Observatory for Mathematical Education

The landscape of undergraduate mathematics degrees in England & Wales

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v1.1

Evidence
Excellence
Equity

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Record of changes

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1.0	24/06/2025	Report published
1.1	01/09/2025	Table 5 values amended and pagination adjusted

Summary

Context and aims

The higher education landscape in England and Wales has changed considerably since the early 1990s in response to the shifting priorities and policies of successive governments, particularly those concerned with funding and regulation. The discipline of mathematics has also evolved due to technological advancements and research developments in the field, as have teaching, learning and assessment approaches. In response to these developments in the *policy context*, *the discipline* and *the learning sciences*, university departments have repeatedly designed and redesigned their BSc Mathematics programmes. This process, however, has lacked a holistic overarching framework that can help to identify both the distinctive features of a particular course and the evolving emphases and gaps in the national undergraduate mathematical sciences provision. This report speaks to those two issues and aims to be of use to university mathematics leaders and teachers, and through them the course-choosing students of the future and their advisors and supporters.

Variability between programmes

This study analyses the documentary information available to prospective students. This information, primarily taken from university websites, includes prospectus course descriptions and programme specifications. This data-driven approach identifies the main sources of variability between programmes to create a student-relevant typology of all BSc Mathematics degrees in England and Wales. The three *dimensions* which explain the most variability are:

- **Dimension 1**: This dimension encompasses both entry requirements, such as the grade required in A level Mathematics, and choice, for example module choice. Higher entry requirements are associated with higher levels of choice.
- **Dimension 2**: The extent to which degrees are promoted as purely mathematics-focused, or as offering a broad experience beyond mathematics.
- **Dimension 3**: The extent to which course descriptions' varying beliefs about the nature of mathematics are explicitly stated or left implicit.

Typology of programmes

Plotting all BSc Mathematics programmes in England and Wales according to these dimensions (Figure 1) highlights three broad *groups* of programmes:

- **Group A** is characterised by low entry requirements, low choice within the degree and a high level of focus on mathematics. These are typically located in smaller mathematics departments.
- **Group B** contains the largest number of programmes, and is characterised by moderate entry requirements, a medium level of choice within the programme, and a broad degree offer beyond just mathematics.
- **Group C**, the smallest group with only 11 programmes, is characterised primarily by high entry requirements and high student choice, typically offered by large mathematics departments.

These three groups can be further subdivided with increasing granularity. Group C, for example, contains considerable variability with respect to Dimension 2.

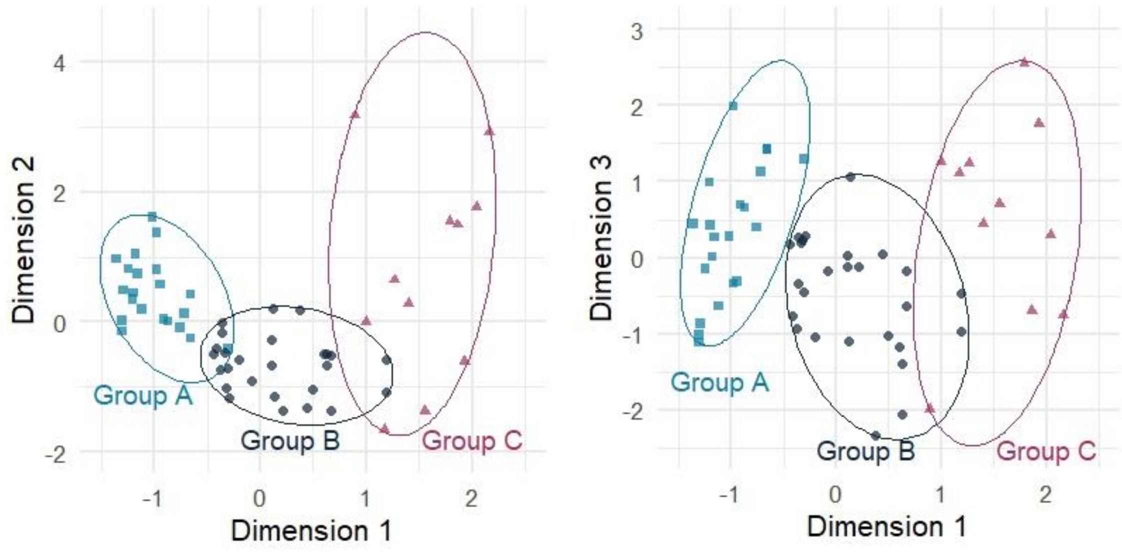

Figure 1 BSc Mathematics degrees plotted against a) Dimensions 1 and 2 and b) Dimensions 1 and 3. Colours and shapes represent the degree groups, and ellipses indicate the boundaries of each group. See Section 3.2 for further details.

Implications

All 58 BSc Mathematics programmes considered in this analysis are of the same status according to national qualification frameworks and subject benchmark statements. However, the analysis shows considerable diversity in curriculum content and the balance between compulsory and elective modules, as well as in teaching and assessment approaches. Although Russell Group membership is commonly used as a proxy for some of these measures, the groups revealed by the analysis do not align along this division. This poses a challenge for how the mathematics community articulates programme differences to prospective students, employers and other stakeholders.

The analysis also reveals ‘maths deserts’, not just as geographical areas where there is a restricted choice of programme, but also as combinations of course characteristics which are not found anywhere. For example, the data suggests there is more variability, and therefore choice, within the Russell Group than outside it. Consideration might be given to whether offering a similar variety of courses for those with, say, A level Mathematics grade B would increase and diversify the undergraduate intake.

With higher education in England and Wales currently facing financial challenges which threaten to reduce BSc Mathematics provision in future, this analysis of the degree programmes landscape will help the sector to consider the recent evolution of the national offer, identify areas at risk, and consider collectively how to maintain a broad, healthy mathematical sciences ecosystem.

1. Introduction

1.1 Context and aims

The higher education landscape in England and Wales has seen several fundamental shifts since the early 1990s. Policy decisions, such as the Conservative government creating new universities from former polytechnics in 1992 and the New Labour government of the early 2000s seeking 50% of young people to access higher qualifications, led to the dramatic expansion of higher education provision. Other policies, such as the substantial increase in tuition fees under the Coalition government and the later removal of student number controls in 2015/16, created a marketplace of institutions competing for students. These sector-wide national decisions have moulded the landscape of mathematics programmes seen today. The expansion of higher education led to a wider cross section of young people studying undergraduate mathematics, but subsequent deregulation has seen an unbalanced distribution of these students across institutions as market forces have taken effect[1].

