

# FINAL REPORT

## **Progression Routes in Science, Technology, Engineering and Mathematics (STEM)**

Final Report

for

The Science Council, on behalf of SCORE

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**prepared by**

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THE UNIVERSITY OF  
**WARWICK**



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## Executive Summary

### Introduction

This research was commissioned by the Science Council on behalf of SCORE (Science Community Representing Education), and has been carried out by the Centre for Education and Industry at the University of Warwick. The research was motivated by a recognition amongst the STEM community that there is a need to raise young people's awareness of the progression routes and career opportunities that can be accessible through studying STEM subjects. It was felt that there was a need to develop more accurate and accessible advice for young people, relating to subject choice, entry requirements (for higher education) and progression in STEM. This research focused on only one of the possible progression routes for young people i.e. progression from post-16 education in schools and colleges into STEM degree programmes in higher education.

### Research Aims

The principal aim of this research was to collect evidence about subject combinations and qualifications that enable students to progress into STEM degrees in the UK. The research also aimed to collect evidence about actual practice in admissions into STEM degrees. The evidence and information gained through the research was intended to assist the development of clear and accurate guidance to be included on the Science Council's *Future Morph* website.

### Methodology

The research methodology comprised two key elements:

- Desk research – investigating the subject requirements for entry into STEM degree courses as stated in publicly available sources;
- Field research – investigating actual practice in admissions of students into STEM degree courses, using an online questionnaire and telephone interviews.

The research investigated sample groups across a range of UK universities. For the purposes of this research sample universities were defined as four 'types'. Where:

- Type 1 = Russell Group<sup>1</sup>;
- Type 2 = Other universities chartered before 1960;
- Type 3 = Other universities chartered between 1960 and 1992;
- Type 4 = Universities chartered after 1992.

The desk research used two main sources from which to gather information about entry requirements, namely the UCAS Course Search facility on the UCAS website<sup>2</sup>, and individual university prospectuses and information accessed online via individual university websites. This part of the research investigated entry requirements across a range of STEM degree courses in 33 universities (11 type 1; 7 type 2; 7 type 3; 8 type 4).

Further desk research collected data from the UCAS Statistical Service, which provided listings of the 'top five' GCE A level subjects (aggregated number of qualifications) held by all students accepted onto a range of STEM degree courses within 24 JACS Subject Lines

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<sup>1</sup> The Russell Group is an association of 20 major research-intensive universities in the UK. The group was formed in 1994

<sup>2</sup> UCAS Universities and Colleges Admissions Service [www.ucas.ac.uk/students/coursesearch/](http://www.ucas.ac.uk/students/coursesearch/)

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from the JACS coding system<sup>3</sup>. For this part of the research data were gathered from a sample group of 43 universities (12 type 1; 9 type 2; 10 type 3; 12 type 4).

The field research used a questionnaire administered both online and by telephone interview with individual admissions tutors from a range of STEM subject areas. In this part of the research 105 individual responses were collected (33 questionnaires and 72 interviews). The sample group contained 32 respondents from type 1 universities, 17 from type 2, 26 from type 3 and 30 from type 4.

## Research Findings

1. The difference between the range of STEM subject choices offered to young people in pre-university education and the range of choice of STEM degree courses in UK universities is huge. At the pre-university stage, allowing for different qualifications and different versions of the same qualification (e.g. different specifications for a GCE A level subject) the number of different STEM subject titles available is relatively limited. For example, of 458 GCE A levels listed on the National Database of Accredited Qualifications<sup>4</sup>, there are 26 different subjects available that could be considered as 'STEM subjects'<sup>5</sup>. In UK universities, according to UCAS information there are 14805 degree courses, with 4815 different titles for which STEM subjects are required as entry qualifications to degrees in 2010. This order of disparity in range of choice presents a substantial challenge for communication, information, advice and guidance for young people making choices for their progression into degree courses. The evidence from this research indicates that this challenge is not being adequately met.
2. One of the key sources available to people seeking information about degree courses and entry requirements is the UCAS website ([www.ucas.ac.uk](http://www.ucas.ac.uk)), and in particular the 'course search' facility on this website ([www.ucas.ac.uk/students/coursesearch/](http://www.ucas.ac.uk/students/coursesearch/)). This facility contains a very large amount of information, providing comprehensive coverage of the courses offered by UK universities and their entry requirements. The information is structured in a logical way, and navigation through the website is straight forward. However, the layout, presentation and design of the detailed information, especially about individual course requirements, are neither clear nor 'user-friendly'. For example information about general qualifications required for entry (e.g. how many GCE A levels) is not shown alongside information and notes about the specific subjects that may be essential, desirable or excluded as entry qualifications. In style and presentation, the design of the UCAS course search facility limits its effectiveness in communicating vital information about degree courses and entry requirements.
3. A second key source available to people seeking information about degree courses and entry requirements are the individual universities themselves e.g. via prospectuses (paper or online) and admissions tutors. Information in prospectuses is easily available, especially online. Each individual university has developed its own style and design, and provides comprehensive information. Many of these individual designs are good, but from the user's point of view, (e.g. when searching online for specific information across a range of universities), each university website is designed differently, and requires different navigation to find the relevant information. In addition to providing online information and prospectuses, many universities carry out outreach work and other liaison activities (e.g. open days for schools). Universities act independently in these and other communications strategies aimed at prospective students.

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<sup>3</sup> Available through UCAS website at [www.ucas.ac.uk/he\\_staff/datamanagement/jacs/jacs20](http://www.ucas.ac.uk/he_staff/datamanagement/jacs/jacs20)

<sup>4</sup> <http://www.accreditedqualifications.org.uk/index.aspx>

<sup>5</sup> This figure includes geology, geography, statistics and accounting, and also counts different design and technology courses separately

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4. This research considered ways in which STEM subjects, at degree level, could be grouped to assist the development of clear information, advice and guidance for young people trying to choose their progression routes. The objective was to provide a better connection between the relatively small number of STEM subject options available in pre-university education, and the very large number of options available at universities. UCAS and HESA<sup>6</sup> have an agreed coding system (JACS) relating to the content of degree courses. The detailed JACS coding system is further organized in broader subject groupings called JACS subject lines. The JACS coding system appears to have been set up principally to communicate information about course content across the higher education sector and between UCAS and HESA. The UCAS website states the purpose of the JACS coding system to be:

*“To transmit information about the subject matter of all courses to universities and colleges, and ultimately to HESA.”*

It is suggested that a simplified version of the JACS subject lines should be used as a basis to produce groupings of STEM subjects that would be more easily understood by young people and their advisers, but would also relate more accurately with the degree courses on offer in universities.

5. The desk and field research investigated entry requirements and admissions practice for STEM degree courses across a range of universities (Russell Group, other universities chartered pre-1960, universities chartered between 1960 and 1992, and universities chartered after 1992). The data collected confirmed a number of well established points including:
  - i. Entry requirements (grades or UCAS points) for post-1992 universities are significantly lower than for other universities;
  - ii. Students wishing to gain entry to STEM degree courses would be best advised to attain GCE A level (or equivalent qualifications) in at least two STEM subjects. The ‘traditional’ sciences (biology, chemistry and physics) and mathematics carry universal ‘currency’. Other sciences and technology subjects are acceptable, but applicants would need to check their overall subject combination against the specific course at a specific university.
6. Whilst the data do confirm these well established points (see 5.), they also show a number of other features indicating that it is most important for applicants and their advisers to research in detail the entry requirements for a specific course at any given university. These features include the following:
  - i. Many universities offer some range (maximum/minimum) for acceptable grades or UCAS points achieved to gain entry;
  - ii. For courses with very similar titles, there can be significant differences in the grades or points requirements between different types of university. As described in 5 (above), there is a general difference between post-1992 universities and others (with occasional specific exceptions), but there are also differences across other types of university;
  - iii. For courses with very similar titles, there can be differences in the grades or points requirements between different universities within one ‘type’;

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<sup>6</sup> HESA Higher Education Statistics Agency

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- iv. For different STEM degrees within an individual university there can be significant differences in the grades or points required for entry to those degree courses e.g. up to 60 points or the difference between 3As and 3Bs at GCE A level;
  - v. Many universities state specific requirements in terms of named subjects and grades, but these can vary significantly between universities;
  - vi. It is quite common to find 'caveats' in the information given by universities about their entry requirements e.g. a general entry requirement may be reduced for an the applicant holding qualifications with a subject combination seen as especially relevant to the course in question;
  - vii. Most universities (all types) do not tend to automatically 'exclude' subjects as entry qualifications which might be seen as 'irrelevant' to STEM. The main exception to this is general studies, which is excluded by over half (60 out of 105) of universities included in the questionnaire and interview research. The data suggest that admissions tutors focus on the whole subject combination and level of achievement offered by an applicant. If all key subject requirements are met, there can be flexibility e.g. in the third or fourth GCE A level being offered.
7. The research shows that in considering applicants for STEM degree courses, mathematics is highly valued as a subject, and capability in mathematics is regarded as a very important element in preparing young people for STEM degrees. Over 40% of admissions tutors who were respondents in the field research (n=80) made some reference to promoting or improving mathematics when asked to name one specific change they would like to see in pre-HE STEM education in order to prepare students better for STEM degree courses. Whilst the majority of these respondents were from the subject areas of mathematics and engineering, these comments also were recorded from tutors in physics, chemistry and biological/biomedical sciences.
  8. When considering applicants for entry to STEM degree courses the evidence gathered through field research indicates that admissions tutors give priority to the predicted or actual grades and the subjects studied by the applicant. (The accuracy of predicted grades is an issue, but these remain important indicators because most applications and offers for degree places are made before final examination grades are known). References and personal statements are also important, but the evidence suggests these are usually secondary to the grades achieved and subjects studied. It is clearly important that applicants have a good understanding of the qualifications and attributes required for entry to the specific course of their choice. The evidence shows that these requirements can be complex, and prospective students would be well advised to consult multiple sources of information (e.g. prospectuses, online information, and, if possible, direct contact with specific course admissions tutors).
  9. The most frequent suggestion made by admissions tutors for how to stimulate more demand for STEM degree courses, was to improve the provision of information, advice and guidance, and to work to influence perceptions and awareness of STEM subjects and opportunities. Over a third of respondents (36.4%; 24 out of 66) to this question chose these issues as the specific change they would like to see occurring in pre-university education.

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## Conclusions

In many ways, this research has served to confirm that the key factors for entry to STEM (or other) degrees that have been well known for many years have not really changed. (e.g. grade requirements and how they differ between universities, and the importance of relevant subjects as entry qualifications). However, the research has also shed some light on the sheer volume and complexity of the information that young people and their advisers now encounter when making choices about progression into STEM degree courses. This presents a major challenge for communication between the higher education sector (including UCAS), and the pre-university education sector and all stakeholders in information, advice and guidance. The conclusion from this research is that current communication systems and processes are not adequate to meet this challenge.

This research has focused on the current and historical position, which is based on well established perceptions and practices. However, in framing advice for young people applying for STEM courses at university in the future it is important to acknowledge that university admissions is a topic of active current debate, (e.g. the recent (2009) report from the Sutton Trust<sup>7</sup>) and may be subject to significant change in the next few years. Also major reforms of 14-19 education, including the introduction of Diplomas, some of which are specifically STEM based, will have an important influence, although the outcome cannot be predicted at this stage.

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<sup>7</sup> *Applications, Offers and Admissions to Research Led Universities* A Joint Report by the Sutton Trust and the Department for Business Innovation and Skills (August 2009)  
[http://www.suttontrust.com/reports/BIS\\_ST\\_report.pdf](http://www.suttontrust.com/reports/BIS_ST_report.pdf)

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## SECTION 1: INTRODUCTION, BACKGROUND AND CONTEXT

### Introduction

This research was commissioned by the Science Council on behalf of SCORE (Science Community Representing Education), and has been carried out by the Centre for Education and Industry at the University of Warwick. The research was motivated by a recognition amongst the STEM community that there is a need to raise young people's awareness of the progression routes and career opportunities that can be accessed by studying STEM subjects. It was felt that there was a need to develop more accurate and accessible advice for young people, relating to subject choice, entry requirements (for higher education) and progression in STEM. This research focused on only one of the possible progression routes for young people i.e. progression from post-16 education in schools and colleges into STEM degree programmes in higher education.

### Background and context

The Royal Society 'State of the Nation' Report (2008)<sup>8</sup> stated that

*"...education in the UK is failing to produce the increase in the numbers of school leavers with science and mathematics qualifications required by industry, business and the research community to assure the UK's future economic competitiveness"*  
p17

Current national initiatives including the DCSF campaign to raise awareness about career prospects for people with good science and mathematics qualifications under the banner '*Science and Maths: see where they can take you*', are attempting to address this challenge by:

- Showing that good science and mathematics qualifications enhance general employability;
- Encouraging more school pupils to study these subjects to a higher level, thereby increasing the pool of appropriately qualified people for future careers in STEM.

The UK has a well established system providing a progression route through which a proportion of young people apply to gain entry to degree courses in higher education. Entry to UK universities is controlled principally by achievement in a range of post-16 qualifications. The current range of qualifications that can be considered for entry to higher education is defined by UCAS (Universities and Colleges Admissions Service) through which body most applications for entry to UK higher education institutions must pass. Eligible qualifications include the following:

- GCE A level and AS levels (the predominant qualification in England);
- Scottish Advanced Highers and Highers;
- Irish Leaving Certificate;
- International Baccalaureate;
- Welsh Baccalaureate;
- A range of more vocational qualifications such as BTEC and OCR Certificates and Diplomas;
- Equivalent overseas qualifications
- Other less common, more specialized qualifications.

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<sup>8</sup> Royal Society (2008) *Science and Mathematics Education 14-19: A state of the nation' report on the participation on the participation and attainment of 14-19 year olds in science and mathematics in the UK, 1996-2007*

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UCAS provides a tariff system in which qualifications are given a 'points' value allowing institutions to consider 'equivalence' when selecting from applicants with different qualifications (e.g. an A grade in GCE A level, an A grade in Scottish Advanced Higher, and a distinction in BTEC national Award all carry a UCAS points tariff value of 120)<sup>9</sup>.

In addition to the main progression routes, entry to degree courses in higher education is also possible through 'non-traditional' routes e.g. access courses and foundation degrees. Whilst these provide access for a relatively small proportion of students, they are important in providing opportunities for people (often older age groups) who do not have standard qualifications.

For each of the main types of qualifications accepted for entry to degree courses in higher education, there is a range of subjects offered by a number of different awarding bodies. In recent years there has been considerable growth in the range of subjects offered for post-16 qualifications, and the choice of options available to schools and young people. For example, for GCE A level (in all subjects), there are 458 specifications listed on the National Database of Accredited Qualifications<sup>10</sup>. The three main awarding bodies in England (AQA, OCR and Edexcel), each offer a range of GCE A levels in STEM subjects. The main titles offered by these awarding bodies are shown in Table 1.

**Table 1: GCE A level titles in STEM subjects offered by 3 awarding bodies<sup>11</sup>**

Awarding body	STEM A level titles offered (from 2008) <sup>12</sup>	
AQA	Applied ICT Applied Science Biology Chemistry Computing Electronics Environmental studies Human Biology ICT Mathematics Physics	Psychology Science in Society Statistics Use of mathematics Design and Technology <ul style="list-style-type: none"> <li>• Food technology</li> <li>• Product Design (3D)</li> <li>• Product design (textiles)</li> <li>• Systems and control technology</li> </ul>
Edexcel	Applied ICT Biology Chemistry Design and Technology <ul style="list-style-type: none"> <li>• Food technology</li> <li>• Product design</li> </ul>	Engineering Further Mathematics Mathematics Physics Psychology
OCR	Biology Chemistry A Chemistry B (Salters) Computing DT Product design Electronics Further Mathematics	Geology Human biology ICT Mathematics Physics Psychology Science (AS only)

<sup>9</sup> A summary of selected UCAS tariff values can be found in Appendix 4 p59. For a full listing of UCAS tariff values see [http://www.ucas.com/students/ucas\\_tariff/tariffables/](http://www.ucas.com/students/ucas_tariff/tariffables/)

<sup>10</sup> <http://www.accreditedqualifications.org.uk/index.aspx>

<sup>11</sup> For further detail see awarding body websites (AQA [www.aqa.org.uk](http://www.aqa.org.uk), Edexcel [www.edexcel.com](http://www.edexcel.com), and OCR [www.ocr.org.uk](http://www.ocr.org.uk))

<sup>12</sup> New suites of GCE A levels were introduced in September 2008. Some subjects are available in more than specification

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The specific post-16 qualifications taken by young people are selected from the choice offered by their school or college. Students have considerable freedom to choose from a breadth of subjects (not limited to STEM), and it is now not uncommon, especially since the introduction of AS levels, for students to choose a mixture of subjects from sciences, humanities and arts. In addition to GCE A levels, other well established qualifications such as BTEC national awards, and a range of new Advanced Diplomas (being phased in between 2008 and 2011) offer further choices for some young people. Despite the fact that there is a wide range of GCE A levels and other qualifications available, the actual choice offered to individual students has tended, in the past, to be limited by their school or college. The introduction of the new Diplomas (between 2008 and 2011) is likely to stimulate the development of area partnerships of schools and colleges, and this may lead to a wider choice of subjects for students at post-16, as students have increasing opportunities to enroll on courses at more than one institution.

Undergraduate degree programmes in the UK are provided by higher education institutions that receive public funding through funding councils, but operate as independent organisations, with the freedom to develop their own degree courses and titles. Higher education institutions operate in a competitive market (competing for students), and are able to respond to changing demand. The result has been the creation of a huge number of undergraduate degree courses. In STEM subjects, data gathered from UCAS (2008)<sup>13</sup> listed 14805 different STEM courses, with 4815 different subject titles available in the UK. This listing includes the full breadth of combinations with STEM subjects (e.g. History and Physics, or Astrophysics and Politics).

The choice facing young people wishing to progress into STEM degree programmes in the UK is highly complex, and potentially bewildering. Whilst it is possible to follow a 'straight line' progression route (e.g. studying GCE A level chemistry leading to an undergraduate degree in chemistry), there is a huge range of other options. The task facing teachers, parents and others responsible for providing information, advice and guidance is truly daunting.

## Research Aims

The principal aim of this research was to collect evidence about subject combinations and qualifications that enable students to progress into STEM degrees in the UK. The research also aimed to collect evidence about actual practice in admissions into STEM degrees. The evidence and information gained through the research was intended to assist the development of clear and accurate guidance to be included on the Science Council's *Future Morph* website.

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<sup>13</sup> From UCAS data supplied to the Gatsby Charitable Foundation

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## SECTION 2: METHODOLOGY

The research methodology comprised two strands:

- Desk research – investigating the subject requirements for entry into STEM degree courses as stated in publicly available sources;
- Field research – investigating actual practice in admissions of students into STEM degree courses, using an online questionnaire and telephone interviews.

This research did not include degrees in medicine (and related degrees), dentistry and veterinary sciences. Whilst these are clearly very important STEM degrees, they have well recognised progression routes for which specific advice is available<sup>14</sup>.

### 2.1 The desk research

The key objectives of the desk research were:

- To explore ways that degree course titles are, or could be, grouped and categorized in order to facilitate accessible information about entry requirements and subject combinations;
- to collect data on publically stated entry requirements (with reference to essential, desirable and excluded subjects) for STEM degree courses, and on the qualifications and subjects that enable students to be accepted onto STEM degree courses.

The starting point for categorizing STEM degrees was the JACS<sup>15</sup> coding system used by UCAS. JACS subject lines provide groupings of related subject titles. The outcome of this work is discussed in Section 3.1 on p 19-24. The desk research explored factors relating to entry into STEM degree courses through three routes:

- Detailed searching of publicly available sources;
- Data collection from UCAS through UCAS Media;
- Data sharing with other related research.

#### 2.1.1 Detailed searching of publicly available sources

This work focused on a sample range of universities. Three main publicly available sources were used to gather information on entry requirements for STEM degree courses:

- The UCAS web-based Course Search facility ([www.ucas.ac.uk/students/coursesearch/](http://www.ucas.ac.uk/students/coursesearch/));
- Individual university prospectuses (mainly web-based, with some paper copy);
- University websites.

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<sup>14</sup> e.g. See The British Medical Association *'Becoming a Doctor: Entry in 2010'*

[http://www.bma.org.uk/careers/becoming\\_doctor/becomdoctor2010.jsp](http://www.bma.org.uk/careers/becoming_doctor/becomdoctor2010.jsp);

The British Dental Association *'Careers in Dentistry: Advice Sheet e12'*

[http://www.bda.org/Images/e12\\_careers\\_in\\_dentistry\\_-\\_oct2007.pdf](http://www.bda.org/Images/e12_careers_in_dentistry_-_oct2007.pdf);

The Royal College of Veterinary Surgeons *'Training to be a veterinary surgeon'* and *'Training to become a veterinary nurse'* <http://www.rcvs.org.uk/Templates/Internal.asp?NodeID=89658>

<sup>15</sup> JACS (Joint Academic Coding System) was introduced by UCAS and the Higher Education Statistics Agency in 2002 to provide a common system for coding subjects. A review completed in 2005 has led to an updated version (JACS 2.0). The codes can be found at:

[http://www.ucas.ac.uk/website/documents/JACS\\_coding/jacsv2.pdf](http://www.ucas.ac.uk/website/documents/JACS_coding/jacsv2.pdf)

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A sample group of universities to be investigated in detail was constructed to include four 'types' defined for this project, as shown in Table 2 below. The sample was intended to provide a range across higher education provision in the UK. After some initial investigation, it was decided to exclude the universities of Oxford and Cambridge from the samples for more detailed desk and field research. There are some additional features relating to entry to these universities e.g. application to individual colleges, additional requirements such as written work or other tests. These features introduced some complexities which could not be covered adequately within the scope and methodology of this research. Cambridge University has published a leaflet providing advice about subject choices for students hoping to gain entry to a range of degree courses<sup>16</sup>.

**Table 2: Sample group of universities – investigating entry requirements**

Type	Definition	Number included in sample
1	Russell Group universities	11
2	Older universities (pre-1960) other than Russell Group	7
3	Universities chartered between 1960 and 1992	7
4	Universities chartered after 1992	8

The first phase of the search involved gathering information about entry requirements for a wide range of (43) STEM, and STEM related undergraduate degree courses in 18 universities (11 type 1; 2 type 2; 2 type 3; 3 type 4). The subjects investigated are shown in Table 3.

**Table 3: STEM courses investigated (entry requirements) – First phase**

Actuarial Science/Studies	Engineering (Acoustics)	Marine/Maritime Studies
Agricultural Sciences/Agriculture	Engineering (Aeronautical and Aerospace)	Materials Science/Metallurgy
Anatomical Science/Anatomy	Engineering (Chemical)	Mathematics
Animal Sciences	Engineering (Civil)	Microbiology
Astronomy and Astrophysics	Engineering (Communications)	Natural Sciences
Biochemistry	Engineering (Computer, Control, Software and Systems)	Naval Architecture
Biological Sciences	Engineering (Electrical and Electronic)	Optometry (Ophthalmic Optics)
Biology	Engineering (Manufacturing)	Pharmacology
Biotechnology	Engineering (Mechanical)	Physics
Building	Environmental Science/Studies	Physiology
Chemistry	Food Science/Studies and Technology	Plant Sciences
Computer courses	Genetics	Science
Dietetics	Geology/Geological Sciences	Statistics
Engineering/Engineering Sciences	Human Sciences/Human Biosciences	Technology
		Zoology

<sup>16</sup> University of Cambridge 'Subject Matters: Post 16 Subject Choices'  
<http://www.cam.ac.uk/admissions/undergraduate/apply/docs/subjectmatters.pdf>

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Information was collected about subjects required, qualifications accepted, grades and UCAS points required. Notes were also recorded of any comments about excluded subjects or other relevant information.

Phase 2 of the investigation of information available online focused on a smaller group of subjects (24) from the areas of biological sciences, chemistry, engineering/engineering sciences, mathematics and physics in 15 other universities (5 type 2, 5 type 3, 5 type 4). The subjects investigated are shown in Table 4.

**Table 4: STEM courses investigated (entry requirements) – Second phase**

<b>Biological Sciences</b>	<b>Mathematics</b>
Biology	Mathematics
Biochemistry	Applied Mathematics
Psychology	Actuarial Science
Sports Science	Statistics
<b>Chemistry</b>	<b>Physics</b>
Chemistry	Physics
Colour Chemistry	Astrophysics
Industrial Chemistry	Medical Physics
Medicinal Chemistry	Quantum Mechanics
<b>Engineering/Engineering Sciences</b>	
Engineering (Acoustics)	
Engineering (Aeronautical and Aerospace)	
Engineering (Chemical)	
Engineering (Mechanical)	

## 2.1.2 Data collection from the UCAS (through UCAS Media)

In addition to a detailed survey of publicly available information about entry requirements in the sample group of universities, additional data were collected from the UCAS, through the UCAS Media service, in relation to actual qualifications held by students accepted onto STEM degree courses. This data collection was designed to fit within available budgets, and within constraints influencing the work of UCAS Media (e.g. scale, compliance with data protection regulations).

