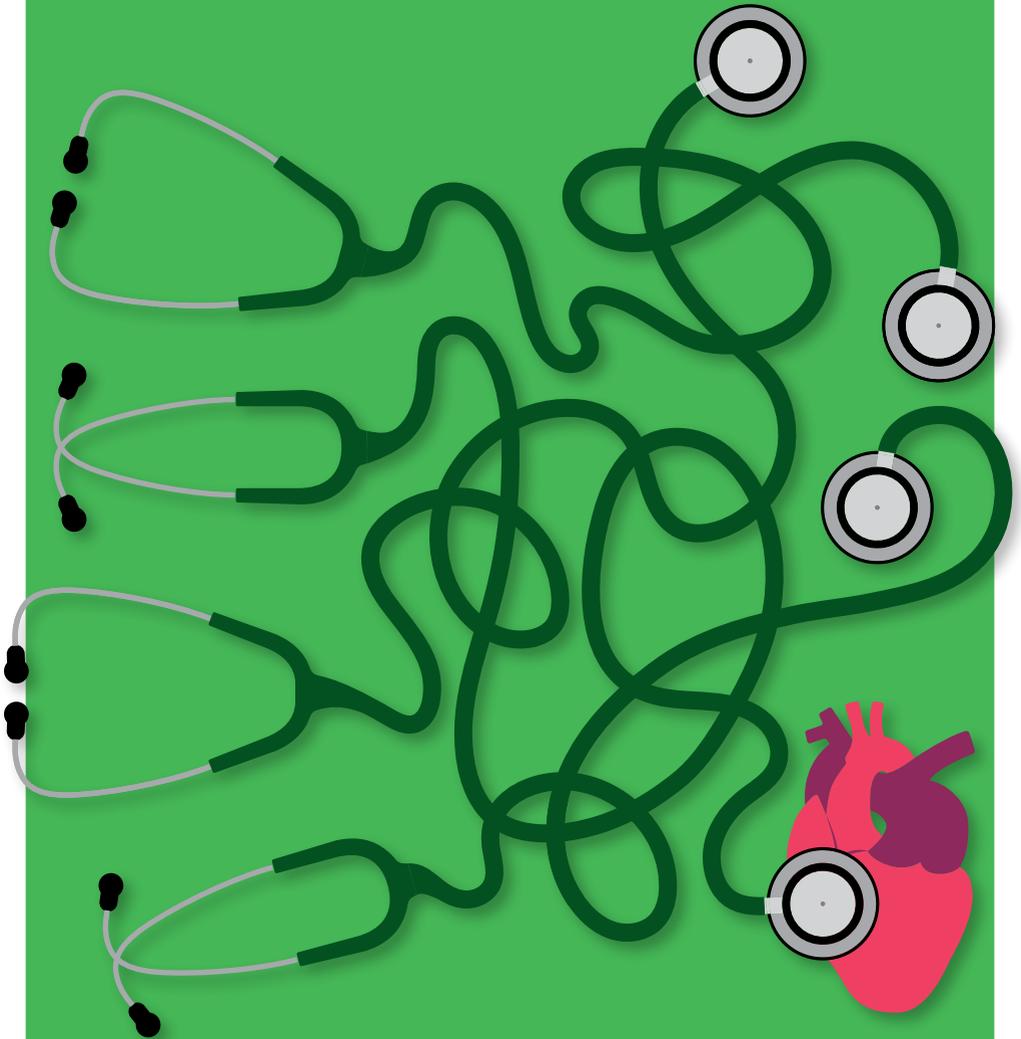
Your job as a qualified ODP would be to prepare the operating theatre, ensuring specialist equipment such as

instruments, dressings and drips are available for specific procedures. You would also be in charge of monitoring theatre cleanliness, ordering items of stock, providing the surgical team with the items they need and monitoring instruments.

Throughout your course, you will learn about human biology, pharmacology (medicine), an understanding of scientific equipment and looking after the care and wellbeing of the patient, both before and after surgery.



CAN YOU WORK OUT WHICH  
STETHOSCOPE IS MONITORING  
THE HEART?



# NURSING

**Nurses form the largest number of staff employed by the NHS and are a vital part of the healthcare team. Nurses can work in a wide variety of settings, including wards within hospitals, in the community visiting patients, schools, GP surgeries, prisons, industry and even cruise ships!**

No matter what work environment a nurse finds themselves in, they are relied on to listen to patients, recognise their needs and always put the individual first. It is a highly challenging but rewarding job, where you have to use your knowledge of how the body works, drug prescription and calculation, and treatment to its full effect.

