

All routes into engineering

**A guide for students
choosing their next steps**





Dilani, robotics engineer at HeroTech8



“ I love that every day is different. So I'm waking up to new challenges and new projects and new work to do every day.**”**

www.neonfutures.org.uk/dilani

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Why choose engineering?

5 reasons to work in engineering and technology:

- 1. Make a difference to the world:** transform the way we live. Engineers help create a healthier, safer, greener, happier and more equal society. They produce vaccinations, develop renewable power, improve cyber security, design accessible venues, and much more.
- 2. Be in demand:** Engineers and engineering skills will always be needed to help us adapt and thrive - now and in the future. Engineers and technicians are critical to reducing carbon emissions and achieving Net Zero.
- 3. Be rewarded:** have a well paid job that you love. Engineering is behind everything, from gaming and sports to the environment and space. It is one of the few career choices that allows you to follow your passion, doing something that you care about, while earning good money.
- 4. Create and innovate:** get paid for having ideas. Engineers find new and innovative solutions to everyday and complex problems. Their flair for design – combined with their highly practical approach to problem-solving – ensure their workload is varied and their skills are in demand.
- 5. Choose your path.** Exciting opportunities exist for engineers and technicians at all levels. The engineering sector needs people from diverse backgrounds to join the profession, whether that's via an apprenticeship, a degree, a degree apprenticeship, T Levels, or your own, unique route.

Hear from different engineers and technicians and find out more about what a job in engineering involves.

www.thisisengineering.org.uk



Leon, apprentice project manager at HS2

// The engineering industry not only helps local communities, but also drives a change to benefit future generations and shapes the world around us."

www.neonfutures.org.uk/leon



What do engineers do?

As an engineer, you could be working with new materials, chemicals and technology to design sports clothing, develop cancer treatments or improve wind turbines. You might be part of a team that designs electric planes, surgical robots or earthquake detection systems. Or you could be developing apps, creating special effects for films, or constructing a new stadium. Engineers work in teams with other engineers and other professionals (such as architects, health and safety experts, designers and project managers) and no 2 weeks are the same.

There are many different types of engineering, which are known as engineering disciplines. These include: aeronautical, chemical, civil, electrical, electronic, manufacturing, mechanical, robotic and software engineering. Engineers often work across different disciplines, building up an exciting and diverse career.

Some of the things that engineers do:

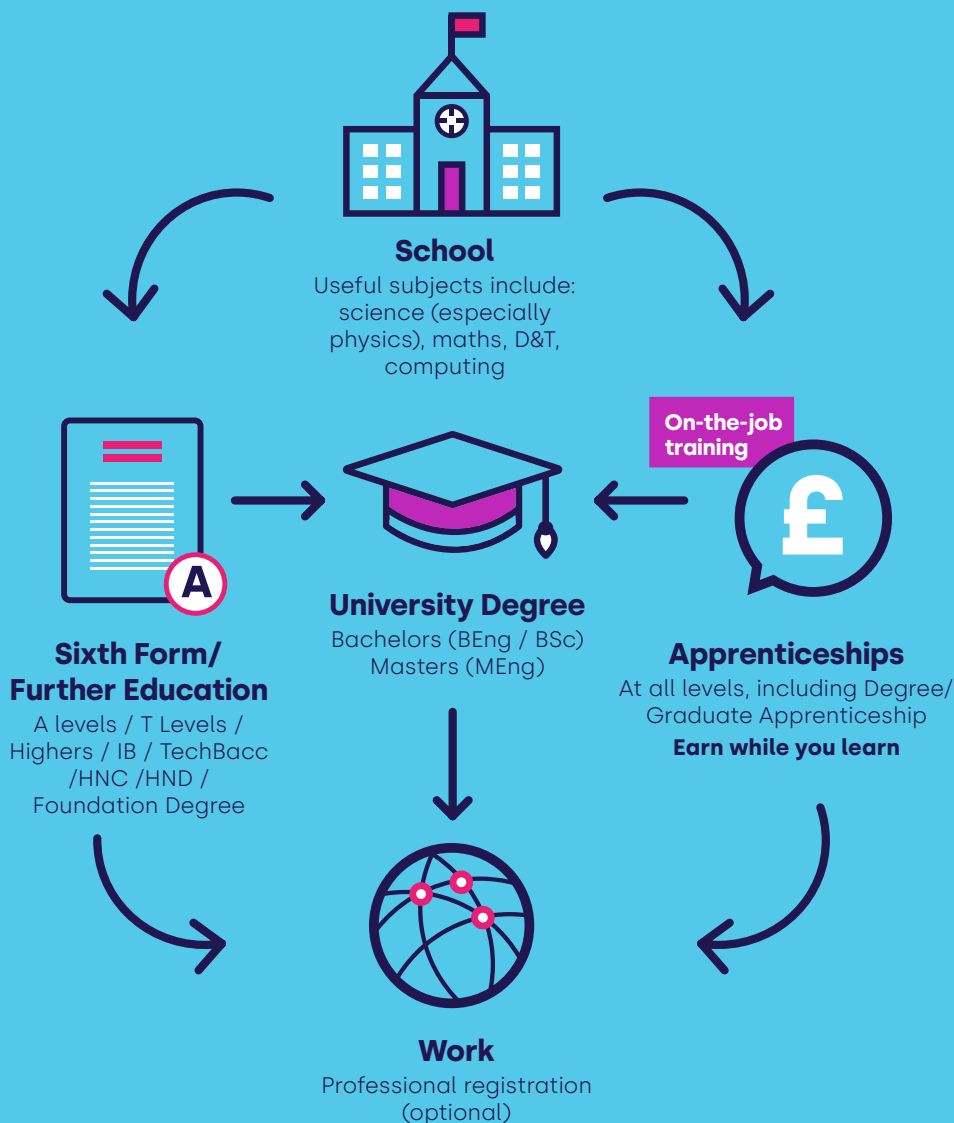
- Come up with **new ideas** and designs
- **Improve** and modify things
- Make things **more efficient**, often using new technology
- Use **specialist knowledge** to offer a unique perspective
- Think about the **implications and impact** of different decisions
- Make and present a case for what they think is the **best solution**
- Continually **review** their work and that of others
- **Think** about different elements at the same time (project management)

