About Aston University
Founded in 1895 and a university since 1966, Aston is a long established research-led university based in Birmingham’s city centre, known for its world-class teaching quality and strong links to industry. Our STEM provision covers a diverse range of areas across engineering and applied science, and life and health sciences. The majority of Aston University STEM courses are accredited by the relevant professional bodies1.

Aston Medical School opened for postgraduate research students in October 2015 and, subject to GMC approval, will commence the five year Bachelor of Medicine degree from September 2018. In 2010 Aston University received a Bronze Award from the ‘Athena SWAN Charter’. This was extended and the University is pursuing a Silver Award in recognition of its support of female staff and students.

Our unrivalled links to industry mean Aston students enjoy innovative employer-led learning, and Aston graduates are well prepared to meet the needs of the UK workforce. Aston has been a leading university for graduate employment success for over 25 years and is one of just four universities where more than half of students take a placement year.

Summary
• Aston University is leading the drive to tackle UK STEM skills gaps – particularly in the key areas of computing, engineering and health. The University has introduced a number of different measures to address the UK’s STEM skills gaps – from early outreach in STEM, engaging women in STEM, to delivering Degree Apprenticeships, work-based degrees, industry work placements, establishing the Aston University Engineering Academy– and across the board through our teaching methods and links with professional bodies.

• Our efforts to address the UK’s STEM skills shortages strongly complement our own ambition to ensure high potential students from all backgrounds can gain the benefits of university education and the social mobility that comes with professional careers.

• Aston’s success is demonstrated by our extremely high graduate employability levels: over the last 20 years we have consistently been ranked as a top university for graduate employability2, and our growing links with industry.

• Aston experiences some barriers and risks in its work to close the STEM skills gap. For example, an unintended consequence of the Apprenticeship Levy is that it may incentivise employers to reduce or remove their placement year opportunities. Where we have identified barriers and risks we have made recommendations for the Committee to consider.

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1 Institution of Chemical Engineers, Institution of Engineering and Technology, Institution of Mechanical Engineers, and BCS, the Chartered Institute for IT. Aston’s integrated masters programmes in Chemical Engineering, Mechanical Engineering, Electrical & Electronic Engineering, and Biomedical Engineering have a placement option that can be scheduled either at the end of year 2 or year 3 of studies.

2 For example, Aston University ranks 80 in the World and 12th in the UK according QS Graduate Employability Rankings.
1. Bridging the gap through STEM outreach and progression programmes

1.1. Developing a pipeline of young people who are inspired and equipped to pursue a STEM career is vital if the UK is to close the STEM skills gap. It is also central to achieving social mobility for our students and graduates.

Aston Progression Pathways

1.2. Our work starts early – with outreach aimed at empowering young people who are considering STEM careers. Aston Progression Pathways (APP)¹, an 18 month programme, works with 150 high potential Year 12 students who may by the first generation in their family to go to university, live in an area where participation in university is low, or are part of a group that is under-represented within UK universities.

1.3. APP aims to bridge the gap between A-level and undergraduate study, easing transition by providing students with a realistic insight into university study. Through one-to-one mentoring sessions from current Aston students and a three day Summer Research Programme run by our world-class academics, we raise aspirations, improve students’ motivation and academic attainment in STEM subjects.

The Sir Doug Ellis Pathway to Healthcare programme

1.4. In November 2016 Aston University launched the Sir Doug Ellis Pathway to Healthcare Programme⁴, made possible through a generous philanthropic donation from Sir Doug Ellis. Designed to prepare students to enter medical school, the programme also actively encourages students to consider other healthcare professions, such as pharmacy, optometry and audiology – at Aston or elsewhere. The programme is specifically for students from widening participation backgrounds, from Birmingham, the Black Country and Solihull. Students who complete the programme and meet our academic entry criteria will be eligible to apply for a subsidised place on the 2018 entry undergraduate medicine degree.

1.5. The first cohort – made up of 101 local students from 23 local schools and colleges – is also ethnically diverse. The programme attracts both male and female students.

1.6. The programme’s three pillars are aspiration, application and attainment. It gives students information, advice and guidance on how to successfully apply to medical school, and what it is like to study medicine. Interactive academic enrichment, such as the A-level boot camp, aims to raise attainment, and work experience placements and mentoring from a local healthcare practitioner provide young people with a deep insight into what it is like to work in the medical field.

1.7. While we have had success in funding programmes through philanthropic donations, this is often not sustainable in the long term. We have had difficulty tapping into alternative funding, such as the pupil premium. Our widening participation activity is cost effective and has a positive impact on the schools involved, but the incentive for schools to spend pupil premium funding on this activity is limited. As the government is exploring ways in which universities and schools and colleges can work together more closely to raise attainment and increase progression, we would hope to see the issue of financial sustainability considered.