The brief agreed with the UCAS Media was to provide a set of data showing the ‘top five’ GCE A level subjects (i.e. number of applicants holding these qualifications) held by students accepted onto degree courses in 2008 in certain specified JACS subject lines (see Table 5 p16) across sample groups of the four types of university. The sample contained:

- 12 type 1 universities (Russell Group);
- 9 type 2 universities (pre-1960, non-Russell Group);
- 10 type 3 universities (1960-1992);
- 12 type 4 universities (post 1992).

The JACS subject lines were chosen to give wide coverage of STEM. The researchers grouped the A level titles, bringing closely related titles together (e.g. all the different available GCE A level physics specifications were grouped as one, within the subject title ‘physics’). The list supplied by UCAS contained 236 GCE A level titles, which the researchers organized into 40 subject groups for the data search.

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**Table 5: JACS subject lines selected for UCAS data collection**

C1 Biology	G1 Mathematics
C4 Genetics	G3 Statistics
C6 Sports Science	G4 Computer science
C7 Molecular Biology, Biophysics, Biochemistry	G6 Software Engineering
C8 Psychology	
D4 Agriculture	H2 Civil engineering
D6 Food and beverage studies	H3 Mechanical engineering
D7 Agricultural Sciences	H4 Aerospace engineering
	H6 Electrical and electronic engineering
F1 Chemistry	H8 Chemical, process and energy engineering
F3 Physics	
F4 Forensic and archaeological science	J4 Polymers and textiles
F6 Geology	J7 Biotechnology
F8 Physical geographical sciences	

Discussions also took place with UCAS and with the Gatsby Charitable Foundation about a possible second data survey showing the combinations of A level subjects held by students accepted onto some major JACS subject lines, for all UK universities for 2008. The added value of this additional work is still being considered, and further consultation with stakeholders is recommended in order to reach a decision on whether to proceed with this or with a similar survey.

### 2.1.3 Data sharing with other related research

During the course of this research it was found that related research was being carried out by the Gatsby Charitable Foundation, also using statistics obtained from UCAS. Communication between CEI and the Gatsby Charitable Foundation enabled some sharing of information and data to add value to overall research findings. Any such sharing of data is acknowledged within this report.

## 2.2 Field research

The key objective for the field research was to collect data on actual admissions practice in UK universities relating to STEM degree courses. This was intended to shed some light on how UK universities implement their admissions requirements for STEM degrees, and the factors which may influence admissions decisions.

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The field research had two key elements.

- i. An online questionnaire, comprising mainly structured questions, was distributed by e-mail via general admissions tutors in 81 UK universities. Admissions tutors were asked to forward the email message, containing a weblink to the online questionnaire, to relevant admissions tutors in specific STEM subject departments. A copy of the email message can be found in Appendix 1 on p49. A text version of the questionnaire can be found in Appendix 2 on p50. The 81 universities contacted covered the four ‘types’ previously identified for this research, as shown in Table 6.

**Table 6: Circulation of email with weblink to online questionnaire**

‘Type’ of university	Definition	Number included in email circulation (online questionnaire)
1	Russell Group <sup>17</sup> universities	19
2	Older universities (pre-1960) other than Russell Group	14
3	Universities chartered between 1960 and 1992	16
4	Universities chartered after 1992	32
	<b>TOTAL</b>	<b>81</b>

The total number of returns from the online questionnaire was 33

- ii. Telephone interviews were carried out with a range of individually targeted university staff with responsibility for admissions into specific STEM degree courses. Respondents were drawn from a range of disciplines within STEM. Personalised email messages were sent to the sample group informing them about the purpose of the research, and inviting their participation. Invitations were circulated to 128 contacts in 38 different UK universities. A copy of the invitation is shown in Appendix 3 p58. The breakdown of the sample is shown in table 7.

**Table 7:**

‘Type’ of university	Definition	Number of individual tutors approached	Number of universities approached
1	Russell Group universities	30	12
2	Older universities (pre-1960) other than Russell Group	14	6
3	Universities chartered between 1960 and 1992	36	6
4	Universities chartered after 1992	48	14
	<b>TOTAL</b>	<b>128</b>	<b>38</b>

The telephone interviews used the same questions as the online questionnaire.

The total number of telephone interviews carried out was 72, providing a total number of respondents in this research of 105.

<sup>17</sup> The Russell Group is an association of 20 major research-intensive universities in the UK. The group was formed in 1994

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CEI engaged the services and expertise of BMG Research (Birmingham)<sup>18</sup> to set up and run the online questionnaire and the telephone interviews, based on the questions agreed between CEI and BMG Research. BMG are specialists in online and telephone survey work, with the cost-effective capacity to handle the volume that could be generated through this research.

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<sup>18</sup> BMG Research Birmingham [www.bmgresearch.co.uk/bmgresearch/kms/news.aspx](http://www.bmgresearch.co.uk/bmgresearch/kms/news.aspx)

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## SECTION 3: RESEARCH FINDINGS FROM THE DESK RESEARCH

### 3.1 Grouping STEM degree course titles

Data collected from UCAS indicate that, in 2008, there were 14805 degree courses, with 4518 different titles (see p12) that could be included under a broad definition of STEM. These include, for example, the full range of pure sciences and mathematics, applied sciences, and all fields of engineering. In addition, modern provision of degree programmes has expanded to include an extensive range of combined disciplines. The following examples illustrate the breadth of combinations:

- Medicinal chemistry and politics;
- Smart systems and biochemistry;
- Biological and medicinal chemistry, with study abroad;
- Forensic science with law;
- Chemistry and human geography;
- Chemical and bioprocess engineering;
- Chemical engineering with management;
- Geology and web development;
- Television and video technology with business;
- Physics with finance;
- Engineering physics;
- Mathematics and neuroscience.

These examples show that coding courses is problematic. For example, it is not clear whether the course entitled 'mathematics and neuroscience' belongs in a 'mathematics group', or a 'biosciences group'. The JACS coding system deals with this by giving the mathematics and neuroscience course a coding of BG11. Within the coding system, B contains codes for 'subjects allied to medicine' and G contains codes for 'mathematical and computer sciences'. The full JACS coding system can deal with combinations at this level of detail, but courses such as this cannot easily be placed in subject lines. The JACS coding system also includes a code Y, which is intended specifically for combined courses.

Some subjects included in the list are certainly debatable in terms of their inclusion in STEM e.g. geography with drama. Other subject titles seem likely to relate to the competition between universities in attracting and recruiting students, by using the title as a 'hook' e.g. the range of different degree titles including the word 'forensic' (81), or physics with finance where, to some extent, these titles highlight topics or potential future career pathways that course providers believe will be attractive to prospective students.

If the issue is viewed from the pre-university (school and college) provision, groupings of STEM subjects are much clearer. Almost all post-16, pre-university STEM courses could be placed in a small number of key groups e.g:

- Mathematics and further mathematics;
- ICT/computing
- Biology;
- Chemistry;
- Physics;
- Technology;
- Engineering;
- Geology/ geography;

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However, even at the pre-university level the boundaries of STEM are not clear. For example, other subjects such as art and design and music show significant STEM content in certain contexts.

Analysis of the current situation shows a massive gap between the relatively small number of STEM subject titles at the pre-university stage, and the very large number of titles offered at undergraduate degree level. Whilst it would be attractive to try to group degree course titles as far as possible within the small number of subject titles familiar to young people at the pre-university stage, this would lead to very large numbers of degree titles appearing within each group. Arguably, this would not offer much in helping young people and their advisers focus down on their most appropriate choices in a systematic way.

Given the complexity of the total range of available STEM degree courses it is difficult to see how a perfect grouping system could be established and maintained. The best option may be to aim to promote the use and understanding of a common grouping system, whilst acknowledging its imperfections. The JACS codes already represent an agreed system (between UCAS and HESA) for grouping degree course titles. According to UCAS the stated purpose of the JACS codes is:

*“To transmit information about the subject matter of all courses to universities and colleges, and ultimately to HESA.”*

(from UCAS website<sup>19</sup>)

The JACS coding system does not appear to have been considered for its potential to communicate information about the subject matter of degree courses to prospective applicants and their advisers. The full JACS coding system<sup>20</sup> is divided into 19 broad subject groups as shown in Table 8.

**Table 8: JACS main subject groups (JACS 2.0)**

Subject group code	Subject area
A	Medicine and dentistry
B	Subjects allied to medicine
C	Biological sciences
D	Veterinary sciences, agriculture and related subjects
F	Physical sciences
G	Mathematical and computer sciences
H	Engineering
J	Technologies
K	Architecture, building and planning
L	Social studies
M	Law
N	Business and administrative studies
P	Mass communication and documentation
Q	Linguistics, classics and related subjects
R	European languages, literature and related subjects
T	Eastern, Asiatic, African, American and Australasian Languages, Literature and related subjects
V	Historical and philosophical studies
W	Creative arts and design
X	Education

UCAS also uses a code Y for a range of combined subject degree courses

<sup>19</sup> [www.ucas.ac.uk/he\\_staff/datamanagement/jacs/jacs20](http://www.ucas.ac.uk/he_staff/datamanagement/jacs/jacs20)

<sup>20</sup> Available through UCAS website at [www.ucas.ac.uk/he\\_staff/datamanagement/jacs/jacs20](http://www.ucas.ac.uk/he_staff/datamanagement/jacs/jacs20)

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Each of these groups can contain a large number of different coded degree titles (e.g. Engineering (H) lists 115 codes). Some of the main group titles indicate the challenge presented by attempts to define them (e.g. group B ‘*subjects allied to medicine*’). In addition, some courses cross main subject code boundaries requiring complex coding (e.g. mathematics and neuroscience coded as BG11 see p19).

The numbers of separate course titles within each one of the main JACS codes shown in Table 8 are so large that these groupings would not seem to offer a useful basis for developing advice for young people. However, JACS subject lines do provide a more compact grouping system. The key subject lines for STEM subjects are shown in Table 9.

**Table 9: STEM subject lines (JACS) excluding A (Medicine and dentistry)  
B (subjects allied to medicine)  
Y (combined subjects)**

JACS2 Subject Group	JACS2 Subject Line	
Group C Biological Sciences	C0 – Biological Sciences: any area of study	
	C1 – Biology	
	C2 – Botany	
	C3 – Zoology	
	C4 – Genetics	
	C5 – Microbiology	
	C6 – Sports Science	
	C7 – Molecular Biology, Biophysics and Biochemistry	
	C8 – Psychology	
	C9 – Others in Biological Sciences	
	CC – Combinations within Biological Sciences	
Group D Veterinary Science, Agriculture and related	D1 – Pre-clinical Veterinary Medicine	
	D3 – Animal Science	
	D4 – Agriculture	
	D5 – Forestry	
	D6 – Food and Beverage studies	
	D7 – Agricultural Sciences	

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	D9 – Others in Veterinary Science, Agriculture and related
	DD – Combinations within Veterinary Science, Agriculture and related
Group F Physical Sciences	F0 – Physical Sciences: any area of study
	F1 – Chemistry
	F2 – Materials Science
	F3 – Physics
	F4 – Forensic and Archaeological Science
	F5 – Astronomy
	F6 – Geology
	F7 – Science of Aquatic and Terrestrial Environments
	F8 – Physical Geographical Sciences
	F9 – Others in Physical Sciences
	FF – Combinations within Physical Sciences
Group G Mathematical and Computer Science	G0 – Mathematical and Computer Science: any area
	G1 – Mathematics
	G2 – Operational Research
	G3 – Statistics
	G4 – Computer Science
	G5 – Information Systems
	G6 – Software Engineering
	G7 – Artificial Intelligence
	G9 – Others in Mathematical and Computer Science
	GG – Combinations within Mathematical and Computer Science

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Group H Engineering	H0 – Engineering: any area of study
	H1 – General Engineering
	H2 – Civil Engineering
	H3 – Mechanical Engineering
	H4 – Aerospace Engineering
	H5 – Naval Architecture
	H6 – Electronic and Electrical Engineering
	H7 – Production and Manufacturing Engineering
	H8 – Chemical, Process and Energy Engineering
	H9 – Others in Engineering
	HH – Combinations within Engineering
Group J Technologies	J0 – Technologies: any area of study
	J1 – Minerals Technology
	J2 – Metallurgy
	J4 – Polymers and Textiles
	J5 – Materials Technology not otherwise specified
	J6 – Maritime Technology
	J7 – Biotechnology
	J9 – Others in Technology
	JJ – Combinations within Technology

An appropriate selection of these subject lines could provide a level of detail which should be understandable and accessible for young people and their advisers considering which route to follow for their degree studies. It is recommended that a simplified list of subject lines is used as a basis for developing advice for young people, omitting the lines containing 'other' (miscellaneous) courses and lines for combined subjects, while making young people aware that opportunities to study combined subjects do exist.

Other benefits could be gained by basing future advice for young people as far as possible on JACS subject lines e.g.

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- It would align future information, advice and guidance with the established system for grouping subject titles and content used by UCAS and HESA, and by universities;
- It could provide the basis for improved communication about progression routes between the universities, via UCAS, and young people;
- The JACS coding system is regularly reviewed by UCAS and HESA in order to ensure that the system keeps pace with changes and development of new courses by universities. Information, advice and guidance about progression routes into STEM degree courses for young people could be informed and kept up to date if linked with the JACS coding system through the subject lines.

## 3.2 Data collected from information available on websites

Detailed searching of websites was carried out for a sample group of 33 universities across the four 'types' identified for this research (see Table 2 p14). Two approaches were followed in searching for information about course entry requirements.

- Through the UCAS Course Search facility;
- By looking at information provided online by individual universities.

### 3.2.1 The UCAS Course Search Facility<sup>21</sup>

There are several pathways to follow through this search facility. Following a pathway through searching for a subject for entry in 2009 gives access to an alphabetical list of "*subjects beginning with...*", which contains 1086 links. Clicking on any one of these links leads to further listings. For example, clicking on 'biology' leads to a page offering three search routes, each leading to listings against individual universities:

- All biology courses;
- Biology on its own as a single subject;
- "More specific subject areas" (providing a list of 45 course titles).

Following the links through one of these three routes leads to information for individual universities. For each university, the relevant degree courses are listed, with links leading to further detailed information. Whilst there is a common structure to how this information is presented, there are frequent variations in detail. For example all provide information about 'entry profiles' entry routes, application and selection, but presentation varies. Four examples (from the UCAS Course Search facility) of the options leading to specific information about entry requirements are shown in Figure 1 p 25. This shows the options presented by four different universities that were included in the sample in this research. These are typical examples of what is seen when the search facility is used. They show variation in headings (e.g. '*entry routes*', '*entry requirements*' and '*application and selection*' are all alternative headings for the same information area), and in lists of links provided.

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<sup>21</sup> [www.ucas.ac.uk/students/coursesearch/coursesearch2009/](http://www.ucas.ac.uk/students/coursesearch/coursesearch2009/)

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Figure 1: Examples from UCAS Course Search facility (Biology)<sup>22</sup>

<b>University 2B</b>	
<b>Entry Requirements</b>	
<u>Course Specific Requirements</u> <u>English, Welsh and Northern Irish</u> <u>Qualifications</u> <u>Scottish Qualifications</u>	<u>Other Tariff Qualifications</u>  <u>Access and Supporting Qualifications</u> <u>Other Qualifications</u>
<b>University 3A</b>	
<b>Application and Selection</b>	
<u>Course Specific Requirements</u> <u>English, Welsh and Northern Irish</u> <u>Qualifications</u> <u>Scottish Qualifications</u> <u>Other Tariff Qualifications</u> <u>Access and Supporting Qualifications</u>	<u>Completing your application</u>  <u>Opportunities for all</u> <u>What skills, qualities and experience do I need?</u> <u>International students</u> <u>General admissions policy</u>
<b>University 1K</b>	
<b>Entry Routes</b>	
<u>Course Specific Requirements</u> <u>English, Welsh and Northern Irish</u> <u>Qualifications</u> <u>Scottish Qualifications</u> <u>Other Tariff Qualifications</u> <u>Access and Supporting Qualifications</u>	<u>Other Qualifications</u>  <u>Widening participation</u> <u>Mature applicants</u> <u>International applicants</u>
<b>University 4C</b>	
<b>Entry Routes</b>	
<u>Course Specific Requirements</u> <u>English, Welsh and Northern Irish</u> <u>Qualifications</u> <u>Scottish Qualifications</u>	<u>Other Tariff Qualifications</u>  <u>Access and Supporting Qualifications</u> <u>Other Qualifications</u>

Following the link to 'Course Specific Requirements' leads the reader to more complex and detailed information which must be read by scrolling down the page. There is a consistent design and layout of this information for all universities. However, considering its function, though the presentation is logical, it cannot be said to be 'user friendly'. For example, vital information for young people such as the subject titles which are essential, desirable or excluded as entry requirements, is separated from the qualifications and grades required. It is not easy for the reader to find essential information, and there are frequent caveats and alternatives in the information

One example showing part of the 'course specific requirements for a Type 1 university (code 1K) is shown in Figure 2 p26.

<sup>22</sup> Universities (HEIs) in this research were given codes within the 4 'types' defined in the methodology (p14)

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**Figure 2: Sample extract from UCAS course search information (HEI 1K)**

<b>Psychology</b> 3 year full-time Degree	
<b>Course Specific Requirements</b>	
<b>Course Specific Requirements</b>	Students with Science or Arts A levels admitted to the course, provided they have GCSE Maths grade B. Students with all Arts A levels normally required to have at least GCSE Double Science grade BB
<b>Volume and depth of study/Tariff points and Grades</b>	
<b>Volume and depth of study (GCE A level or equivalent)</b>	Minimum number required: 3 Number preferred: 3.5
<b>Tariff score</b>	
<b>GCE A/AS level grade range</b>	AABb-BBBb
<b>GCE AS</b>	
<b>Acceptability</b>	Acceptable only when combined with other qualifications
<b>Excluded Subjects</b>	General Studies
<b>GCE A level</b>	
<b>Acceptability</b>	Acceptable on its own & combined with other qualifications
<b>Excluded Subjects</b>	General Studies.
<b>Additional Information</b>	Grades AAB at A level plus a grade B in a 4 <sup>th</sup> AS subject required, or for applicants whose profiles include one natural science subject, ABB plus a grade B in a 4 <sup>th</sup> AS subject required, or for applicants whose profiles include two or more natural science subjects, BBB at A level plus a grade B from an additional subject at AS level.

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Overall the UCAS Course Search facility provides very comprehensive information about progression into degree courses. Its complexity reflects the provision on offer, and is thus to some extent unavoidable. The search facility is logical and easy to navigate in a mechanistic sense. However, its current design and presentation reduce its effectiveness, and make it difficult for young people and their advisers to understand. It is possible that a system and design that was adequate and effective when originally set up has now been overtaken by rapid growth in numbers of courses and options available. Coding has become more difficult. Clear definition of entry requirements has also become more difficult, as the relationship between the subjects which students study at school or college, and the options available in STEM degrees becomes more complex.

## 3.2.2 Information provided online by individual universities

All universities have extensive websites that include downloadable prospectuses and other information about courses and entry requirements. Given their independent status, every university website has a different design, and presents information in a different way. As would be expected in this circumstance, there is variation in the quality of these websites, and the ease with which a user might find the information they are seeking about course entry requirements.

In addition to providing online information, many universities carry out outreach work and other liaison activities (e.g. open days for schools). Universities act independently in these and other communication strategies aimed at prospective students.

Data collected by searching online information about entry requirements provided by individual universities included:

- Reference to subjects required;
- Reference to alternative qualifications accepted (GCE levels, Scottish Advanced Highers etc);
- Reference to grades required;
- Reference to UCAS tariff points required;
- Reference to any comments on 'excluded subjects';
- Reference to other notes.

Data were collected in two phases as described in Section 2 (Methodology, pp13-15) Selected samples of the raw data from this research are shown in the following Tables (11 and 12 pp28-30). Further examples are shown in Appendix 6.1 on pp63-69.

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**Table 11: Sample raw data from Phase 1 online search – Grade requirements (cont p 28-29)**

<b>Subject</b>	<b>1G</b>	<b>1K</b>	<b>1E</b>	<b>1B</b>	<b>4A</b>
Actuarial Science/Studies	AAA/a	X	x	x	x
Agricultural Sciences/Agriculture	BBC/BCC	X	x	x	x
Anatomical Sciences/Anatomy	x	X	x	ABB, IB 32pts H665	x
Animal Sciences	x	X	x	x	x
Astronomy and Astrophysics	x	X	x	x	x
Biochemistry	BBC	ABB/BBB, IB 32pts H55	ABB+AS-AB/bb+AS, IB 34pts H55	ABB, IB 35pts H666	x
Biological Sciences	BBB/BBC	BBB, IB 32pts H5	x	x	x
Biology	x	X	x	AAA-ABB, IB 34pts H666	220-260 UCAS pts
Biotechnology	x	X	x	x	x
Building	x	X	x	x	x
Chemistry	BCC	ABB, IB 34pts H66	x	AAA-ABB, IB 33-35pts H665	x
Computer Courses	BCC	AAB or AA+bb, IB 36pts H6	AAC+AS-ABB+AS, IB 34pts H6	AAA-AAB, IB 35pts H665	x
Dietetics	x	X	ABB+AS-AB/bb+AS, IB 34pts H55	x	x
Engineering/Engineering Sciences	x	BBB/BBC, IB 34pts H55	x	x	x
Engineering (Acoustics)	x	X	x	x	x
Engineering (Aeronautical & Aerospace)	BBC/BCC	X	x	AAB, IB 35pts H666	x
Engineering (Chemical)	BCC	X	x	x	x
Engineering (Civil)	BBC	BBB/BBC, IB 34pts H55	x	AAA, IB 37pts H66	x
Engineering (Communications)	x	X	x	Aab, IB 35pts H66	x
Engineering (Computer, Control, Software & Systems)	x	BBB/BBC, IB 34pts H55	x	x	x
Engineering (Electrical & Electronic)	BBC/BCC	BBB/BBC, IB 34pts H55	ABB+AS-AB/bb+AS, IB 34pts H5	AAB, IB 35pts H66	x
Engineering (Manufacturing)	BBC/BCC	BBB/BBC, IB 34pts H55	x	x	x
Engineering (Mechanical)	BBC/BCC	BBB/BBC, IB 34pts H55	ABB+AS-AB/bb+AS, IB 34pts H5	AAA-AAB, IB 35pts H666	x
Environmental Science/Studies	x	X	x	AAB, IB 35pts H666	220-260 UCAS pts
Food Sciences/Studies & Technology	x	X	x	x	220-260 UCAS pts
Genetics	BBC	X	ABB+AS-AB/bb+AS, IB 34pts H55	x	x
Geology/Geological Sciences	x	X	x	AAB, IB 35pts H666	x
Human Sciences/Human Biosciences	BBC	X	ABB+AS-AB/bb+AS, IB 34pts H55	x	x
Marine/Maritime Studies	BBB/BBC	X	x	x	x
Materials Science/Metallurgy	x	X	x	x	x
Mathematics	ABC	AABb-AAAa+gd 2STEP, IB 37pts H6	AAA+AS-AAB+AS, IB 38pts H6	AAA-AAB, IB 36pts H666	x

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Subject	1G	1K	1E	1B	4A
Microbiology	BBC	BBB, IB 32-34pts	x	ABB, IB 33pts H665	x
Natural Sciences	x	X	x	x	x
Naval Architecture	x	X	x	x	x
Optometry (Ophthalmic Optics)	x	X	x	x	x
Pharmacology	x	X	ABB+AS-AB/bb+AS, IB 34pts H55	ABB, IB 33pts H665	x
Physics	BBC	AAB, IB 36pts H66	ABB+AS-AB/bbb, IB 34pts H55	AAA-AAB, IB 35-37pts H66	x
Physiology	x	X	ABB+AS-AB/bb+AS, IB 34pts H55	ABB, IB 33pts H65	x
Plant Sciences	x	X	x	AAA-AAB, IB 34pts H666	x
Science	x	X	x	x	x
Statistics	x	X	x	x	x
Technology	x	X	x	x	x
Zoology	BBB/BBC	X	x	AAA-AAB, IB 34pts H666	x

### Key:

- Upper case letters (e.g. AAB) = GCE A level grades
- Lower case letters = GCE AS level grades
- UCAS pts = tariff points defined by UCAS based on aggregate grades achieved in eligible qualifications<sup>23</sup>
- IB = International Baccalaureate, shown with required points score and levels required (H = Higher, S = Standard, C = Core)<sup>24</sup>
- X = subject not offered at this institution

<sup>23</sup> A summary of selected UCAS tariff values can be found in Appendix 4 p59. For a full listing of UCAS tariff values see [http://www.ucas.com/students/ucas\\_tariff/tarifftables/](http://www.ucas.com/students/ucas_tariff/tarifftables/)

<sup>24</sup> A summary of the UCAS tariff points for the IB is shown in Appendix 5 p61