Take a look at our guide, 'From idea to career: explore 12 areas of engineering' to find out more about the different types of engineering and the career opportunities that exist.

www.neonfutures.org.uk/idea



Different ways to become an engineer



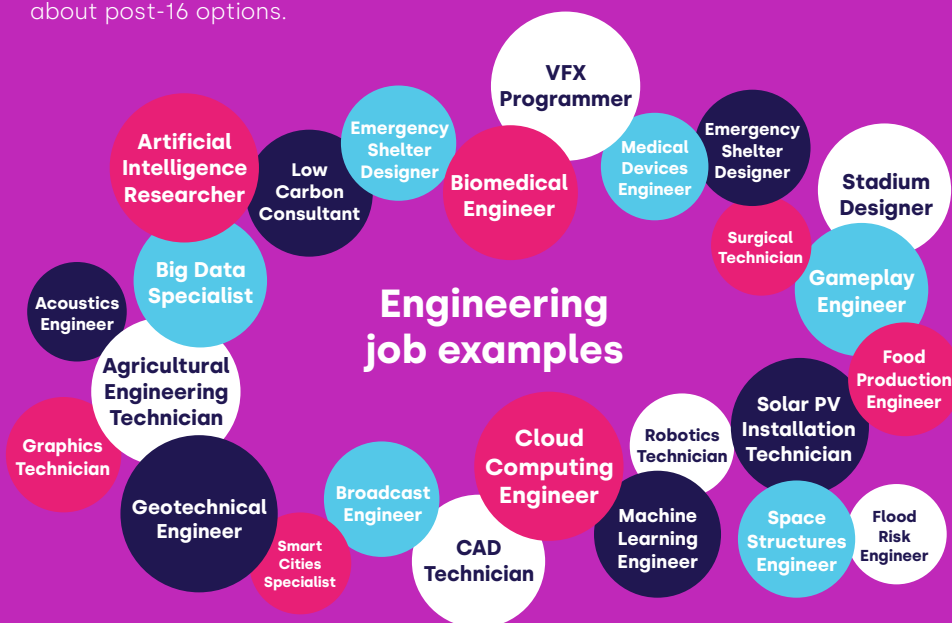
Routes into engineering

You can follow a number of different routes into engineering, including apprenticeships, T Levels, A levels, International Baccalaureate (IB), Scottish Highers, Degree/Graduate Apprenticeships, and degrees. Over the next few pages you can find out more about some of the different qualifications and pathways, to help you make a decision about your next steps.

It's always a good idea to speak to family, teachers and others who know you well, as they may be able to support you to explore different options. Check www.ucas.com for useful subject guides and information about post-16 options.

Useful subjects

Engineering uses **maths**, **science** – often **physics** – and subjects such as **D&T**, **computing**, **electronics** and **construction**, to improve the world around us. One or more of these subjects (or relevant T Levels) will usually be required to study engineering at university. Other subjects are also useful to some types of engineering – for example, **geography** for civil and environmental engineering, **chemistry** for chemical and biomedical engineering, **art and design** for product design and design engineering, and **psychology** for helping engineers understand how people think and feel about the world around them. Engineers often work on global projects – and so **languages** can also be an advantage.



T Levels

What are T Levels?

There are different qualifications available when you leave school, including T Levels, A levels, Highers, IB, TechBacc and apprenticeships.

T Levels are career-focused qualifications designed by employers, made up of 80% classroom learning and 20% workplace experience, consisting of a 45-day industry placement, helping prepare you for the world of work. T Levels take 2 years to complete and are equivalent to 3 A levels, making them the ideal entry route to a university degree, a degree apprenticeship, or a job.

The experience and understanding you will gain of the real world of work will be attractive to potential employers, who will value the skills, knowledge and practical experience you will gain.

