

## Appendix A: Quantitative analysis method

Quantitative analysis is based on the following data sources:

Joint Council for Qualifications A Level Results Tables (<https://www.jcq.org.uk/examination-results/a-levels>)

Higher Education Statistics Agency Student Records (<https://www.hesa.ac.uk/collection/c16051>)

Higher Education Statistics Agency Staff Records (<https://www.hesa.ac.uk/collection/c17025>)

### A Level students

Data count individual candidates sitting A Level examinations in each year.

### HE graduates

Data count individual graduates in each year from the mathematical sciences subject area, by level of study.

### HE staff

Data count the full time equivalent (FTE) number of academic staff in mathematics cost centre, by contract level and academic employment function.

HESA requires Higher Education Institutions (HEIs) to map their constituent departments to cost centres as a way of distinguishing between different activities. Departments can be apportioned across a number of cost centres, which can lead to anomalies: in some cases, HEIs report mathematical sciences staff even though there is no recognised mathematical sciences department; in other cases staff numbers may not match those in a specific mathematical sciences department as staff from other departments may be counted as belonging to the mathematics cost centre, and/or staff working in a mathematical sciences department may be assigned to another cost centre.

Staff full-time equivalent numbers are defined by contract(s) of employment and are apportioned to each activity's cost centre. FTE indicates the proportion of a full-time year being undertaken over the course of the reporting period (1 August to 31 July). The FTE is therefore counted using a population of staff who were active during the reporting period, not just on a given snapshot date.

Contract level and academic employment function are used to identify the different types of staff described in this report. From 2012/13, staff with a contract level of 'F1 Professor' constitute the 'Professors' category in the analysis; prior to 2011/12 a separate Professor marker was available. The two are not directly comparable. Other staff (i.e. those not identified as Professors) with an academic employment function of either 'teaching' or 'teaching and research' are counted as 'senior lecturers/lecturers', while those with an academic employment function of 'research only' are counted as 'researchers'.

## Appendix B: Benchmarking data – women in mathematics by quartile

The following tables show quartiles for the proportion of females at various stages of the mathematical sciences pipeline, by institution. Data are provided to facilitate departmental benchmarking. Further benchmarking data is published separately by the London Mathematical Society, alongside this report.

**Table 28: Proportion of first degree Mathematics graduates who are female, by quartile**

Quartile	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
Minimum	20.3%	19.4%	19.5%	18.3%	17.6%	16.7%	14.6%	13.8%	15.0%
1 <sup>st</sup> quartile	37.9%	38.5%	38.4%	38.6%	37.3%	36.0%	35.7%	34.8%	33.7%
Median	40.9%	42.6%	42.1%	41.8%	40.9%	40.8%	39.1%	38.3%	

Table 31: Proportion of lecturers/senior lecturers in the Mathematics cost centre who are female, by quartile

Quartile	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
Minimum	5.4%	4.3%	0%	3.6%	2.8%	3.2%	4.7%	4.9%	7.1%
1 <sup>st</sup> quartile	9.5%	9.9%	9.9%	11.0%	10.2%	11.0%	11.7%	13.7%	14.0%
Median	14.7%	16.2%	18.4%	16.0%	17.6%	19.4%	17.9%	18.2%	18.8%

## Appendix C: Benchmarking data – UK HEIs by quartile

The following tables show the distribution of UK Higher Education institutions by level of their mathematical sciences departments' Athena SWAN application and the proportion of females at various stages of the mathematical sciences pipeline in 2016/17, by quartile. Because of the small number of mathematics departments applying forward at Gold level, only Bronze and Silver



## Appendix D: Additional Qualitative Analysis Tables

Table 36: Full List of Common Practices

Practice	Proportion of applications
Data gathering	94%
More targeted/proactive recruitment	91%
Promoting postgraduate opportunities	75%
Review/improve promotional material	72%
Review/improve student recruitment activities	72%
Recruitment training	69%
Review/improve promotions processes	69%
Review/improve recruitment materials	69%
Review/improve student support	69%
Review/improve workload allocation	69%
More proactive/targeted approach to career development	66%
Review/improve recruitment processes	66%
Staff mentoring	66%
Improve staff career support	63%
Review/improve staff support information	63%
Review/improve staff support processes	63%
Improve access to relevant information	59%
Improving gender balance	53%
Raise awareness of equality/diversity activity/issues	53%
Review/improve appraisal processes	53%
Review/improve promotions information	53%
Visibility of positive role models	53%
Widen/review SAT membership	53%
Improving academic support for students	50%
Better gender balance of seminar speakers	47%
Improve staff support	47%
Review/improve induction processes	47%
Review/improve training processes	47%
Introduction of core hours	41%
Student funding	41%
Student mentoring	41%