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**Table 12: Sample raw data from Phase 2 online search - Grade requirement**

Subject (with JACS coding)	2B	2C	2E	2G	2F	4C	4D	4E
Biology (C100)	ABB-BBB, IB:29-32	240-280pts, IB:29-31	300pts, IB:6,5,5	280-300pts, BBC-BCC	ABB, IB:32	X	X	200-280pts, IB:26
Biochemistry (C700)	X	X	300pts, IB:6,5,5	280-300pts, BBC-BCC	ABB, IB:32	200pts, IB:26	X	X
Sports Science (C600)	AAB-BBB, IB:29-34	280pts	X	280pts	X	X	280pts, IB:28	280pts, IB:28
Psychology (C800)	AAA-AAB, IB:33-36	280pts, IB:28	AAB-ABBb, IB:6,6,6	300-320pts	AAB, IB:36	290pts, IB:28	240pts, IB:24	280pts, IB:30
Mechanical Engineering (H300)	ABB-BBB, IB:29-32	220-260pts	X	260-300pts	X	220pts, IB:26	X	240pts, IB:26
Chemical Engineering (H800/810)	X	X	X	300pts	X	X	X	X
Aerospace Engineering (H400)	X	X	X	260-300pts	X	X	X	X
Physics (F300)	AAB-BBB, IB:29-34	240-300pts	X	280pts	AAB, IB:36	X	X	X
Astrophysics (F510)	X	X	X	X	AAB, IB:36	X	X	X
Quantum Mechanics (F342)	X	X	X	X	X	X	X	X
Chemistry (F100)	X	240-300pts	260-290pts, IB:5,5,5	X	AAB-ABB, IB:36-32	200pts, IB:26	X	160-240pts, IB:24
Industrial Chemistry (F111)	X	X	X	X	AAB-ABB, IB:36-32	X	X	X
Colour Chemistry (F112)	X	X	X	X	X	X	X	X
Medicinal Chemistry (F150)	X	X	ABB, IB:6,5,5	X	AAB-ABB, IB:36-32	200pts, IB:26	X	X
Mathematics (G100)	AAB-BBB, IB:29-34	X	320pts, IB:6,6,5	300pts	AAB, IB:34	X	X	220-280pts, IB:24
Statistics (G300)	X	X	280pts, IB:5,5,5	X	AAB, IB:34	X	X	X
Applied Mathematics (G120)	X	X	X	300pts	AAB, IB:34	X	X	X
Computer Science (G400)	X	200-260pts	300-340pts, IB:6,5,5	280pts	ABB, IB:32- 34	200-250pts, IB:28	160pts, IB:24	240-280pts, IB:26
Forensic Computing (G550)	X	X	X	X	X	X	160pts, IB:24	240-280pts
Software Engineering (G600)	X	200-260pts	300-340pts, IB:6,5,5	X	X	300pts, IB:28	X	220-280pts, IB:26

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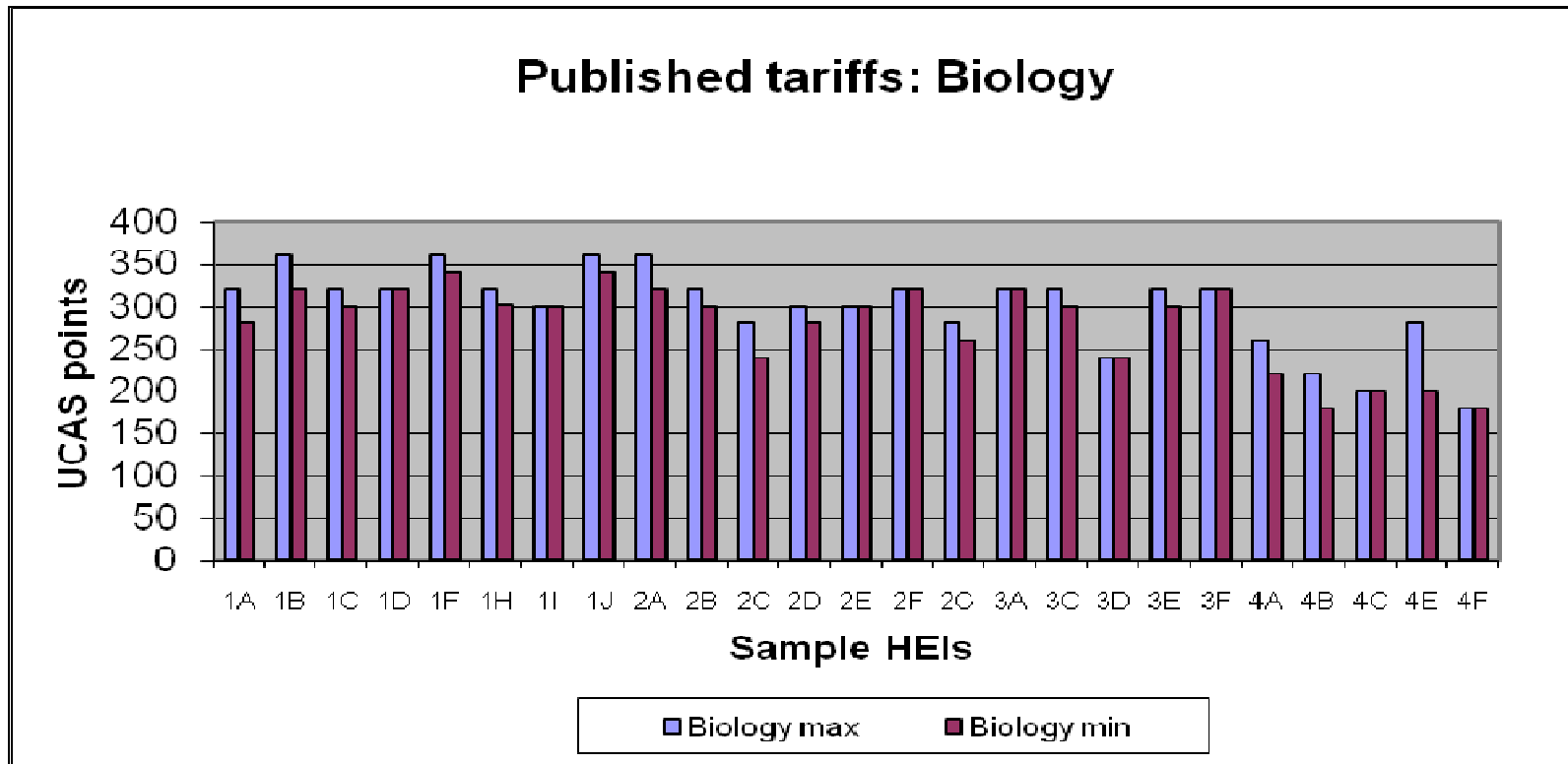
Working from the raw data, results were grouped and assembled to display findings for:

- Comparisons of entry requirements for a range of universities in each of the four types defined in this research, for a range of STEM subjects
- Comparisons of maximum and minimum requirements stated for entry for a range of STEM degree courses in these universities. The maximum and minimum figures refer to situations where the information provided by the universities shows a range of UCAS points scores that may be considered as acceptable.

Sample findings are set out in Charts A and B pp32 and 33. Further charts are shown in Appendix 6.2 p70-78

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Chart A: Entry requirements published by sample HEIs<sup>25</sup>: Maximum and minimum points for entry to biology



(HEIs coded 1 = Russell Group; HEIs coded 2 = Pre-1960 non Russell Group; HEIs coded 3 = 1960-92; HEIs coded 4 = Post-1992)

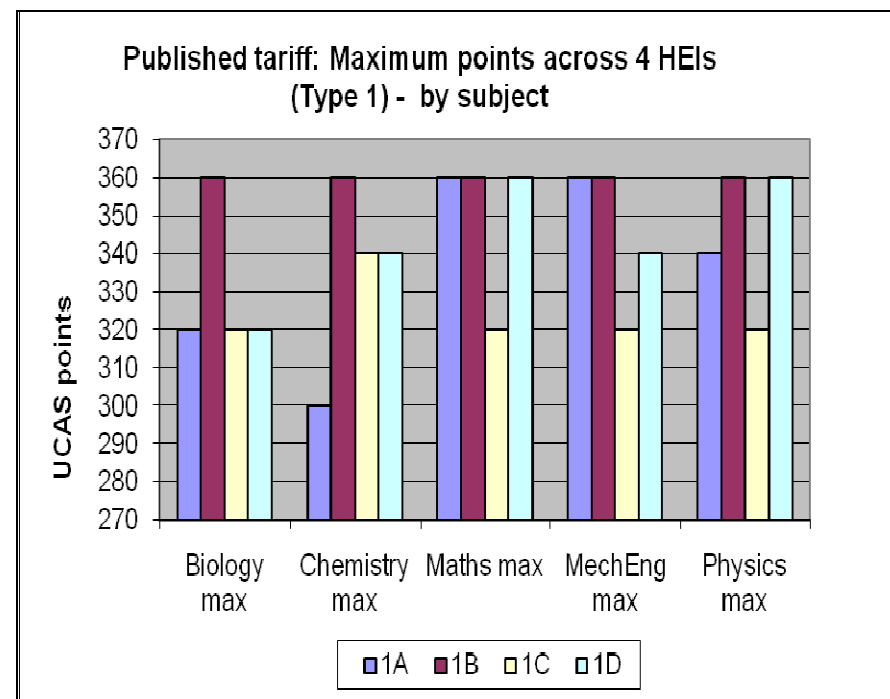
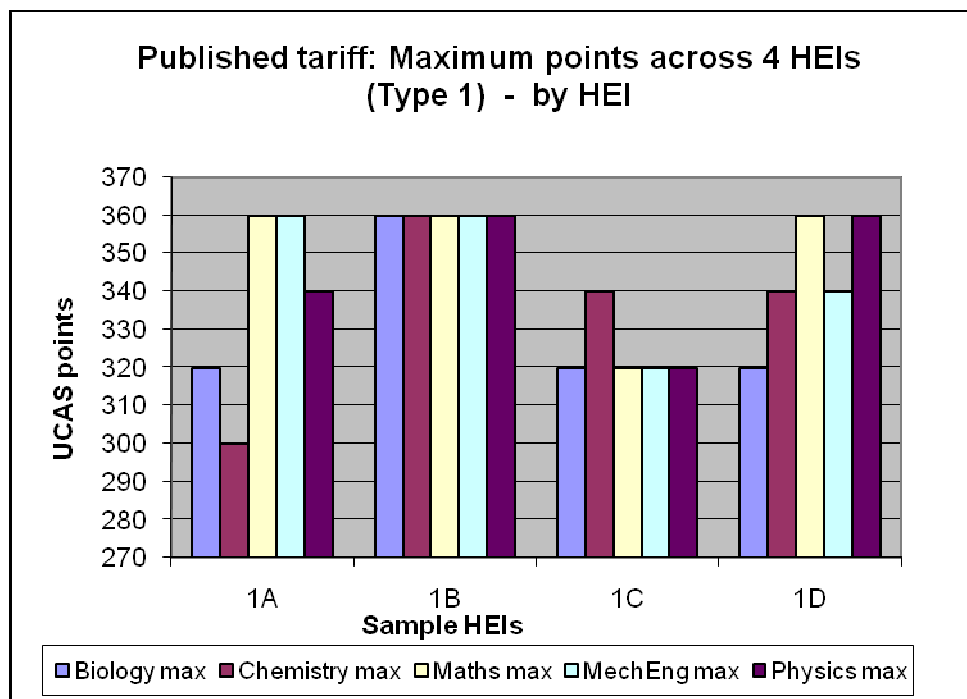
**Comments:** Many results overall (See also Appendix 6.2 p70-78) are unsurprising e.g. confirmation of higher points requirement for entry to Russell Group universities, and lower points requirements for entry to post 1992 universities. However, some other findings emerge including:

- Most universities operate with a range (maximum to minimum) of points scores/grades for entry, and this varies between universities;
- The points score/grade requirements vary between universities within a 'type' (see also Chart B).

<sup>25</sup> HEI – Higher Education Institution. All HEIs sampled in this research were UK universities

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**Chart B: Entry requirements based on the highest published tariff (maximum) for four Russell Group HEIs (5 STEM subjects)**



**Comments and Notes:** 1A, 1B, 1C, 1D = Four universities from the research sample

- Grades/ points set by universities as entry requirements vary between subjects within a single university, and the profile is different for different universities.
- The widest variation seen in this example (all universities from within Type 1, Russell Group) is 60 points (300-360) in chemistry between university 1A and 1B. This represents the difference between an entry requirement of 3As and 3Bs at GCE A level. Appendix 6.2 provides charts for type 4 universities (post 1992). These show a range for chemistry between 200 and 260 points equivalent to a GCE A level grade range of CDD to BCC.

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## 3.3 Findings from data collection through the UCAS Statistical Service

The data collected from UCAS (UCAS Media) gave the 'top five' (i.e. most frequently occurring) GCE A level subjects held by all students accepted onto STEM degree courses (2008 entry) in the JACS subject lines at the universities included in the sample (see Methodology p16)

The full results are set out in Appendix 6.3 on pp79-89, showing:

- The top five GCE A levels held by accepted students for each of the four types of university;
- The top five GCE A levels held by accepted students for each of the (24) subject lines included in the sample<sup>26</sup>;
- The average UCAS points tariff achieved by accepted students per GCE A level for each subject line.

### 3.3.1 UCAS top five data - GCE A level subjects against JACS subject lines

The 'top five' data supplied by UCAS showed 24 different GCE A level subjects including 'other' appearing across the whole data set (i.e. across all 24 JACS subject lines surveyed for the universities included in the sample). The frequency with which these subjects appear at any position in the top five across the JACS subject lines<sup>27</sup> is shown in Table 13 p 35. It is important to emphasise that the 'top five' data reflects the total number of GCE A level qualifications in each subject aggregated for all students accepted onto degree courses within the 24 JACs subject lines in the sample. No adjustment has been made in relation to the size of cohort taking the A levels. This will vary considerably between large cohorts e.g. mathematics (64593 sitting candidates in 2008) and small cohorts e.g. electronics (part of the group of 4555 sitting candidates listed by the JCQ<sup>28</sup> as 'Science' including all sciences except biology, physics and chemistry).

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<sup>26</sup> One subject line (D7 Agricultural Sciences) was not offered by any of the universities in the sample. There was a small number of other cases where a subject line was not offered by all types of universities in the sample e.g. J4 Polymers and textiles was only offered by universities type 1 and 4.

<sup>27</sup> The number of JACS subject lines for each type of university varies slightly because not all subject lines are offered by the universities in the sample

<sup>28</sup> The Joint Council for Qualifications lists numbers of candidates sitting GCE A levels in the UK at <http://www.jcq.org.uk/attachments/published/984/JCQ%20A-Level%20Results%202008.pdf>

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**Table 13**

GCE A level subject (grouping closely related titles)	Number of JACS subject lines in which GCE A level subjects feature somewhere in the 'top five' (Out of maximum of 23)			
	Uni Type 1 Out of 23 lines	Uni Type 2 Out of 21 lines	Uni Type 3 Out of 21lines	Uni Type 4 Out of 22 lines
Mathematics	19	16	18	13
Further mathematics	7	4	3	1
Biology	14	12	12	13
Chemistry	15	14	14	14
Physics	13	11	13	8
Electronics	1	1	1	1
Psychology	3	3	5	8
General studies	18	15	18	16
Geography	4	5	5	7
Design and Technology	2	4	1	6
ICT	0	2	1	2
Applied ICT	0	0	1	3
Computing	2	1	2	2
Art	1	0	0	0
Art and Design	1	0	0	2
English	2	4	4	4
Business Studies	1	0	1	2
History	1	1	0	0
Modern Foreign Languages	1	0	1	0
Sociology	0	1	1	1
Physical Education	1	1	1	1
Health and Social Care	0	0	0	1
Economics	0	1	0	1
Other	1	1	0	1

The data show a number of features worthy of comment and further discussion, including:

- The continuing importance of GCE A levels in mathematics, chemistry, physics and biology in providing access for students to a wide range of STEM degrees;
- The widespread occurrence of general studies, although this subject is often excluded as a qualification for entry to many STEM degrees. This result reflects the large cohort of students taking general studies (JCQ statistics showed 54879 sitting candidates in 2008), which has become an important part of the provision of a broad education at post-16;
- The position of psychology in relation to entry to STEM degree courses seems worth further investigation. GCE A level psychology is a popular option (52706 sitting candidates in 2008 according to JCQ), yet it appears infrequently in the 'top five'. Psychology was one of the JACS subject lines surveyed (C8) and psychology A level came 'top' as an entry qualification for psychology degrees in all four types of university. Apart from this, the profile of GCE A level psychology in the data is limited. The UCAS data does not tell us anything about the combinations of subjects taken by individual applicants. The evidence in this research does not suggest that GCE A level psychology is an 'excluded' subject for entry to STEM degrees. However, it does suggest that a significant proportion of young people opting to take GCE A level psychology may choose this as part of a combination of subjects not

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suitable for entry to most STEM degrees. Alternatively, a significant proportion of young people taking GCE A level psychology may be choosing to progress to non-STEM degree courses;

- Design and technology, at least potentially, could be seen as providing a foundation for the 'T' in STEM. The number of students taking design and technology at GCE A level is relatively small, but significant, forming part a group called 'technology subjects' by the JCQ. In 2008, 17396 students sat GCE A levels in this group. The numbers are considerably smaller than those taking more 'traditional' STEM A levels e.g mathematics (64593), biology (56010), and chemistry (41680)<sup>29</sup>, and it follows that design and technology features relatively infrequently in the 'top five' subjects held by students accepted on to STEM degree courses. However if compared to physics (28096), though the number of students taking design and technology is still significantly smaller, the difference is not so great and does not seem sufficient to explain the prominence of physics in the 'top five' lists in comparison with design and technology. Design and technology is a more recently introduced GCE A level, with a very different developmental history, compared to physics, chemistry, mathematics and biology. There will, of course, be differences in content, style and approach between the different subjects, and they may attract different groups of students (e.g. through interest and ability level). Also, the relative 'value' of design and technology may be perceived differently by various stakeholders, including university admissions tutors, STEM teachers in schools, parents, and young people themselves. However, if one accepts the importance of the 'T' in STEM, it may be timely to explore the role of design and technology as a subject in preparing young people for STEM degrees and for progression in STEM more generally.
- Table 13 p35 and the detailed results shown in Appendix 6.3 p79-89 show that there is quite a high degree of consistency across the four types of university in the subjects that appear in the 'top five'. There are a few subjects where the results may suggest differences between type 4 (post-1992) universities and the other three types of university, although the sample sizes are too small to draw firm conclusions. For example:
  - Less frequent appearance of mathematics (especially further mathematics);
  - Less frequent appearance of physics;
  - Slightly higher frequency in appearance of psychology;
  - Slightly higher frequency in appearance of design and technology.

### 3.3.2 UCAS top five data – GCE A level subjects against specific JACS subject lines

The UCAS 'top five' data have also been organised to show how the top five GCE A level subjects for acceptance on to degrees in each specific JACS subject line compares across the four types of university. A complete set of these data tables is shown in Appendix 6.3 on p79-89. Some of these tables are shown below to illustrate the key findings emerging from this part of the research.

- a) Tables 14 – 23 confirm the predominance of the traditional STEM GCE A level subjects (mathematics, chemistry, physics and biology) as qualifications held by students who gain acceptance in all types of university. That this should be case for degree courses focusing directly on these subjects is not at all surprising, but these

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<sup>29</sup> Figures all taken from the JCQ statistics for National Provisional GCE A level Results (June 2008) – All UK candidates.

<http://www.jcq.org.uk/attachments/published/984/JCQ%20A-Level%20Results%202008.pdf>

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four GCE A level subjects also feature strongly across many other JACS subject lines. In addition, although the UCAS data in Tables 14 – 23 count all the A level subject qualifications separately, the results strongly suggest that a significant proportion of students accepted onto degrees in these subject lines held combinations of these A level subjects.

**Table 14: Biology - JACS Subject Line C1**

University Type	GCE 1	GCE 2	GCE 3	GCE 4	GCE 5
1	Biology	Chemistry	Mathematics	General Studies	Psychology
2	Biology	Chemistry	Mathematics	General Studies	Geography
3	Biology	Chemistry	Mathematics	General Studies	Psychology
4	Biology	Chemistry	General Studies	Psychology	Geography

**Table 15: Chemistry - JACS Subject Line F1**

University Type	GCE 1	GCE 2	GCE 3	GCE 4	GCE 5
1	Chemistry	Mathematics	Biology	Physics	General Studies
2	Chemistry	Mathematics	Biology	Physics	General Studies
3	Chemistry	Mathematics	Biology	Physics	General Studies
4	Chemistry	Biology	Mathematics	General Studies	Physics

**Table 16: Physics - JACS Subject Line F3**

University Type	GCE 1	GCE 2	GCE 3	GCE 4	GCE 5
1	Physics	Mathematics	Chemistry	Further Maths	General Studies
2	Physics	Mathematics	Chemistry	General Studies	Further Maths
3	Physics	Mathematics	Chemistry	General Studies	Further Maths
4	Physics	Mathematics	Chemistry	General Studies	Applied ICT

**Table 17: Mathematics - JACS Subject Line G1**

University Type	GCE 1	GCE 2	GCE 3	GCE 4	GCE 5
1	Mathematics	Further Maths	Physics	Chemistry	General Studies
2	Mathematics	Further Maths	Physics	Chemistry	General Studies
3	Mathematics	Further Maths	Physics	Chemistry	General Studies
4	Mathematics	Physics	General Studies	Chemistry	Biology

- b) The results for acceptances on to degrees in the psychology subject line (See table 18) show GCE A level psychology as the qualification held by the largest number of students accepted. The relevance of this is obvious, but it is interesting to note that most universities do not require GCE A level psychology as an essential subject for entry to their degrees. This seems entirely fair, since access to GCE A level psychology for post-16 students is still limited, though growing. Many universities use flexible entry requirements, some asking for one or more science A levels, and others not specifying any particular subjects. The top five subject data shows that GCE A level biology appears frequently in accepted students. With the exception of the appearance of mathematics (Type 1 Russell Group), other science A levels have not appeared in sufficient numbers to feature in the lists. The result for psychology

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provides an example where a popular GCE A level is an acceptable, but not an essential entry requirement for progression to degree courses in this subject area.

**Table 18: Psychology - JACS Subject Line C8**

University Type	GCE 1	GCE 2	GCE 3	GCE 4	GCE 5
1	Psychology	English	Biology	General Studies	Mathematics
2	Psychology	English	Biology	General Studies	Sociology
3	Psychology	English	General Studies	Biology	Sociology
4	Psychology	English	Sociology	General Studies	Biology

- c) The results for acceptances to the geology subject line (See Table 19) provide an example of a STEM subject that crosses wider subject boundaries. This is reflected in the subjects appearing as the top five GCE A levels. The 'traditional' STEM A levels (mathematics, chemistry, physics and biology) feature strongly.

**Table 19: Geology - JACS Subject Line F6**

University Type	GCE 1	GCE 2	GCE 3	GCE 4	GCE 5
1	Geography	Chemistry	Geology	Mathematics	Biology
2	Geography	Geology	Chemistry	Biology	General Studies
3	Geography	Geology	Mathematics	General Studies	Physics
4	Geology	Geography	Biology	General Studies	Chemistry

- d) The results for acceptances to the food and beverage subject line (See Table 20) provide one example of the complexity that exists within STEM progression, and associated choices for young people. This JACS subject line contains a variety of courses with a wide range of scientific or STEM content, from food science (JACS code D610 to 'food and beverages for the consumer' (JACS code D640). The top five data reflects the range, but biology and chemistry still feature strongly, presumably linked to the more scientific degree courses within this subject line. Design and technology features strongly in this subject line, with the A levels in food technology and product design, for example, having particular relevance.

**Table 20: Food and Beverage Studies - JACS Subject Line D6**

University Type	GCE 1	GCE 2	GCE 3	GCE 4	GCE 5
1	Biology	Chemistry	Design and Technology	Mathematics	General Studies
2	Biology	Chemistry	Design and Technology	Business Studies	Economics
3	(no data)	(no data)	(no data)	(no data)	(no data)
4	Design and Technology	English	General Studies	Health and Social Care	Art and Design

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- e) The results for acceptances to the subject lines for civil, mechanical, and electronic and electrical engineering (See Table 21 - 23) confirm the predominance GCE A levels in mathematics and physics as qualifications held by students who gain acceptance to engineering courses in all types of university. Chemistry A level also features strongly, as does design and technology.