Alongside the evolution of policy, the discipline of mathematics has itself evolved. Where computing resources were once scarce and slow, computational methods for finding numerical solutions or analysing enormous datasets, are now available to most. With the introduction of artificial intelligence, past debates on whether it is helpful for mathematicians to use calculators, are now rehearsed in the context of large language models. Furthermore, mathematics courses have been encouraged to embed interdisciplinarity and employability skills in their curricula as the discipline justifies its existence to government, industry, research funders and students. The knowledge, skills and competencies expected of today's undergraduate mathematicians have therefore also evolved.

The landscape of teaching, learning and assessment has also changed. Once again, this is partially driven by new technology enabling more diverse practice, such as video content and computer-based assessments, housed in virtual leaning environments. While traditional chalk-and-talk didactic methods and closed-book examinations remain commonplace, departments may have also evolved to place greater emphasis on skill development alongside knowledge acquisition, to be more inclusive of a diverse student body, and in pursuit of enhanced student engagement, student satisfaction and lucrative league table positions.

Very little of this evolution in undergraduate mathematics provision has been centrally coordinated and planned. It is likely that mathematics departments and programmes have reacted to these political and market pressures and opportunities in different ways. In terms of curricula, for example, the Quality Assurance Agency for Higher Education (QAA) subject benchmark statement[2] only specifies calculus, linear algebra and some element of probability or statistics as the common core across mathematical sciences programmes, with the remaining content at the discretion of individual departments. So, what is the current landscape of BSc Mathematics programmes? How diverse are they in terms of characteristics such as teaching, assessment, curriculum, level and size?

This report seeks to answer these questions from the perspective of prospective students. While unprecedented numbers of students are taking A level Mathematics[3], the same growth has not been seen at undergraduate level and retention of students on degree programmes is a concern. If the discipline is to thrive, or merely survive given current higher education funding pressures, then the mathematics community could benefit from better understanding the differences between programmes and for these to be better articulated so that applicants, together with teachers and parents, can understand the diversity of the university mathematical sciences offer. Current attempts to classify courses by entry requirements or by Russell Group membership are blunt instruments. In contrast, this study uses documentary analysis of the information that is available to prospective students, primarily from university websites, to create a more student-relevant typology of BSc Mathematics programmes. A more holistic and nuanced understanding of the current landscape will enable the mathematics community to make sure provision is appropriately aligned with the requirements of future students and the future of the discipline.

1.2 Universities offering mathematics degrees

This analysis includes all 58 universities in England and Wales with a BSc Mathematics degree offer advertised to start in academic year 2025-26. The geographical distribution of these universities is shown in Figure 2. Universities in Scotland and Northern Ireland are excluded since each nation operates under different education systems and programmes are not entirely comparable. For example, undergraduate degrees in Scotland are typically four years, compared to three years in England and Wales. The present study also focuses on full-time, in person degree programmes and therefore does not encompass more flexible, part-time undergraduate pathways, such as those offered by The Open University. Based on recent data, mathematics departments range in size from 25 undergraduates (approximately 8 students per cohort) at the University of Chichester, to 2,045 undergraduates (around 680 students per cohort) at the University of Warwick (Figure 2).

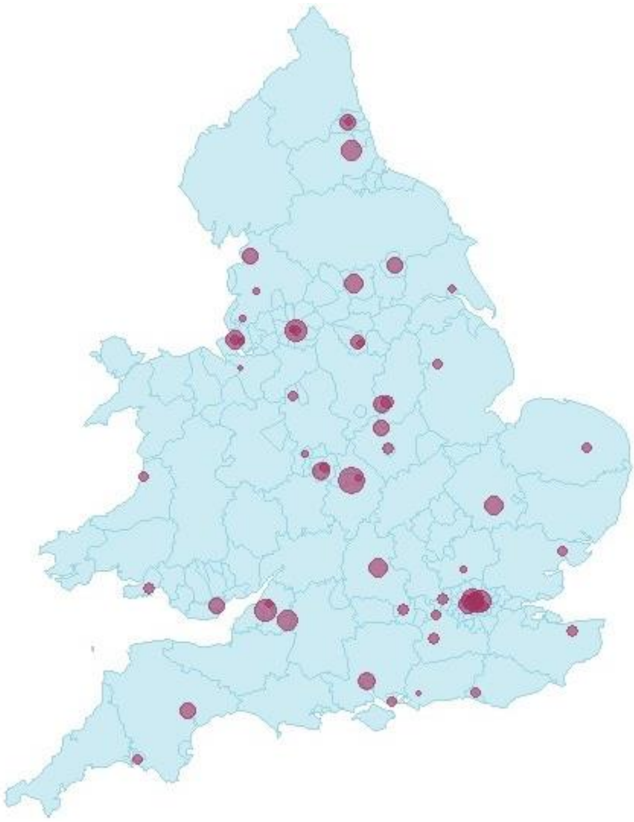

Figure 2 Location of BSc Mathematics courses in England and Wales. Circles represent offering universities, with circle size proportional to the number of mathematical sciences undergraduates in 2023-24[4].

1.3 Undergraduate mathematics student numbers over time

In academic year 2023-24, there was a total of 25,760 mathematics undergraduates at universities in England and Wales, including students taking both single honours and joint honours degrees in mathematical sciences subjects[4]. This equates to roughly 8,600 students per cohort, based on an average degree length of 3 years. Some universities offer undergraduate master's degrees (e.g. MMath Mathematics), which are typically the same as the BSc degree for the first three years, with students completing an additional fourth year at master's level. Student numbers in 2022/23 and 2023/24 were the lowest for the last ten years, with almost 4,000 fewer mathematical sciences undergraduates than in 2018/19 (Figure 3).