³ http://www.aston.ac.uk/study/undergraduate/sro/outreach/app/
⁴ http://www.aston.ac.uk/aston-medical-school/pathwaytohealthcare/
2. The Aston University Engineering Academy and Aston University Sixth Form

2.1. In its fifth year, Aston University Engineering Academy (AUEA) and the Aston University Sixth Form, created in partnership with Birmingham City Council, was the first new-build, major university-led University Technical College (UTC) in the country. Aston University is the only university to have an on-campus UTC. AUEA serves its local area, and 60% of AUEA students come from 10% of the most deprived postcodes in the UK. The academy also works with primary school-aged children to enthuse them and their teachers, further developing a pipeline of future STEM leaders.

2.2. AUEA is employer focused. It has links with a wide range of industrial partners to ensure the curriculum fully meets the needs of employers, and fills gaps in STEM skills. Partners include Rolls-Royce, Jaguar Land Rover, BMW, Network Rail, HS2, Birmingham Women’s Hospital and the Royal Air Force. These partners support AUEA by advising on skills needs, providing work placements, supporting curriculum design and providing specialist industry equipment.

2.3. AUEA is ranked first in the Midlands for vocational education, and its science GCSE results are among the highest in the UK. 84% of graduates at 19 years old went on to study engineering or science higher apprenticeships or undergraduate degrees – this is 18% higher than the national average for all UTCs, and 39% higher than the national average. Recent destinations include degrees in Mechanical, Civil and Automotive Engineering, Physics and Computer Science, and a Degree Apprenticeship with the Royal Navy.

2.4. In September 2016 the AUEA launched a Post-16 Engineering Sandwich course, in which students study at AUEA for one year, move to Austria for year two, living and studying at their partner technical school HTL Modling, before returning to complete their final year at AUEA. This is the first course of this kind in the UK for a school/UTC.

2.5. Aston University works closely with staff and students at AUEA, for example by hosting masterclasses, role-modelling women in STEM, and providing mentors and work experience placements. In 2015 100% of AUEA students who applied to Aston were offered places on their chosen degree course.

2.6. We hope Government continues to support universities in their sponsorship of UTCs, and would urge caution over placing pressure on universities to spread their resource more thinly by requiring the sponsorship of multiple schools and colleges. This is an area the Committee may wish to consider.

3. Degree Apprenticeships, foundation years and work-based degrees

Degree Apprenticeships

3.1. There is an acute computing skills gap estimated at between 3,000 and 10,000 jobs per year. In Big Data, the needs are even more acute: the Tech Partnership predicts 56,000 new jobs per year by 2020. The digital skills gap is estimated to cost the economy £63bn per year. The Shadbolt Review recognised that

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3 https://www.thetechpartnership.com/
in order to close the skills gap in the digital industries it is important that students gain experience of industry and exposure to up-to-date technologies, but that this shouldn't come at the cost of learning the foundations of the subject, which allow graduates to adapt as industry changes.

3.2. Degree Apprenticeships are an ideal way to meet these twin goals. Students are in full-time employment from the start of their degrees and so gain significant practical experience, but the academic rigour of the courses requires them to develop a principled understanding of their subjects' fundamentals.

3.3. Aston University was one of the first UK universities to develop Degree Apprenticeships, and the UK's first Degree Apprentices will graduate from Aston in July 2017. As of January 2017, Aston has 250 Digital and Technology Solutions Degree Apprentices from a range of employers including large multinationals and local SMEs. The Degree Apprenticeship is a BSc for students in full-time employment in an IT role. With two streams, Software Engineering and Business Information Systems, as well as flexibility to incorporate work-based projects, the programme develops the skills and knowledge required for a wide range of computing-related careers. The research-led curriculum is designed to Aston University's exacting standards with input from employers to ensure its relevance to industry.

3.4. Aston has ambitious plans for Degree Apprenticeships. The University is extending its range of Degree Apprenticeships in STEM subjects by adding specialisms to Digital and Technology Solutions at level 7 (Data Analytics), creating a conversion MSc and level 7 apprenticeship (which will allow graduates from non-STEM subjects to add computing skills), and by developing new Degree Apprenticeships in utilities (nuclear power, water, electrical and power engineering, logistics).

3.5. We view Degree Apprenticeships as particularly valuable to meet the needs of students whose preferred learning style combines theory and practice – there are apprentices who are currently excelling but who had dropped out of a university degree.

3.6. There are a number of ways that the Government could enhance apprenticeships, and the Committee may wish to consider the following. We are pleased to see the establishment of the Institute for Apprenticeships which will ensure there is greater order in the process of standard development. It is important that the body of apprenticeship standards is coherent, to avoid the risk of overlapping or conflicting standards – which could lead to poor uptake under the current approach.

3.7. The process of finding and applying for apprenticeships is much more complicated than it is for standard university degrees – and this is a fair access issue. We would like to see more work done to coordinate the different agencies (e.g. SFA and UCAS).