**Table 21: Civil Engineering - JACS Subject Line H2**

University Type	GCE 1	GCE 2	GCE 3	GCE 4	GCE 5
1	Mathematics	Physics	Chemistry	General Studies	Further Maths
2	Mathematics	Physics	Chemistry	Design and Technology	General Studies
3	Mathematics	Physics	Chemistry	Design and Technology	General Studies
4	Mathematics	Physics	Design and Technology	Geography	Chemistry

**Table 22: Mechanical Engineering - JACS Subject Line H3**

University Type	GCE 1	GCE 2	GCE 3	GCE 4	GCE 5
1	Mathematics	Physics	Chemistry	Further Maths	General Studies
2	Mathematics	Physics	Chemistry	General Studies	Design and Technology
3	Mathematics	Physics	Chemistry	Further Maths	General Studies
4	Mathematics	Physics	Design and Technology	General Studies	Chemistry

**Table 23: Electronic and Electrical Engineering - JACS Subject Line H6**

University Type	GCE 1	GCE 2	GCE 3	GCE 4	GCE 5
1	Mathematics	Physics	Chemistry	Further Maths	Electronics
2	Mathematics	Physics	Electronics	Computing	ICT
3	Mathematics	Physics	Chemistry	Electronics	General Studies
4	Mathematics	Physics	Electronics	General Studies	Design and Technology

The complete set of data from the UCAS 'top five' subject survey is shown in Appendix 6.3 on pp79-89.

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## SECTION 4: RESEARCH FINDINGS – THE FIELD RESEARCH

The field research collected data using the questionnaire shown in Appendix 2 on p50.

The structure of the sample (numbers and types of university, and numbers of respondents from different subject areas) is shown in Tables 24 and 25.

**Table 24: Numbers of respondents from the 4 ‘types’ of university**

Type of University	Frequency	% of sample
Russell Group (Type 1)	32	30.5
Pre 1960 (non Russell) (Type 2)	17	16.2
1960 – 1992 (Type 3)	26	24.8
Post 1992 (Type 4)	30	28.6
Total	105	100.0

**Table 25: Numbers of respondents from different subject areas**

Subject Area	Frequency	% of sample
Biological Sciences/ biology/ biosciences	16	15.2
Biomedical sciences	6	5.7
Chemistry	8	7.6
Earth sciences (geology, geophysics, Meteorology, other earth sciences)	5	4.8
Food science	2	1.9
Mathematics/ Mathematical sciences/ Statistics	17	16.2
Physics (include astronomy or related subjects)	13	12.4
Psychology	1	1.0
Computer/ Software engineering	10	9.5
Chemical engineering	2	1.9

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Civil engineering	7	6.7
Electronic engineering	4	3.8
Mechanical engineering	10	9.5
Other	4	3.8
Total	105	100.0

Detailed results from the questionnaire are shown in Appendix 6.4 on pp90-101. The full SPSS data file is available as advised on p102.

Considerable caution must be applied in interpreting the data given the complexity of the data set, compared to the sample size. Nevertheless, the data indicate a number of features that deserve attention, some confirming widely held beliefs and some suggesting further research. Results from key questions from the questionnaire are described below:

## 4.1 Questionnaire results from closed questions

### **Q6 Were all places on the course filled in 2008-9?**

**(on the respondent's STEM degree programme – analysed by university type)**

Considering the data across all STEM subjects included in the research, the results suggest that the Russell Group (type 1) universities found the least difficulty in filling all their available places. (29 Yes; 3 No). The post 1992 universities found the most difficulty in filling all their places (15 Yes; 14 No).

### **Q6 Were all places on the course filled in 2008-9?**

**(on the respondent's STEM degree programme – analysed by STEM subject area)**

Small sample sizes limit the extent to which the data can be interpreted. The subjects areas (13 plus 'other') are those listed in Table 25 p40. The actual results included the following:

- Among 6 respondents for biomedical sciences, none reported any unfilled places;
- Among 13 respondents for physics and related subjects, 5 reported some unfilled places;
- There were 2 subject areas for which the number of respondents reporting all places filled was less than those reporting some unfilled places. These were earth sciences (4 out of 5 respondents reporting unfilled places) and electronic engineering (3 out of 4 reporting unfilled places).

### **Q7 Have you noticed any changes over the past five years in how easy or difficult it has been to recruit students to this degree course? (analysed by university type)**

Of the 105 respondents, 48 reported that it had become easier to recruit into STEM subject degrees (all subject areas combined) over the past five years, 27 reported finding it more difficult and 19 reported no change. The results suggest that Russell Group universities (type 1) tend to have less difficulty recruiting (18 easier; 4 more difficult; 5 no change; 5 don't

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know), compared to post-1992 universities (10 easier; 13 more difficult; 19 no change; 11 don't know).

### **Q7 Have you noticed any changes over the past five years in how easy or difficult it has been to recruit students to this degree course? (analysed by subject area)**

Care must be taken in interpreting the results for the 13 different subject areas because of the small sample sizes. Further research would be required to draw firm conclusions, but the results included the following:

- None of the 17 respondents for mathematics reported that it had become more difficult to recruit students over the past 5 years (13 easier; 2 no change; 2 don't know);
- In electronic engineering, all the (4) respondents reported that recruitment had become more difficult over this time period;
- There were 3 other subject areas in which more respondents reported that recruitment had become more difficult compared to those reporting it had become easier (small samples). These were earth sciences (1 easier; 2 more difficult; 2 no change), physics (2 easier; 3 more difficult; 5 no change; 3 don't know) and computer/software engineering (3 easier; 5 more difficult; 0 no change; 2 don't know).

### **Q15 Are any of the following subjects at GCE A level or equivalent excluded as entry qualifications (i.e. will not be counted) (from a list of 13 subjects, plus 'other'. See questionnaire Appendix 2 p50)**

The two subjects most frequently cited as being 'excluded' from the qualifications considered in making admissions decisions were general studies (excluded by 60 out of 105 respondents) and critical thinking (excluded by 21 out of 105 respondents). Their exclusion should not be interpreted as meaning that they are not valued as additional evidence, but refers to the fact that an applicant's other qualifications must meet the entry requirements separately. In general, universities do not seem keen to automatically exclude subjects, even where these may appear unrelated to STEM (e.g. only 14 out of 105 specifically reported excluding drama, and 13 out of 105 excluded media studies). These data, combined with the results from the UCAS survey of the top five GCE A levels held by students accepted onto STEM degrees indicate that universities look for direct relevance of at least first and second GCE A level subjects in particular, but are prepared to be progressively more flexible in relation to the third and fourth GCE A level subjects held by an individual applicant. The evidence collected in this research does not suggest that Russell Group universities are any more likely than others to automatically exclude specific GCE A level subjects as qualifications for entry to STEM degrees, although strong performance in at least two directly relevant GCE A levels is essential.

### **Q16 What is the average UCAS points score held by the most recent cohort of students entering the BSc degree course you are referring to?**

Care is needed in interpreting these data because of the small sample sizes, and further research would be needed to confirm differences between subjects. Focusing on the reporting of UCAS points averages of 300 or more, some results obtained in this research are shown in Table 26 on p43:

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**Table 26: Frequency of UCAS points score of 300 or more in accepted students**

Subject Area	Number of respondents reporting average UCAS points score held by applicants to be 300 or more
Biological sciences	6 out of 16
Biomedical sciences	3 out of 6
Mathematics	13 out of 17
Physics	5 out of 13
Chemistry	4 out of 8
Mechanical engineering	2 out of 10

These results are not separated by different types of university, and have not been adjusted to take any account of well known differences in entry requirements between different types of university (e.g. Russell Group, compared to post 1992), as confirmed by the desk research (see pp28-32).

## **Q20 Has the actual performance of students entering this undergraduate degree course (in terms of UCAS points achieved) changed in the past 5 years?**

The results overall indicate 60 out of 105 respondents reporting an increase in the UCAS points score of accepted students, while 27 reported no change, and only 6 reporting a decrease (plus 12 'don't knows'). It is important to emphasise that these results only relate to students' UCAS points scores (i.e. combined grades they achieved at GCE A level or equivalent). It is not adjusted for any possible impact of 'grade inflation', which some people believe has occurred, giving a distorted view of trends in performance.

## **4.2 Questionnaire results from open questions (Qs 25, 26 and 27)**

Three open questions were included in the questionnaire to collect further data on the views and actual practice of admissions tutors. These questions were:

**Q25.** Please write in the top 3 things you look for when assessing a student's application for your main undergraduate programme:

**Q26.** Is there ONE specific change you would like to see in pre-HE STEM education in order to stimulate more demand for STEM degree courses?

**Q27.** Is there ONE specific change you would like to see in pre-HE STEM education in order to prepare students better for your main undergraduate programme?

The full set of data tables from these results is shown in Appendix 6.4.2 on p97.

### **4.2.1 Responses to question 25**

*Please write in the top 3 things you look for when assessing a student's application for your main undergraduate programme.*

Responses to this question were grouped, coded and summarised in two ways. The first method was a simple count of the number of times a comment was mentioned overall, regardless of whether is the first, second or third thing an individual was looking for. These results are shown in Table 27 p244.

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**Table 27: Number of mentions overall**

Rank position	Coded comment	Number of mentions
1	Predicted grades	45
2	Specific / relevant subjects	44
3	Good personal statement	36
4	Positive reference / recommendations	29
5	Subjects and grades	28
6	Motivation and enthusiasm for subject / discipline	23
7	Actual grades	20
8	Aptitude	18
9	Experiences (work experience / extracurricular activities etc)	13
10	Predicted and actual grades	12
11	Other	6
	<b>Total number of comments recorded</b>	<b>274</b>

The second method used to summarise these results was to weight responses according to the order in which each respondent listed their three comments. The first comment was assigned a score of 3, the second a score of 2 and the third a score of 1. The results obtained by this method are shown in Table 28.

**Table 28: Weighted scores**

Rank position	Coded comment	Weighted Score
1	Specific / relevant subjects	112
2	Subjects and grades	80
3	Predicted grades	79
4	Good personal statement	50
5	Motivation and enthusiasm for subject / discipline	45
6	Positive reference / recommendations	44
6	Actual grades	44
8	Aptitude	32
9	Predicted and actual grades	31
10	Experiences (work experience / extracurricular activities etc)	20
11	Other	7

The results indicate strongly the priority given to predicted grades, actual grades and relevant subject choices. Some separation in the coding used reflects differences in the comments provided by respondents (e.g. specific reference to valuing actual grades where these are available), but the overall results (Table 27) show over 54% of the comments (149 / 274) making direct reference to achievement of grades and relevance of subjects studied. The comments made included the following:

- “Predicted or actual grades achieved, including relevant subjects”*
- “Appropriate subjects”*
- “A level subject must be relevant i.e. sciences”*
- “Relevant A levels or equivalent qualifications”*

The importance of motivation, good references and personal statements is also apparent in the results from this question, although an examination of the detailed data (see Appendix

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6.4.2 p97-99) for individuals' three comments clearly indicates that these attributes have lower priority than the grades achieved and subjects studied. For example from the first of the three comments provided by respondents, 85% (88 out of 104) referred to achievement of grades and/or subjects studied, while just under 10% (10 out of 104) referred to motivation, good references and personal statements. In contrast, the pattern shown in the third of the respondents' three responses showed 60% (47 out of 78) referring to motivation, good references and personal statements with just 13% (10 out of 78) referring to achievement of grades and/or subjects studied.

### 4.2.2 Responses to Q26

*Is there ONE specific change you would like to see in pre-HE STEM education in order to stimulate more demand for STEM degree courses?*

The responses to this question were grouped and coded and are shown in Table 29.

**Table 29: Specific changes to stimulate more demand for STEM degree courses**

Coded Comments	Frequency	Valid Percent	Cumulative Percent
Information and Guidance/influence perceptions and awareness	24	36.4	36.4
Standards in schools	1	1.5	37.9
Teaching expertise	7	10.6	48.5
Better prospects	1	1.5	50.0
Practical/work demonstrations	3	4.5	54.5
More/better uptake in schools	10	15.2	69.7
Investment at early stages	4	6.1	75.8
Change in the system	6	9.1	84.8
Other	8	12.1	97.0
Raise importance of mathematics	2	3.0	100.0
Total responses	66	100.0	
(Missing/ no response)	39		

A range of comments was collected in response to this question. The most frequent comments (36.4% of respondents) focused on changes to improve the provision of information and guidance, influencing students' perceptions and awareness of STEM degrees. Specific comments included the following:

*“Wider media coverage, more awareness of STEM subjects. Wider appreciation of STEM subjects and the career paths it leads to”*

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*“A better understanding of subjects – people apply for medicine and dentistry when they are not well suited”*

*“More and better advice of what subjects are required for entry to this course, before university”* (Mechanical engineering)

*“Careers advisers need to be more knowledgeable and better trained to give guidance or advice on job prospects from this degree”* (Civil engineering)

*“Society to appreciate science subjects”* (Biological sciences)

Although not shown clearly in the coding system used, there were more references to mathematics (12) than to any other specific subject, reflecting its importance across STEM subjects. This finding is supported by the results for Question 27 (see Appendix 6.4.2 p101). For example the specific reference coded as ‘standards in schools’ provided the comment:

*“Overall improvement in standard of mathematics in schools and in A level”*

Other comments relating to mathematics included the following:

*“Raise the importance of maths in broader science education”* (Chemistry)

*“More people taking maths at school. More coverage of the subject is required”* (engineering)

### 4.2.3 Responses to Q27

*Is there ONE specific change you would like to see in pre-HE STEM education in order to prepare students better for your main undergraduate programme?*

The responses to this question were grouped and coded and are shown in Table 30.

**Table 30: Changes to prepare students better for STEM degree programmes**

Coded comments	Frequency	Valid Percent	Cumulative Percent
Problem solving	6	7.5	12.5
More / better mathematical skills	27	33.8	46.3
More mathematics and science	2	2.5	48.8
Change styles of learning / more independence	12	15.0	63.8
Raise awareness / expectation of university	4	5.0	68.8
Change the structure of courses / exams	9	11.3	80.0
Improvements in numeracy AND literacy required	9	11.3	91.3

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More engineering mathematics	1	1.3	92.5
Specialist teachers	4	5.0	97.5
Integration of STEM subjects	2	2.5	100.0
Other	5	5.0	5.0
Total responses	80	100.0	
Missing/ no response	25		

The most frequent responses to this question were suggestions that better mathematics skills are needed (33.8% of respondents; 27 out of 80). In total, 34 out of 80 respondents wanted to see some action relating to promoting or improving mathematics. These comprised admissions tutors across a range of STEM areas, representing mathematics (8), engineering (14), physics (5), chemistry (2), and biological/biomedical sciences (5). Another prominent comment was a perceived need for more independent learning (15% of respondents; 12 out of 80). This latter point was also supported by 7.5% (6 out of 80) suggesting a need for more problem solving. In addition, 9% of respondents wanted to see improvements in literacy and numeracy, and 9% wanted to see changes in the structure of pre-university courses and examinations.

#### 4.2.4 Other analysis of open questions

In addition to the analysis described in 4.2.1, 4.2.2 and 4.2.3, cross tabulations were carried out on the data collected for questions 26 and 27 to allow comparison between responses for the four types of university defined in this research. The results of these cross tabulations are shown in Appendix 6.4.2 p100-101. No clear conclusions can be drawn from these results, as most of the data sets are too small. However, in cases where the data sets are slightly larger, there is no evidence to suggest significant differences between the different types of universities in relation to the changes they would like to see to stimulate demand and prepare students for STEM degrees. For example the breakdown of results for 27 out of 80 respondents suggesting better mathematical skills is shown in Table 31.

**Table 31: Cross tabulation – suggesting better mathematical skills against university type**

Coded Comment	Type 1 Russell Gp	Type 2 Pre-1960 Non-Russell	Type 3 1960-92	Type 4 1992	Total (out of 80)
More / better mathematical skills	8	5	7	7	27

The complete set of data tables from the questionnaire and interview responses is shown in Appendix 6.4.2 pp90-101.

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## References

Coe R, Searle J, Barmby P, Jones K, Higgins S (2008) *Relative difficulty of examinations in different subjects*. Centre for Evaluation and Monitoring (CEM), Durham University

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## Appendix 1: E-mail message requesting participation in the online questionnaire

Dear Colleague

We are conducting some research into entry requirements for degree courses in STEM (science, technology, engineering and maths) subjects in UK universities. This research has been commissioned by the Science Council on behalf of SCORE (Science Community Representing Education), and is being carried out by the Centre for Education and Industry (CEI) at the University of Warwick. We are working in partnership with BMG Research (Birmingham) to collect some information through an online questionnaire. **This questionnaire can be accessed at <https://surveys.bmgresearch.co.uk/surveys/007497/>.** No individuals, departments or universities will be identified in the reporting of this research.

We would be most grateful if you could forward this e-mail message to appropriate staff (e.g. admissions tutors) in the 'STEM' departments in your university. These could include:

- Biological Sciences, environmental sciences
- Chemistry and related subjects
- Physics and related subjects
- Engineering
- Mathematics, mathematical sciences and statistics

**(We are not including medicine, nursing, dentistry or veterinary science in this research)**

STEM colleagues would wish to know that the purpose of the research is to collect, group and categorise information about university entrance requirements and procedures so that the Science Council can produce some concise and accessible material about progression routes in STEM to be posted on the new Future Morph website ([www.futuremorph.org](http://www.futuremorph.org)). Future Morph is designed to inform young people, teachers, careers professionals and parents about the opportunities the study of STEM subjects can offer. This material will not in any way be intended to replace the precise and detailed information provided through UCAS and individual universities. It will aim to provide some basic information to help young people 'get started' in considering their options, and then to seek more detail through UCAS and university prospectuses.

Our aim is to encourage more young people to consider applying for STEM degrees, and to help them make appropriate choices for post-16 study in order to maximise their chances of achieving suitable entry qualifications for the degree of their choice.

We hope you will be able to take part in this research by accessing and completing the questionnaire (see web link above).

Yours sincerely,

Peter Stagg  
Regional Director  
Centre for Education and Industry  
University of Warwick

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## Appendix 2:

### Text version of the online questionnaire and telephone interview schedule

#### INTRODUCTION – Front page

**Thank you for giving time to complete this survey.**

This research has been commissioned by the Science Council on behalf of SCORE (Science Community Representing Education), and is being carried out by the Centre for Education and Industry (CEI) at the University of Warwick. The survey is being hosted by BMG Research (Birmingham),

The purpose of the research is to collect information about university entrance requirements and procedures so that the Science Council can produce some concise and accessible material about progression routes in STEM to inform young people, teachers, careers professionals and parents about the opportunities the study of STEM subjects can offer. This material will not in any way be intended to replace the precise and detailed information provided through UCAS and individual universities. It will aim to provide some basic information to help young people 'get started' in considering their options, and then to seek more detail through UCAS and university prospectuses.

Please complete this survey by 5<sup>th</sup> June.

Please contact Mary Costello at BMG Research if you have any queries at: [mary.costello@bmgresearch.co.uk](mailto:mary.costello@bmgresearch.co.uk)

#### DETAILS TO BE COMPLETED

1. Please complete the following details (Please note all personal details remain confidential and will not be passed on to anyone else)

#### Please write in the following details

Name  
Position  
Department

University

#### CODES TO BE PROVIDED BY CLIENT

2. In relation to your role in undergraduate admissions, please select one subject area in which you have significant involvement

#### INSERT DROP DOWN BOX WITH COURSE OPTIONS

#### Please select one subject area only

	<b>CODE ONE ONLY</b>
Biological Sciences/ biology/ biosciences	1
Biomedical sciences	2
Chemistry	3
Earth sciences (geology, geophysics, Meteorology, other earth sciences)	4

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Food science	5
Mathematics/ Mathematical sciences/ Statistics	6
Physics (include astronomy or related subjects)	7
Psychology	8
Computer/ Software engineering	9
Chemical engineering	10
Civil engineering	11
Electrical engineering	12
Electronic engineering	13
Mechanical engineering	14
Other <b>Please write in subject area in full</b>	95

3. Please choose one specific undergraduate degree course from the subject area you indicated above, and answer all other questions in relation to this course.

**Please write in course title in full eg BSc Hons Biomedical Sciences**

\_\_\_\_\_

4. How many students did you enrol to the first year of this undergraduate degree course last in 2008-2009?

**Please write in an estimate** \_\_\_\_\_

5. And how many places did you have available on this course?

**Please write in an estimate** \_\_\_\_\_

6. Were all places filled? **Select one response only**

**1 YES                      2 NO                      3 D/K**

7. Have you noticed any changes over the past 5 years in how easy or difficult it has been to recruit students to this degree course?

**Please select one response from the options below**

<b>Ease of recruitment</b>	
Easier/ less difficult	1
More difficult	2
No change	3
Don't know/ Cannot say	4

8. For entry to this undergraduate course, please select any subjects that are mandatory/essential at GCE A level, (or write in the title of any equivalent qualifications)

Subject	Yes	No
Biology	1	2
Chemistry	1	2
Mathematics	1	2
Further Maths	1	2
Physics	1	2
Other equivalent subjects <b>Please write in</b>	95	
None/ subjects not specified	96	

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**FOR EACH INDIVIDUAL SUBJECT CODED YES AT Q8 ASK THE INDIVIDUAL GRADE REQUIREMENTS AT Q9**

9. What are the specific grade requirements for GCE A level **INSERT SUBJECT IDENTIFIED AT Q8?**

<b>Subject identified at Q8</b>	Grade A	Grade B	Grade C	Grade D	Grade E
Biology	1	2	3	4	5
Chemistry	1	2	3	4	5
Mathematics	1	2	3	4	5
Further Maths	1	2	3	4	5
Physics	1	2	3	4	5
Other subjects identified	1	2	3	4	5
Other subjects identified	1	2	3	4	5

10. In addition to full GCE A level (or equivalent) qualifications that are mandatory, are any of the following GCE AS levels (or equivalent) required?

	Yes	No
Biology	1	2
Chemistry	1	2
Mathematics	1	2
Further Maths	1	2
Physics	1	2
Other <b>PLEASE WRITE IN</b>		95
None/ subjects not specified		96

**FOR EACH INDIVIDUAL SUBJECT CODED YES AT Q10 ASK THE INDIVIDUAL GRADE REQUIREMENTS AT Q11**

11. What are the specific grade requirements for GCE AS level **INSERT SUBJECT IDENTIFIED AT Q10?**

<b>Subject identified at Q10</b>	Grade A	Grade B	Grade C	Grade D	Grade E
Biology	1	2	3	4	5
Chemistry	1	2	3	4	5
Mathematics	1	2	3	4	5
Further Maths	1	2	3	4	5
Physics	1	2	3	4	5
Other subjects identified	1	2	3	4	5
Other subjects identified	1	2	3	4	5
No specific grade requirements					
DK					

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12. In addition to the GCE A level and AS level requirements (or equivalent), are there any special requirements at GCSE (**in addition to standard matriculation**) for entry to this undergraduate course? e.g. do you require any specific GCSEs at grades **above Grade C**. (tick appropriate response)

**1      YES**

**2      NO**

**IF YES GO TO Q 13 IF NO GO TO Q14**

13. If you answered 'YES' to Q12, which GCSE subject(s) do you require?

	Yes	No
English	1	2
Maths	1	2
Science	1	2
Other <b>Please write in</b>	95	

**ASK ALL**

14. In addition to any GCE A level subjects (or equivalent) you named as being mandatory/ essential to gain entry onto the course specified, please select the GCE A level subjects (or equivalent) that are **desirable** for entry to this undergraduate degree course.

	Yes	No
Any science	1	2
Applied science	1	2
Biology	1	2
Chemistry	1	2
Computing/ICT	1	2
Design and Technology	1	2
Electronics	1	2
Environmental science	1	2
Further mathematics	1	2
Geography	1	2
General Studies	1	2
Human biology	1	2
Mathematics	1	2
Physics	1	2
Psychology	1	2
Science in Society	1	2
No specific desirable courses		
Entry requirements that do not specify subjects eg an offer that just specifies UCAS points	1	2
Other <b>Please write in</b>	95	

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15. Are any of the following subjects at GCE A level or equivalent **excluded** as entry qualifications (i.e. will not be counted)

**Please mark the appropriate response**

	Yes	No
Applied science	1	2
Computing/ICT	1	2
Critical Thinking	1	2
Design and Technology	1	2
Drama	1	2
Electronics	1	2
Environmental science	1	2
Geography	1	2
General Studies	1	2
Human biology	1	2
Media studies	1	2
Psychology	1	2
Science in Society	1	2
Other	95	
<b>Please write in</b>		
No excluded subjects		

16. What is the average UCAS points score held by the most recent cohort of students entering the BSc/ Bachelors degree course you are referring to? (NB If you offer an Integrated Masters degree, as well as a BSc degree, this is covered in the next question)

**Select one range of UCAS points only**

UCAS points range	Select one range of UCAS points only
More than 360 points	<b>1</b>
300-359 points	<b>2</b>
240-299 points	<b>3</b>
180 – 239 points	<b>4</b>
120 – 179 points	<b>5</b>
Less than 120 points	<b>6</b>
Don't know	<b>7</b>

17. Do you offer an Integrated Masters degree course for this subject?

1      YES                      2      NO

**If YES Go to Q 18 If NO go to Q 19**

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18. What is the average UCAS points score held by the most recent cohort of students entering the course you are referring to?

