Postgrad study

Is it time you pursued a higher-level degree?

Plus: widening participation for students with disabilities
Education is key to improving social mobility

The benefits enjoyed by those with postgraduate qualifications are becoming increasingly evident. Research published by the Sutton Trust education charity suggests that in Britain, they will earn on average 14% more than those with an undergraduate degree alone. They are also 15% more likely to be employed full-time after six months, according to the Higher Education Statistics Agency, and more likely to use skills acquired during their education in their work.

But with undergraduate tuition fees now capped at £9,250 a year, mounting debt could deter potential students into postgraduate study, which raises questions about the economic barriers some face. Around three-quarters of those on taught postgraduate programmes in the UK - which cost on average £6,848 - are self-funded, with many relying on financial support from their families to pay their fees.

“It is no longer enough to have a bog-standard bachelor's degree to distinguish yourself from the crowd. Postgraduate qualifications are often essential in many fields such as journalism, and they command a wage premium - £200,000 more than an undergraduate degree alone over a lifetime,” says Lee Elliot Major, chief executive of the Sutton Trust.

“But with undergraduates racking up average debts of £50,000, those who do not come from privileged backgrounds and cannot rely on the bank of mum and dad, are prevented from pursuing postgraduate education - the new frontier of social mobility.”

Those from under-represented minority groups are the most likely to want to study at postgraduate level but the least likely to do so. Therefore, many universities are now in a multi-million-pound drive to equalise opportunity. In 2017/18, Russell Group universities will spend more than £250m on scholarships, bursaries, fee waivers and outreach to widen participation in education.

However, pleas for a means-tested postgraduate loan system - in which funding is prioritised for those most in need of it - are often ignored, says Elliot Major. “Rather than levelling the playing field, financial aid is too often a vehicle for people who are already advantaged to cement their place in society,” he says.

The University of Sheffield provides postgraduate students from under-represented groups with scholarships of £10,000, with awards based on criteria such as whether they are from deprived areas. Last year, the university awarded 154 scholarships - worth more than £1.5m. “It is vitally important that we tear down financial barriers to postgraduate study and widen access to people from all backgrounds,” says Wyn Morgan, vice president for education at Sheffield. “Education is key to improving social mobility. A postgraduate degree can provide a huge boost to your employment prospects.”

Scott Walker, 25, thought he could not afford a postgraduate qualification, being from a low-income family. But a scholarship from the University of Warwick – which awards 100 scholarships of £5,000 to under-represented groups each year – paid for him to study an MSc in advanced mechanical engineering. Since graduating last year, Walker has received job offers from leading postgraduate employers including Jaguar Land Rover and Aston Martin, where he works in Milton Keynes as a senior quality engineer. He says the funding was “fundamental to my success”.

Postgraduate funding

Loans, fees, scholarships

- From 2016/17, non-means-tested loans of up to £10,000 have been available to postgraduate students living in England and some EU students taking master's courses at UK universities. These are subject to an interest rate of the RPI (retail price index) plus 3%. Repayments are set at 6% of any income over £21,000.
- The government will be introducing loans of up to £25,000 for doctoral students from 2018/19.
- Around 35% of postgraduate students have used their own savings to pay towards their fees. About 22% used formal loans, 19% had loans from family or friends, and around 10% used fee waivers such as scholarships.
- Young people from working-class backgrounds are only 28% as likely to obtain a postgraduate degree as their peers from privileged upbringings, with high fees deterring many.

Sources: Higher Education Funding Council; White Rose University Consortium; University of York; London School of Economics
Artificial intelligence

Master of machines

AI is everywhere – and a broad range of industries want postgrad experts, says Helena Pozniak

I

ntelligence is no longer exclusively human. Machines can now recognise a human face, drive a car, beat a chess master and cope with uncertainty. To be as clever as a human, a system must make the right decision in complex and changing conditions – aware to avoid someone while not knowing if it’s safe, for example, or understand loosely worded commands.

