



Degrees of decline?

Core science and mathematics degree courses in the UK 1998-2007

University and College Union

November 2006

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Overview

- In the decade to 2007, there has been a 10% reduction in the number of core, ie single honours, science and maths degree courses offered by UK higher education institutions.¹
- Worst-hit have been chemistry and physics: in the North-east of England and in Northern Ireland, there is only one institution providing single honours physics. There is the risk that some regions of the UK may soon lose the ability to provide single honours courses in chemistry or physics.
- By contrast, the number of higher education institutions providing single honours biology courses has increased over the decade.
- Students – or potential students - from a minority ethnic group and from the lowest social classes are more likely to be affected by closure of a local university department since they are more likely to live at home while a student.
- Regional analysis of the population of young people and the provision of BSc single honours courses raises particular concerns about provision for disadvantaged students in Northern Ireland, London and the East of England.
- The average number of students per single honours science and maths course per region varied widely, from 107,000 in Scotland, to 286,000 in Northern Ireland, 302,000 in London and 352,000 in Eastern England. In other words, there were more than three times the number of young people per single honours science and maths course in Eastern England compared with Scotland.
- The situation in the East of England is exacerbated by Cambridge University being the leading provider in the region of BSc courses in science and maths, given the relatively low proportion of students there from a non-traditional background,² and the high academic standards for entry.

Science & Maths	total	total	change
Single honours BSc courses	1998	2007	1998-2007
UK total	250	224	-10.4%

UCAS (1997) Handbook Entry 1998, Cheltenham: UCAS; <http://www.ucas.ac.uk/search/index.html>. Analysis by UCU.

Why do core STEM* courses matter?

This report only looks at the provision of core science and mathematics courses.³ This is not to downplay the importance of joint honours or other combined courses, or applied science degrees, but there is a strong case for arguing that it is vital to maintain provision in core science and mathematics subjects.

The Institute of Physics has recently argued that it is 'essential to maintain a healthy core science research base ... Many of our most outstanding scientists were motivated to start their careers in the 'pure challenge' areas of science, and many of the 20th century's key technological developments came from core science research.'⁴

The Royal Society recently reported that: 'The time available within a three- or four-year full-time first degree course is such that professional scientists, technologists and engineers generally need to have followed a single subject first degree course in the relevant discipline. Multidisciplinary activity in both the public and private sectors is largely taken forward by teams of such specialists.'⁵

The House of Commons Science and Select Committee recently conducted an inquiry into strategic science provision in English universities. The committee commented: '... we remain concerned about the disappearance of university departments in some core STEM subjects, whether or not their capacity has been absorbed by departments in other disciplines. The Association of the British Pharmaceutical Industry (ABPI), for example, told us that there were very few degrees, even those in core STEM subjects, that were an appropriate substitute for chemistry: "of particular concern is the supply of chemists [...] Although numbers following biological degrees have held up well, the relevance of the training has not" ... A biology degree, however rigorous, will not equip a student with the same set of skills as a chemistry degree. By failing to provide specific chemistry training for students, universities may be limiting their employment options.'⁶

The committee recommended: 'When a department in a particular subject is closed, arrangements need to be made to ensure that students can continue to study that subject in its pure form.'

Tony Blair, Prime Minister: speech to the Royal Society, 3 November 2006

For Britain, science will be as important to our economic future as stability.

Alistair Darling, Secretary of State for Trade and Industry: speech to the Royal Society, 23 October 2006

Science is vital for our future. In the global economy in which we now live we will only prosper if we are at the forefront of innovation and invention.

* Science, technology, engineering and mathematics

Science

There has been a 31% fall in the number of single honours chemistry degree courses and a 14% fall in the number of single honours physics degree courses.

Chemistry			change
Single honours BSc courses	1998	2007	1998-2007
UK total	62	43	-30.6%

UCAS (1997) Handbook Entry 1998, Cheltenham: UCAS; <http://www.ucas.ac.uk/search/index.html>. Analysis by UCU. Generally courses with the F100 subject code.

Physics			change
Single honours BSc courses	1998	2007	1998-2007
UK total	51	44	-13.7%

UCAS (1997) Handbook Entry 1998, Cheltenham: UCAS; <http://www.ucas.ac.uk/search/index.html>. Analysis by UCU. Generally courses with the F300 subject code.

There has been a different trend with biology, with a 9% increase in the number of single honours degree courses.