**Select one range of UCAS points only**

UCAS points range	Select one range of UCAS points only
More than 360 points	1
300-359 points	2
240-299 points	3
180 – 239 points	4
120 – 179 points	5
Less than 120 points	6
Don't know	7

**ASK ALL**

19. Has the entry requirement (UCAS tariff points) for this degree course changed in the past 5 years?

**Please select one response only**

Yes, increased	1
Yes, decreased	2
No, stayed the same	3
Don't know	4

**ASK ALL**

20. Has the actual performance of students entering this undergraduate degree course (in terms of UCAS points achieved) changed in the past 5 years?

**Please select one response only**

Yes, increased	1
Yes, decreased	2
No, stayed the same	3
Don't know	4

**ASK ALL**

21. Please provide an estimate of the proportion of applicants you reject, **without making an offer**, based on the following scenarios:

**RESPONDENT TO WRITE IN A PROPORTION FOR EACH SCENARIO THE TOTAL DOES NOT NEED TO EQUAL 100%**

Rejection due to:	Proportion of total rejected for this reason Please write in an approximate %	Don't know
A. Predicted exam grades /UCAS points score too low		997
B. Applicant is offering a combination of subjects which omits a subject which is essential for		997

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Rejection due to:	Proportion of total rejected for this reason Please write in an approximate %	Don't know
entry to the degree course (e.g. applying for Physics, without A level Maths)		
C. Applicant is offering an 'excluded' subject (one that is not 'counted') as one of their key qualifications for entry.		997
D. 'Type' of qualification being offered by applicant is not acceptable/ recognised (e.g. the qualification is not recognised in the UCAS system)		997
E. Poor personal statement		997
F. Poor performance in interview		997

22. What proportion (estimated average) of students have you accepted on to this undergraduate degree course through the UCAS clearing process?  
**Please write in a % in the following box.**

<b>Proportion accepted through clearing</b>	
---	--

23. Excluding international and EU students, what proportion (estimated average) of students have you accepted on to your main undergraduate programme with 'non standard' entry qualifications (e.g. without GCE A levels, International Baccalaureate).  
**Please write in a % in the following box**

<b>Proportion accepted through non standard routes</b>	
--	--

24. What proportion (estimated average) of students enter your main undergraduate programme via a Foundation Year?

**Please write in a % in the following box**

<b>Proportion entering via a Foundation Year</b> please enter figure in box (right)	
--	--

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25. Please write in the top 3 things you look for when assessing a student's application for your main undergraduate programme:

**RESPONDENT TO PROVIDE THREE INDIVIDUAL RESPONSES**

First thing that you look for	
Second thing that you look for	
Third thing that you look for	

26. Is there ONE specific change you would like to see in pre-HE STEM education in order to stimulate more demand for STEM degree courses?

**Please write in below:**

\_\_\_\_\_

27. Is there ONE specific change you would like to see in pre-HE STEM education in order to prepare students better for your main undergraduate programme?

**Please write in below:**

\_\_\_\_\_

28. Thank you for completing this questionnaire. CEI may be researching further issues around this subject in the near future. Would you be interested in participating in any further research?

1 YES **GO TO Q29**                      2 No **GO TO CLOSE**

29. If yes please can you complete the following details:

Your e-mail address \_\_\_\_\_

Your telephone number \_\_\_\_\_

30. Are you willing to have details passed on to CEI identifying your university (but not your department)?

1 YES                      2 NO

**Thank you for completing this questionnaire**

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## Appendix 3: Invitation message for participants in telephone interviews

Dear

We are contacting you to ask if you would be prepared to assist in some research into entry requirements for degree courses in STEM (science, technology, engineering and maths) subjects in UK universities. We are seeking respondents for a telephone interview, lasting no more than 20 minutes. The interview would focus on subject areas in which each respondent has direct knowledge. No individuals, departments or universities will be identified in the reporting of this research.

This research has been commissioned by the Science Council on behalf of SCORE (Science Community Partnership Supporting Education), and is being carried out by the Centre for Education and Industry (CEI) at the University of Warwick. The interviews will be conducted by BMG Research (Birmingham). We expect the interviews to take place between June 8<sup>th</sup> and June 26<sup>th</sup>. **Please reply to this e-mail (by Friday 5 June) to let us know if you would NOT be able to provide an interview.**

The purpose of the research is to collect, group and categorise information about university entrance requirements and procedures so that the Science Council can produce some concise and accessible material about progression routes in STEM to be posted on the new Future Morph website ([www.futuremorph.org](http://www.futuremorph.org)). Future Morph is designed to inform young people, teachers, careers professionals and parents about the opportunities the study of STEM subjects can offer. This material will not in any way be intended to replace the precise and detailed information provided through UCAS and individual universities. It will aim to provide some basic information to help young people 'get started' in considering their options, and then to seek more detail through UCAS and university prospectuses.

Our aim is to encourage more young people to consider applying for STEM degrees, and to help them make appropriate choices for post-16 study in order to maximise their chances of achieving suitable entry qualifications for the degree of their choice.

We hope you will be able to take part in this research

Yours sincerely,

Peter Stagg  
Regional Director  
Centre for Education and Industry

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### Appendix 4: The UCAS Tariff System – points value of selected qualifications

#### UCAS tariff system<sup>30</sup>

Qualification	Grade	A	B	C	D	E
GCE	AS-level	60	50	40	30	20
	A-level (single award) A-level (double award)	120 AA: 240 AB: 220	100 BB: 200 BC: 180	80 CC: 160 CD: 140	60 DD: 120 DE: 100	40 EE: 80
<b>Free standing Mathematics</b>	Tariff points	20	17	13	10	7
<b>Scottish Qualifications</b>	Higher Level	72	60	48	42	
	Advanced Higher Level	120	100	80	72	
<b>Irish Leaving Certificate</b>	Higher Level	A1: 90 A2: 77	B1: 71 B2: 64 B3: 58	C1: 52 C2: 45 C3: 39	D1: 33 D2: 26 D3: 20	
<b>Key Skills</b> Number, IT & communication	<b>Level</b>	<b>4</b>	<b>3</b>	<b>2</b>		
	Tariff points/unit	30	20	10		
<b>Advanced Extension Awards</b>	<b>Grade</b> Tariff points	<b>Distinction</b> 40		<b>Merit</b> 20		

**International Baccalaureate (IB):** tariff points range from 24 (min) to 45 (max) equating to 280-768 UCAS tariff points (**Details shown in Appendix 5**)

**BTech National awards, certificates and diplomas:** from 40 points for a pass in a National Award to 360 points for a triple distinction in a Diploma.

**Diploma in Foundation Studies:** Pass (165), Merit (225), Distinction (285) points tariff.

<sup>30</sup> Full details can be found at [http://www.ucas.com/students/ucas\\_tariff/tariffables/](http://www.ucas.com/students/ucas_tariff/tariffables/)

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Offers may be given in the form of a UCAS tariff total, but allowance is not often given for candidates to use points from the above 3 routes to contribute towards the total. Candidates may be asked specifically to achieve the total by way of A-levels or combination of A-levels and AS-levels. If this happens 'units' are specified using the following table (most degree course need a minimum of 12 units, occasionally 15, 18 or 21):

<b>AS level</b>	<b>3 units</b>
<b>A level</b>	6 units
<b>Double award A level</b>	12 units

There are no universally-agreed equivalences between the UK universities, for all the qualifications, and universities set the entry bar depending on the popularity of the course and the aptitude of the candidate. This can lead to wide variation between the offers made by different universities. Mathematics as a discipline is indicative of this. Cambridge University acknowledges the rigour needed to survive such a course, making conditional offers which include STEP mathematics (6th Term Examination Papers in Mathematics, administered by Cambridge Assessment [www.stepmathematics.org.uk](http://www.stepmathematics.org.uk)). This series of 3 papers is used to supplement A levels in assessing an applicant's aptitude. Other institutions, accept students without science A levels onto 1-year foundation courses. Problems occasionally arise with examinations taken on these courses, is that they may not be accepted by the professional body overseeing a particular discipline of engineering, resulting in graduates having to re-take certain modules to obtain Chartered Engineer status.

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### Appendix 5: UCAS tariff points for the International Baccalaureate

IB points score*	UCAS tariff		IB points score*	UCAS tariff
45	768		34	512
44	744		33	489
43	722		32	466
42	698		31	442
41	675		30	419
40	652		29	396
39	628		28	373
38	605		27	350
37	582		26	326
36	559		25	303
35	535		24	280

\*The points for the International Baccalaureate (IB) are awarded for the IB Diploma.

#### International Baccalaureate (IB) Certificate (points for entry into HE from 2010)

Higher Level		Standard Level		Core	
Grade	Tariff points	Grade	Tariff points	Grade	Tariff points
7	130	7	70	3	120
6	110	6	59	2	80
5	80	5	43	1	40
4	50	4	27	0	10
3	20	3	11		

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## Appendix 6 Detailed Research Results

Appendix 6 contains detailed results obtained during the research for reference and information. Relevant SPSS data files are also available separately. These can be requested through the Centre for Education and Industry at the University of Warwick. Please contact Peter Stagg ([p.p.stagg@warwick.ac.uk](mailto:p.p.stagg@warwick.ac.uk)) if further information is required.

The sets of data in this appendix are:

6.1 Desk research data from investigation of the UCAS Course Search website, and from individual university websites - tabulated

6.2 Desk research data from investigation of the UCAS Course Search website, and from individual university websites – charted

6.3 UCAS data showing the top five GCE A level subjects held by students accepted on to STEM degree courses (a sample of 24 subject lines) in a sample group of 43 universities in 2008. (SPSS data file available separately)

6.3.1.1 By 'type' of university for all subject lines

6.3.1.2 For individual subject lines

6.4.1 Field research data – responses from the online questionnaire and interviews – closed questions (SPSS data file available separately)

6.4.2 Field research data – responses from the online questionnaire and interviews – open questions (25, 26 and 27) (SPSS data file available separately)

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## 6.1 Sample raw data from Phase 1 online search – Grade requirements

Subject	1G	1K	1E	1B	4A
Actuarial Science/Studies	AAA/a	x	x	x	x
Agricultural Sciences/Agriculture	BBC/BCC	x	x	x	x
Anatomical Sciences/Anatomy	x	x	x	ABB, IB 32pts H665	x
Animal Sciences	x	x	x	x	x
Astronomy and Astrophysics	x	x	x	x	x
Biochemistry	BBC	ABB/BBB, IB 32pts H55	ABB+AS-AB/bb+AS, IB 34pts H55	ABB, IB 35pts H666	x
Biological Sciences	BBB/BBC	BBB, IB 32pts H5	x	x	x
Biology	x	x	x	AAA-ABB, IB 34pts H666	220-260 UCAS pts
Biotechnology	x	x	x	x	x
Building	x	x	x	x	x
Chemistry	BCC	ABB, IB 34pts H66	x	AAA-ABB, IB 33-35pts H665	x
Computer Courses	BCC	AAB or AA+bb, IB 36pts H6	AAC+AS-ABB+AS, IB 34pts H6	AAA-AAB, IB 35pts H665	x
Dietetics	x	x	ABB+AS-AB/bb+AS, IB 34pts H55	x	x
Engineering/Engineering Sciences	x	BBB/BBC, IB 34pts H55	x	x	x
Engineering (Acoustics)	x	x	x	x	x
Engineering (Aeronautical & Aerospace)	BBC/BCC	x	x	AAB, IB 35pts H666	x
Engineering (Chemical)	BCC	x	x	x	x
Engineering (Civil)	BBC	BBB/BBC, IB 34pts H55	x	AAA, IB 37pts H66	x
Engineering (Communications)	x	x	x	Aab, IB 35pts H66	x
Engineering (Computer, Control, Software & Systems)	x	BBB/BBC, IB 34pts H55	x	x	x
Engineering (Electrical & Electronic)	BBC/BCC	BBB/BBC, IB 34pts H55	ABB+AS-AB/bb+AS, IB 34pts H5	AAB, IB 35pts H66	x
Engineering (Manufacturing)	BBC/BCC	BBB/BBC, IB 34pts H55	x	x	x
Engineering (Mechanical)	BBC/BCC	BBB/BBC, IB 34pts H55	ABB+AS-AB/bb+AS, IB 34pts H5	AAA-AAB, IB 35pts H666	x
Environmental Science/Studies	x	x	x	AAB, IB 35pts H666	220-260 UCAS pts
Food Sciences/Studies & Technology	x	x	x	x	220-260 UCAS pts
Genetics	BBC	x	ABB+AS-AB/bb+AS, IB 34pts H55	x	x
Geology/Geological Sciences	x	x	x	AAB, IB 35pts H666	x
Human Sciences/Human Biosciences	BBC	x	ABB+AS-AB/bb+AS, IB 34pts H55	x	x
Marine/Maritime Studies	BBB/BBC	x	x	x	x
Materials Science/Metallurgy	x	x	x	x	x

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Mathematics	ABC	AABb-AAAa+gd 2STEP, IB 37pts H6	AAA+AS-AAB+AS, IB 38pts H6	AAA-AAB, IB 36pts H666	x
<b>Subject</b>	<b>1G</b>	<b>1K</b>	<b>1E</b>	<b>1B</b>	<b>4A</b>
Microbiology	BBC	BBB, IB 32-34pts	x	ABB, IB 33pts H665	x
Natural Sciences	x	x	x	x	x
Naval Architecture	x	x	x	x	x
Optometry (Ophthalmic Optics)	x	x	x	x	x
Pharmacology	x	x	ABB+AS-AB/bb+AS, IB 34pts H55	ABB, IB 33pts H665	x
Physics	BBC	AAB, IB 36pts H66	ABB+AS-AB/bbb, IB 34pts H55	AAA-AAB, IB 35-37pts H66	x
Physiology	x	x	ABB+AS-AB/bb+AS, IB 34pts H55	ABB, IB 33pts H65	x
Plant Sciences	x	x	x	AAA-AAB, IB 34pts H666	x
Science	x	x	x	x	x
Statistics	x	x	x	x	x
Technology	x	x	x	x	x
Zoology	BBB/BBC	x	x	AAA-AAB, IB 34pts H666	x

### Key:

- Upper case letters (e.g. AAB) = GCE A level grades
- Lower case letters = GCE AS level grades
- UCAS pts = tariff points defined by UCAS based on aggregate grades achieved in eligible qualifications<sup>31</sup>
- IB = International Baccalaureate, shown with required points score and levels required (H = Higher, S = Standard, C = Core)<sup>32</sup>
- X = subject not offered at this institution

<sup>31</sup> A summary of selected UCAS tariff values can be found in Appendix 4 p59. For a full listing of UCAS tariff values see [http://www.ucas.com/students/ucas\\_tariff/tarifftables/](http://www.ucas.com/students/ucas_tariff/tarifftables/)

<sup>32</sup> A summary of the UCAS tariff points for the IB is shown in Appendix 5 p61

## FINAL REPORT

### Sample raw data from Phase 2 online search - Grade requirement

Subject (with JACS coding)	2B	2C	2E	2G	2F	4C	4D	4E
Biology (C100)	ABB-BBB, IB:29-32	240-280pts, IB:29-31	300pts, IB:6,5,5	280-300pts, BBC-BCC	ABB, IB:32	X	X	200-280pts, IB:26
Biochemistry (C700)	X	X	300pts, IB:6,5,5	280-300pts, BBC-BCC	ABB, IB:32	200pts, IB:26	X	X
Sports Science (C600)	AAB-BBB, IB:29-34	280pts	X	280pts	X	X	280pts, IB:28	280pts, IB:28
Psychology (C800)	AAA-AAB, IB:33-36	280pts, IB:28	AAB-ABBb, IB:6,6,6	300-320pts	AAB, IB:36	290pts, IB:28	240pts, IB:24	280pts, IB:30
Mechanical Engineering (H300)	ABB-BBB, IB:29-32	220-260pts	X	260-300pts	X	220pts, IB:26	X	240pts, IB:26
Chemical Engineering (H800/810)	X	X	X	300pts	X	X	X	X
Aerospace Engineering (H400)	X	X	X	260-300pts	X	X	X	X
Physics (F300)	AAB-BBB, IB:29-34	240-300pts	X	280pts	AAB, IB:36	X	X	X
Astrophysics (F510)	X	X	X	X	AAB, IB:36	X	X	X
Quantum Mechanics (F342)	X	X	X	X	X	X	X	X
Chemistry (F100)	X	240-300pts	260-290pts, IB:5,5,5	X	AAB-ABB, IB:36-32	200pts, IB:26	X	160-240pts, IB:24
Industrial Chemistry (F111)	X	X	X	X	AAB-ABB, IB:36-32	X	X	X
Colour Chemistry (F112)	X	X	X	X	X	X	X	X
Medicinal Chemistry (F150)	X	X	ABB, IB:6,5,5	X	AAB-ABB, IB:36-32	200pts, IB:26	X	X
Mathematics (G100)	AAB-BBB, IB:29-34	X	320pts, IB:6,6,5	300pts	AAB, IB:34	X	X	220-280pts, IB:24
Statistics (G300)	X	X	280pts, IB:5,5,5	X	AAB, IB:34	X	X	X
Applied Mathematics (G120)	X	X	X	300pts	AAB, IB:34	X	X	X
Computer Science (G400)	X	200-260pts	300-340pts, IB:6,5,5	280pts	ABB, IB:32- 34	200-250pts, IB:28	160pts, IB:24	240-280pts, IB:26
Forensic Computing (G550)	X	X	X	X	X	X	160pts, IB:24	240-280pts
Software Engineering (G600)	X	200-260pts	300-340pts, IB:6,5,5	X	X	300pts, IB:28	X	220-280pts, IB:26

# FINAL REPORT

Sample raw data - individual subject data from Phase 2 online search (Psychology in Type 3 universities)

Psychology	3A	3C	3D	3E	3F
<b>A levels</b>	AAA-AAAb		ABB-AAC	ABB-ABB Any science	AAB Any science or psychology
Min/preferred A level no.	3/3.5		2/3	3/3.5	3/3.5
<b>General Studies</b>	No		No	No	No
<b>Scottish: Higher</b>	n/k		AAAAB	AAABB-AABBB	AAABB any science/psychology + 1 sitting only
<b>Advanced Higher</b>	AAA		AAB or AAC	n/k	AB 1 sitting only
<b>Irish Leaving Certificate</b>	All subjects grade A or B			AAAABB-AABBBB	AAAABB Min 1 science, may include psychology
<b>IB</b>	38		35 16 at H level: maths 4, English A1/A2/B at 4/5/5 or S level A1/A2/B at 5/6/6	34-36	36 H level in science
<b>EU – B</b>	See university		78% 7.5 in written English 6 maths	77-80%	80% Specific subject requirements
<b>Other</b>	AS level at grade B			GCSE maths grade C	

## FINAL REPORT

### Sample raw data – individual subject data from Phase 2 online search (Psychology in Type 4 universities)

Psychology	4C	4D	4E	4G	4H
<b>A levels</b>	240		<b>AAB</b> or <b>ABB</b> (if 2 science-based subjects offered) Maths, biology, chemistry or physics all in standard offer	<b>ABB</b>	260
Min/preferred A level no.	2/2		3/3	3/3	2/3
<b>General Studies</b>	No		No	No	
<b>Scottish: Higher</b>	BBBB		<b>AAABB-AABBB</b>	See university	CCCC
<b>Advanced Higher</b>	n/k		<b>AAB-ABB</b>		n/k
<b>Irish Leaving Certificate</b>	BBBCC-BBCCC		<b>AAABB</b>	See university	AABB
<b>IB</b>	28		33	See university	n/k
<b>EU – B</b>	80%		Set for individual applicant	See university	n/k
<b>Other</b>				GCSE maths grade B or statistics at grade C or above	

## FINAL REPORT

### Detailed raw data, showing stated subject requirements, from one university (2E) – phase 2 online search

UNIVERSITY 2E	A Levels/UCAS pts	IB pts	GCSEs/Other requirements
Biology (C100)	300pts. Inc grade B in at least one A Lev sci	6,5,5 in 3 H Lev subjects inc. one sci	Grade C in Maths, sci & □hem.□h. Exclude Key Skills and General Studies.
Biochemistry (C700)	300pts. At least Grade C in A Lev Chem & C in another sci (pref bio)	6,5,5 in 3 H-Lev subjects inc. □hem. (+pref bio)	Grade C in Maths, sci & □hem.□h. Exclude Key Skills and General Studies.
Sports Science (C600)	X	X	X
Psychology (C800)	AAB-ABBb. Some pref given to sci A levels inc. Psych & geog.	6,6,6 in 3 H-Lev subjects	Grade B in Maths, sci & □hem.□h.
Mechanical Engineering (H300)	X	X	X
Chemical Engineering (H800/810)	X		X
Acoustics Engineering (H340)	X	X	X
Aerospace Engineering (H400)	X	X	X
Physics (F300)	X	X	X
Astrophysics (F510)	X	X	X
Medical Physics (F350)	X	X	X
Quantum Mechanics (F342)	X	X	X
Chemistry (F100)	260-290pts. Min 80pts in A-Lev □hem.. Exclude KS & GS.	5,5,5 in 3 H-Lev subjects inc. chemistry	
Industrial Chemistry (F111)	X	X	X
Colour Chemistry (F112)	X	X	X
Medicinal Chemistry (F150)	ABB inc grade B in Chem & at least 1 other sci.	6,5,5 -6,6,5 inc.chemistry & 1 other science	Exclude KS & GS.
Mathematics (G100)	320pts. Grade B in Maths A Level.	6,6,5 inc. maths	Exclude KS & GS.
Statistics (G300)	280pts. Grade C in AS Maths or grade B in A-Lev statistics	5,5,5 in 3 H-Lev subjects	Exclude KS & GS.
Actuarial Science	X	X	X
Applied Mathematics (G120)	X	X	X
Computer Science (G400)	300pts from 3 A-Lev or 340pts from 3 A-Lev + 1AS	6,5,5 in 3 H-Lev subjects	Grade C in English and Grade B in Maths
Forensic Computing (G550)	X	X	X
Software Engineering (G600)	300pts from 3 A-Lev or 340pts from 3 A-Lev + 1AS	6,5,5 in 3 H-Lev subjects	Grade C in English and Grade B in Maths
Information Systems (G500)	X	X	X