Expectations of what artificial intelligence (AI) can do run high, and AI for non-computer scientists. “Many of his students come from a financial background – AI can be useful in assessing risk and fraud and making sense of vast amounts of data. Learning the discipline makes them highly employable, says Hagras, and the same can be said for other sectors such as health, gaming and the automotive.

Essex runs crash courses to open up AI non-computer scientists. “Many courses touch on AI but don’t have it in the title – robotics, for example,” Hagras says. “It’s a hot topic in the games industry – many use AI even though they may not call it that.”

Most courses want a computer science degree, and they are competitive – the University of Manchester’s MSc in AI is often oversubscribed, but may make exceptions for science graduates with professional programming experience. “But we try to give students the broad perspective,” says Manchester’s Prof Ul Sattler. “AI means more than just machine learning.”

At UCL, AI master’s students will be taught some of the course by experts from DeepMind Technologies, a Google subsidiary famous for creating AlphaGo. Last year, the program beat the reigning champion at the ancient and complex Chinese board game Go – a feat experts believed was a decade away.

Nearby, Imperial College’s specialist master’s is open only to students with a solid background in computing. The course is broad – cognitive robotics, computational finance and more. One of the longest established centres for AI is based at the University of Edinburgh. From here postgrads go on to work in a variety of specialisms, from fraud detection to spacecraft control. Car manufacturers, finance and healthcare – all have openings for AI specialists. “It’s a huge field, moving very, very quickly,” says Hagras.

‘AI accelerates the search for new drugs’

PhD research student Sam Cooper explains how AI can improve the way we treat cancer

When trying to find new drugs, researchers typically must process and search thousands of images, which can take months of work. With these new techniques, we will potentially be able to get results in a day or two.

I started by studying biochemistry at undergraduate level and went straight into research after my degree. I’d been to an inspirational talk about the potential of AI and I was hooked. Although I didn’t really know much about it, when I saw this research position advertised, I jumped at it. I’ve always loved maths and computer programming as a hobby - I used to try and make my own computer games. Now this project has allowed me to take a quantitative approach to studying biological systems. I believe AI could be truly useful for drug discovery.

On automating parts of the drug discovery process. Scientists have been looking into the potential of deep learning for years – you get the sense that we’re on the verge of scientific breakthroughs linked to the technology and there seems to be a lot of investment and interest in the field.

There are really good things happening around research into cancer – there’s a chance to make a real difference. I believe we could see the end of cancer in our lifetime.

Interview by Helena Pozniak

Sam Cooper, 24, is in the final year of his PhD in cancer research at the Institute of Cancer Research and Imperial College, partly funded by Stand Up To Cancer, a joint national fundraising campaign from Cancer Research UK/Channel 4.

In Toronto with a view to helping found a new startup. We’re at the early stages, but using this technology we want to automate the analysis of biomedical images, whether it’s for assessing drug effects or diagnosing cancer. We’re initially focused on automating parts of the drug discovery process.

I believe we could see the end of cancer in our lifetime.
Learn on location

As an EU citizen, options for cheap or free postgrad courses and funding opportunities are plentiful, despite Brexit, says Lucy Jolin

It’s not too late to beat Brexit and study for a postgraduate qualification in Europe. The benefits are huge and employability is a big factor. “The European Commission’s Erasmus Impact Study showed that the share of employers across Europe who consider experience abroad to be important for employability nearly doubled between 2006 and 2013, from 37% to 64%, and this is set to rise,” says Naquita Lewis, higher education lead, Erasmus+ UK National Agency.