Biology			Change
Single honours BSc courses	1998	2007	1998-2007
UK total	64	70	9.4%

UCAS (1997) Handbook Entry 1998, Cheltenham: UCAS; <http://www.ucas.ac.uk/search/index.html>. Analysis by UCU. Generally courses with the C100 subject code.

Mathematics

There has been an 8% decrease in single honours mathematics degree courses.

Maths			change
Single honours BSc courses	1998	2007	1998-2007
UK total	73	67	-8.2%

UCAS (1997) Handbook Entry 1998, Cheltenham: UCAS; <http://www.ucas.ac.uk/search/index.html>. Analysis by UCU. Generally courses with the G100 subject code.

Regional provision of single honours science and maths degree courses

There is a varied picture of changes in provision of single honours science and maths degree courses by region over the period 1998-2007.

There has been a fall of nearly one-third in provision of single honours science and maths courses in Eastern and North-East England. London has seen a fall of nearly one-quarter in provision of single honours science and maths courses in London. In Wales, there has been a one-in-six reduction in provision of single honours science and maths courses. Scotland, Yorkshire and Humber and South-east England have all seen approximately a 10% reduction in provision of single honours science and maths courses, and there has been a 5% fall in provision in the East Midlands. In South-west England and Northern Ireland, provision of single honours science and maths degree courses has remained at a constant rate. In the West Midlands and the North-west of England, there has actually been an increase in provision of single honours science and maths degree courses.

Science & Maths	total	total	change %
Single honours BSc courses	1998	2007	1998-2007
Eastern	16	11	-31.3%
North-East	13	9	-30.8%
London	31	24	-22.6%
Wales	18	15	-16.7%
Scotland	37	33	-10.8%
Yorkshire & Humber	20	18	-10.0%
South-east	33	30	-9.1%
East Midlands	19	18	-5.3%
South-west	16	16	0.0%
Northern Ireland	5	5	0.0%
West Midlands	19	20	5.3%
North-west	23	25	8.7%
UK total	250	224	-10.4%

UCAS (1997) Handbook Entry 1998, Cheltenham: UCAS; <http://www.ucas.ac.uk/search/index.html>. Analysis by UCU.

Regional provision of single honours biology degree courses

While provision of single honours biology courses has remained fairly constant in most parts of the UK, North-west England has seen courses double in 1998-2007 and there has been an increase from 4 to 6 in the number of courses in South-west England. The number of courses fell by one in North-east England and Wales, and by two in Eastern England.

Biology		
Single honours BSc courses	1998	2007
East Midlands	4	5
Eastern	5	3
London	7	7
North-East	3	2
North-west	5	10
South-east	9	9
South-west	4	6
West Midlands	6	7
Yorkshire & Humber	4	5
Wales	6	5
Scotland	9	9
Northern Ireland	2	2
UK total	64	70

UCAS (1997) Handbook Entry 1998, Cheltenham: UCAS; <http://www.ucas.ac.uk/search/index.html>. Analysis by UCU.

Regional provision of single honours chemistry degree courses

With the exception of Northern Ireland, all parts of the UK have seen a reduction in the provision of single honours degree courses in chemistry in 1998-2007. The reductions have been sharpest in North-west England, with 4 courses cut, and London, with 3 courses cut.

Chemistry		
Single honours BSc courses	1998	2007
East Midlands	5	4
Eastern	4	2
London	7	4
North-East	4	3
North-west	7	3
South-east	6	5
South-west	4	2
West Midlands	5	4
Yorkshire & Humber	6	5
Wales	4	3
Scotland	9	7
Northern Ireland	1	1
UK total	62	43

UCAS (1997) Handbook Entry 1998, Cheltenham: UCAS; <http://www.ucas.ac.uk/search/index.html>. Analysis by UCU.

Regional provision of single honours physics degree courses

Provision of single honours physics degree courses has fallen over the period 1998-2007 by one course in Eastern England, North-east England and West Midlands, and by two courses in London and South-east England. The number of courses has remained constant in the rest of the UK.

Physics		
Single honours BSc courses	1998	2007
East Midlands	4	4
Eastern	3	2
London	6	4
North-East	2	1
North-west	5	5
South-east	8	6
South-west	3	3
West Midlands	4	3
Yorkshire & Humber	4	4
Wales	3	3
Scotland	8	8
Northern Ireland	1	1
UK total	51	44

UCAS (1997) Handbook Entry 1998, Cheltenham: UCAS; <http://www.ucas.ac.uk/search/index.html>. Analysis by UCU.