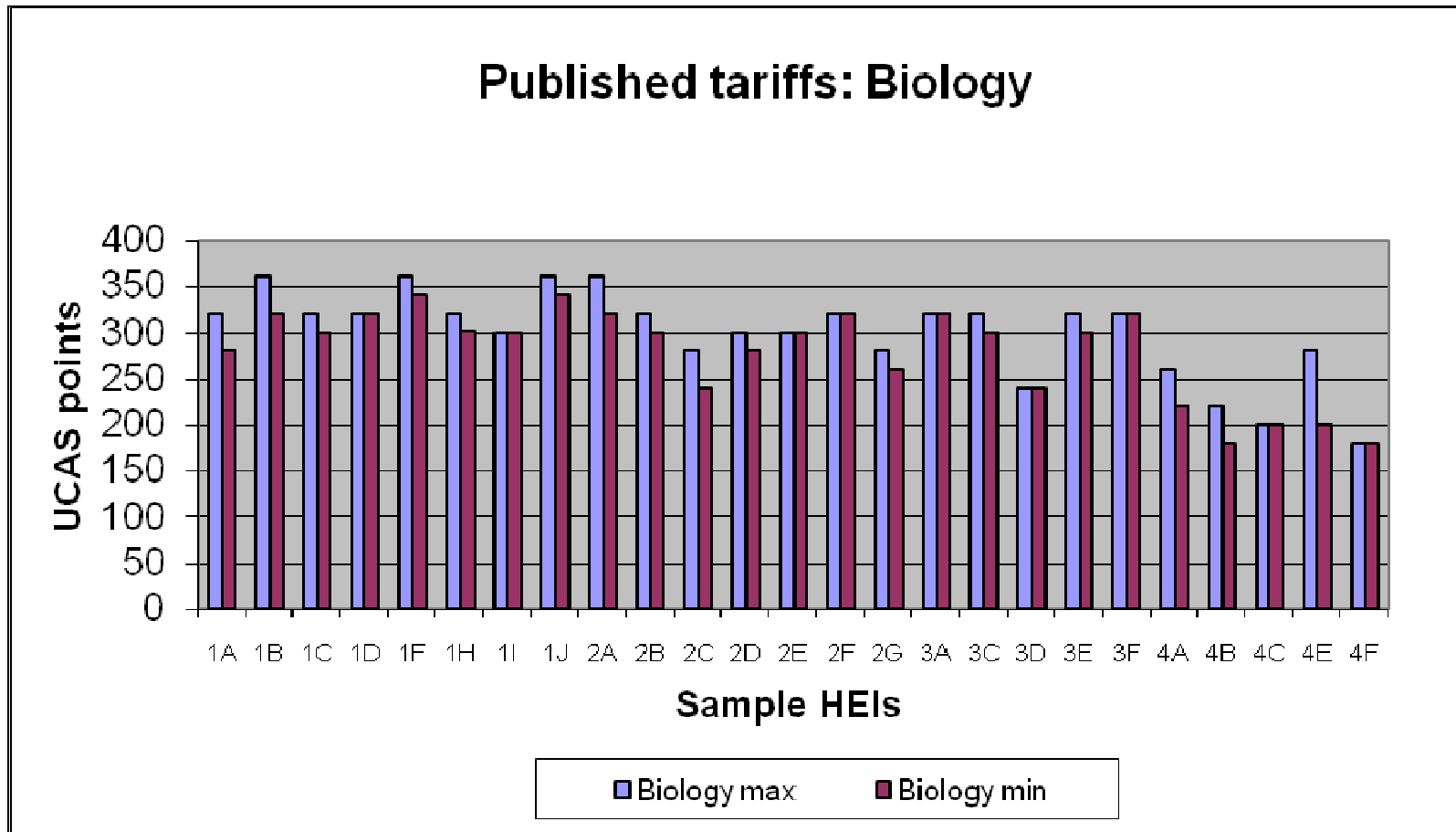
## FINAL REPORT

### Detailed raw data, showing stated subject requirements, from one university (2G) – phase 2 online search

UNIVERSITY 2G	A Levels/UCAS pts	GCSEs/Other requirements
Biology <b>(C100)</b>	280-300pts. BBC-BCC. Bio essential.	General Studies excluded.
Biochemistry <b>(C700)</b>	280-300pts. BBC-BCC. Chemistry + at least 1 other science.	
Sports Science <b>(C600)</b>	280pts. 3 A Levels with at least one science.	At least 5 GCSE passes inc Eng or Welsh Lang and Maths.
Psychology <b>(C800)</b>	300-320pts. 3 good A Levels expected.	Grade C or above in Maths.
Mechanical Engineering <b>(H300)</b>	260-300pts inc. Maths at A2 and pref Physics to A2.	
Chemical Engineering <b>(H800/810)</b>	300pts. Need maths and chemistry components at A Level.	
Acoustics Engineering <b>(H340)</b>	X	X
Aerospace Engineering <b>(H400)</b>	260-300pts inc. Maths at A2 and pref Physics to A2.	
Physics <b>(F300)</b>	280pts. Need 3 A Levels including Physics and Maths	
Astrophysics <b>(F510)</b>	X	X
Medical Physics <b>(F350)</b>	X	X
Quantum Mechanics <b>(F342)</b>	X	X
Chemistry <b>(F100)</b>	X	X
Industrial Chemistry <b>(F111)</b>	X	X
Colour Chemistry <b>(F112)</b>	X	X
Medicinal Chemistry <b>(F150)</b>	X	X
Mathematics <b>(G100)</b>	300pts including at least 100 in maths.	
Statistics <b>(G300)</b>	X	X
Actuarial Science	X	X
Applied Mathematics <b>(G120)</b>	300pts including at least 100 in maths.	
Computer Science <b>(G400)</b>	280pts. A Level computer science is helpful but not essential.	Good Maths GCSE.
Forensic Computing <b>(G550)</b>	X	X
Software Engineering <b>(G600)</b>	X	X
Information Systems <b>(G500)</b>	X	X

# FINAL REPORT

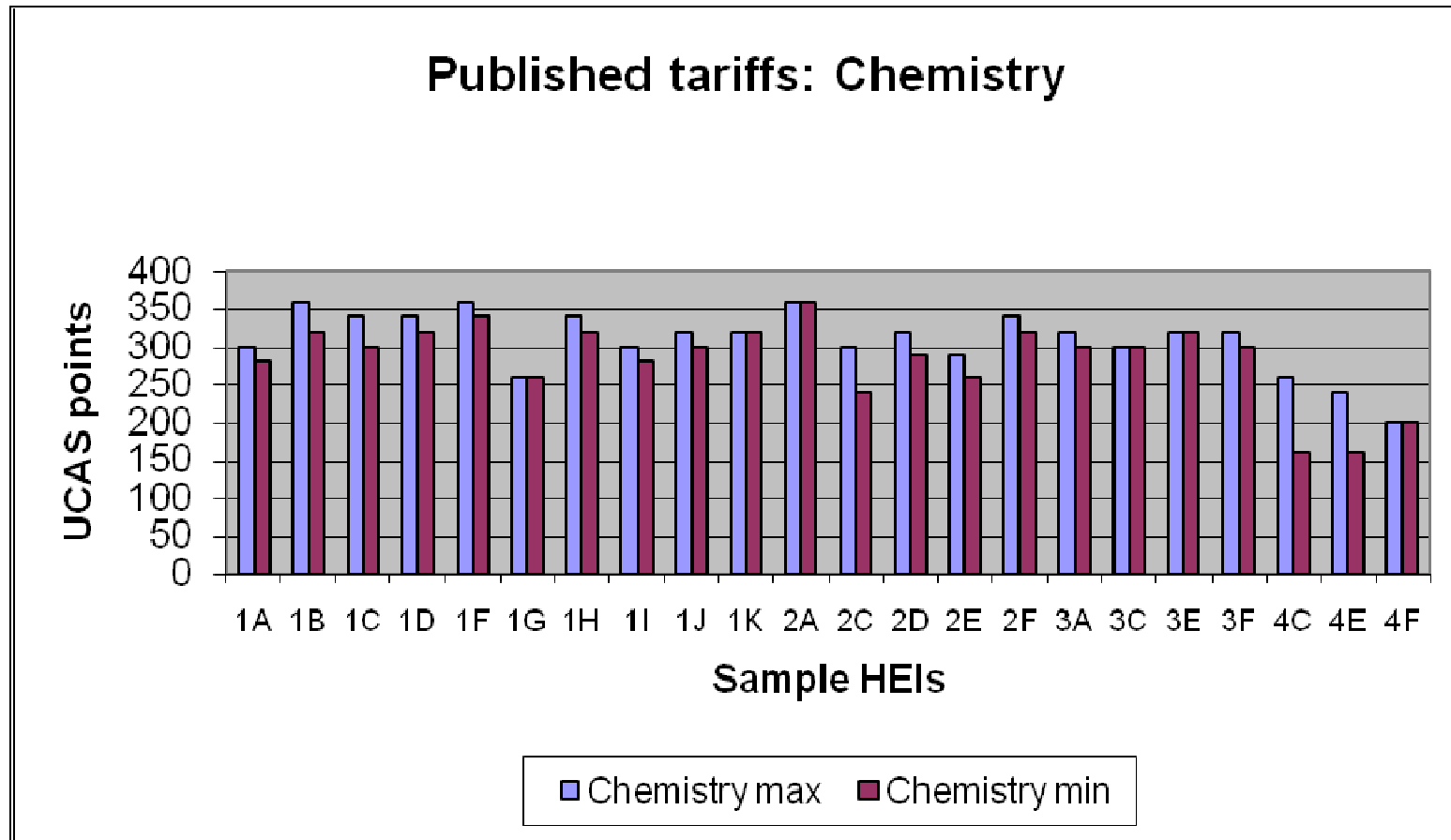
6.2 Chart 1: Entry requirements published by sample HEIs: Maximum and minimum points for entry to biology



(HEIs coded 1 = Russell Group; HEIs coded 2 = Pre-1960 non Russell Group; HEIs coded 3 = 1960-92; HEIs coded 4 = Post-1992)

# FINAL REPORT

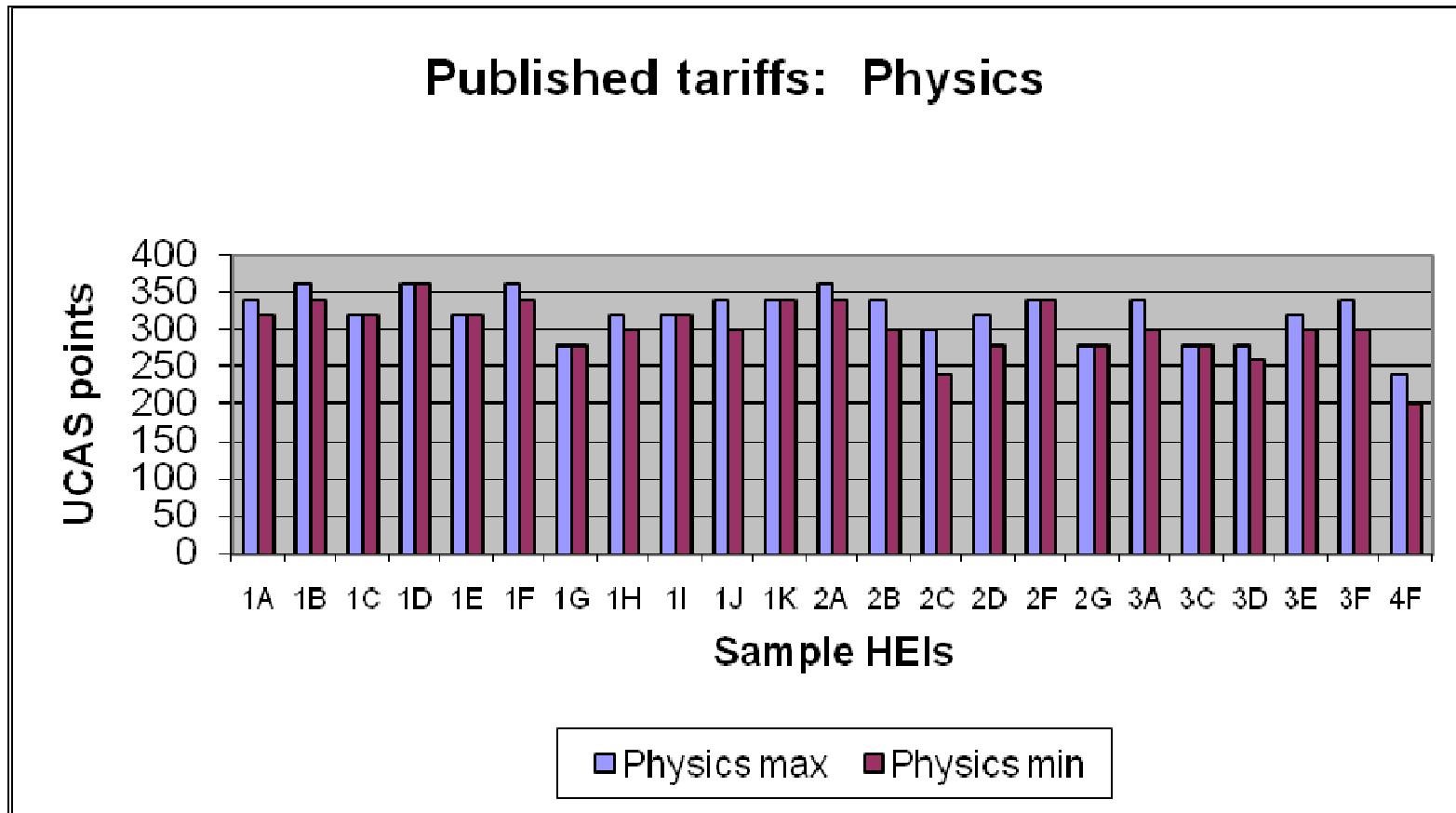
Chart 2: Entry requirements published by sample HEIs: Maximum and minimum points for entry to chemistry



(HEIs coded 1 = Russell Group; HEIs coded 2 = Pre-1960 non Russell Group; HEIs coded 3 = 1960-92; HEIs coded 4 = Post-1992)

# FINAL REPORT

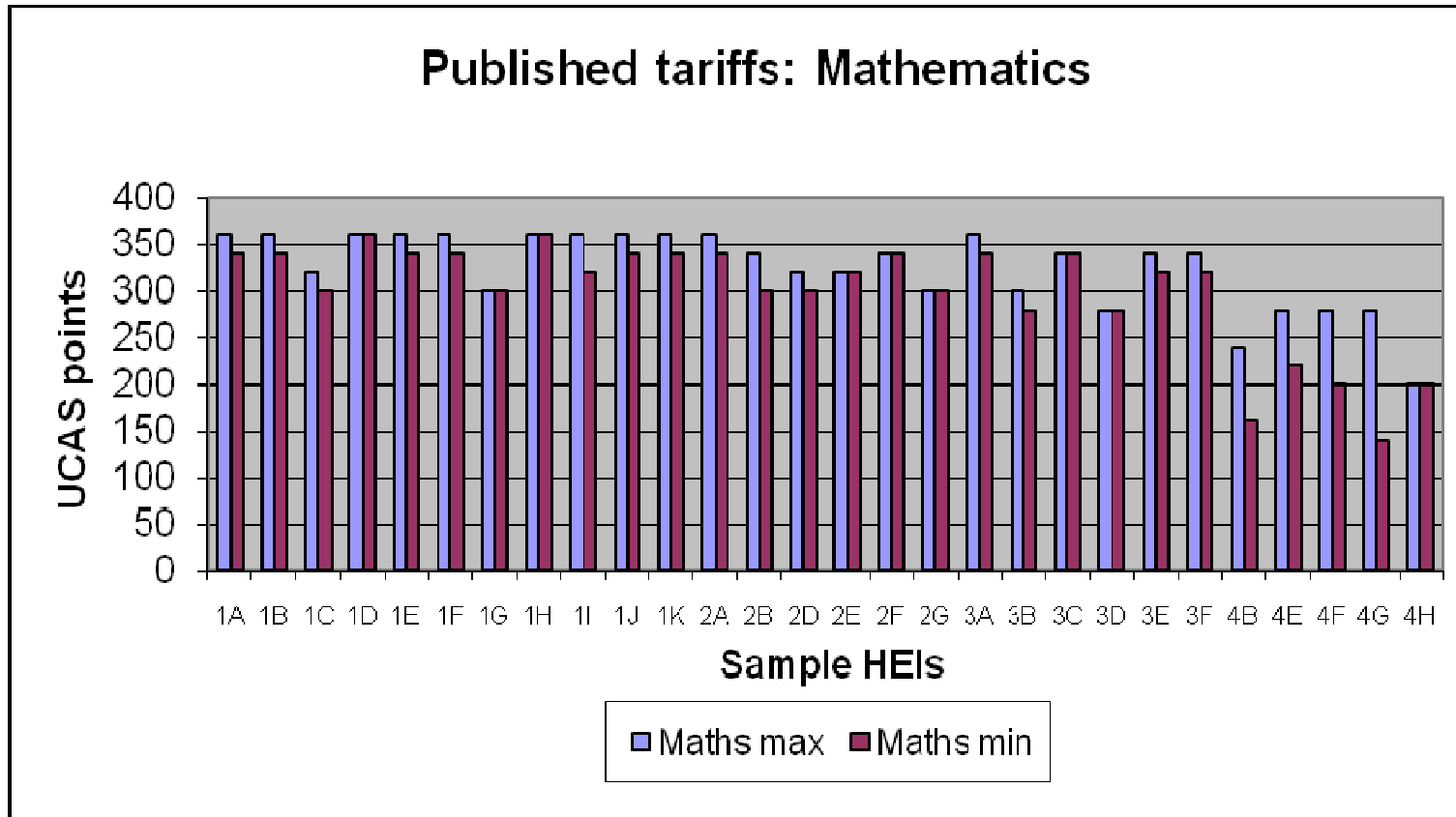
Chart 3: Entry requirements published by sample HEIs: Maximum and minimum points for entry to physics



(HEIs coded 1 = Russell Group; HEIs coded 2 = Pre-1960 non Russell Group; HEIs coded 3 = 1960-92; HEIs coded 4 = Post-1992)

# FINAL REPORT

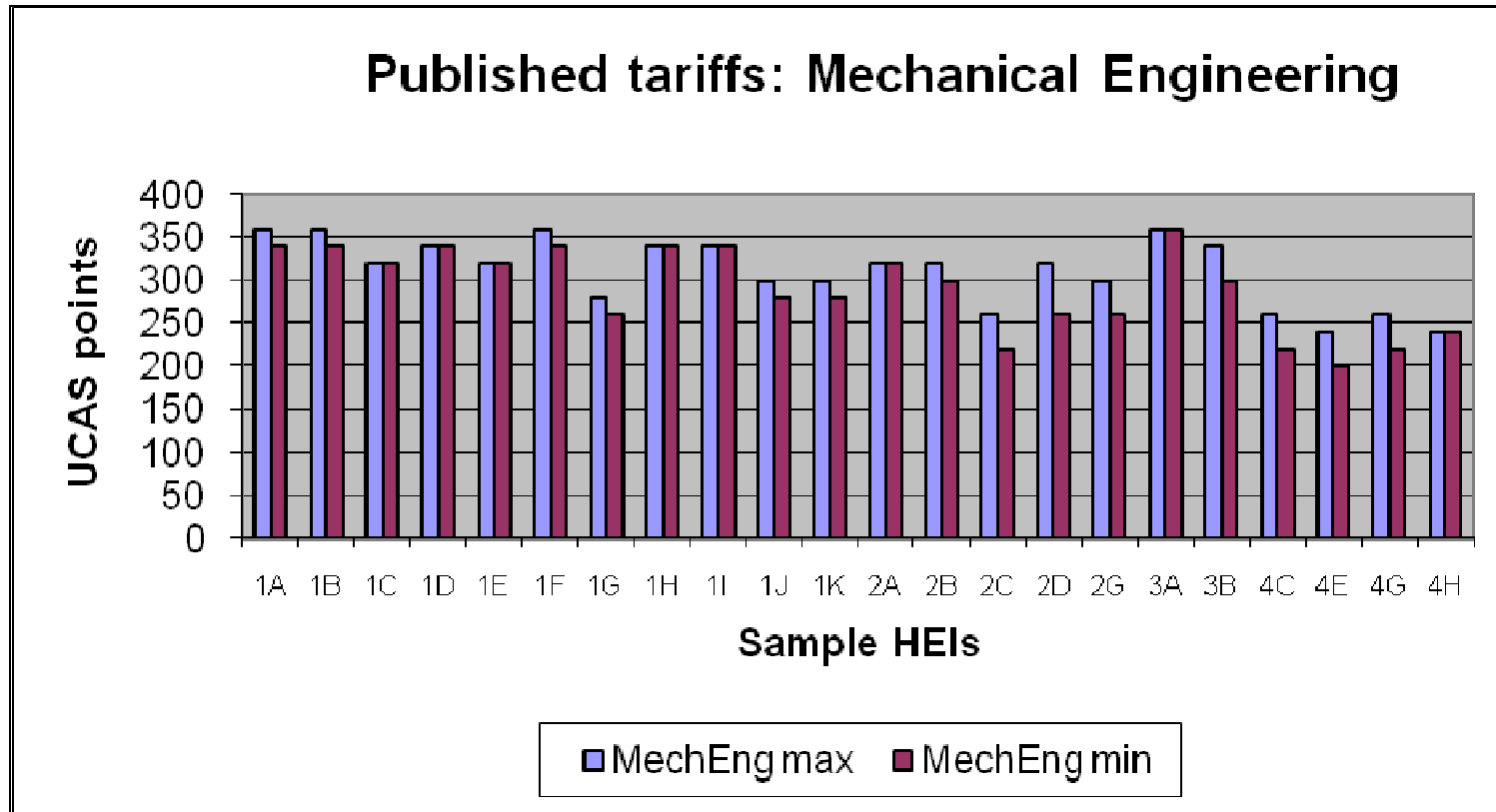
Chart 4: Entry requirements published by sample HEIs: Maximum and minimum points for entry to mathematics



(HEIs coded 1 = Russell Group; HEIs coded 2 = Pre-1960 non Russell Group; HEIs coded 3 = 1960-92; HEIs coded 4 = Post-1992)

# FINAL REPORT

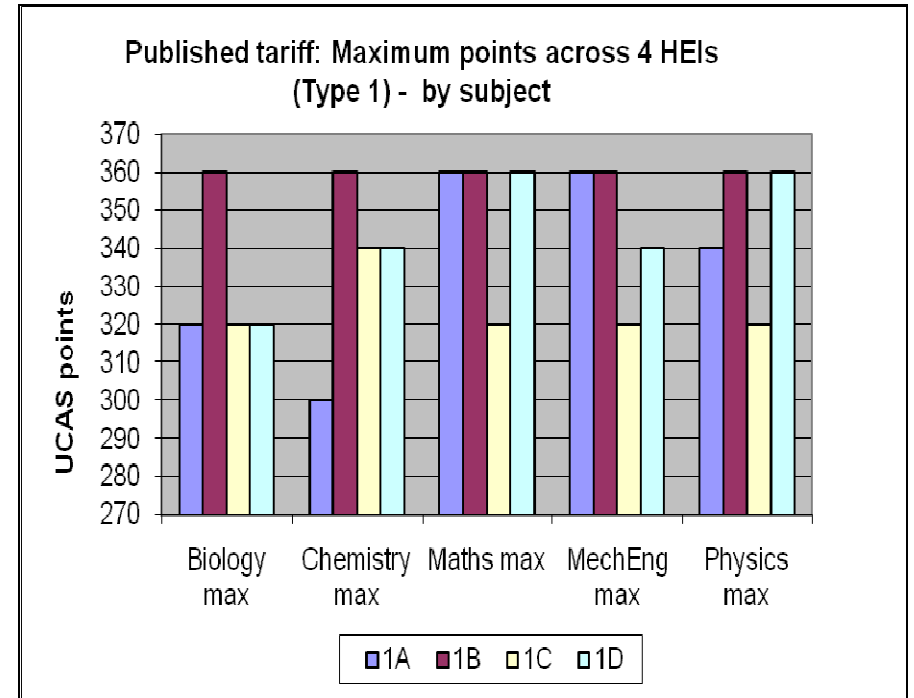
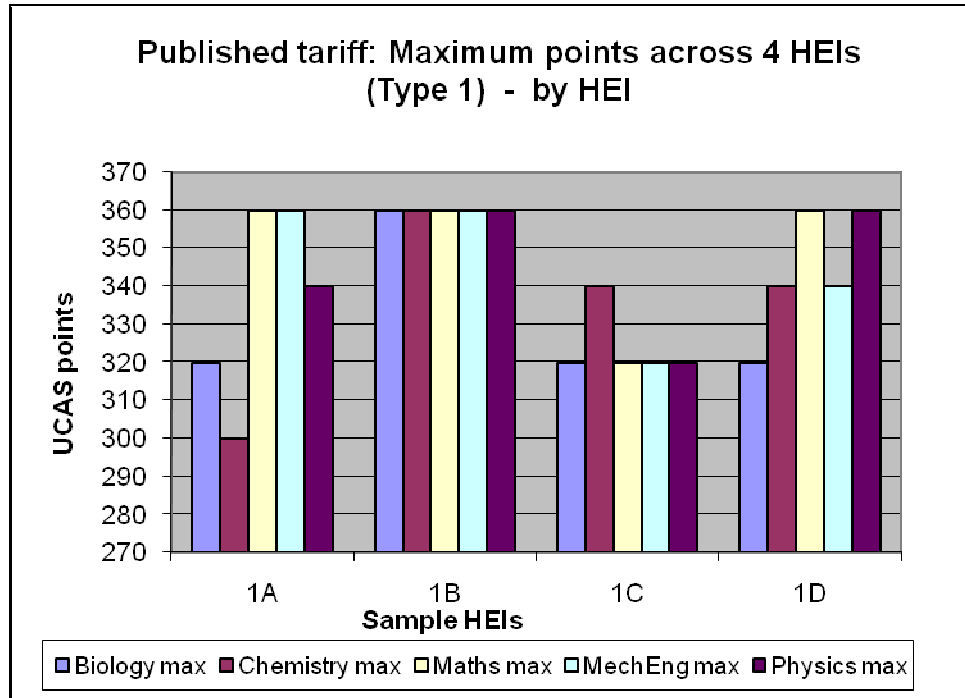
Chart 5: Entry requirements published by sample HEIs: Maximum and minimum points for entry to mechanical engineering



(HEIs coded 1 = Russell Group; HEIs coded 2 = Pre-1960 non Russell Group; HEIs coded 3 = 1960-92; HEIs coded 4 = Post-1992)