At Birmingham City University, you can specialise in one of four different

fields of nursing. You can choose to learn about:

- Adult Nursing
- Child Nursing
- Mental Health Nursing
- Learning Disability Nursing.

Each course prepares you to understand and work with the specialised individual needs of your patient.



## DID YOU KNOW?

- The word 'nurse' is derived from 'nourice', meaning "one who nourishes".
- Just over 10 per cent of the nurses in the UK are male.
- In 2014, the NHS employed 150,273 doctors and 377,191 qualified nursing staff.

## What makes a good nurse?

The Nursing and Midwifery Council has set out six Cs to show what skills a great nurse should aim to demonstrate at all times.

- Care** Always provide a high level of care to people and help to improve the health and wellbeing of the whole community.
- Compassion** Provide care in a sympathetic manner, with respect and dignity.
- Competence** Demonstrate clinical and technical knowledge and understand the patient's needs.
- Communication** Communicate with patients, families and other members of staff.
- Courage** Do the right thing and speak up for the people you care for.
- Commitment** Show dedication to the care of your patients.

## A DAY IN THE LIFE OF A STUDENT NURSE

Two students from the School of Nursing, Midwifery and Social Work have been appointed as student nurse editors for the Nursing Times.

Victoria Abrahams is the new editor for adult nursing and Hazel Nash for mental health nursing. The role involves Victoria and Hazel writing regular blogs about aspects of being a student nurse and hosting debates on Twitter that will interest and provoke debate within the nursing community.

For Victoria, the role is a chance to share her interest in elderly care. "I'm hoping to use it as a platform to champion my passion of good care of older adults within our community," she said. "It's a subject I'm really passionate about after regularly volunteering with a charity called Contact the Elderly."



# MIDWIFERY

A midwife is a trained health professional who helps women during labour, delivery and after the birth of their babies.

Midwifery is the job for you if you enjoy the science of how the body works, as well as the development and progression of pregnancy and birth. You'd work with expectant mothers, their families and other health professionals in challenging but highly rewarding situations.



## DID YOU KNOW?

- The term 'midwife' literally means "with woman" when translated in Old English.
- It only takes a few weeks before a baby can visually distinguish between his or her mother and other adults.
- One would think that January sees the heaviest babies given all the holiday eating, but this is untrue. May is actually the month that sees the heaviest babies born – on average, they are usually 200 grams heavier than any other month.

Midwifery is not just a career for women. Lee Wright, one of our resident lecturers, has been a midwife for 22 years, and has worked both in the UK and abroad. Coming from a military background, Lee is one of only 140 male midwives on the register of the Nursing and Midwifery Council.

Last year, Lee took a team of twenty student midwives to undertake the 10k Royal Marines Commando Challenge in Lympstone. Our students completed the challenge, raising £2,500 for the Devon Air Ambulance Trust and the Royal Marines Benevolent fund. It was a great chance to practice skills such as teamwork and decision-making, vital for a future career as a midwife.

## CAN YOU FIND THE HEALTH-RELATED WORDS BELOW?

A I A M H O A P H O R A P K U  
Y N F L R P Z C P W M L F F T  
R S A C E E Q E T H E A T R E  
E C U E L R R E R A C L W Q S  
V R U Q S A E C N A L U B M A  
O U D X T T C R S F G Q P W G  
C B U I H I H I B U U U A P N  
E S N M J O Z E N F R R H U M  
R G L H U N V X T I D G Y C T  
K Q I K F O A G E I L F E N R  
P L R L D R T E H J C C E O M  
D H S S Z K Q F S Q B I V E N  
K L X T U K Y C S Y T Q L Q N  
B W I S D B W X F A B F H H N  
L F V Z W R P R P Z Y D G V U

Patient  
Operation  
Ward

Operating  
Theatre  
Ambulance

Clinical  
Anaesthetic  
Recovery

Care  
Surgeon  
Scrubs

# SPORTS, EXERCISE SCIENCE AND THERAPY

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**Sport and Exercise Science covers what happens during physical activity, from the biochemistry in a cell through to the physiological changes of the whole body.**

You could work with professional sports people looking for a cutting edge, or someone who needs exercise as a treatment for illness or for health improvement.

Sports therapy is where you diagnose, treat and prevent sporting injuries. You would learn about how to exercise, train and rehabilitate people, ranging from young competitors to ageing adults, including elite athletes and those with chronic disease.