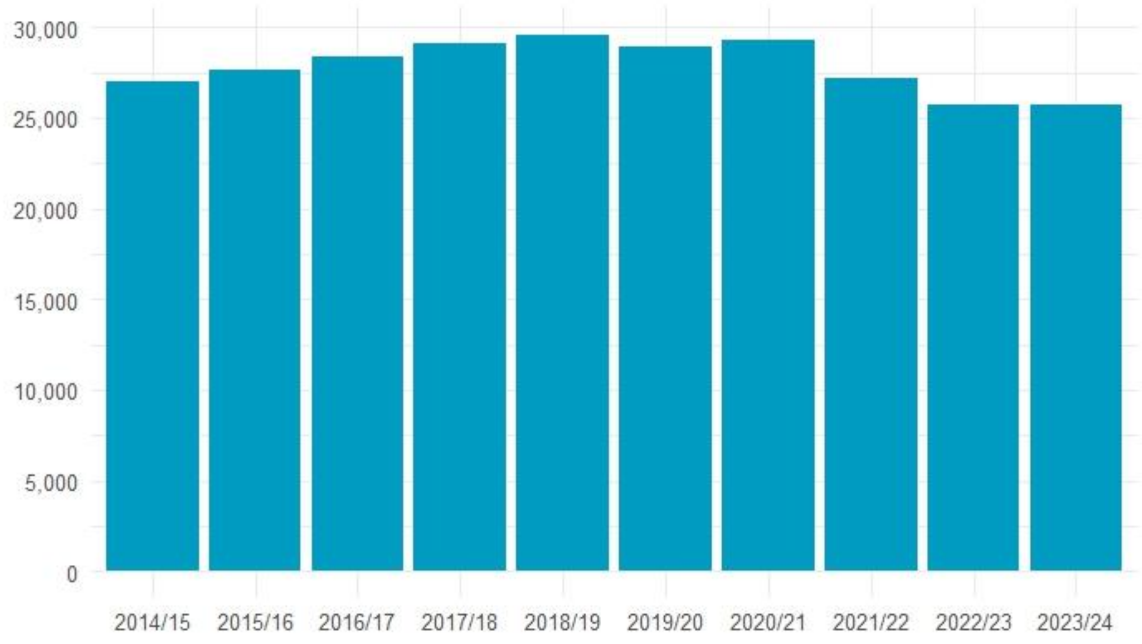

Figure 3 The total number of mathematical sciences students enrolled on undergraduate degrees in England and Wales over a 10-year period. Student numbers data from HESA (2025)[4].

2. Methods

2.1 Data

The primary data for the project consisted of text, images and videos published on BSc Mathematics course pages on the website of each university, downloaded between October and December 2024. These data were chosen in line with the project aim of understanding how courses are presented to prospective students. While it is reasonable to assume that course descriptions represent the actual course experience fairly accurately, a limitation is that different levels of detail were available for different courses. Hence, for example, where a teaching method is explicitly mentioned, this is a good indication that it is used in practice on the course. However, if the teaching method is not mentioned, it would be incorrect to conclude that it does not happen, although the absence does suggest that it is not considered to be important information to communicate to prospective students.

Supplementary data were gathered from the following publicly available online sources: Higher Agency Statistics Agency (HESA), University and Colleges Admissions Service (UCAS), Russell Group, and Campaign for Mathematical Sciences (CaMS). These data provide additional context for the BSc Mathematics programmes, including recent undergraduate numbers, typical entry requirements, and university mission group membership, as well as whether the university has recently announced voluntary redundancy processes potentially affecting their future mathematics provision.

2.2 Methods

Content analysis was used to construct categorical variables under five categories, shown in Table 1. Coding of variables using R and NVivo software was checked and agreed by at least two of the research team. After removing variables likely to be measuring overlapping constructs, Multiple Correspondence Analysis (MCA) was conducted using the Factoshiny package in R, with a post-hoc cluster analysis resulting in groupings of BSc Mathematics degree programmes[5]. MCA is a form of geometric data analysis, where similarity is represented by distance between points on a graph[6]. This method can be used to find clusters in responses to multiple variables, and is therefore better able to represent the complexity of mathematics in higher education than simply looking for correlations between pairs of variables. University-level variables including geographical location, mission group membership, and size of mathematics department were not included in the MCA and so did not contribute to the resulting typology. The complete list of degrees grouped into three groups and six types is given in Appendix 5.1, while the next section describes the MCA dimensions and resulting typology.

Category	Binary/Numerical/Value	Variables
Entry requirements	Value for each	Grades required in A level Mathematics and Further Mathematics.
Entry requirements	Binary for each	Additional tests required; other qualifications recognised; conditional offers.
Degree pathways	Binary for each	Foundation year/ year abroad/ year in industry /integrated master's available.
Degree pathways	Numerical	Number of single and joint honours degrees subject options[7] offered at bachelor's and master's levels.
Module choice	Numerical	Number of compulsory/ elective credits, number and discipline of compulsory/ elective modules.
Teaching and assessment methods	Binary for each	Number and type of teaching, support and assessment methods mentioned (see Appendix 5.2 and 5.3).
The nature of mathematics	Binary for each	Thematic coding of statements that express a view or belief about the nature of mathematics (see Appendix 5.4).

Table 1 Variables constructed from BSc Mathematics course data.

3. Results

3.1 Dimensions of variation between mathematics degrees

The three dimensions generated by Multiple Correspondence Analysis together accounted for 28% of variation between mathematics degrees, as represented in course descriptions.

3.1.1 Dimension 1 – Choice and entry requirements

Dimension 1 is associated both with degree entry requirements and the level of choice for course modules and degree pathways (Table 2). All the degrees require prior attainment in A level Mathematics, with grade requirements ranging from grade A* to grade E. Grade requirements for A level Further Mathematics range from A* to B, although 69% of universities do not require Further Mathematics at all. Courses which are positive for Dimension 1 are more likely to have high grade requirements for A level Mathematics and Further Mathematics, require (or request) additional tests such as STEP, AEA or MAT, and offer high numbers of elective modules. The University of Warwick is an outlier in relation to module choice, advertising a total of 94 elective modules over the three-year mathematics degree, which is 18 more than the next highest university. Degree programmes with these high levels of module choice (and high entry requirements) are nevertheless less likely to have a final year project option, as well as being less likely to be accredited by the Institute of Mathematics and its Applications (IMA).

Dimension 1 – Choice & entry requirements (12.2% of variance)

-		+
Low choice, low entry requirements		*High choice, high entry requirements*

Negative categories	**Positive categories**
1. A level Mathematics grade C	1. Highest number of elective modules
2. No integrated master's option	2. A level Further Mathematics grade A*
3. Mathematics is about remembering formulae and facts	3. Additional entry tests required
4. A level Mathematics grade E	4. A level Mathematics grade A*
5. Lowest proportion of elective credits	5. Additional entry tests optional
6. Lowest number of elective modules	6. High number of elective modules
7. Mathematics is a socially responsible subject	7. A level Further Mathematics grade A
8. A level Mathematics grade B	8. Not IMA accredited
9. Mathematics is a language	9. High proportion of elective credits
10. Medium number of BSc subject options	10. No final year project option

Table 2 The 10 categories with the greatest positive and negative coordinates for Dimension 1, in descending order of these loadings.

In contrast, mathematics degrees with low A level grade requirements are likely to have a low proportion of elective credits and a low number of elective modules to choose from, as well as being more likely to not offer an integrated master's (MMath) option. Indeed, three degree programmes, at the University of Chichester, Liverpool Hope

University, and Sheffield Hallam University, appear to have no within-course choice at all, with all BSc Mathematics modules advertised as compulsory. Course descriptions for low choice, low entry requirement degrees are more likely to refer to mathematics as *'remembering definitions, formulas, and facts'*, as *'socially responsible'*, and as *'a language that people can use to communicate'*. Note that the relationship between course choice and department size is discussed in Section 3.4.