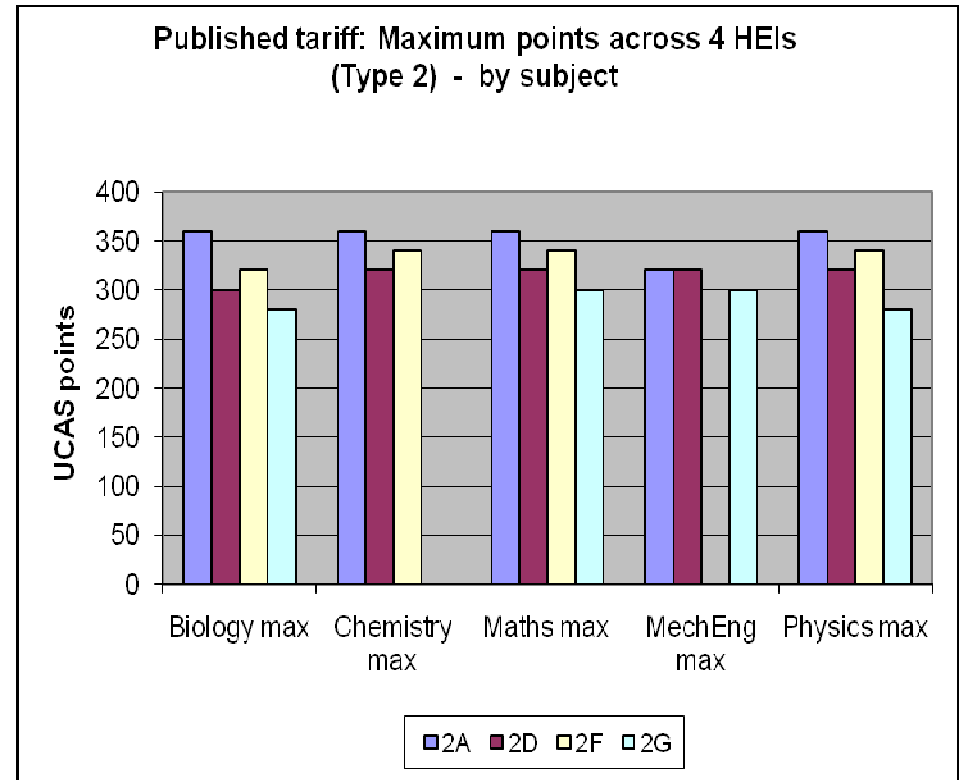
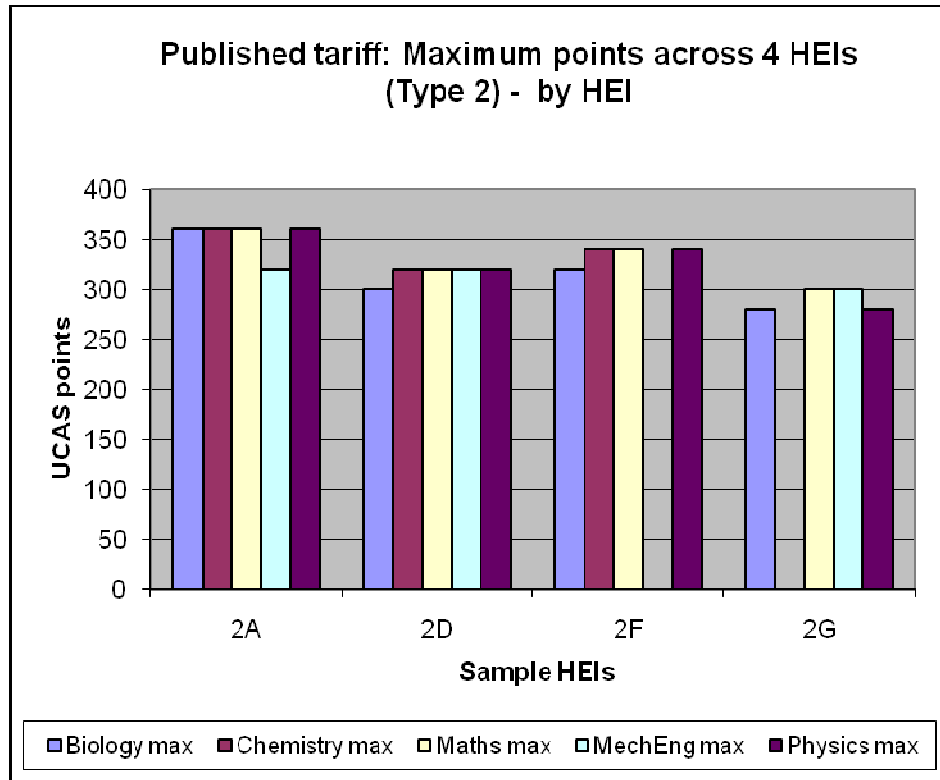
# FINAL REPORT

Chart 6: Entry Requirements based on the highest published tariff (maximum) for four Russell Group HEIs (5 STEM subjects)



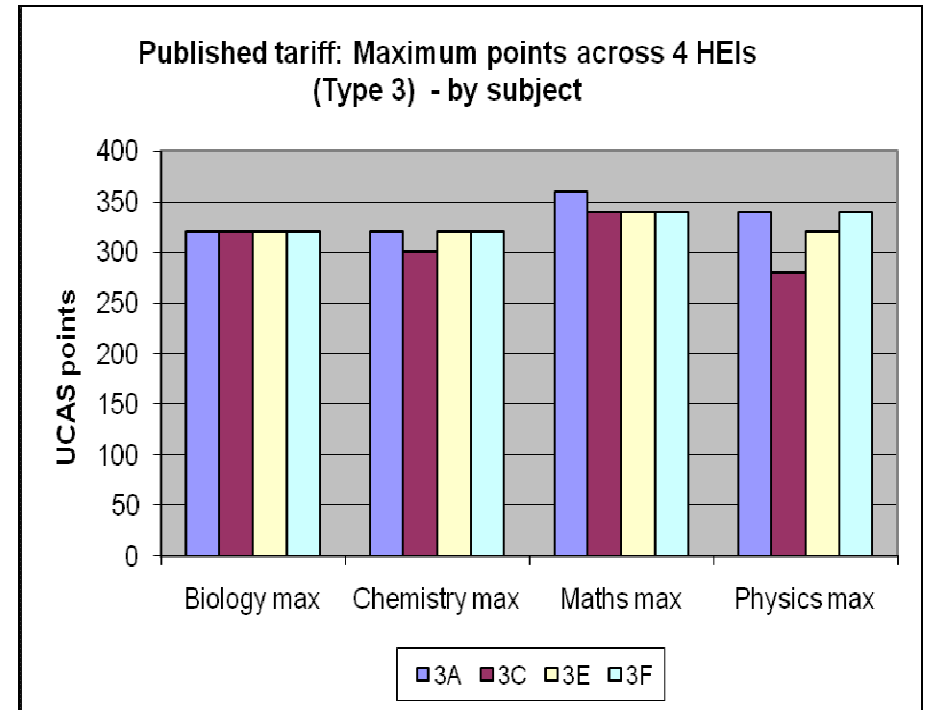
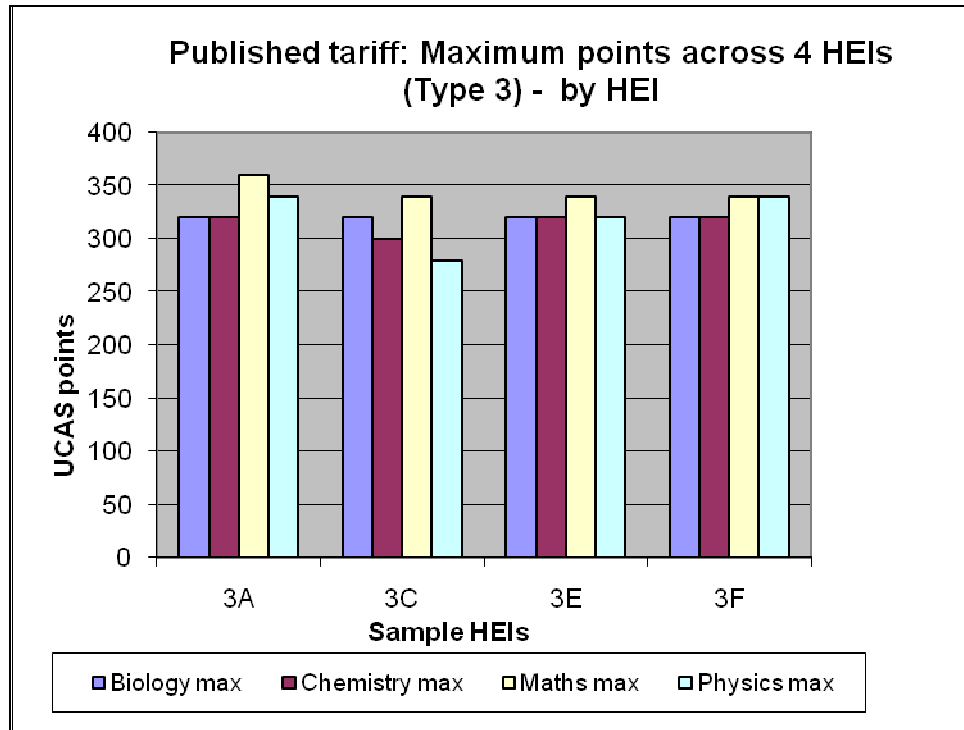
# FINAL REPORT

Chart 7: Entry Requirements based on the highest published tariff (maximum) for four pre-1960 HEIs (5 STEM subjects)



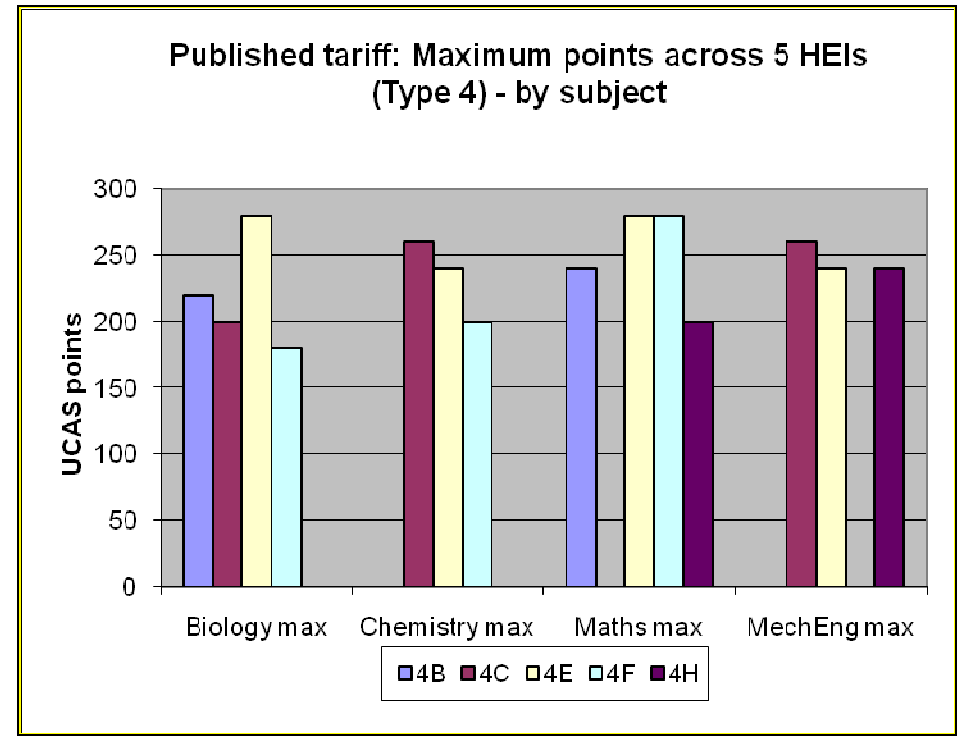
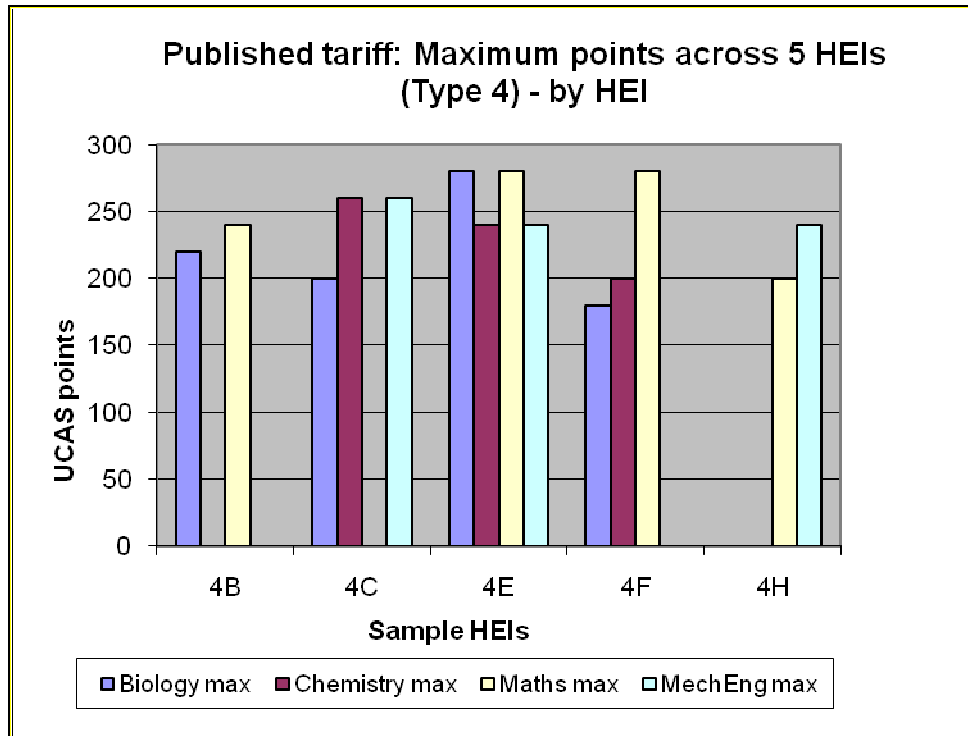
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Chart 8: Entry Requirements based on the highest published tariff (maximum) for four 1960-1992 HEIs (4 STEM subjects)



# FINAL REPORT

Chart 9: Entry Requirements based on the highest published tariff (maximum) for five post-1992 HEIs (4 STEM subjects)



## FINAL REPORT

### 6.3 Top five GCE A level (including double award) subjects for accepted applicants to STEM degrees in 2008 ( Type 1 Russell Gp)

STEM Subject Line	GCE 1	GCE 2	GCE 3	GCE 4	GCE5	Ave Tariff per GCE A Level
C1 - Biology	Biology	Chemistry	Mathematics	General Studies	Psychology	101.51
C4 - Genetics	Chemistry	Biology	Mathematics	General Studies	Physics	98.95
C6 - Sports Science	Physical Education	Biology	Psychology	General Studies	Geography	101.27
C7 - Molecular Biology,Biophysics & Biochem	Chemistry	Biology	Mathematics	General Studies	Physics	104.16
C8 - Psychology	Psychology	English	Biology	General Studies	Mathematics	110.62
D4 - Agriculture	Geography	Biology	History	Design and Tech	Business Studies	88.97
D6 - Food and Beverage studies	Biology	Chemistry	Design and Tech	Mathematics	General Studies	94.47
F1 - Chemistry	Chemistry	Mathematics	Biology	Physics	General Studies	101.79
F3 - Physics	Physics	Mathematics	Chemistry	Further Maths	General Studies	108.34
F4 - Forensic and Archaeological Science	History	English	Other	General Studies	Biology	96.57
F6 - Geology	Geography	Chemistry	Geology	Mathematics	Biology	99.39
F8 - Physical Geographical Sciences	Geography	Biology	General Studies	Mathematics	Chemistry	104.83
G1 - Mathematics	Mathematics	Further Maths	Physics	Chemistry	General Studies	110.58
G3 - Statistics	Mathematics	Other	Biology	Economics	Modern Foreign Langs	115.65
G4 - Computer Science	Mathematics	Physics	Computing	General Studies	Further Maths	102.12
G6 - Software Engineering	Mathematics	Computing	Physics	General Studies	Further Maths	101.40
H2 - Civil Engineering	Mathematics	Physics	Chemistry	General Studies	Further Maths	104.06
H3 - Mechanical Engineering	Mathematics	Physics	Chemistry	Further Maths	General Studies	105.42
H4 - Aerospace Engineering	Mathematics	Physics	Chemistry	Further Maths	General Studies	107.65
H6 - Electronic and Electrical Engineering	Mathematics	Physics	Chemistry	Further Maths	Electronics	105.87
H8 - Chemical,Process and Energy Engineering	Chemistry	Mathematics	Physics	Biology	General Studies	106.27
J4 - Polymers and Textiles	Business Studies	English	Art and Design	Art	Psychology	94.96
J7 - Biotechnology	Biology	Chemistry	Mathematics	Physics	General Studies	100.00

## FINAL REPORT

**Top five GCE A level (including double award) subjects for accepted applicants to STEM degrees in 2008 ( Type 2 pre-1960 not Russell)**

<b>STEM Subject Line</b>	<b>GCE 1</b>	<b>GCE 2</b>	<b>GCE 3</b>	<b>GCE 4</b>	<b>GCE5</b>	<b>Ave tariff points per GCE A Level</b>
C1 - Biology	Biology	Chemistry	Mathematics	General Studies	Geography	93.38
C4 - Genetics	Biology	Chemistry	Mathematics	General Studies	Physics	95.70
C6 - Sports Science	Physical Education	Biology	Psychology	Geography	General Studies	91.49
C7 - Molecular Biology, Biophysics & Biochem	Biology	Chemistry	Mathematics	Physics	General Studies	96.15
C8 - Psychology	Psychology	English	Biology	General Studies	Sociology	100.17
D4 - Agriculture	Geography	Biology	Mathematics	Business Studies	Chemistry	89.51
D6 - Food and Beverage studies	Biology	Chemistry	Design and Technology	Business Studies	Economics	91.84
F1 - Chemistry	Chemistry	Mathematics	Biology	Physics	General Studies	92.32
F3 - Physics	Physics	Mathematics	Chemistry	General Studies	Further Maths	101.19
F4 - Forensic and Archaeological Science	History	Other	English	Chemistry	Biology	97.99
F6 - Geology	Geography	Geology	Chemistry	Biology	General Studies	97.96
F8 - Physical Geographical Sciences	Geography	Biology	General Studies	Mathematics	English	94.97
G1 - Mathematics	Mathematics	Further Maths	Physics	Chemistry	General Studies	102.02
G3 - Statistics	Mathematics	Further Maths	Psychology	Biology	Chemistry	90.00
G4 - Computer Science	Mathematics	Computing	Physics	ICT	General Studies	85.51
G6 - Software Engineering	Mathematics	Computing	General Studies	Applied ICT	English	87.33
H2 - Civil Engineering	Mathematics	Physics	Chemistry	Design and Technology	General Studies	92.05
H3 - Mechanical Engineering	Mathematics	Physics	Chemistry	General Studies	Design and Technology	87.27
H4 - Aerospace Engineering	Physics	Mathematics	Chemistry	Design and Technology	Further Maths	88.77
H6 - Electronic and Electrical Engineering	Mathematics	Physics	Electronics	Computing	ICT	84.64
H8 - Chemical, Process and Energy Engineering	Chemistry	Mathematics	Biology	Physics	General Studies	81.95

## FINAL REPORT

### Top five GCE A level (including double award) subjects for accepted applicants to STEM degrees in 2008 ( Type 3 1960-92)

STEM Subject Line	GCE 1	GCE 2	GCE 3	GCE 4	GCE5	Ave Tariff points per GCE A Level
C1 - Biology	Biology	Chemistry	Mathematics	General Studies	Psychology	95.32
C4 - Genetics	Biology	Chemistry	General Studies	Mathematics	Physics	98.31
C6 - Sports Science	Physical Education	Psychology	Biology	General Studies	Geography	84.77
C7 - Molecular Biology, Biophysics & Biochem	Chemistry	Biology	Mathematics	General Studies	Psychology	98.23
C8 - Psychology	Psychology	English	General Studies	Biology	Sociology	103.17
D4 - Agriculture	Biology	English	Geography	Psychology	General Studies	78.55
F1 - Chemistry	Chemistry	Mathematics	Biology	Physics	General Studies	99.28
F3 - Physics	Physics	Mathematics	Chemistry	General Studies	Further Maths	90.93
F4 - Forensic and Archaeological Science	Biology	Chemistry	Mathematics	English	Physics	79.92
F6 - Geology	Geography	Geology	Mathematics	General Studies	Physics	90.85
F8 - Physical Geographical Sciences	Geography	General Studies	Biology	English	Mathematics	92.19
G1 - Mathematics	Mathematics	Further Maths	Physics	Chemistry	General Studies	103.43
G3 - Statistics	Mathematics	General Studies	Biology	Business Studies	Chemistry	92.73
G4 - Computer Science	Mathematics	Computing	Physics	ICT	General Studies	91.73
G6 - Software Engineering	Physics	Applied ICT	Computing	Mathematics	Modern Foreign Langs	101.67
H2 - Civil Engineering	Mathematics	Physics	Chemistry	Design and Tech	General Studies	94.53
H3 - Mechanical Engineering	Mathematics	Physics	Chemistry	Further Maths	General Studies	100.47
H4 - Aerospace Engineering	Physics	Mathematics	Chemistry	General Studies	Geography	93.80
H6 - Electronic and Electrical Engineering	Mathematics	Physics	Chemistry	Electronics	General Studies	86.22
H8 - Chemical, Process and Energy Engineering	Chemistry	Mathematics	Physics	Biology	General Studies	101.45
J7 - Biotechnology	Biology	Chemistry	Mathematics	Psychology	(blank)	83.33

## FINAL REPORT

### Top five GCE A level (including double award) subjects for accepted applicants to STEM degrees in 2008 ( Type 4 post 1992)

STEM Subject Line	GCE 1	GCE 2	GCE 3	GCE 4	GCE5	Ave Tariff points per GCE A level
C1 - Biology	Biology	Chemistry	General Studies	Psychology	Geography	74.51
C4 - Genetics	Biology	Chemistry	General Studies	Mathematics	Physics	64.00
C6 - Sports Science	Physical Education	Biology	General Studies	Psychology	English	77.72
C7 - Molecular Biology, Biophysics & Biochem	Biology	Chemistry	Mathematics	Psychology	General Studies	68.11
C8 - Psychology	Psychology	English	Sociology	General Studies	Biology	85.21
D4 - Agriculture	Biology	English	Geography	Psychology	Chemistry	78.04
D6 - Food and Beverage studies	Design and Technology	English	General Studies	Health and Social Care	Art and Design	80.22
F1 - Chemistry	Chemistry	Biology	Mathematics	General Studies	Physics	66.86
F3 - Physics	Physics	Mathematics	Chemistry	General Studies	Applied ICT	65.71
F4 - Forensic and Archaeological Science	Biology	Chemistry	Psychology	General Studies	Mathematics	76.76
F6 - Geology	Geology	Geography	Biology	General Studies	Chemistry	72.66
F8 - Physical Geographical Sciences	Geography	Biology	General Studies	English	Psychology	77.81
G1 - Mathematics	Mathematics	Physics	General Studies	Chemistry	Biology	78.38
G3 - Statistics	Mathematics	Further Maths	Biology	Business Studies	Chemistry	79.05
G4 - Computer Science	Applied ICT	Computing	ICT	Mathematics	General Studies	74.04
G6 - Software Engineering	Mathematics	Applied ICT	Computing	ICT	General Studies	75.01
H2 - Civil Engineering	Mathematics	Physics	Design and Technology	Geography	Chemistry	71.56
H3 - Mechanical Engineering	Mathematics	Physics	Design and Tech	General Studies	Chemistry	73.33
H4 - Aerospace Engineering	Mathematics	Physics	Design and Tech	Geography	Chemistry	75.22
H6 - Electronic and Electrical Engineering	Mathematics	Physics	Electronics	General Studies	Design and Tech	70.96
J4 - Polymers and Textiles	Art and Design	English	Other	Psychology	Design and Tech	81.96
J7 - Biotechnology	Biology	Chemistry	Business Studies	Economics	Geography	71.43

## FINAL REPORT

### C1 Biology

	GCE 1	GCE 2	GCE 3	GCE 4	GCE 5
Uni Type 1	Biology	Chemistry	Mathematics	General Studies	Psychology
Uni Type 2	Biology	Chemistry	Mathematics	General Studies	Geography
Uni Type 3	Biology	Chemistry	Mathematics	General Studies	Psychology
Uni Type 4	Biology	Chemistry	General Studies	Psychology	Geography

### C4 Genetics

	GCE 1	GCE 2	GCE 3	GCE 4	GCE 5
Uni Type 1	Biology	Chemistry	Mathematics	General Studies	Physics
Uni Type 2	Biology	Chemistry	Mathematics	General Studies	Physics
Uni Type 3	Biology	Chemistry	General Studies	Mathematics	Physics
Uni Type 4	Biology	Chemistry	General Studies	Mathematics	Physics

### C6 Sports Science

	GCE 1	GCE 2	GCE 3	GCE 4	GCE 5
Uni Type 1	Physical Education	Biology	Psychology	General Studies	Geography
Uni Type 2	Physical Education	Biology	Psychology	Geography	General Studies
Uni Type 3	Physical Education	Psychology	Biology	General Studies	Geography
Uni Type 4	Physical Education	Biology	General Studies	Psychology	English

### C7 Molecular biology, Biophysics and Biochemistry

	GCE 1	GCE 2	GCE 3	GCE 4	GCE 5
Uni Type 1	Chemistry	Biology	Mathematics	General Studies	Physics
Uni Type 2	Biology	Chemistry	Mathematics	Physics	General Studies
Uni Type 3	Chemistry	Biology	Mathematics	General Studies	Psychology
Uni Type 4	Biology	Chemistry	Mathematics	Psychology	General Studies