For a full list and to search for T Levels near you, visit:
www.tlevels.gov.uk/students

Information for parents/carers can be found at: **www.tlevelinfo.org.uk**



There are several T Levels available at schools and colleges in England, including:

- Design & Development for Engineering and Manufacturing
- Maintenance, Installation and Repair for Engineering and Manufacturing
- Building Services Engineering for Onsite Construction
- Science
- Digital Production, Design & Development
- Design, Surveying and Planning for Construction
- Engineering, Manufacturing, Processing and Control



Employer spotlight: Portmeirion

“ We have embraced the opportunity to offer T Level placements - we want to help bring young talent within the ceramic industry and engineering T Levels are helping to boost the skills we need. **”**

www.neonfutures.org.uk/portmeirion



University degrees and degree apprenticeships

A degree in engineering can be a useful starting point for a career in engineering, or for a career in another sector where the ability to creatively problem-solve using maths and science is valued.

Which degree is for me?

A general engineering degree could be a good option if you want to build a broad knowledge base and find out more about the different engineering disciplines (such as chemical, civil, electrical and mechanical) and how they interconnect, before deciding which area(s) to specialise in. For engineering, the 2 main Undergraduate degrees are Bachelor of Engineering (BEng) and Bachelor of Science (BSc). If taken full-time, Undergraduate degrees generally take 3 to 4 years to complete. Some degrees are offered with a year in industry or abroad. You could opt to take a Foundation Degree, which is equivalent to the first 2 years of an Undergraduate degree, if you are working and wish to study part time. A Master of Engineering (MEng) is more in-depth than a BEng, usually lasting for an extra year and involving a significant research project. It can lead directly to professional registration with the Engineering Council.

What qualifications do I need?

Engineering degrees normally require A level/Higher mathematics. Physics, or sometimes chemistry, depending on the type of engineering, are often required, though it is advisable to check individual entry requirements. Relevant T Levels, advanced apprenticeships and other Level 3 qualifications can also support entry onto an engineering degree. Specific grade requirements vary between universities, but generally at least a Grade 5 (C) or equivalent will be required in maths and often physics or a related science subject and in some cases a Grade 7 or 8 (A) or above will be required.

For students who do not have the required subjects for entry onto an engineering degree, a foundation year is sometimes an option, to gain familiarity with maths, physics and general engineering related concepts, before progressing onto an engineering or engineering related degree. It is also possible to become an engineer after studying a related degree such as maths, physics or computer science.

Entry requirements will vary

depending on the degree and the university so double check the UCAS website (ucas.com) and the university prospectuses, or have a chat with university admissions departments to understand the Tariff point system and ensure your intended qualifications and subjects are accepted by the universities you wish to apply to.



Adil, chemical engineer at Unilever UK

// The skills, principles and techniques that I learnt during my degree have helped me to understand and contribute to the technical discussions within the innovation projects for new products that I lead. **//**

www.neonfutures.org.uk/adil

What are degree apprenticeships and Graduate Apprenticeships?

Degree apprenticeships (Graduate Apprenticeships in Scotland) are higher level apprenticeships that can lead to Bachelor's Degrees as part of an apprenticeship. They are ideal for students who want to gain work experience rather than studying full-time at university but would like to achieve the same degree status. If the financial implications of doing a degree are a concern, degree apprenticeships are worth exploring, as apprentices earn a weekly wage, and the cost of the degree is covered.

How do I choose between all the different options?

Do your research!

- **Visit universities** and find out how the course is taught:
 - How practical is it?
 - Are there opportunities for industry visits?
 - Does it involve project work?
 - Can you develop a specialism?
 - Is the degree accredited?
- **Look at rankings** (for example, www.thecompleteuniversityguide.co.uk)
- **Talk to current and past students**
- **Speak to teachers** and careers advisers at school or college.

How can I stand out?

Demonstrate your genuine passion for the subject – for instance, work experience, placements, extended projects, competitions and taster days can enhance your application.

Have a look at this guide for further inspiration:

www.neonfutures.org.uk/student-guide

Accredited degrees

Many engineering degrees are accredited – this means they meet the standards set out by the engineering profession. Accreditation is based on the quality of the degree programme and whether it provides the knowledge and understanding needed for professional registration as Incorporated Engineer (IEng) or Chartered Engineer (CEng). Visit the Engineering Council's website to search for accredited degree programmes: **www.engc.org.uk/courses**



Apprenticeships

What is an apprenticeship?

Apprenticeships allow you to earn money, combining on-the-job training with study. Apprentices work towards nationally recognised qualifications at college and/or a training provider and through virtual learning – and spend the rest of their time developing technical skills and on-the-job knowledge with an employer in their chosen industry. Apprentices are supported throughout their apprenticeship and are encouraged to take on varied tasks and develop new skills. Once you complete your apprenticeship, it is likely that you will stay with your existing employer and progress from apprentice to professional technician or engineer. The skills and qualifications you achieve during an apprenticeship are transferable and they can help you throughout your career. You could decide to apply for another job, opt for a higher-level apprenticeship, or apply to university, once you complete your apprenticeship.

How long does an apprenticeship take to complete?

Apprenticeships exist at different levels and tend to take between 1 and 5 years to complete, depending on the level.

- Intermediate Apprenticeship – equivalent to Level 2/GCSE
- Advanced Apprenticeship – equivalent to Level 3/A level/ T Level
- Higher Apprenticeship – equivalent to Levels 4-7/Foundation Degree and above
- Degree Apprenticeship – equivalent to Levels 6-7 / Bachelor's or Master's Degree

In Scotland, you could do a Foundation, Modern or Graduate Apprenticeship, gaining industry skills while working towards qualifications accredited by the Scottish Qualifications Authority (SQA).