3.1.2 Dimension 2 – Mathematical focus or breadth

Dimension 2 appears to differentiate between courses that are highly focused on mathematics and those that have a broader degree offer (Table 3). Mathematics-focused degrees seem to place importance on prior attainment in mathematics only, either requiring prior mathematics attainment to be as high as possible or to meet a minimum standard. Hence, this dimension groups together degrees with either very low or very high entry grade requirements, such as A level Mathematics grade A* or E. Degrees with a broad offer tend to have moderate entry requirements (A level Mathematics grade A or B) and are likely to recognise prior attainment beyond mathematics, for example by accepting the Extended Project Qualification (EPQ) as part of entry offers. Mathematics-focused degrees tend to advertise the highest numbers of elective mathematics modules and to describe mathematics as *'a versatile subject'*, placing emphasis on the diversity within mathematics itself.

Dimension 2 – Focus/ breadth (8.2% of variance)

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Broad offer | *Mathematics focus*

Negative categories	**Positive categories**
1. EPQ included in entry offer	1. Additional entry tests required
2. A level Further Mathematics grade B	2. Highest number of elective modules
3. A level Mathematics grade A	3. A level Further Mathematics grade A*
4. Year abroad option	4. A level Mathematics grade E
5. High number of elective modules	5. Mathematics problems can be solved in many ways
6. Mathematics is about calculations	6. No final year project option
7. Optional final year project	7. A level Mathematics grade A*
8. Medium number of master's subject options	8. No year in industry option
9. Medium number of BSc subject options	9. Mathematics is a versatile subject
10. Mathematics is about tools & techniques	10. No mention of mathematics as exploring problems

Table 3 The 10 categories with the greatest positive and negative coordinates for Dimension 2, in descending order of these loadings.

By comparison, universities with a broad offer are more likely to have year abroad and year in industry options, suggesting that they place value on experiences beyond mathematics. Broad-offer universities are also likely to offer higher numbers of subject options at both bachelor's and master's level, including joint honours degrees that make connections between mathematics and other disciplines. An extreme example is Aberystwyth University (A level Mathematics grade B required), which offers joint honours BSc Mathematics programmes with 12 other subject areas in addition to the single honours BSc Mathematics. By contrast, 13 universities only offer mathematics as a single honours degree, including the University of Cambridge (A level Mathematics grade A* required) and London Metropolitan University (A level Mathematics grade E required).

3.1.3 Dimension 3 - Implicit or explicit beliefs about mathematics

While some categories associated with Dimension 3 relate to prior attainment and within-course choice, the majority reflect aspects of the nature of mathematics highlighted in course descriptions (Table 4). These aspects appear to be grouped by prevalence rather than by any similarity in how the nature of mathematics is presented. Hence, this dimension distinguishes between course descriptions where the nature of mathematics is implicit, meaning that there is an assumption of a common understanding of what mathematics is, and those where the nature of mathematics is explicitly described. Positively-loaded to Dimension 3 are degrees with a more implicit presentation of mathematics, where the course descriptions are likely to make no mention of mathematics as *'helping us understand the world'*, as *'exploring problems'* or as *'separate from the real world'*, and no mention of mathematics as *'research-oriented'* or *'using computers and programming'*. In contrast, degrees negatively-loaded to this dimension are more likely to describe mathematics as involving *'using rules and equations'*, *'calculations'* and *'provable truths'*, as well as suggesting that *'university mathematics is different from the school mathematics'.*

Dimension 3 – Nature of mathematics implicit/ explicit (7.5% of variance)

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Nature of mathematics explicit *Nature of mathematics implicit*

Negative categories	**Positive categories**
1. Mathematics is using rules and equations	1. A level Mathematics grade E
2. Mathematics problems can be solved in many ways	2. High number of elective modules
3. University mathematics is different to school mathematics	3. No mention of mathematics as helping understand the world
4. Mathematics involves proving	4. No mention of mathematics as involving research
5. Mathematics is separate from the real world	5. No mention of mathematics as involving using computers
6. A level Further Mathematics grade B	6. A level Further Mathematics grade A
7. Low number of elective modules	7. No mention of mathematics as exploring problems
8. A level Further Mathematics grade A*	8. No mention of mathematics as separate from the real world
9. Mathematics is about calculations	9. A level Mathematics grade A*
10. A level Mathematics grade A	10. Low number of BSc subject options

Table 4 The 10 categories with the greatest positive and negative coordinates for Dimension 3, in descending order of these loadings.

3.2 Typology of BSc Mathematics degrees – Three groups

Post-hoc cluster analysis was used to generate three broad groups of mathematics degree programmes, which can be sub-divided into six degree types (for full list see Appendix 5.1). This section describes differences between the broader degree groups, while differences between the six sub-types are elaborated later in the report. Figures Figure 4, Figure 5 and Figure 6 show degree courses plotted against the three dimensions described above. Labelled on these figures are ‘typical’ examples of each group: Sheffield Hallam University (Group A), the University of Exeter (Group B), and Durham University (Group C). These mathematics degrees are the closest to their group mean when calculated across all three dimensions.