3.8. In addition, quality assurance (QA) is an issue in apprenticeship delivery. Compared to the (rightly) tight regulation of degree-awarding bodies, the QA regime for apprenticeship providers is very weak. A stronger regime is vital in order to maintain the quality of apprenticeships and raise their esteem to the required level. For the same reason, we would also support some form of endorsement of programmes that claim to deliver to a standard (as is done for Digital and Technology Solutions).
Professional work-based degrees

3.9. In addition to Degree Apprenticeships, Aston University offers other work-based degree routes (including at Foundation Degree, Bachelors and Masters level). Subjects include Power Engineering, Professional Engineering, Engineering Leadership Management and Logistics. Employees develop their skills and become better qualified and able to make a real contribution to the success of their employer and industry. Numerous case studies have been collected from graduates which demonstrate that the development of skills directly contributes to the increase in profitability, competitiveness and innovation of the companies. This enables the companies to nurture their own talent to strengthen their internal engineering skills capability.

Aston University Foundation Years

3.10. It is important to Aston University that high potential students from a wide range of backgrounds and previous educational experience can find a suitable route for them into a STEM career.

3.11. Foundation Years aid transition into the first year of Aston’s degree course. For example, the Foundation Year within the School of Engineering and Applied Science is designed for students who have an interest and passion for Engineering, the Applied Sciences and Computing. The course attracts entrants who, for whatever reasons, do not have qualifications at the expected level or in appropriate subjects for admission to the first year of Aston’s degree course. The Foundation Year aims to prepare students with the knowledge and skills in mathematics and science to progress onto an Aston degree course.

4. Placement years

4.1. Aston is a leading university for work placement years. Currently over 70% of our students undertake placement years, and our goal is that 100% of our students will undertake placements by 2020. The placement year is essential to the student-professional transition because this is when the discipline-based knowledge and technical abilities they learn are wholly applied to industry – something that cannot be replicated on campus. The placement experience enables students to understand how and where their interests and abilities fit within the UK industrial sectors – this goes a long way to develop well-rounded and informed candidates that STEM employer’s desire.

4.2. Academic research\(^7\) shows that a placement year spent with an employer enhances graduate employment prospects and degree performance. Employers openly talk about the challenges they face recruiting high quality graduates, particularly in areas of skills shortages like STEM. This is why graduates with relevant work experience are critical for employers. Increasingly employers are using work experience as entry pipelines in their recruitment strategy. Our destination analysis shows a strong correlation between placement uptake and positive graduate destinations.\(^8\)

4.3. Aston students undertake placements in areas where there are STEM skills shortages. In 2015/16, 13 Electrical Engineering students were placed in IBM, Rolls Royce and Airbus, as well as SMEs, including Datagas. 34 Mechanical Engineering students were placed in GE, Jaguar Land Rover, BOSCH and SMEs

\(^7\) Moores & Redy 2011; Driffield, Foster & Higson 2016

\(^8\) Aston Engineering and Applied Science students who have completed a placement year have a higher \(^8\) Graduate Level Destination proportion (90.4%) than full-time students who do not take a placement (78.3%).
including Heimdall, and in Computing Science, 38 students undertook placements in IBM, Capgemini, the NHS, BMW and SMEs including Pinewood.

4.4. Showcasing women in STEM careers is very important to Aston University, and the National Centre for Universities and Business (NCUB), of which Aston is a member. This NCUB blog post⁹ from an Aston Chemical Engineering undergraduate undertaking a placement year in Malaysia as a Process Engineer Trainee gives further insight into the value of the placement.

4.5. Most placements pay a salary and students have access to a number of grants and scholarships. Unlike most UK higher education institutions, the fee for the placement year is reduced (£1250) and is in most cases waived, including for voluntary and overseas placements. Aston University funds a dedicated Placements Team to support a high volume of students through the application, preparation and completion of the placement year. This level of investment shows Aston’s commitment to the placement year.

4.6. Although Aston’s placement scheme is thriving and we have unrivalled links with industry, we face a number of barriers and risks. It is often the case that SMEs do not have the resource and infrastructure to offer a placement year. We would like to see government support and incentivise SMEs to develop placement year opportunities for students. This may be particularly valuable for students from backgrounds meaning they do not have as much ‘social capital’.

4.7. In addition, the government could encourage Professional Engineering Institutes to collaborate with universities’ careers departments to facilitate placements through financial incentives and support. Aston has successfully completed a Placement Bursary pilot with the Institute of Mechanical Engineers and Leeds, Loughborough and Portsmouth Universities, securing 24 placements in two years with SMEs that would otherwise not have been in a position to provide a placement.

4.8. As noted above, Aston University is a strong proponent of the value of Degree Apprenticeships, but this should not be at the expense of degrees with a placement year in industry. We are concerned that an unintended consequence of the Apprenticeship Levy could be that employers are incentivised to reduce or remove entirely the availability of student placements, in favour of Degree Apprenticeships. This would disadvantage those students who choose the academic-based route to a STEM career, making it more difficult for them to develop the knowledge and authentic practice desired by industry.

4.9. We encourage government to recognise the benefits of placements alongside Degree Apprenticeships, and recommend that Government explores ways to level the playing field, for example, by incentivising employers to host student placements. One solution could be to differentiate the Levy to allow employers to fund undergraduate STEM placements, thus maintaining the momentum and growth that has been achieved.

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⁹ http://www.ncub.co.uk/blog/placement-with-aston.html