## FINAL REPORT

### C8 Psychology

	GCE 1	GCE 2	GCE 3	GCE 4	GCE 5
Uni Type 1	Psychology	English	Biology	General Studies	Mathematics
Uni Type 2	Psychology	English	Biology	General Studies	Sociology
Uni Type 3	Psychology	English	General Studies	Biology	Sociology
Uni Type 4	Psychology	English	Sociology	General Studies	Biology

### D4 Agriculture

	GCE 1	GCE 2	GCE 3	GCE 4	GCE 5
Uni Type 1	Geography	Biology	History	Design and Technology	Business Studies
Uni Type 2	Geography	Biology	Mathematics	Business Studies	Chemistry
Uni Type 3	Biology	English	Geography	Psychology	General Studies
Uni Type 4	Biology	English	Geography	Psychology	Chemistry

### D6 Food and Beverage Studies

	GCE 1	GCE 2	GCE 3	GCE 4	GCE 5
Uni Type 1	Biology	Chemistry	Design and Technology	Mathematics	General Studies
Uni Type 2	Biology	Chemistry	Design and Technology	Business Studies	Economics
Uni Type 3					
Uni Type 4	Design and Technology	English	General Studies	Health and Social Care	Art and Design

### F1 Chemistry

	GCE 1	GCE 2	GCE 3	GCE 4	GCE 5
Uni Type 1	Chemistry	Mathematics	Biology	Physics	General Studies
Uni Type 2	Chemistry	Mathematics	Biology	Physics	General Studies
Uni Type 3	Chemistry	Mathematics	Biology	Physics	General Studies
Uni Type 4	Chemistry	Biology	Mathematics	General Studies	Physics

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### F3 Physics

	GCE 1	GCE 2	GCE 3	GCE 4	GCE 5
Uni Type 1	Physics	Mathematics	Chemistry	Further Maths	General Studies
Uni Type 2	Physics	Mathematics	Chemistry	General Studies	Further Maths
Uni Type 3	Physics	Mathematics	Chemistry	General Studies	Further Maths
Uni Type 4	Physics	Mathematics	Chemistry	General Studies	Applied ICT

### F4 Forensic and Archaeological Science

	GCE 1	GCE 2	GCE 3	GCE 4	GCE 5
Uni Type 1	History	English	Other	General Studies	Biology
Uni Type 2	History	Other	English	Chemistry	Biology
Uni Type 3	Biology	Chemistry	Mathematics	English	Physics
Uni Type 4	Biology	Chemistry	Psychology	General Studies	Mathematics

### F6 Geology

	GCE 1	GCE 2	GCE 3	GCE 4	GCE 5
Uni Type 1	Geography	Chemistry	Geology	Mathematics	Biology
Uni Type 2	Geography	Geology	Chemistry	Biology	General Studies
Uni Type 3	Geography	Geology	Mathematics	General Studies	Physics
Uni Type 4	Geology	Geography	Biology	General Studies	Chemistry

### F8 Physical Geographical Sciences

	GCE 1	GCE 2	GCE 3	GCE 4	GCE 5
Uni Type 1	Geography	Biology	General Studies	Mathematics	Chemistry
Uni Type 2	Geography	Biology	General Studies	Mathematics	English
Uni Type 3	Geography	General Studies	Biology	English	Mathematics
Uni Type 4	Geography	Biology	General Studies	English	Psychology

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### G1 Mathematics

	GCE 1	GCE 2	GCE 3	GCE 4	GCE 5
Uni Type 1	Mathematics	Further Maths	Physics	Chemistry	General Studies
Uni Type 2	Mathematics	Further Maths	Physics	Chemistry	General Studies
Uni Type 3	Mathematics	Further Maths	Physics	Chemistry	General Studies
Uni Type 4	Mathematics	Physics	General Studies	Chemistry	Biology

### G3 Statistics

	GCE 1	GCE 2	GCE 3	GCE 4	GCE 5
Uni Type 1	Mathematics	Further Maths	Biology	Economics	Mod Foreign Langs
Uni Type 2	Mathematics	Further Maths	Psychology	Biology	Chemistry
Uni Type 3	Mathematics	General Studies	Biology	Business Studies	Chemistry
Uni Type 4	Mathematics	Further Maths	Biology	Business Studies	Chemistry

### G4 Computer Science

	GCE 1	GCE 2	GCE 3	GCE 4	GCE 5
Uni Type 1	Mathematics	Physics	Computing	General Studies	Further Maths
Uni Type 2	Mathematics	Computing	Physics	ICT	General Studies
Uni Type 3	Mathematics	Computing	Physics	ICT	General Studies
Uni Type 4	Applied ICT	Computing	ICT	Mathematics	General Studies

### G6 Software Engineering

	GCE 1	GCE 2	GCE 3	GCE 4	GCE 5
Uni Type 1	Mathematics	Computing	Physics	General Studies	Further Maths
Uni Type 2	Mathematics	Computing	General Studies	Applied ICT	English
Uni Type 3	Physics	Applied ICT	Computing	Mathematics	Mod Foreign Langs
Uni Type 4	Mathematics	Applied ICT	Computing	ICT	General Studies

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## H2 Civil Engineering

	GCE 1	GCE 2	GCE 3	GCE 4	GCE 5
Uni Type 1	Mathematics	Physics	Chemistry	General Studies	Further Maths
Uni Type 2	Mathematics	Physics	Chemistry	Design and Technology	General Studies
Uni Type 3	Mathematics	Physics	Chemistry	Design and Technology	General Studies
Uni Type 4	Mathematics	Physics	Design and Technology	Geography	Chemistry

## H3 Mechanical Engineering

	GCE 1	GCE 2	GCE 3	GCE 4	GCE 5
Uni Type 1	Mathematics	Physics	Chemistry	Further Maths	General Studies
Uni Type 2	Mathematics	Physics	Chemistry	General Studies	Design and Technology
Uni Type 3	Mathematics	Physics	Chemistry	Further Maths	General Studies
Uni Type 4	Mathematics	Physics	Design and Technology	General Studies	Chemistry

## H4 Aerospace Engineering

	GCE 1	GCE 2	GCE 3	GCE 4	GCE 5
Uni Type 1	Mathematics	Physics	Chemistry	Further Maths	General Studies
Uni Type 2	Physics	Mathematics	Chemistry	Design and Technology	Further Maths
Uni Type 3	Physics	Mathematics	Chemistry	General Studies	Geography
Uni Type 4	Mathematics	Physics	Design and Technology	Geography	Chemistry

## H6 Electronic and Electrical Engineering

	GCE 1	GCE 2	GCE 3	GCE 4	GCE 5
Uni Type 1	Mathematics	Physics	Chemistry	Further Maths	Electronics
Uni Type 2	Mathematics	Physics	Electronics	Computing	ICT
Uni Type 3	Mathematics	Physics	Chemistry	Electronics	General Studies
Uni Type 4	Mathematics	Physics	Electronics	General Studies	Design and Technology

## FINAL REPORT

### H8 Chemical, Process and Energy Engineering

	GCE 1	GCE 2	GCE 3	GCE 4	GCE 5
Uni Type 1	Chemistry	Mathematics	Physics	Biology	General Studies
Uni Type 2	Chemistry	Mathematics	Biology	Physics	General Studies
Uni Type 3	Chemistry	Mathematics	Physics	Biology	General Studies
Uni Type 4					

### J4 Polymers and Textiles

	GCE 1	GCE 2	GCE 3	GCE 4	GCE 5
Uni Type 1	Business Studies	English	Art and Design	Art	Psychology
Uni Type 2					
Uni Type 3					
Uni Type 4	Art and Design	English	Other	Psychology	Design and Technology

### J7 Biotechnology

	GCE 1	GCE 2	GCE 3	GCE 4	GCE 5
Uni Type 1	Biology	Chemistry	Mathematics	Physics	General Studies
Uni Type 2					
Uni Type 3	Biology	Chemistry	Mathematics	Psychology	(blank)
Uni Type 4	Biology	Chemistry	Business Studies	Economics	Geography

## FINAL REPORT

**Average tariff points per GCE A Level subject held by accepted applicants for STEM subject lines by type of university**

STEM Subject Line	Average UCAS Tariff Points per GCE A Level				Average across all types
	University type 1 Russell Group	University type 2 Pre-1960 non-Russell	University type 3 1960-92	University type 4 Post 1992	
C1 - Biology	101.51	93.38	95.32	74.51	91.18
C4 - Genetics	98.95	95.70	98.31	64.00	89.24
C6 - Sports Science	101.27	91.49	84.77	77.72	88.81
C7 - Molecular Biology, Biophysics & Biochem	104.16	96.15	98.23	68.11	91.66
C8 - Psychology	110.62	100.17	103.17	85.21	99.78
D4 - Agriculture	88.97	89.51	78.55	78.04	83.77
D6 - Food and Beverage studies	94.47	91.84		80.22	88.84
F1 - Chemistry	101.79	92.32	99.28	66.86	90.06
F3 - Physics	108.34	101.19	90.93	65.71	91.54
F4 - Forensic and Archaeological Science	96.57	97.99	79.92	76.76	87.81
F6 - Geology	99.39	97.96	90.85	72.66	90.21
F8 - Physical Geographical Sciences	104.83	94.97	92.19	77.81	92.45
G1 - Mathematics	110.58	102.02	103.43	78.38	98.60
G3 - Statistics	115.65	90.00	92.73	79.05	94.36
G4 - Computer Science	102.12	85.51	91.73	74.04	88.35
G6 - Software Engineering	101.40	87.33	101.67	75.01	91.35
H2 - Civil Engineering	104.06	92.05	94.53	71.56	90.55
H3 - Mechanical Engineering	105.42	87.27	100.47	73.33	91.62
H4 - Aerospace Engineering	107.65	88.77	93.80	75.22	91.36
H6 - Electronic and Electrical Engineering	105.87	84.64	86.22	70.96	86.92
H8 - Chemical, Process and Energy Engineering	106.27	81.95	101.45		96.56*
J4 - Polymers and Textiles	94.96			81.96	88.46**
J7 - Biotechnology	100.00		83.33	71.43	84.92***

\* Subject line H8 Chemical, Process and Energy Engineering shows no result for Type 4 universities

\*\* Subject line J4 Polymers and Textiles has no results for type 2 and 3 universities

\*\*\* Subject line J7 has no result for university type 2

## FINAL REPORT

### 6.4: Responses from questionnaires/ interviews

#### 6.4.1: Responses from closed questions

##### Q1 Numbers of respondents from the 4 'types' of university

Type of University	Frequency	% of sample
Russell Group (Type 1)	32	30.5
Pre 1960 (non Russell) (Type 2)	17	16.2
1960 – 1992 (Type 3)	26	24.8
Post 1992 (Type 4)	30	28.6
Total	105	100.0

##### Q2 Numbers of respondents from different subject areas

Subject Area	Frequency	% of sample
Biological Sciences/ biology/ biosciences	16	15.2
Biomedical sciences	6	5.7
Chemistry	8	7.6
Earth sciences (geology, geophysics, Meteorology, other earth sciences)	5	4.8
Food science	2	1.9
Mathematics/ Mathematical sciences/ Statistics	17	16.2
Physics (include astronomy or related subjects)	13	12.4
Psychology	1	1.0
Computer/ Software engineering	10	9.5
Chemical engineering	2	1.9
Civil engineering	7	6.7
Electronic engineering	4	3.8
Mechanical engineering	10	9.5
Other	4	3.8
Total	105	100.0

## FINAL REPORT

### Q6. Were all places on the degree course filled? (Overall totals by type of university)

Type of university	Q6. Were all places filled?			Total
	Yes	No	Don't know	Yes
Russell Group	29	3	0	32
Pre 1960 (non Russell)	9	4	4	17
1960 -1992	17	8	1	26
Post 1992	15	14	1	30
<b>Total</b>	<b>70</b>	<b>29</b>	<b>6</b>	<b>105</b>

### Q6. Were all places on the degree course filled? (Totals for different subject areas)

Subject Area	Yes	No	Don't know	Total
Biological Sciences/ biology/ biosciences	11	4	1	16
Biomedical sciences	6	0	0	6
Chemistry	5	2	1	8
Earth sciences (geology, geophysics, Meteorology, other earth sciences)	1	4	0	5
Food science	1	0	1	2
Mathematics/ Mathematical sciences/ Statistics	12	4	1	17
Physics (include astronomy or related subjects)	8	5	0	13
Psychology	1	0	0	1
Computer/ Software engineering	8	1	1	10
Chemical engineering	1	1	0	2
Civil engineering	5	2	0	7
Electronic engineering	1	3	0	4
Mechanical engineering	8	1	1	10
Other	2	2	0	4
<b>Total</b>	<b>70</b>	<b>29</b>	<b>6</b>	<b>105</b>

## FINAL REPORT

**Q7. Have you noticed any changes over the past 5 years in how easy or difficult it has been to recruit students to this degree course? (Overall totals by type of university)**

Type of university	Ease of recruitment over past 5 years				Total
	Easier/ less difficult	More difficult	No change	Don't know/ Cannot say	
Russell Group	18	4	5	5	32
Pre 1960 (non Russell)	10	1	5	1	17
1960 - 1992	10	9	5	2	26
Post 1992	10	13	4	3	30
Total	48	27	19	11	105

## FINAL REPORT

**Q7. Have you noticed any changes over the past 5 years in how easy or difficult it has been to recruit students to this degree course? (Totals for different subject areas)**

Subject Area	Ease of recruitment over past 5 years				Total
	Easier/ less difficult	More difficult	No change	Don't know/ Cannot say	
Biological Sciences/ biology/ biosciences	8	4	4	0	16
Biomedical sciences	4	2	0	0	6
Chemistry	5	3	0	0	8
Earth sciences (geology, geophysics, Meteorology, other earth sciences)	1	2	2	0	5
Food science	1	0	0	1	2
Mathematics/ Mathematical sciences/ Statistics	13	0	2	2	17
Physics (include astronomy or related subjects)	2	3	5	3	13
Psychology	0	0	1	0	1
Computer/ Software engineering	3	5	0	2	10
Chemical engineering	1	0	1	0	2
Civil engineering	3	0	2	2	7
Electronic engineering	0	4	0	0	4
Mechanical engineering	5	3	2	0	10
Other	2	1	0	1	4
<b>Total</b>	<b>48</b>	<b>27</b>	<b>19</b>	<b>11</b>	<b>105</b>

## FINAL REPORT

**Q15. Are any of the following subjects at GCE A level or equivalent excluded as entry qualifications (i.e. will not be counted)**

GCE A level subject	Type of university				TOTALS n= 105
	Russell n=32	Pre-1960 Non-Russell n=17	1960-92 n=26	Post 1992 n=30	
Applied science	0	0	0	0	0
Computing/ICT	1	0	1	0	2
Critical Thinking	9	4	5	3	21
Design and Technology	1	1	1	2	5
Drama	2	2	4	6	14
Electronics	1	0	1	1	3
Environmental science	0	1	1	0	2
Geography	0	0	1	0	1
General Studies	23	11	14	12	60
Human biology	0	1	1	2	4
Media studies	2	1	3	7	13
Psychology	1	1	3	1	6
Science in Society	2	1	1	1	5
No excluded subjects	8	6	12	14	40
Other Please write in					

**Q16. What is the average UCAS points score held by the most recent cohort of students entering the BSc/ Bachelors degree course you are referring to? (Overall totals by type of university)**

Average UCAS points score	Type of university				Total
	Russell	Pre 1960 (non Russell)	1960- 1992	Post 1992	
More than 360 points	11	2	2	1	16
300-359 points	13	9	9	1	32
240-299 points	0	4	11	16	31
180 - 239 points	1	0	1	8	10
Less than 120 points	2	0	0	0	2
Don't know	5	2	3	4	14
Total	32	17	26	30	105

## FINAL REPORT

**Q16. What is the average UCAS points score held by the most recent cohort of students entering the BSc/ Bachelors degree course you are referring to (Totals by subject area)**

Average UCAS points Score	Subject Area (see key below)														Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
More than 360 points	4	1	2	0	0	5	1	0	1	0	1	0	0	1	16
300-359 points	2	2	2	1	1	8	4	1	4	2	1	1	2	1	32
240-299 points	6	1	0	2	1	4	4	0	2	0	3	3	4	1	31
180 - 239 points	2	1	1	0	0	0	1	0	1	0	0	0	3	1	10
Less than 120 points	0	0	0	1	0	0	0	0	1	0	0	0	0	0	2
Don't know	2	1	3	1	0	0	3	0	1	0	2	0	1	0	14
<b>Total</b>	<b>16</b>	<b>6</b>	<b>8</b>	<b>5</b>	<b>2</b>	<b>17</b>	<b>13</b>	<b>1</b>	<b>10</b>	<b>2</b>	<b>7</b>	<b>4</b>	<b>10</b>	<b>4</b>	<b>105</b>

### Subject Area Key

1 = Biological Sciences/ biology/ biosciences	8 = Psychology
2 = Biomedical sciences	9 = Computer/ Software engineering
3 = Chemistry	10 = Chemical engineering
4 = Earth sciences (geology, geophysics, Meteorology, other earth sciences)	11 = Civil engineering
5 = Food science	12 = Electronic engineering
6 = Mathematics/ Mathematical sciences/ Statistics	13 = Mechanical engineering
7 = Physics (include astronomy or related subjects)	14 = Other

## FINAL REPORT

**Q20. Has the actual performance of students entering this undergraduate degree course (in terms of UCAS points achieved) changed in the past 5 years? (Overall totals by type of university)**

Any change in average points score	Type of university				Total
	Russell Group	Pre 1960 (non Russell)	1960-1992	Post 1992	
Yes, increased	21	13	13	13	60
Yes, decreased	1	0	2	3	6
No, stayed the same	6	1	8	12	27
Don't know	4	3	3	2	12
<b>Total</b>	<b>32</b>	<b>17</b>	<b>26</b>	<b>30</b>	<b>105</b>

## FINAL REPORT

### 6.4.2 Results from questionnaire – open questions (25, 26 and 27)

Q25. Please write in the top 3 things you look for when assessing a student's application for your main undergraduate programme:

Q26. Is there ONE specific change you would like to see in pre-HE STEM education in order to stimulate more demand for STEM degree courses?

Q27. Is there ONE specific change you would like to see in pre-HE STEM education in order to prepare students better for your main undergraduate programme?

#### Q25 The top 3 things admissions tutors look for

Two methods of summarising this information are shown in the tables below, the first (A) is a simple count of the number of times a comment was mentioned overall, regardless of it being the first, second or third thing individuals were looking for.

##### A) Number of mentions overall

Rank position	Theme	Number of mentions
1	Predicted grades	45
2	Specific / relevant subjects	44
3	Good personal statement	36
4	Positive reference / recommendations	29
5	Subjects and grades	28
6	Motivation and enthusiasm for subject / discipline	23
7	Actual grades	20
8	Aptitude	18
9	Experiences (work experience / extracurricular activities etc)	13
10	Predicted and actual grades	12
11	Other	6

An alternative approach is to weight responses (B), whereby the first response is assigned a score of 3, the second a score of 2 and the third a score of 1.

##### B) Weighted scores

Rank position	Topic	Weighted Score
1	Specific / relevant subjects	112
2	Subjects and grades	80
3	Predicted grades	79
4	Good personal statement	50
5	Motivation and enthusiasm for subject / discipline	45
6	Positive reference / recommendations	44
6	Actual grades	44
8	Aptitude	32
9	Predicted and actual grades	31
10	Experiences (work experience / extracurricular activities etc)	20
11	Other	7

# FINAL REPORT

## The top 3 things – in order listed by respondents

### First thing you look for ...

Coding Question 25\_1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Predicted grades	25	23.8	24.0	24.0
	Predicted and actual grades	7	6.7	6.7	30.8
	Positive reference / recommendations	3	2.9	2.9	33.7
	Specific / relevant subjects	27	25.7	26.0	59.6
	Motivation and enthusiasm for subject / discipline	5	4.8	4.8	64.4
	Subjects and grades	24	22.9	23.1	87.5
	Actual grades	5	4.8	4.8	92.3
	Good personal statement	2	1.9	1.9	94.2
	Aptitude	6	5.7	5.8	100.0
	Total	104	99.0	100.0	
Missing	System	1	1.0		
Total		105	100.0		

### Second thing you look for...

Coding for Question 25\_2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Predicted grades	14	13.3	15.2	15.2
	Predicted and actual grades	5	4.8	5.4	20.7
	Positive reference / recommendations	9	8.6	9.8	30.4
	Specific / relevant subjects	14	13.3	15.2	45.7
	Motivation and enthusiasm for subject / discipline	12	11.4	13.0	58.7
	Subjects and grades	4	3.8	4.3	63.0
	Actual grades	14	13.3	15.2	78.3
	Good personal statement	10	9.5	10.9	89.1
	Aptitude	2	1.9	2.2	91.3
	Work experience	7	6.7	7.6	98.9
	Interview performance	1	1.0	1.1	100.0
	Total	92	87.6	100.0	
Missing	System	13	12.4		
Total		105	100.0		

# FINAL REPORT

## Third thing you look for ...

Coding for Question 25\_3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Predicted grades	6	5.7	7.7	7.7
	Positive reference / recommendations	17	16.2	21.8	29.5
	Specific / relevant subjects	3	2.9	3.8	33.3
	Motivation and enthusiasm for subject / discipline	6	5.7	7.7	41.0
	Actual grades	1	1.0	1.3	42.3
	Good personal statement	24	22.9	30.8	73.1
	Aptitude	10	9.5	12.8	85.9
	Extracurricular activities and experiences	6	5.7	7.7	93.6
	Other	5	4.8	6.4	100.0
	Total	78	74.3	100.0	
Missing	System	27	25.7		
Total		105	100.0		

## FINAL REPORT

### Q 26: One specific change you would like to see pre-HE STEM to stimulate more demand for STEM degree courses

Coding for Q 26

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Information and Guidance/influence perceptions and awareness	24	22.9	36.4	36.4
	Standards in schools	1	1.0	1.5	37.9
	Teaching expertise	7	6.7	10.6	48.5
	Better prospects	1	1.0	1.5	50.0
	Practical/work demonstrations	3	2.9	4.5	54.5
	More/better uptake in schools	10	9.5	15.2	69.7
	Investment at early stages	4	3.8	6.1	75.8
	Change in the system	6	5.7	9.1	84.8
	Other	8	7.6	12.1	97.0
	Raise importance of maths	2	1.9	3.0	100.0
	Total	66	62.9	100.0	
Missing	System	39	37.1		
Total		105	100.0		

### Cross tabulation – University type by Q 26 themes

Coding for Q 26 \* Type Cross tabulation

		University Type				Total
		Russell Group	Chartered pre 1960 (non Russell Group)	Chartered between 1960 - 92	Chartered post 1992	
Coding for Q 26	Information and Guidance/influence perceptions and awareness	6	2	5	11	24
	Standards in schools	0	1	0	0	1
	Teaching expertise	1	2	2	2	7
	Better prospects	0	0	0	1	1
	Practical/work demonstrations	1	1	0	1	3
	More/better uptake in schools	2	1	2	5	10
	Investment at early stages	2	0	0	2	4
	Change in the system	1	2	2	1	6
	Other	2	0	4	2	8
	Raise importance of maths	2	0	0	0	2
Total		17	9	15	25	66

## FINAL REPORT

### Q27: One specific change you would like to see pre-HE STEM education to better prepare students for STEM degree courses

Coding for Q 27

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Other	5	3.8	5.0	5.0
	Problem solving	6	5.7	7.5	12.5
	More / better mathematical skills	27	25.7	33.8	46.3
	More Maths and Science	2	1.9	2.5	48.8
	Change styles of learning / more independence	12	11.4	15.0	63.8
	Raise awareness / expectation of university	4	3.8	5.0	68.8
	Change the structure of courses / exams	9	8.6	11.3	80.0
	Improvements in numeracy AND literacy required	9	8.6	11.3	91.3
	More Engineering Mathematics	1	1.0	1.3	92.5
	Specialist teachers	4	3.8	5.0	97.5
	Integration of STEM subjects	2	1.9	2.5	100.0
	Total	80	76.2	100.0	
Missing	System	25	23.8		
Total		105	100.0		

### Cross tabulation - University type by Q 27 themes

Coding for Q 27 \* Type Cross tabulation

		University Type				Total
		Russell Group	Chartered pre 1960 (non Russell Group)	Chartered between 1960 - 92	Chartered post 1992	Russell Group
Coding for Q 27	Other	3	0	2	0	5
	Problem solving	3	2	0	1	6
	More / better Mathematical skills	8	5	7	7	27
	More maths and science	1	0	0	1	2
	Change styles of learning / more independence	2	3	2	5	12
	Raise awareness / expectation of university	1	0	1	2	4
	Change the structure of courses / exams	4	0	3	1	8
	Improvements in numeracy AND literacy required	1	2	2	4	9
	More engineering mathematics	0	0	1	0	1
	Specialist teachers	0	1	1	2	4
	Integration of STEM subjects	0	1	0	1	2
Total		23	14	19	24	80

## FINAL REPORT

Access to the SPSS data file for the field research (questionnaire and telephone interviews) is subject to permission from the Science Council and the Centre for Education and Industry at the University of Warwick

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