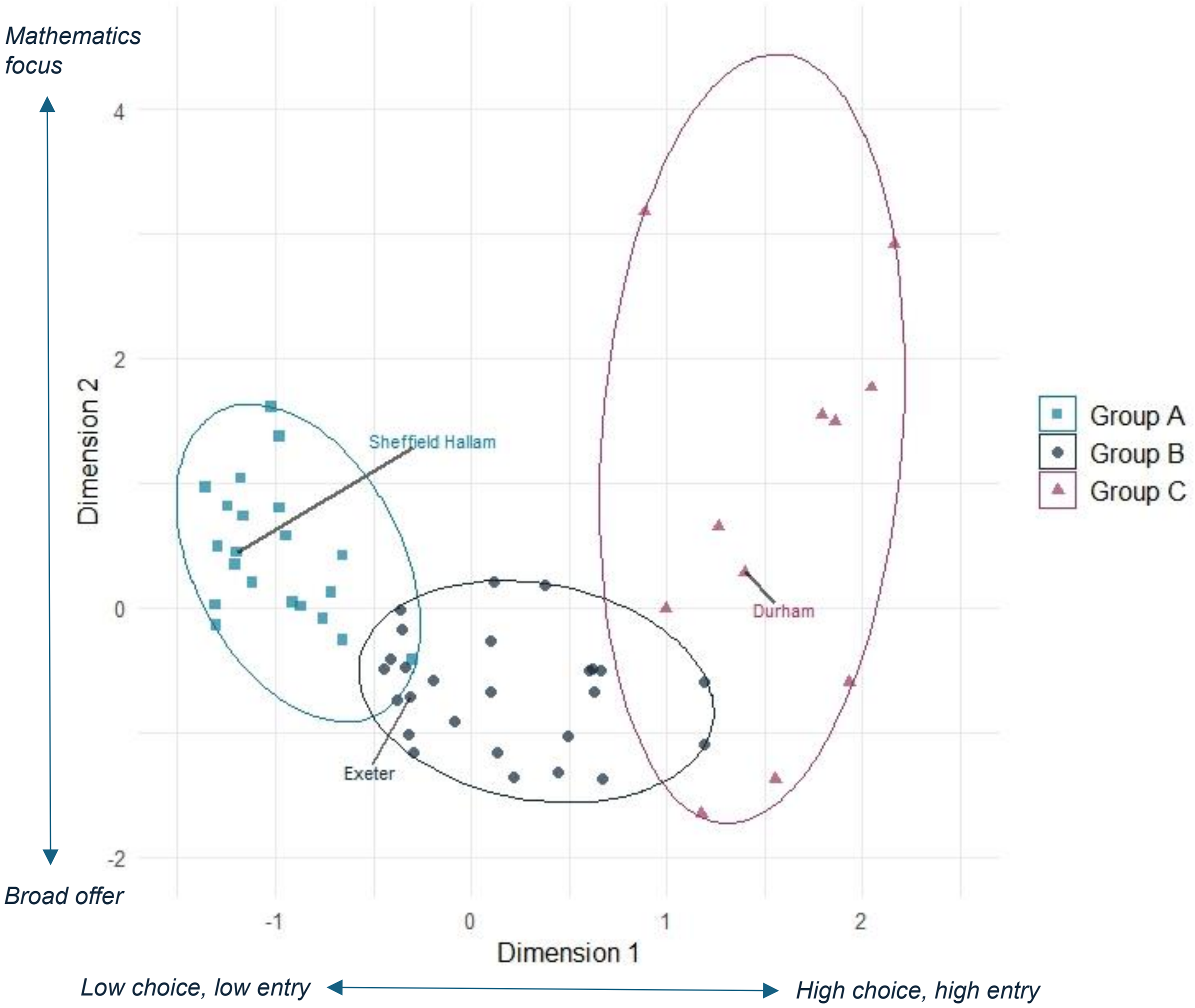

Figure 4 BSc Mathematics degrees plotted against Dimensions 1 and 2. Colours and shapes represent the degree groups, and ellipses indicate the boundaries of each group. A typical example of each group is labelled. A version of this plot with all universities labelled in given in Appendix 5.5.

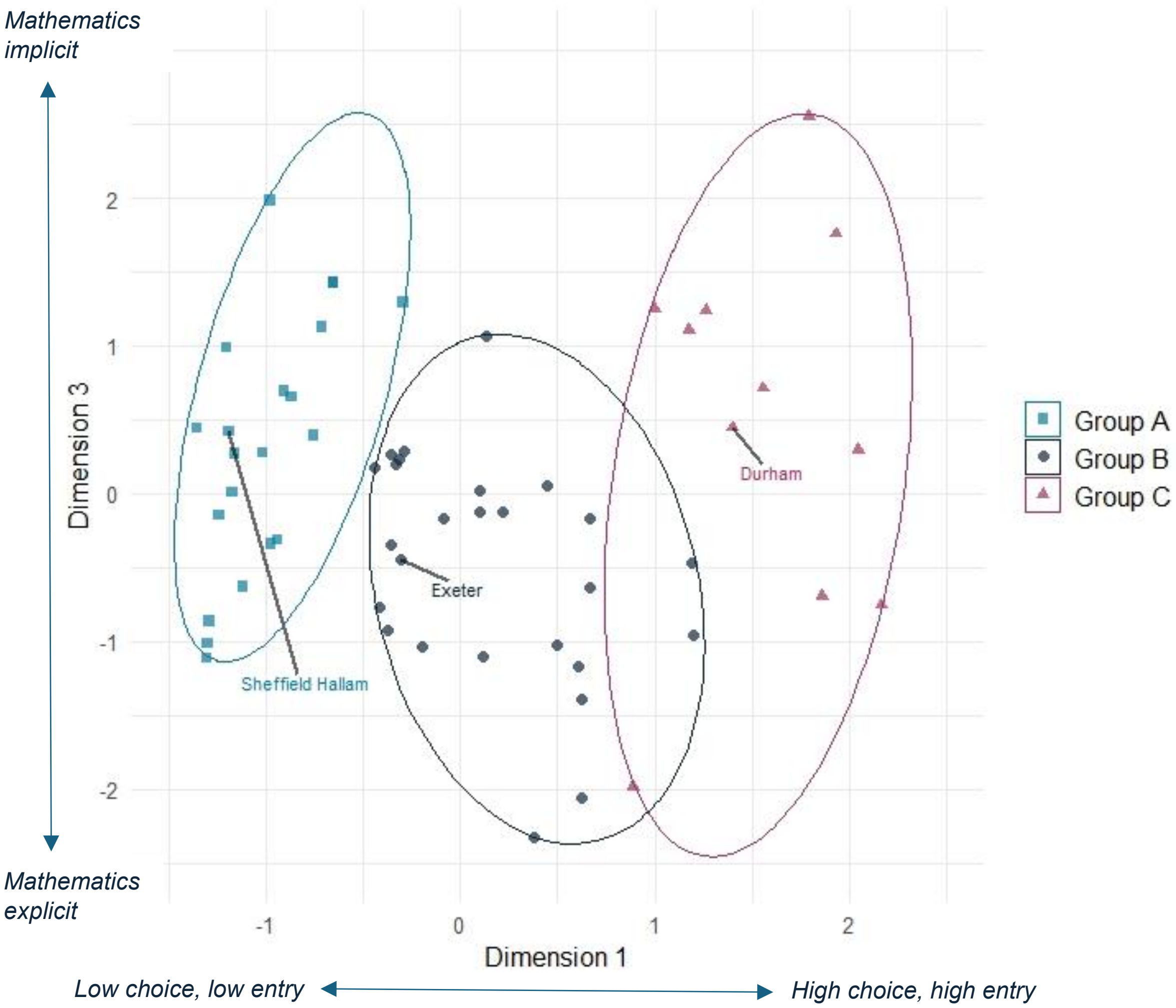

Figure 5 BSc Mathematics degrees plotted against Dimensions 1 and 3. Colours and shapes represent the degree groups, and ellipses indicate the boundaries of each group. A typical example of each group is labelled. A version of this plot with all universities labelled in given in Appendix 5.5.