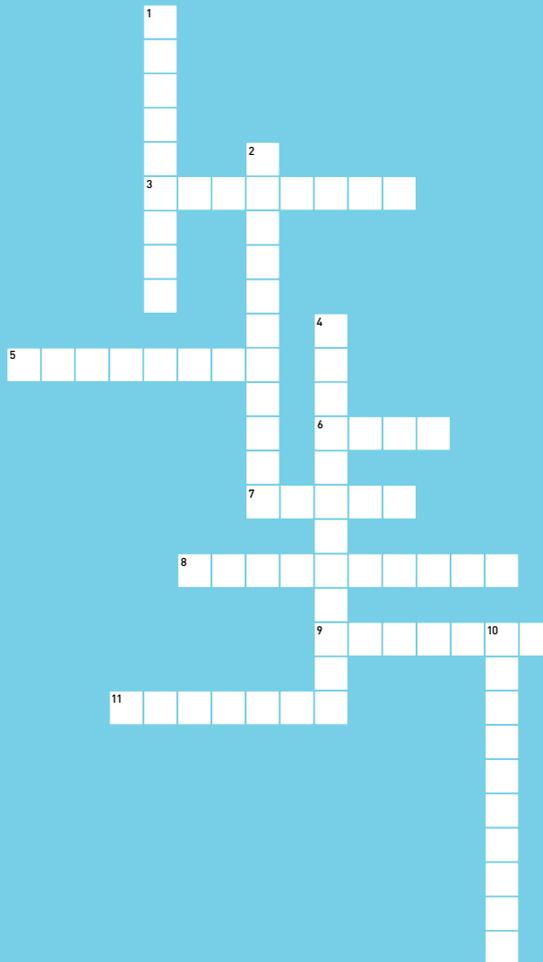
You don't have to be a sports fanatic to consider these careers, as there is much more to them. If you like biology and chemistry and enjoy fitness and exercise, this could be a great choice.

You could work as a personal trainer, a sports coach, a teacher or a researcher for top sports teams. Alternatively, you could work for the NHS, helping rehabilitate patients.

In a hospital, you could work with challenging patients that have previously done very little exercise. Away from a hospital, you could work for yourself or with sports coaches, local sports clubs, professional athletes, engineers and researchers.



# SPORTS, EXERCISE SCIENCE AND THERAPY CROSSWORD



## CLUES:

### Down

1. You are what you eat!
2. Life through movement
4. Chemical processes in the body
10. Mental processes and behaviour

### Across

3. Practice makes perfect
5. Physically active
6. The smallest unit of life that can replicate independently
7. How fast can you go?
8. Word that describes how the body functions

**Answers**  
Down: 1. Nutrition, 2. Biokinetics, 4. Biochemistry, 10. Psychology  
Across: 3. Training, 5. Exercise, 6. Cell, 7. Speed, 8. Physiology, 9. Therapy, 11. Anatomy

# BIOMEDICAL SCIENCE

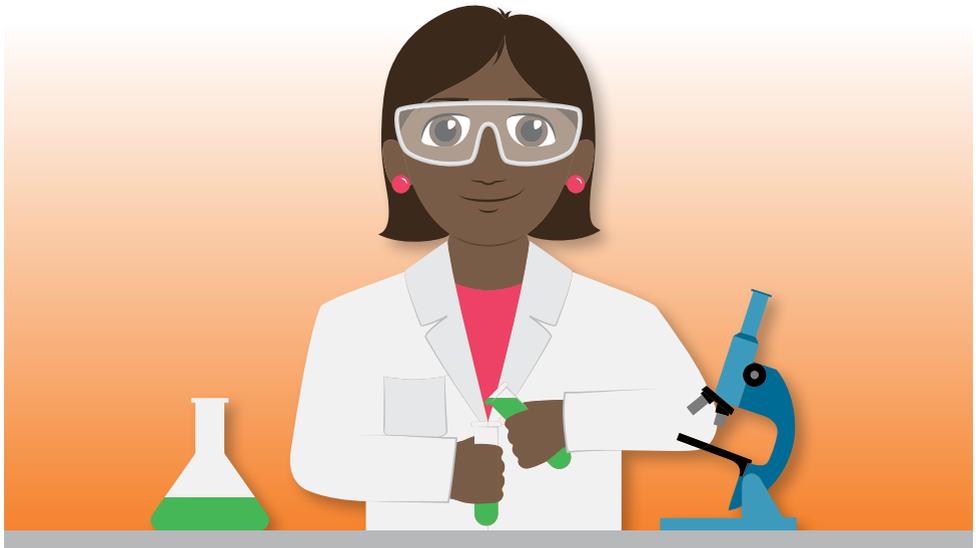
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**Biomedical scientists play an important role in keeping people healthy. They focus on how the human body works – from organs right down to individual cells and molecules – and use this knowledge to help with the diagnosis and treatment of different conditions.**