Practice	Proportion of applications
Review/improve committee membership recruitment	28%
Informal networking	25%
Physical surroundings	25%
Staff funding for career development	25%
Gender monitoring of workload	22%
Review/improve career development information	22%
HR training	19%
Improve gender balance in outreach	19%
Improve visibility to current students/staff	19%
Improving careers support for students	19%
Managing Athena SWAN action plan	19%
Outreach in workload allocation	19%
Review/improve research processes	19%
Social events	19%
Student funding for career development	19%
	19%
More proactive/targeted approach to training	16%
Outreach activities promoting maths	16%
Promote part time working	16%
Review/improve information for students	16%

Practice	Proportion of applications
Workload model	6%
Childcare support	3%
Core hours	3%
Development opportunities for students	3%
Improve administration of meetings	3%
Improved appraisal process	3%
Improving appraisal/review processes	3%
Monitoring gender balance	3%
More proactive/targeted approach to promotion	3%
Outreach activities encouraging further maths	3%
Providing funding for research	3%
Review workload	3%
Review/improve maternity support	3%
Review/improve promotion information	3%
Timetabling flexibility for staff	3%
Timings of social events	3%
Unconscious bias	3%
Workload accreditation	3%

Source: Ortus Economic Research analysis of Athena SWAN applications



Table 37: Words/Terms used to Define Departmental Culture by level/success

Word/term	Bronze – Successful	Bronze – Unsuccessful	Silver – Successful	Silver – Unsuccessful	All
Social events	69%	50%	75%	73%	70%
Athena SWAN commitment	46%	75%	75%	82%	67%
Internal communication	54%	25%	50%	27%	42%
Physical environment	31%	25%	50%	18%	30%
Social space	31%	0%	25%	18%	24%
Atmosphere	31%	0%	0%	36%	24%
Open door policy	15%	50%	50%	9%	21%
Diversity training/awareness	23%	0%	25%	18%	18%
Diverse website	15%	0%	25%	18%	15%
Visible role models	15%	0%	25%	18%	15%
Childcare support	8%	25%	0%	18%	12%
Flexible working	15%	0%	0%	9%	9%
Work/life balance	8%	0%	0%	18%	9%
Hierarchy	8%	0%	0%	9%	6%
Females in leadership roles	0%	25%	25%	0%	6%
Networking opportunities	8%	0%	0%	9%	6%
Diverse range of speakers	0%	0%	0%	9%	3%
Decision making processes	0%	25%	0%	0%	3%
Mentoring	0%	0%	0%	9%	3%

Source: Ortus Economic Research anal

Table 39: Mechanisms for Meaning Culture by level/success

Word/term	Bronze – Successful	Bronze – Unsuccessful	Silver – Successful	Silver – Unsuccessful	All
Staff survey responses	69%	100%	75%	64%	73%
Number of social events	31%	25%	0%	18%	24%
Student survey responses	23%	25%	25%	18%	24%
Percentage of female speakers	15%	0%	50%	27%	21%
Attendance at events	23%	0%	25%	9%	15%
Diversity training rates	8%	25%	0%	18%	15%
Gender balance of department	8%	50%	0%	9%	12%
Student awards	15%	0%	0%	18%	12%
Staff awards	0%	0%	25%	18%	9%
Number of staff working flexibly	8%	0%	0%	9%	6%
Informal staff feedback	0%	0%	25%	9%	6%
Engagement with Athena SWAN	0%	0%	25%	0%	3%
Number of female role models on website	0%	0%	25%	0%	3%
Webpage views	0%	0%	25%	0%	3%
£s in Professional Development Accounts	0%	0%	25%	0%	3%
Workload points for ED&I	8%	0%	0%	0%	3%
Number of children using childcare provision	0%	0%	0%	9%	3%
REF data	0%	0%	0%	9%	3%
Percentage of staff with caring responsibilities	0%	25%	0%	0%	3%

Table 41: Words/terms used to describe departmental Culture by level/success

Word/term	Bronze -
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Table 42: Words/terms used to describe departmental Culture by female staff quartile

Word/term	Bottom quartile	Lower middle quartile	Upper middle quartile	Top quartile	All
friendly	50%	73%	73%	80%	70%
diverse/diversity	83%	73%	64%	40%	67%
supportive	67%	64%	45%	100%	64%
equal/equality	67%	45%	91%	40%	64%
inclusive	67%	64%	55%	40%	58%
excellence	50%	36%	36%	0%	33%
welcoming	50%	9%	27%	20%	24%
respectful	17%	18%	18%	0%	15%
positive	17%	9%	27%	0%	15%
open	17%	9%	18%	0%	12%
fairness	17%	9%	9%	20%	12%
dynamic	17%	9%	18%	0%	12%
safe	17%	9%	9%	0%	9%
flexible	0%	9%	9%	20%	9%
informal	0%	9%	18%	0%	9%
happy	17%	9%	0%	20%	9%
stimulating	17%	0%	9%	20%	9%
proud	17%	0%	9%	0%	6%
outstanding	17%	9%	0%	0%	6%
inspiring	0%	9%	9%	0%	6%
caring	0%	9%	0%	0%	3%
approachable	0%	0%	0%	20%	3%
help	0%	0%	0%	20%	3%
dignity	0%	9%	0%	0%	3%
productive	17%	0%	0%	0%	3%
competitive	0%	9%	0%	0%	3%