Postgraduate study in Europe can be considerably cheaper. If you’re a citizen of an EU country, you’ll only have to pay what citizens of your chosen university’s country pay. Fees range from entirely free (Austria, Denmark, Norway) to reasonable – between £200 (€177) and £650 in France, or €1,350 to €1,500 in Spain. Language isn’t an issue, either. The majority of countries in Europe offer programmes taught in English, with the majority in the Netherlands – 12 universities with 1,034 English-taught degrees, including 930 master’s. Applying directly to an EU university is easy: just find the relevant contact on the university’s website and take it from there.

The Erasmus scheme is still very much a potential source of funding. “We cannot speculate on any possible future scenarios following the UK’s exit from the EU, but we note the government position that UK participation in some EU programmes ‘promoting science, education and culture’ may continue subject to the negotiation,” says Lewis. “While we are a member of the EU, UK students should carry on applying and taking part.”

Postgraduate students can apply for an Erasmus+ master loan to help with their living and tuition costs when studying in a country other than where they live or where they took their first degree. And the scheme doesn’t just provide funding - you can also apply to study on an Erasmus Mundus joint master’s degree (EMJMD), an integrated, international study programme jointly delivered by a consortium of higher education institutions. You’ll study in at least two countries in Europe and may also have the chance to study outside of Europe. It’s also possible to study in Europe while still being affiliated to a UK university. The University of Kent, for example, has four specialist postgraduate centres in Brussels, Rome, Paris and Athens (as part of the Brussels School of International Studies).

“There are numerous benefits in terms of travel, experience, personal development, language skills and more importantly, a focus on the integration of place and academic subject,” says Prof Jeremy Carrette, dean for Europe. “For example, the Brussels School of International Studies has access to all the political agencies in Brussels for internships and experience visits, speakers visits and so on.”

Europe is still very much open to UK postgrads. “People are brought up in a very strongly connected world,” says Carrette. “We don’t travel to escape life, we travel to find life. I think that’s what an education in another country can help to do.”

Kate Pemberton, 24, spent a semester of her undergraduate anthropology and international relations degree at the University of Copenhagen. She loved it so when it came to choosing a master’s, the city was her first choice.

“It was exactly the kind of master’s I wanted to do, and I love living in the city,” says Pemberton (below), who is now three months into her master’s. “In terms of studying, it’s a lot more focused on group work and collaborating with other people. I like being part of an international community.”

As well as wanting the experience of studying abroad, the absence of fees was a big factor. As an EU student, it’s not only free for her to study a master’s in Denmark, but she’s also eligible for a government grant, available to those who work 10 to 12 hours per week. “It wasn’t a deciding factor, but it was a big help,” she says. “I don’t know how long the situation regarding fees is going to last, but I’m hoping to have finished by the time Brexit kicks in.”

Pemberton feels the experience of studying abroad has given her valuable skills. “I’ve been learning Danish, which isn’t the most useful language, but I think any language is a bonus on your CV,” she shays. “Plus, employers want what moving abroad and living in a different country gives you – you become more adaptable and can survive in stressful situations. It makes you more resilient and you open yourself up to more opportunities.”
Access all areas

Tighter laws and trained staff help to widen participation for students with disabilities, says Lucy Jolin

The number of people with a declared disability in postgrad study has doubled over the last 10 years, according to recent statistics from the Higher Education and Funding Council for England (HEFCE). What’s changed – and what do higher education providers still need to improve?

“To some extent, the trend of more disabled students undertaking postgraduate study since 2005 simply reflects the shift to a more supportive and inclusive learning environment that began with the ‘widening participation’ agenda in the late 1990s,” says Tony Stevens, fundraising professional who has worked with students with all kinds of impairments. “There is less of a stigma, as well, says Stevens. “In recent years, disability support departments have become more integrated into wider student services.”

People with disabilities, Stevens advises, should start their search in the same way as people without disabilities: think about course subject and type, and funding – then visit, and ask questions around your particular needs.