Regional provision of single honours maths degree courses

Over the period 1998-2007 there was a reduction in the provision of single honours maths degree courses by one course in East Midlands, North-east England and Wales, and by two courses in London, Yorkshire and Humber and Scotland. The number of courses provided remained constant in Eastern England, South-east England, South-west England and Northern Ireland. The number of courses grew in North-west England and West Midlands.

Maths		
Single honours BSc courses	1998	2007
East Midlands	6	5
Eastern	4	4
London	11	9
North-East	4	3
North-west	6	7
South-east	10	10
South-west	5	5
West Midlands	4	6
Yorkshire & Humber	6	4
Wales	5	4
Scotland	11	9
Northern Ireland	1	1
UK total	73	67

UCAS (1997) Handbook Entry 1998, Cheltenham: UCAS; <http://www.ucas.ac.uk/search/index.html>. Analysis by UCU.

Regional provision of single honours courses for young people

There is considerable variation between regions and subjects in the population of 16-29 year olds per single honours BSc course in science and maths in 2007. This variation may adversely affect young people – particularly disadvantaged ones - living in certain parts of the UK, given the rise in the proportion of full-time students remaining in their country of domicile in the UK, and the increasing proportion of full-time undergraduates living in their parental/guardian home or their own home, to reduce maintenance costs.⁷

Recent research indicates that the student groups with the lowest incomes include those who lived at home with their parents; came from a minority ethnic group; came from the lowest social classes; and came from a family where no one else had studied at university. Those most likely to live with their parents include minority ethnic students and students from the lowest social classes. In addition, students living at home were more likely to work during the academic year.⁸ This adverse impact is intensified when universities close courses in single honours BSc subjects.

In biology, there were 97,000 young people per course in Scotland, compared with 219,000 in North-east England, 229,000 in London and 296,000 in Eastern England. For the UK as a whole, there were 149,000 young people per single honours BSc course in biology.

In chemistry, the range was from 125,000 young people per course in Scotland to 392,000 in North-west and South-west England, 401,000 in London and 444,000 per course in Eastern England. In the UK as whole, there were 243,000 young people per single honours BSc course in chemistry.

In physics, there were 109,000 young people per course in Scotland, compared with 401,000 in London, 439,000 in North-east England, and 444,000 in Eastern England. In the UK as whole, there were 237,000 young people per single honours BSc course in physics.

In maths, the range was from 97,000 young people per course in Scotland to 327,000 per course in Northern Ireland. In the UK as whole, there were 156,000 young people per single honours BSc course in mathematics.

The average number of students per single honours science and maths course per region varied widely, from 107,000 in Scotland, to 286,000 in Northern Ireland, 302,000 in London and 352,000 in Eastern England. In other words, there were more than three times the number of young people per single honours science and maths course in Eastern England compared with Scotland.

Given that nearly a half of all non-white students lived in London, this relative lack of provision in London may disproportionately affect minority ethnic

students.⁹ The situation in the East of England is exacerbated by Cambridge University being the leading provider in the region of BSc courses in science and maths, given the relatively low proportion of students there from a non-traditional background, and the high academic standards for entry. It is worth noting the low proportion of first degree students in East of England studying in their home region (25%) compared with, for example East Midlands (40%), London (56%), or Scotland (93%).¹⁰