Asha, materials engineer at Dr Martens

// It's so rewarding to see the products I helped to make in high street stores across the UK."

www.neonfutures.org.uk/asha



How much does an apprentice earn?

Engineering employers tend to pay significantly more than the national minimum apprentice wage. Have a look at current apprenticeship vacancies to get an idea of typical earnings. It's worth remembering that your employer is investing in your career development by funding your training and education. When you weigh this up against the cost of university, you can see why many people consider the apprenticeship route.

What are the different types of apprenticeship?

There are many different apprenticeships available in engineering, technology, manufacturing, construction, computing and digital. Browse live apprenticeship vacancies to get an idea of the range of apprenticeships that exist. A huge number of new roles for apprentices, technicians, engineers and scientists are being created as a result of the UK's Net Zero target, requiring skilled workers to innovate solutions in areas such as power (for example, wind and tidal power), transport (such as low-carbon air travel and improved cycle networks) and building (including retrofitting and climate adaptation).

How do I apply for an apprenticeship?

You must be 16 or over. (In Scotland, you can do a Foundation Apprenticeship while you are still at school). Apprenticeships don't usually have a set start date that corresponds to school term times – employers recruit all year-round. You will generally need Grade 4 (C) in maths, English and a science-related subject to be accepted onto an engineering apprenticeship, but each employer or training provider will set its own entry requirements.

Search and apply for apprenticeships:

- **England**
www.apprenticeships.gov.uk
- **Scotland**
www.apprenticeships.scot
- **Wales**
www.careerswales.gov.wales
- **Northern Ireland**
www.nidirect.gov.uk/apprenticeships



Ross, apprentice at Drax

“ As someone with severe dyslexia, I find the focus on the practical application of skills and knowledge is the best way to learn. **”**

neonfutures.org.uk/ross



Where will the jobs be?

Engineers are at the forefront of shaping the world we live in, helping to solve our biggest challenges. From enabling commercial space travel and minimising the impact of natural disasters to developing sustainable power and producing and distributing vaccinations, engineers help pave the way to a better future for everyone.



Advanced manufacturing:

An area of significant growth for the UK economy, influenced by the growing 'computerisation' of production processes, designing for the new 'right to repair' legislation, using renewable materials and techniques like 3D and 4D printing.



Automotive:

Electric and autonomous vehicles are a key focus for the future as diesel and petrol cars are phased out, leading to thousands of additional jobs in automotive, design, electrical and mechanical engineering.



Aerospace and space:

The UK is Europe's largest aerospace manufacturer, second only to the USA globally. Over the coming years there is likely to be significant investment into researching and developing greener, quieter, more economical aircraft.



Agricultural technologies:

A fast-growing global market driven by population growth. Nutrition, informatics, satellite remote sensing, precision farming, vertical farming and meat alternatives are all underpinned by technological advances.



'Big Data': There is a massive global market for data analysis products and services. The UK's current digital skills shortage means that opportunities exist in the next decade to gain the skills required to analyse complex data and turn it into useful intelligence.



Creative digital: The UK is a world leader in areas requiring software and coding skills, such as post-production special effects in films, games design and digital advertising.



Construction:

Significant investment into housing and the need to retrofit our existing housing stock, along with infrastructure projects such as Crossrail, Hinkley Point C, Northern Powerhouse Rail and the Dogger Bank wind farm, will generate plenty of opportunities in this sector.



Life sciences: Employs people in areas such as medical technology and biopharmaceuticals. There has been a rapid expansion in the number of roles for engineers working on vaccine research, development, manufacture and distribution.



Renewable power: Renewable power now provides around a fifth of the UK's electricity. The UK is a world leader in offshore wind and this is a huge growth sector, along with solar, tidal and hydrogen power, requiring engineers who are skilled in civil, electrical and mechanical engineering.



Nuclear power: is likely to form an important part of a 'balanced mix' of generating technologies over the long term, to provide reliable, low carbon electricity. A nuclear power station at Hinkley Point C, Somerset, is due to start generating electricity by 2027.



Road and rail transport:

Significant investment in road and infrastructure projects - including smart motorways and port expansion, as well as the electrification of the rail network - mean there will be plenty of jobs in this sector.

Engineering – did you know?

- **You don't need top grades in maths and physics to become an engineer.** An aptitude for and interest in these subjects is often a good indication that engineering could be for you – along with the desire to come up with creative solutions to problems. Whichever route you take into engineering, you are likely to need at least a Grade 4 or 5 (C) in maths and science – and for some competitive university degree courses, you may need a Grade 7 or 8 (A) or above in maths and sometimes physics or another related subject. Check UCAS for more info and specific entry requirements: www.ucas.com

- **Engineering is for everyone.** The engineering, tech and digital sectors are actively recruiting a diverse workforce. Different perspectives gained from varying life experiences lead to greater potential for innovation and creativity, which is what engineering is all about.

- **Engineers are in demand.** As an engineer, you can enjoy job security and a flexible career. Engineering is an evolving, ever-growing sector that will always be needed as it helps us thrive and adapt to the world around us, often using advancements in technology to help us respond.