Source: Ortus Economic Research analysis of Athena SWAN applications

Table 43: Average number of terms defining culture by level/success

Theme	Bronze – Successful	Bronze – Unsuccessful	Silver – Successful	Silver – Unsuccessful
Defining culture	3.8	3.0	4.3	4.0
Measuring culture	2.1	2.5	3.3	2.4
Describing culture	5.3	5.5	4.8	5.0

Source: Ortus Economic Research analysis of Athena SWAN applications

Table 44: Average number of terms defining culture by female staff quartile

Theme	Bottom quartile	Lower middle quartile	Upper middle quartile	Top quartile
Defining culture	3.8	4.4	4.3	1.8
Measuring culture	2.7	2.5	2.1	2.4
Describing culture	6.2	4.6	5.5	4.4

Source: Ortus Economic Research analysis of Athena SWAN applications

## Appendix E: Participating departments

33 departments participated in the research:

Department of Mathematical Sciences, University of Bath  
 Department of Economics, Mathematics and Statistics, Birkbeck, University of London  
 School of Mathematics, University of Birmingham  
 Department of Mathematics, University of Bristol  
 Faculty of Mathematics, University of Cambridge  
 School of Mathematics, Cardiff University  
 Department of Mathematical Sciences, Durham University  
 School of Mathematics, University of East Anglia  
 Department of Mathematics and Computer Science, University of Exeter  
 Department of Mathematics, Statistics and Actuarial Science, University of Kent  
 Department of Mathematics, King's College London  
 Department of Mathematics and Statistics, Lancaster University  
 Faculty of Maths and Physical Sciences, University of Leeds  
 Department of Mathematics, University of Leicester  
 Mathematical Sciences Department / Mathematics Education Centre, Loughborough University  
 Department of Mathematics, London School of Economics  
 Department of Mathematics, University of Manchester  
 Department of Mathematical Sciences, University of Nottingham  
 Department of Mathematics and Statistics, Open University  
 Mathematical Institute, University of Oxford  
 Department of Mathematical Sciences, Queen Mary University of London  
 School of Mathematical, Physical, and Computational Science, University of Reading  
 Department of Mathematics, Royal Holloway, University of London  
 School of Mathematics and Statistics, University of Sheffield  
 School of Mathematics, University of Southampton  
 School of Mathematics and Statistics, University of St Andrews  
 Department of Computing Science and Mathematics, University of Stirling  
 Department of Mathematics and Statistics, University of Strathclyde  
 Department of Mathematics, University of Sussex  
 Department of Mathematics, University College London  
 Department of Engineering, Design and Mathematics, University of the West of England, Bristol  
 Mathematics Institute, University of Warwick  
 Department of Mathematics, University of York

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Evidence-based example	Challenge	Action	Output/outcome	Evidence	Theme
Evidence-based: Strong evidence that encouraging more female undergraduates to study the 4-year Masters programmes is working, with female Masters graduates rising from 24% to 43% over three years.	Improving the number of women going on to further study (i.e. staying in the pipeline)	Personal tutors to encourage undergraduates to consider MSci and postgraduate studies	The number of female students progressing to the 4 year MSci programmes is increasing, with female MSci graduates rising from 6 (24%) to 20 (43%) over three years	Internal information	Improve numbers
Evidence-based: Changes were made to the format of open days after a survey indicated that female UGs were less impressed than male UGs by their first visit to the campus. Changes included increasing visibility of female staff and students and explicitly referencing the commitment to AS. Subsequent surveys indicate that these changes have been a success, with a much higher level of satisfaction reported.	Attracting/retaining greater numbers of female students	Improved the experience of potential female applicants at Open Days. Female staff and student volunteers are well represented and the department's commitment to gender equality is outlined in presentations and leaflets.	Proportion of students who had attended Open Days and reported being impressed has increased	Student survey	Improve numbers
Evidence-based: In its first year of operating, 100% of the student intake for a new course was male. Following this, the department consulted with the London Mathematical Society (LMS) Women in Mathematics Committee to improve gender balance in recruitment materials, webpages, and interviews with female staff, corresponding with measures taken for UG recruitment. 50% of the next cohort was female and has remained high.	Attracting/retaining greater numbers of female students	Consulted with the London Mathematical Society (LMS) Women in Mathematics			

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Evidence-based example	Challenge	Action	Output/outcome	Evidence	Theme
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