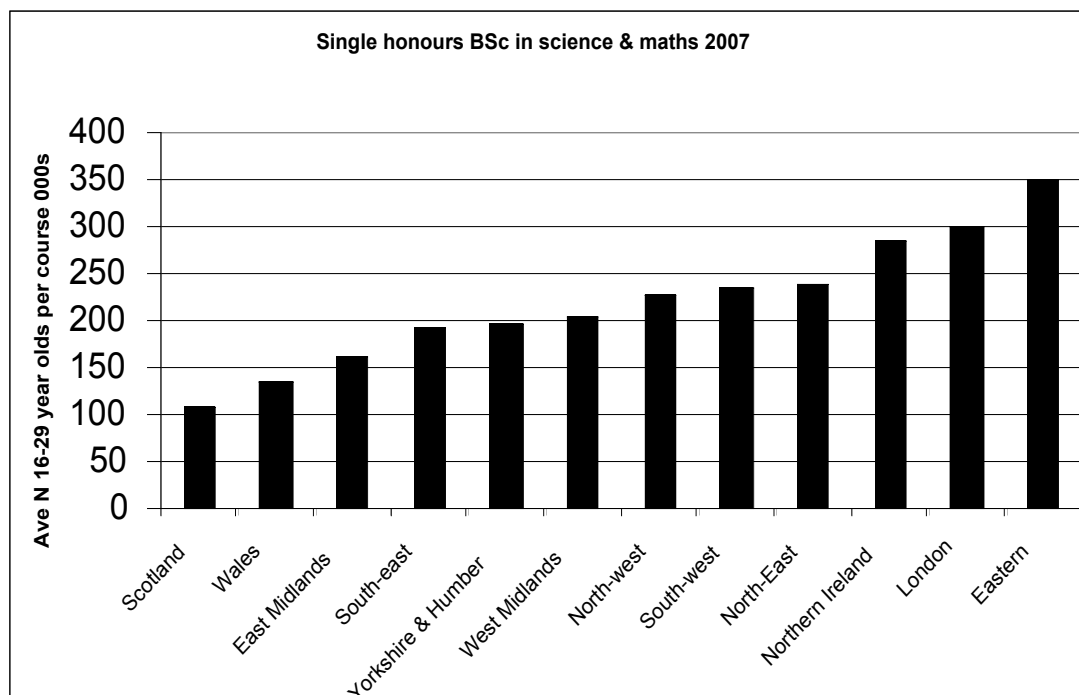
Although students theoretically have the option of studying where they choose in the UK, in practice their choice is increasingly restricted to higher education institutions close to their domicile. If students live at home, they are able to reduce their expenditure on maintenance; with tuition fees in England and Northern Ireland rising in 2006 to £3,000 a year in most HE institutions, and the possibility of a lifting of the fees 'cap' beyond 2009, there is an increasing incentive for students to study close to their place of domicile.

Because of the growing need for provision of higher education relatively near to the homes of young people, particularly from a non-traditional background, it is a matter of concern that there is such disparity across the UK in the availability of single honours science and maths courses. It is a further matter of concern that so many single honours courses in science and maths in the UK have been allowed to close in the past decade.

16-29 year olds per single honours science and maths courses in 2007

Single honours BSc	biology	chemistry	physics	maths	Average for all courses
	000s	000s	000s	000s	000s
East Midlands	144	180	180	144	162
Eastern	296	444	444	222	352
London	229	401	401	178	302
North-East	219	146	439	146	238
North-west	118	392	235	168	228
South-east	150	269	225	135	195
South-west	131	392	262	157	236
West Midlands	131	229	306	153	205
Yorkshire & Humber	176	176	220	220	198
Wales	98	164	164	123	137
Scotland	97	125	109	97	107
Northern Ireland	164	327	327	327	286
UK	149	243	237	156	196

Population data: Table 1: mid-2003 population estimates http://www.statistics.gov.uk/downloads/theme_population/KPVS30_2003/KPVS2003.pdf



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Sources

UCAS (1997) Handbook Entry 1998, Cheltenham: UCAS;
<http://www.ucas.ac.uk/search/index.html>; Table 1: mid-2003 population estimates
http://www.statistics.gov.uk/downloads/theme_population/KPVS30_2003/KPVS2003.pdf.
 Analysis by UCU.

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Endnote

¹ This analysis excludes other types of BSc courses, such as applied courses, joint honours or other types of combined courses.

² http://www.hesa.ac.uk/pi/0405/t1a_0405.xls

³ Including 4-year Mchem, Mbiolsci, Mmaths, Mphys, Msci courses

⁴ http://www.iop.org/Our_Activities/Science_Policy/Consultations/Research/file_3035.doc

⁵ Royal Society (2006) A degree of concern? UK first degrees in science, technology and mathematics, London: Royal Society, p. 61

⁶ House of Commons Science & Technology Committee (2005) Eighth Report - Strategic Science Provision in English Universities, para 17; <http://www.publications.parliament.uk/pa/cm200405/cmselect/cmsstech/220/220i.pdf>

⁷ Brian Ramsden (2006) Patterns of higher education institutions in the UK – Sixth report, London: UUK, para 205-7

⁸ Claire Callender and David Wilkinson (2003) 2002/03 Student Income and Expenditure Survey: Students' Income, Expenditure and Debt in 2002/03 and changes since 1998/99, London: DfES, research report no. 487, section 2.3.1, 2.6.1, 2.6.2

⁹ Callender and Wilkinson, op cit, section 2.8.1

¹⁰ Brian Ramsden (2005) Patterns of higher education institutions in the UK – Fifth report, London: UUK, table 9.