- **Engineering is about making a difference to people's lives.** Engineers solve current and future global challenges. They are critical to helping the UK and the rest of the world reduce carbon emissions, develop renewable power, electric vehicles and new 'green' methods of re-using and disposing of waste materials. They invent devices that improve the quality of life for elderly people and people with mobility or health issues and they create safer online and physical environments. Engineers ensure everyone in the world has access to food and clean water, they work out how to respond to and protect us from natural disasters and they help us stay connected and they make sure that the buildings and transport networks we use are safe, sustainable and fit for purpose.



Taha, quality engineer at Thales

// I love the endless opportunities - with such a diverse range of disciplines, there is always room for you to use your skills regardless of the background you come from."

www.neonfutures.org.uk/taha



- **Engineers use different skills and qualities.** A big part of being an engineer is working in teams and communicating with others, to get your ideas across, collectively problem-solve, and make sure the project stays on track. Engineers develop the skill of seeing things from different perspectives, so that they can value and constructively challenge different viewpoints. Engineers tend to be curious about the world around them and they develop integrity, which means they consider the safety, durability and sustainability of a product or project, always thinking about the potential impact on the environment and any moral or ethical considerations.

- **Engineers and technicians work everywhere!** They can be found in design studios, offices, hospitals, high-tech manufacturing centres, at sea, underground, in space, at home, on construction sites, railways and out in the field, for example at the aftermath of an earthquake or flood. Engineers are also employed outside of the engineering sector, for example, by theatres and retailers. Teaching is another option for

people who have studied or worked in engineering – the UK needs more skilled STEM subject teachers, to inspire future engineers and technicians.

- **You can work towards professional registration as an engineer.**

Whichever route you take into engineering, once you build up the necessary practical and technical skills and workplace experience, you can become professionally registered, which is recognised globally and demonstrates a certain level of expertise. Registration options are: Engineering Technician (EngTech), Incorporated Engineer (IEng) and Chartered Engineer (CEng). Engineers are experts in their chosen field, and they often span more than one engineering discipline (for example civil, mechanical and energy engineering), meaning there is plenty of variety and scope to work on different projects.

Take a look at research done by EngineeringUK and others into the engineering sector.

www.engineeringuk.com/research



Employer spotlight : Drax

“Engineers are critical to our business as we're committed to enabling a zero carbon, lower cost energy future through engineering, technology and innovation.**”**

www.neonfutures.org.uk/drax



What next?

Top tips for exploring your future options

- **Get involved** – we've put together some tips and suggestions for interesting podcasts, books, films, social media channels, days out, quizzes, competitions, activities, events and career websites, which are all related to engineering, science, technology and maths.
www.neonfutures.org.uk/student-guide
- **Do your research** – speak to anyone you know who works in engineering, and seek careers advice at school or college. Chat to family, teachers and friends about your future options.

- **Try it out** – if you can, doing some work experience or attending a taster day, industry visit or summer course can be a great way of working out whether engineering might be for you. Take a look at this information to get you started:

www.etrust.org.uk/the-year-in-industry

www.in2scienceuk.org/students

www.nuffieldfoundation.org/students-teachers

www.ratemyplacement.co.uk

www.studentladder.co.uk

www.speakersforschools.org/vwex/



Have a look at careers information online – there are lots of useful websites, which are listed on www.neonfutures.org.uk/student-guide

- **Hear from different engineers**, talking about what they do:
www.thisisengineering.org.uk
www.neonfutures.org.uk/case-study