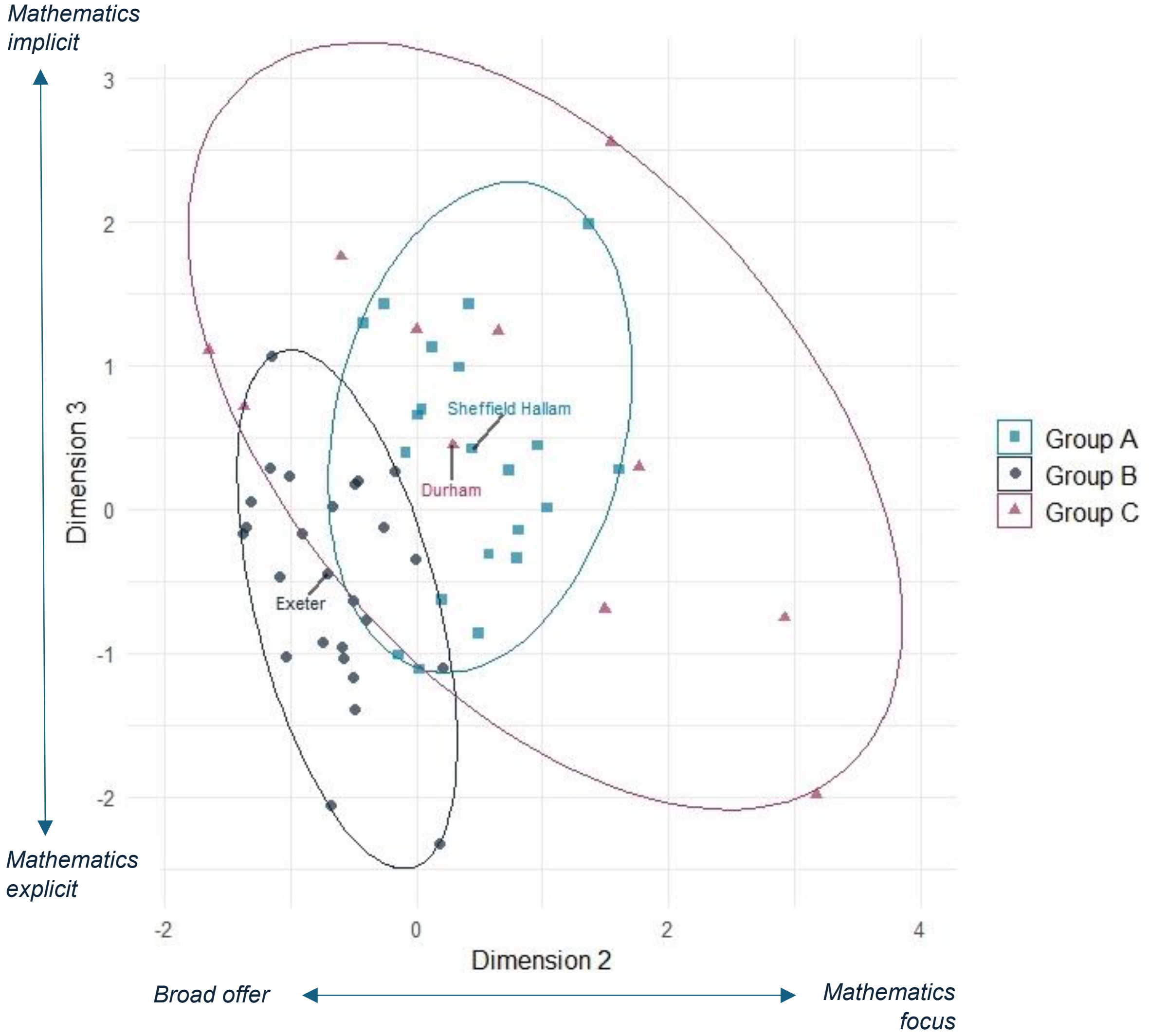

Figure 6 BSc mathematics degrees plotted against Dimensions 2 and 3. Colours and shapes represent the degree groups, and ellipses indicate the boundaries of each group. A typical example of each group is labelled. A version of this plot with all universities labelled in given in Appendix 5.5.

3.2.1 Dimension 1 - Choice & entry requirements

With respect to Dimension 1, Group A degrees have relatively low choice & entry requirements, compared to high choice & entry requirements for Group C. Group B courses are in between, having moderate choice & entry requirements. Hence, the modal requirements for A level Mathematics are grade B, A and A* for Groups A, B and C, respectively. Similarly, achieving A level Further Mathematics is an entry requirement for all Group C degrees but only 27% of Group B degrees and no Group A degrees. An example of the choice aspect of this dimension is the number of elective modules available in each year of the degree course, as listed on university websites (Table 5). Included are all modules offered within the mathematics department but not those delivered by other departments, for example optional language modules. The exact modules offered are clearly subject to change over time but are taken here as an indication of the level of choice that students can expect within the programme, with differences evident between the three groups. While the average number of elective modules in the first year is 0 for all three groups, for the second and final years, Group C courses offer the highest median number of elective modules and Group A the lowest.

	First year		Second year		Third year	
	Median	Range	Median	Range	Median	Range
Group A (*n* = 21)	0	0-3	1	0-7	5	0-12
Group B (*n* = 26)	0	0-6	5	0-16	19.5	1-32
Group C (*n* = 11)	0	0-5	12	7-19	35	19-70

Table 5 Number of advertised elective mathematics modules by year of the programme and degree group.

In addition to the differences in levels of choice, the three groups of universities also differ somewhat in their curricula. Module titles were categorised into mathematical topics using the coding framework found in Appendix 5.6, and the full curriculum mapping of topics taught across the 3-year degree programmes is given in Appendix 5.7. Within the first year curriculum, most Group C universities include abstract mathematics within the compulsory, core modules (91%), compared to around half of universities in Groups A and B (Figure 7). In the second year, Group A degrees have the greatest number of compulsory modules and the fewest elective modules (Table 5). In particular, almost all Group A programmes have a compulsory calculus module in the second year (95%), dropping to 77% of Group B and 55% of Group C courses (Figure 7). Another difference of curriculum is that no Group C universities require students to take probability and statistics beyond the first year of the degree, while over half of Group A and B have compulsory second year modules in probability and statistics.