Of course, barriers to participation still exist for students with disabilities. One big challenge, says Stevens, is careers advice. “We believe that careers advice for disabled students and support to transition into employment is an area that providers still need to improve. Unfortunately, some disabled graduates are tempted to stay in education because they can’t get a job, but they haven’t researched whether postgrad study will help them get the job they want. In some cases, work experience may be a better way for them to get the skills they need.”

On the whole, Stevens says that UK higher education as “a relative success story. Few colleges and universities nowadays would seriously think of refusing a place to an applicant simply because of their impairment, and most have well developed systems and procedures for making sure disabled students progress in their studies.” Visit disabilityrightsuk.org for more info.

Martin McLean: ‘A PhD supervisor found out I was deaf, and cancelled the interview’

Martin McLean, 38, has two postgraduate degrees – a PGCE awarded by the University of Wales and a master’s in arts policy and management from Birkbeck. He’s an education and training policy adviser at the National Deaf Children’s Society, and has been deaf since birth.

“I took my master’s part time alongside working full time, so I needed a university that offered courses in the evening,” he says. “That was my priority, rather than a university with a good track record for supporting disabled students. All universities should be accessible to deaf students and the disabled student allowance system for funding support makes this possible.”

McLean used a palantypist (someone who types out everything that is said in class at high speed) and a sign language interpreter for small group discussions or field trips. “Generally, things were OK at Birkbeck, but one lecturer told my palantypist to move as the noise was affecting her. She also told them, from time to time, not to type something controversial she had said. I was annoyed that she felt entitled to choose what I was allowed to understand. It singed me out as different from the hearing students, who had no filter on what was said.”

While McLean points out that the statistics around more people with disabilities undertaking postgraduate study may not tell the whole story – they also cover those with mental health conditions, which have risen in recent years – he believes that things have got better. In 2001, he was invited to interview for a PhD position at the University of Glasgow. “When the supervisor found out I was deaf, through a reference, he cancelled the interview and emailed me, criticizing me for my lack of candour for not telling him about my deafness. Under the law, I didn’t have to reveal my disability and I was shocked at such overt discrimination.” McLean received an apology but was told that the position was no longer available, as the supervisor had since left the university.

He advises students with disabilities to be proactive in seeking support. “It helps if you are clear about the support that you require rather than leaving it to other people like disability advisers or DSA assessors to decide what you need,” he says. “Much postgraduate study involves independent research and writing it up, so make sure you think about your needs outside of class and the lecture environment.”

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Disability

Disability

Disability
How to ace the application

The trickiest part about the application process for a postgraduate degree, is making the choice to study in the first place. So seize the moment, says Helena Pozniak, and the rest is easy.

Unlike undergraduate applications, there’s no central, deadline-driven process for applying to postgraduate courses. Most prospective students apply directly to individual universities and need a good grade - usually a 2:1 or above - in a relevant subject, but universities will make exceptions.

“The application process for postgrads is remarkably straightforward,” says Prof Valerie Sanders, director of the graduate school at the University of Hull. Particularly when you compare it with the longer timeframe of the undergraduate process. The best way is to apply online.

The popularity of a course can determine admissions procedures. Hull, for instance, interviews all PhD students and for a few taught master’s linked to psychology, music and business. Business schools tend to interview MBA students and top-flight schools ask for the dreaded GMAT - a tough entrance exam. At Alliance Manchester Business School, there are four applicants per place. “For us it’s not about being choosy,” says Fran Johnson, associate MBA director.

As well as a sparkling CV, academic results and sometimes a personal statement, candidates “must demonstrate the ability to deal with change and develop new ideas”.

Most taught masters require a personal statement explaining why a student is interested. The academic departments then usually make the call on whether to accept a student rather than a centralised admissions department - although numbers of students on master’s courses tend to be kept much lower than undergraduate classes.

While students can apply at any point in the year, places on a few popular courses get snapped up early and some, such as top fashion and engineering degrees and many at elite universities, are highly competitive.

Candidates must demonstrate the ability to deal with change and develop new ideas.