**Nargiza,
Researcher at UCL**

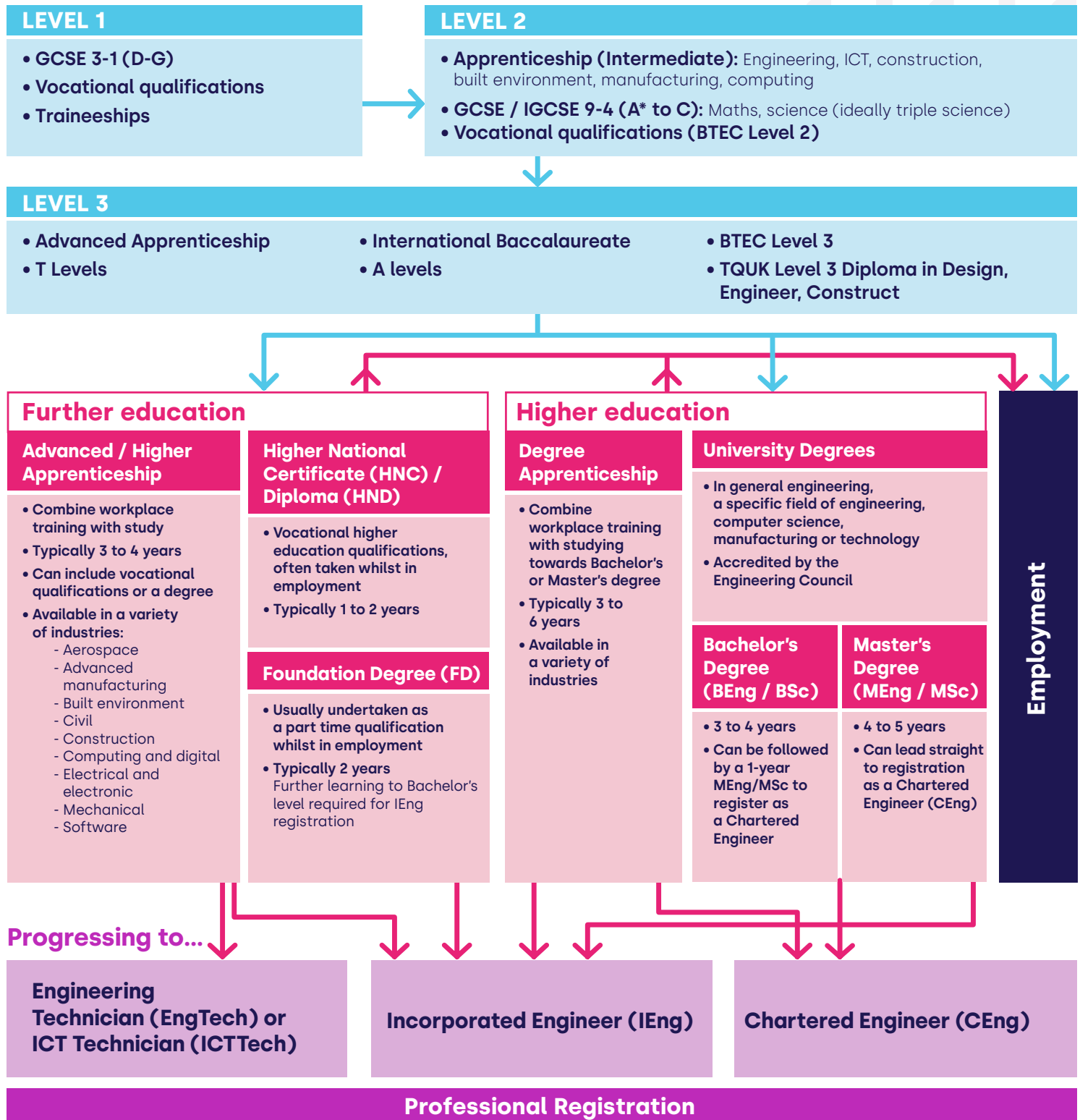


“Look around and see if there's something that can or should be done better, and then become an engineer to fix that problem.”

www.neonfutures.org.uk/nargiza

Routes into engineering (England)

Where am I now?



Useful subjects for engineering:

- maths, science (triple)
- physics, computing, design & technology, electronics, chemistry

Other relevant subjects:

- geography, art & design, creative media, languages, psychology

T Levels: www.tlevels.gov.uk/students

Apprenticeships: www.apprenticeships.gov.uk
www.instituteforapprenticeships.org/occupational-maps

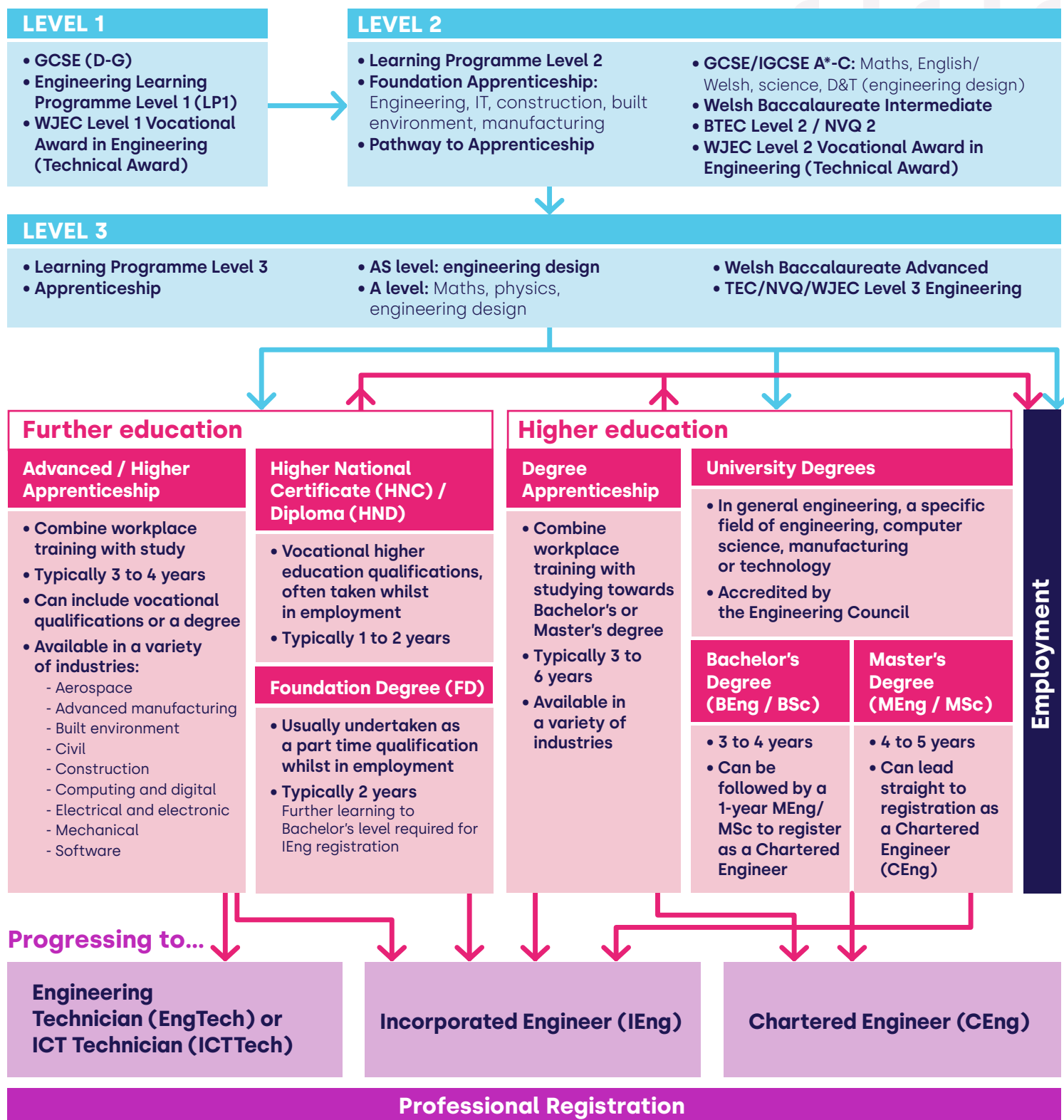
Degrees and Degree Apprenticeships: www.ucas.com