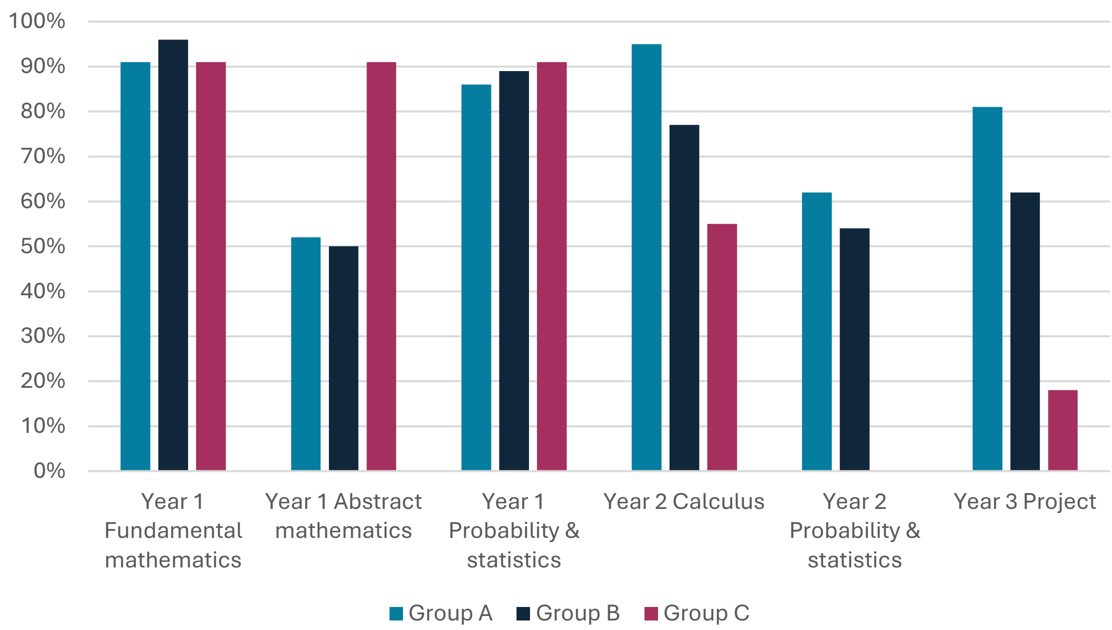

Figure 7 Proportion of degrees with selected mathematical topics as compulsory modules in the first, second and third years of the programme, by degree group.

Some notable differences are also found between groups in the content of elective modules (Figure 8). Given that Group C degrees offer the greatest number of elective modules overall, it is unsurprising that they are also most likely to offer 7 out of the 10 topics identified across second year elective modules. In particular, over 90% of Group C universities offer one or more abstract mathematics modules as electives, compared to only half of Group B universities and less than a quarter of Group A universities. The three exceptions to this trend in the second year are mathematical physics modules, which are most likely to be offered by Group B universities (23%), and modules covering financial mathematics or topics related to education, communication and employability, which are most likely to be offered by Group A universities (19% and 5% respectively). The third year constitutes the final year for most degree programmes, and again Group C programmes offer a wider range of elective modules. For example, they are much more likely to advertise third year mathematical biology modules (82%) than the other groups. However, elective final year probability and statistics modules are more likely to be offered by Group B universities (85%).

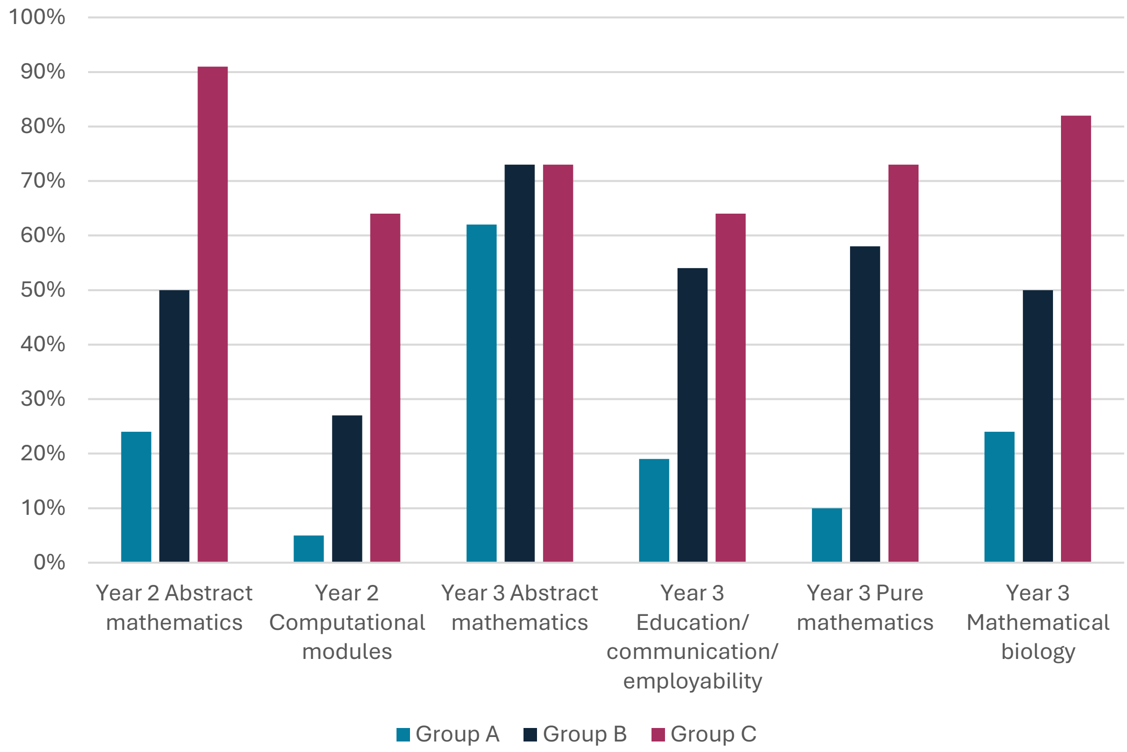

Figure 8 Proportion of degrees with selected mathematical topics as elective modules in the second and third years of the programme, by degree group.

3.2.2 Dimension 2 – Mathematical focus or breadth

In terms of Dimension 2, both Group A and Group C course descriptions tend to be mathematics-focused, whereas Group B programmes are generally represented as having greater breadth beyond the discipline of mathematics. For example, most Group B universities provide a broader student experience by offering a year abroad option for BSc Mathematics students (62%), compared to a minority of Group C and Group A universities (36% and 24% respectively). A further instance of this dimension is the types of assessment methods mentioned in course descriptions (Figure 9, see also Appendix 5.3). Group C course descriptions are the most likely to mention examinations (100%) and the least likely to mention coursework (73%), suggesting a focus on traditional forms of mathematics assessment. In contrast, Group B universities are the most likely to mention several broader forms of assessment, such as presentations, reports and group assessment.