Applying for a postgraduate course is surprising simple, often with flexible entry cycles throughout the year. Photo: Getty

So far this year, 2,654 people have died crossing the Mediterranean, an estimated 5,000 drowned, up from 3,700 in 2015 (IOM)

by taking the refugees off their hands very close to the Libyan coast - making the 'product' (the trip) a more attractive option, and ultimately, increasing the number of journeys,” says Campana. It’s the exponential demand from people desperate to migrate which should be targeted, but this, he admits, is easier said than done.

While much of Campana’s work involves quantitative analysis – he also teaches statistical methods to map criminal networks - researchers must be careful to retain their humanity, he says. He has travelled to Greece and Sicily to speak to people in refugee camps face-to-face shortly after they’ve disembarked. He has also collaborated with fellow Cambridge academic Prof Lurana Gelleborce to speak to migrants in the UK about their experiences at the hands of people smugglers. “Even though I deal with thinking operation is struc- tured,” says Campana. But Facebook is sometimes used by smugglers to advertise their services. “We try to understand the networks, the more effective the solutions, says Helena Pozniak.

The more we study human trafficking and its associated criminal networks, the more effective the solutions, says Helena Pozniak.

Applying

The lowdown

• Since the introduction of postgrad loans in 2016 (for English students), numbers of students taking a master's straight from an undergraduate degree have increased by more than a third.

• Entry cycles are more flexible throughout the year, though popular courses fill up quickly. Many are offered part-time, and some online.

• Students can apply for up to 10 postgrad courses at a time. Postgrad fairs and open days offer help with choosing. For free advice see ucas.com

• Ten UK universities use UCas’ online application service UPPAS, mostly used by international students. A centralised system launches in 2018.

• A good personal statement, covering your motives and commitment, is important. Popular courses and business degrees may ask students to come in for an interview.

• Universities will usually let students know within a couple of weeks if they’ve been successful.

The Guardian | Saturday 11 November 2017

A faculty for freedom

The more we study human trafficking and its associated criminal networks, the more effective the solutions, says Helena Pozniak.
I studied full-time for one year and the latest cutting-edge techniques. The most valuable aspect of the master’s is the network — I am still in touch with some classmates. Many of us work in the same or similar fields and help each other solve work-related problems. An alumnus helped me land my current job as a senior policy analyst for electricity transmission at Ofgem, Britain’s independent energy regulator. She helped me understand what Ofgem was looking for and prepared me for the interview. Without the master’s degree, I would not be where I am now.

After graduation, I worked for the Department of Energy and Climate Change, which promotes international action to mitigate climate change. Then I moved to the European Emissions Trading Scheme, a scheme for trading greenhouse gas emissions allowances. I began working at Ofgem in 2014. My team manages the delivery of several billion pounds of investment in offshore wind farms and electricity transmission networks. My job is to assess the cost of the infrastructure. It involves data analysis and negotiation with wind farm developers — the most challenging part of the job.

I plan to move into an economist’s role within Ofgem, focusing on competition in the retail energy market. The MSc will become less relevant in that job, but it will still be important to understand the wider sector in which I operate. The industry is driven by government support and policy — exactly what I learned on the master’s.

Michele Zarri: ‘The most valuable aspect of the master’s is the network’

Michele Zarri is a senior policy analyst for electricity transmission at Ofgem.

When I left school, I trained as a solicitor in Italy and worked as a legal assistant in the private sector. But I wanted a more international career and saw a master’s degree abroad as a good way to change industries. I’ve always been fascinated by energy and thought it was the right time to work in the sector - climate change is high on the political agenda in the UK, with the government pursuing aggressive renewable energy policies. I enrolled in the University of Edinburgh’s MSc in energy and renewable energy policies.