Without the work of biomedical scientists, other areas of healthcare would not function. For example, you could work with accident and emergency (A&E) departments, testing emergency blood transfusions to find out blood groups, or samples from patients who have overdosed or had a heart attack, to help decide on what treatment is needed.

Alternatively, you could work on longer-term treatments for different illnesses by identifying bacteria and viruses and monitoring the effects of treatments. You could also work on screening for diseases, to catch them before they do too much damage, giving patients the best chance of recovery.

This could be the career for you if you enjoy working in laboratories, using sophisticated equipment to carry out experiments and analysis. Biomedical scientists work in health services, research organisations and overseas charities, while others may go into academic research, teaching or journalism.



## Dr Andrew Powell

### Senior Lecturer in Clinical Physiology

“As a research scientist who specialises in recording the activity in individual brain cells, a typical day starts even before I reach the lab. Before I can start the day’s experiments, I need to reflect on my previous experiments; what worked, but also more importantly what didn’t work and how I can tweak things to improve the results I produce. This preparation is vital to ensuring that I am working towards the research goals of the project.

“Once in the lab, I have catch-up with my PhD students to see how their work is progressing; the discussion over coffee is vital to kick-start the day and also to see off any potential problems. Once I have topped up my caffeine levels, I will prepare for my day’s experiments (making solutions, making sure the brain cells are healthy), before spending the rest of the day sitting at my ‘rig’ to record the activity in the brain cells.

“On occasion, the brain cells do not behave themselves, making the day very frustrating – these days are not common, and are

just part of the job. When I am not in the lab, I will be hunched over a computer either analysing the data from previous experiments, planning the direction of my research, writing new funding proposals or preparing manuscripts for publication in scientific journals, all of which will be achieved with an ample supply of coffee.

“The major plus points of my job as a research scientist are the freedom to decide my daily tasks and research goals, to interact with intelligent individuals and to travel the world presenting my research findings. I love my job as there is a new challenge every day, and I wouldn’t change it for the world.”



# NUTRITION SCIENCE

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**Nutrition science is about the nutrients in the food and drinks we consume, and how the body uses them. Analysing the impact of these nutrients can help us understand how to prevent illness and disease, from obesity to mental health issues.**

It looks at how food production and processing methods can impact on the nutrient quality and content of food and drinks, as well as how to educate and motivate positive changes around healthier food choices.

Successful graduates could go on to work as nutritionists with the NHS or in a freelance capacity. You could also go on to further study to become a Complementary and Natural Healthcare Council registered nutritional therapist, who work to

analyse the impact diet is having on health issues, and then prescribe dietary, supplement and herbal programmes to support these issues. Most major food manufacturers and supermarkets also employ nutritionists.

There is also a variety of food-orientated careers within the related field of food science and technology. Nutritionists also work in emergency relief or development projects in low income countries.

Sport and Exercise Nutrition focuses on the role nutrition plays in supporting elite sports performance, exercise and health, opening doors to a variety of roles in the health and fitness industry.



# EIGHT HEALTHY TIPS!

## **Don't skip breakfast!**

It is the kick start your body needs, give yourself a healthy start to the day.

## **Get active!**

Walking, swimming, cycling, running, weight lifting, exercising, it all counts!

## **Eat more fish.**

Fish is a natural source of Vitamin D which is very important for bone health.

Aim for at least two portions a week.

## **Eat less salt.**

High salt intake is associated with increased risk of developing high blood pressure that can lead to stroke or heart disease

## **Eat lots of fruit and veg.**

Choose a variety as they contain different combinations of vitamins and minerals.

## **Eat less sugar and saturated fat.**

Replace saturated fats with good fats found in vegetable oils, nuts, seeds and oily fish.

Too much sugar is linked with tooth decay and obesity!

## **Drink plenty of water.**

Aim for 8 – 10 glasses of fluid a day. Avoid drinks with added sugars.

## **Base your meals on starchy foods:**

**bread, potatoes, pasta  
rice and noodles.**

Choose wholegrains and potatoes with skin on for more fibre, vitamins and minerals!