Brilliant Inspiration

Routes into engineering (Wales)

Where am I now?



Useful subjects for engineering:

- maths, science (triple)
- physics, computing, design & technology, electronics, chemistry

Other relevant subjects:

- geography, art & design, creative media, languages, psychology

Apprenticeships: www.careerswales.gov.wales/apprenticeships

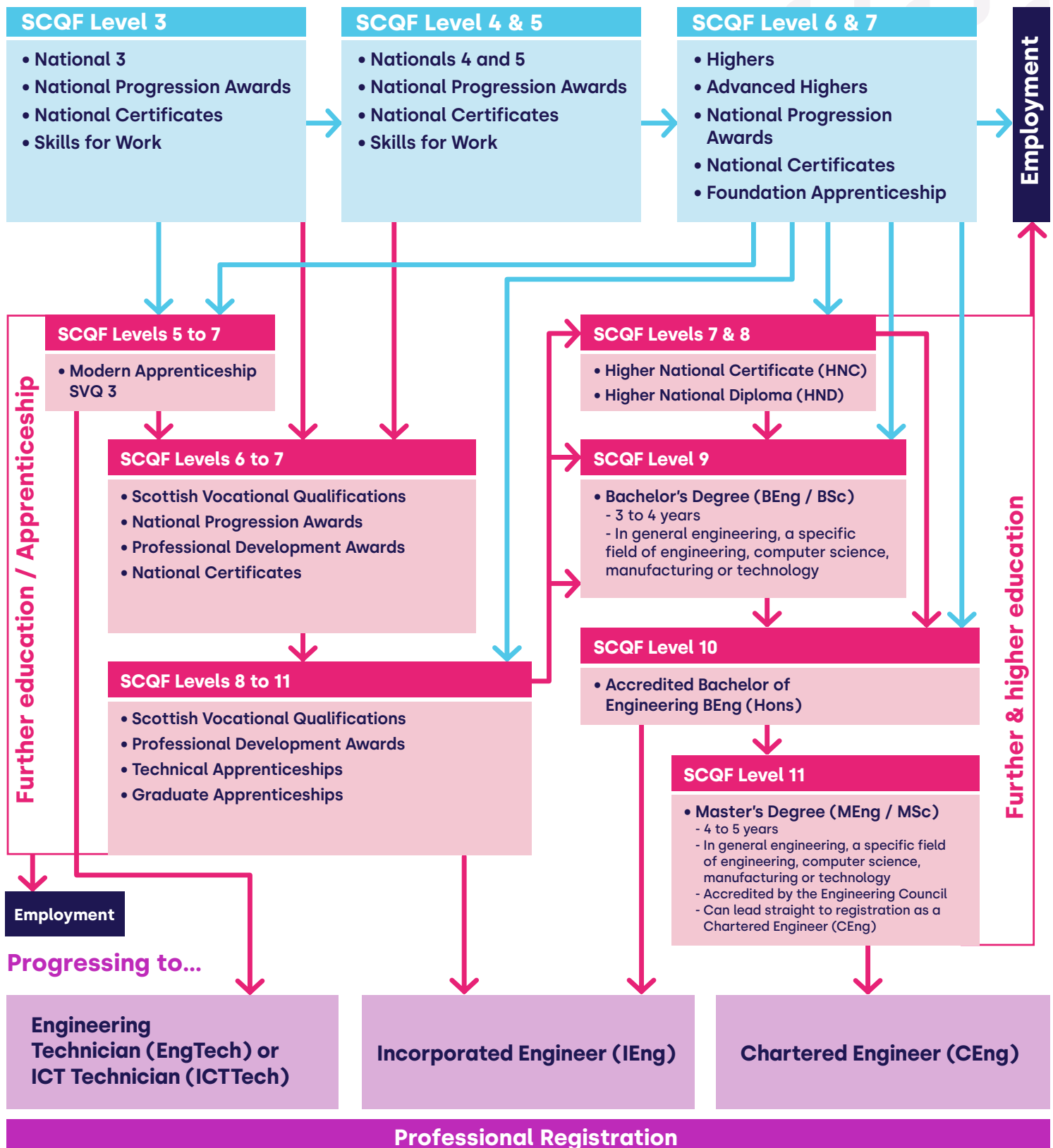
Degrees and Degree Apprenticeships: www.ucas.com



Brilliant Inspiration

Routes into engineering (Scotland)

Where am I now?