I found the programme really enjoyable. I learned about the geoscience behind climate change and renewable technologies that can be deployed to reduce greenhouse gas emissions. The most valuable aspect of the master’s is the network — I am still in touch with some classmates. Many of us work in the same or similar fields and help each other solve work-related problems. An alumnus helped me land my current job as a senior policy analyst for electricity transmission at Ofgem, Britain’s independent energy regulator.

Are two degrees better than one?

Postgraduate study can help you stand out in the jobs market, but choose wisely, says Seb Murray

A growing number of students believe a bachelor’s degree is no longer enough to attract the attention of employers when job hunting and are entering postgraduate education to boost their employment prospects. Data from the Higher Education Funding Council shows the number of people taking full-time, taught postgraduate programmes surged by more than 16,000 to 50,600 in 2015/16 — a 22% increase, with the figures expected to be even higher this year. Three-quarters of the students are under 25 — suggesting that many went straight from a first degree into a second.

“With almost half of all young people in England obtaining undergraduate qualifications, many are turning to postgraduate degrees to set themselves apart in a very competitive climate,” says Nick Hillman, director of the Higher Education Policy Institute — particularly in law, media and medicine. Most postgraduate degrees boost your position in the labour market — and your earnings. The increase in the number of postgraduate students is also attributable to a new loan system, providing up to £110,000 to help with course fees and living costs. “The introduction of the loans system has made it feasible for people who previously did not have access to funding to stay on for an extra year, such as those from low-income backgrounds,” Hillman says.

But are two degrees really better than one? Lluís Bandet Álvarez, 24, studied a master’s in management at the London School of Economics after getting a bachelor’s degree in business administration. He says a postgraduate qualification was essential to securing his current job at a consultancy firm in Dubai. “Debt did not put me off as I knew a second degree would make me more employable,” Álvarez says.

“My undergraduate degree was useful but the postgraduate degree programme was more hands-on and collaborative, with group projects replicating the workplace,” he adds.

In addition to the qualification itself, knowing more and having greater expertise in a subject will also help you stand out, says Chris MacRae, head of talent for pharmaceutical company GlauxsmithKline: “We value postgraduates because they bring a high level of academic ability, strategic thinking, leadership and a global perspective,” she says.

“We employ a large number of postgraduates globally each year, many through our Esprit programme, which is specifically tailored to nurturing postgrad talent. They enter senior leadership positions in all areas of our business, including consumer healthcare, pharmaceuticals, sales, marketing, finance and R&D.”

So, is a postgraduate course a guaranteed route to success? Not necessarily, says Alan Smithers, director of the Centre for Education and Employment Research at the University of Buckingham. He warns that students should not assume that a postgraduate qualification will automatically lead to a decent job. “Before embarking on a master’s degree, think carefully about whether it will update your knowledge and skills and is relevant to your intended career path,” he says.

“It could be the best investment you ever make — but do your homework.”

Michele Zarri: ‘Without the master’s degree, I would not be where I am now’

Michele Zarri is a senior policy analyst for electricity transmission at Ofgem.

People aged 26 to 60 in the UK with a postgraduate qualification, up from to 4% in 1996

£31k

Median wage for a postgrad, rising to £46k for mathematical sciences, £49k for medicine and £42k for business

32%

Rise in the number of people obtaining postgraduate degrees in the last 10 years

59k

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“It could be the best investment you ever make — but do your homework.”
A matter of life

With the help of CGI models of placentas, universities are collaborating to investigate why one in five pregnancies end in miscarriage. By Helena Pozniak

For an engineer, Dr Michelle Oyen has spent a lot of time with placentas recently. “It’s a really weird organ, half baby, half mother. It must begin functioning at the same time as it develops. There’s nothing else like it in the body,” she says.

Oyen is committed to discovering why miscarriages go wrong. And fascinated by applying engineering principles to medical research in her post as reader in bioengineering at the University of Cambridge. “You can’t experiment on pregnant women – it’s totally unethical and impossible.” Instead, her team takes high resolution images of donated placentas to understand the geometry of blood vessels. They then use these to build 3D online models to understand how blood flows around the placenta. “We are trying to understand why cells involved in building a placenta know how to invade the right amount into a uterus,” she says. “They have to get it just right, and it’s a poorly understood process.”

Currently, six in five pregnancies are believed to end in miscarriage, and 5% of these happen in the first 12 weeks of pregnancy. Patients often have no idea why – and it can be heartbreaking for the 200,000 people (women or partners) affected every year.

“I believe some of the problems in healthcare are some of the biggest problems in modern society,” says Oyen. “As engineers we have different tools to biologists and doctors. The more people you have approaching a problem from a different perspective, the more likely you are to understand it.”

Around the country, researchers are forming between universities. “There seems to be an explosion of bioengineers interested in pregnancy,” says Oyen. “But compared with other conditions it’s been understudied – from a bioengineering perspective at least.” In 2013 to 2014, miscarriage research charity Tommy’s says that the most up-to-date figures it was able to obtain indicate that just 4.4% of the country’s health research budget was spent on reproductive health and childbirth, with only a fraction of this going towards miscarriage research.

At the largest miscarriage research centre in Europe, hosted by the University of Birmingham, scientists and medics from Birmingham, the University of Warwick and Imperial College London are collaborating to research the causes of miscarriage, stillbirth and premature birth. Tommy’s National Centre for Miscarriage, funded by the charity, investigates potential genetic causes, ways of testing for damaged DNA in sperm, and other ways of improving fertility, such as the role of bacteria. Using clinical data from

The imitation game

How biomimetics is replicating nature to create life-changing materials

Scientists could borrow from nature – recreating the strength and elasticity of spider silk for instance – the impact on the environment, manufacturing and medicine would be vast. This is biomimetics - literally copying life – part of an emerging discipline of bioengineering, a subject now offered by many universities at postgraduate level.

Spider silk is stronger than steel on a per weight basis. It doesn’t necessitate heavy industrial processes to manufacture. Eggshell is about 97% ceramic but doesn’t require the high temperatures needed to make concrete, and bees can make it in about 18 hours. It’s the small amount of protein that makes eggshell so tough, says scientists at the department of engineering at the University of Cambridge, where bioengineers are investing natural materials. While successful replication of spider silk is yet to be mastered, companies in the US have engineered a lab-grown burger that looks, tastes and smells like real meat. “Bioengineering is a niche area, and necessarily so,” says James Hallinan, synthetic biology business developer at Cambridge Consultants, an engineering and tech company that hires postgrads. “Numbers working in it in the UK are only in their thousands. But we are seeing a lot of interest from clients asking about its manufacturing capabilities. If was a student now it’s an area I definitely be keen to study.”

Hallinan says they are seeing increased interest in the manufacturing side, particularly using sustainable biofuels, as a material to replace oil as the basis for a wide range of products, from fuels to plastics to industrial chemicals. “Companies such as BP, Shell and Total all have their medical departments,” he says. Medical applications are inspiring a different strand of research, Hallinan adds. A new gene therapy treatment, CAR-T, which genetically modifies a patient’s own cells so they can attack cancer, was recently approved in the US and was hailed by scientists as a game changer in medicine. "Another less dramatic but interesting area is being able to manufacture the bacteria in our gut through the food we eat, to improve health," says Hallinan.

UK universities offer a vast range of bioengineering master’s with various specialisms, and many have a medical focus. “Bioengineering is a new and emerging field, with the new engineering tools to solve healthcare problems, through multidisciplinary collaboration,” says Dr Reiko Hallinan, lecturer in bioengineering at Imperial College London. “And it’s a sector which welcomes a variety of academic disciplines,” says Hallinan from computer science through to molecular biology and biochemistry. "The broad perspective is helpful – it gives you that background in experimental science you might not get at undergraduate level. The sheer scope of opportunities is breathtaking,” he says.