Useful subjects for engineering:

- maths, sciences
- physics, computing science, design & technology, electronics, chemistry

Other relevant subjects:

- geography, art & design, creative media, languages, psychology

Apprenticeships: www.apprenticeships.scot

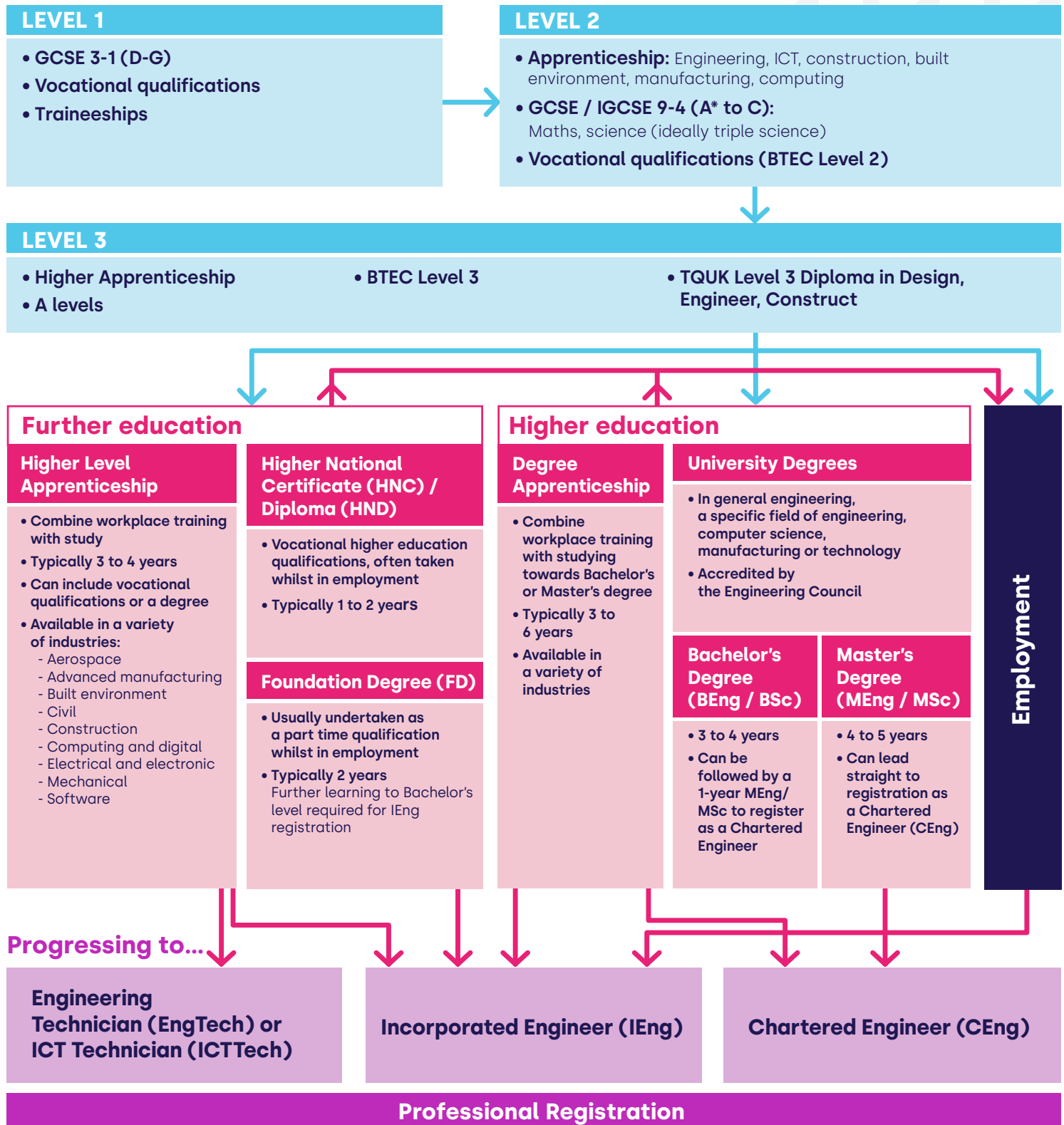
Degrees and Degree Apprenticeships: www.ucas.com

neon

Brilliant Inspiration

Routes into engineering (Northern Ireland)

Where am I now?



Useful subjects for engineering:

- maths, science (triple)
- physics, computing, technology & design, electronics, chemistry

Other relevant subjects:

- geography, art & design, creative media, languages, psychology

Apprenticeships: www.nidirect.gov.uk/apprenticeships

Degrees and Degree Apprenticeships: www.ucas.com



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Image credit: This is Engineering