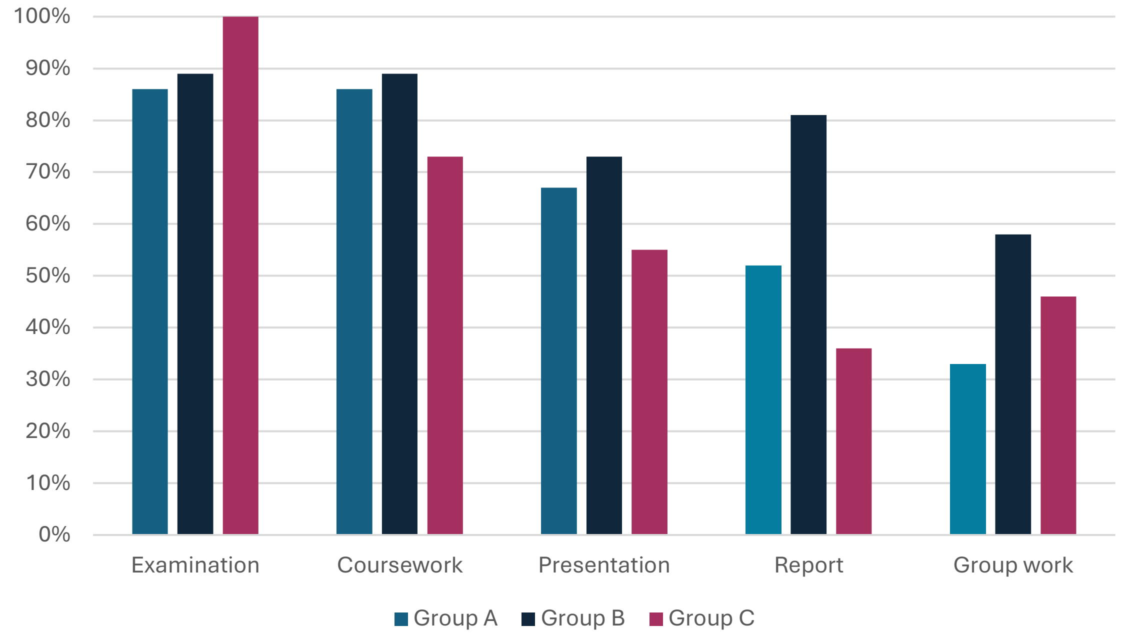

Figure 9 Proportion of degree programmes advertising selected forms of assessment, by degree group.

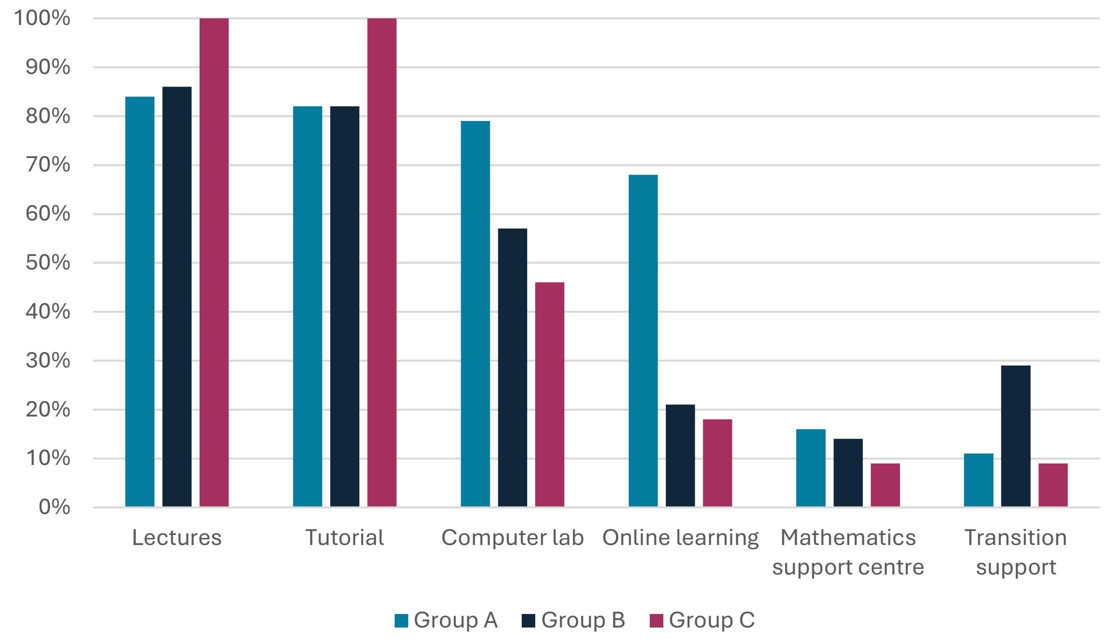

Figure 10 Proportion of degree programmes advertising selected types of teaching and support, by degree group.

Likewise, while the number of teaching and support approaches mentioned in course descriptions does not differ substantially between groups, there appear to be differences in the forms of teaching and support advertised. The full categorisation used is given in Appendix 5.2. There is a notable difference in terminology used, making it difficult to compare teaching practices between universities. For example, Group A universities are more likely than the other groups to mention individual support (26%) and Group C are most likely to mention personal tutoring (27%), although in practice these two approaches could be very similar. This report aims to take the viewpoint of a prospective undergraduate student attempting to make sense of differences between mathematics degrees, and therefore the categorisation of teaching and support types retains to a large degree the diversity of language found in course descriptions. The most commonly mentioned teaching types across all degrees are lectures and tutorials (Figure 10). Indeed, these are present in course descriptions for all Group C universities. Group A course descriptions are more likely than the other groups to mention computer labs (79%) and online learning (68%), suggesting a greater focus on the use of technology in these programmes. They are also slightly more likely than Groups B and C to mention having a mathematics support centre. On the other hand, Group B degrees are far more likely to mention specific support at the transition to university (29%).

3.2.2 Dimension 3 – Implicit or explicit beliefs about mathematics

In relation to Dimension 3, mathematics is generally described more overtly in course descriptions for Group B degrees compared to Groups A and C, although Group C degrees vary widely in this dimension (Figure 5 and Figure 6). However, there are also differences in the beliefs about the nature of mathematics expressed in programme descriptions (Figure 11, see also Appendix 5.4). The most prevalent idea across groups is that mathematics involves *'exploring problems'*. Compared to other groups, Group A descriptions emphasised mathematics as *'using tools and techniques'* and as *'new ideas and creativity'*. Group B degree courses were most likely to describe mathematics as a *'helping us understand the world'* and as *'research-oriented'*, highlighting research as a mathematical activity for students as well as for academics.

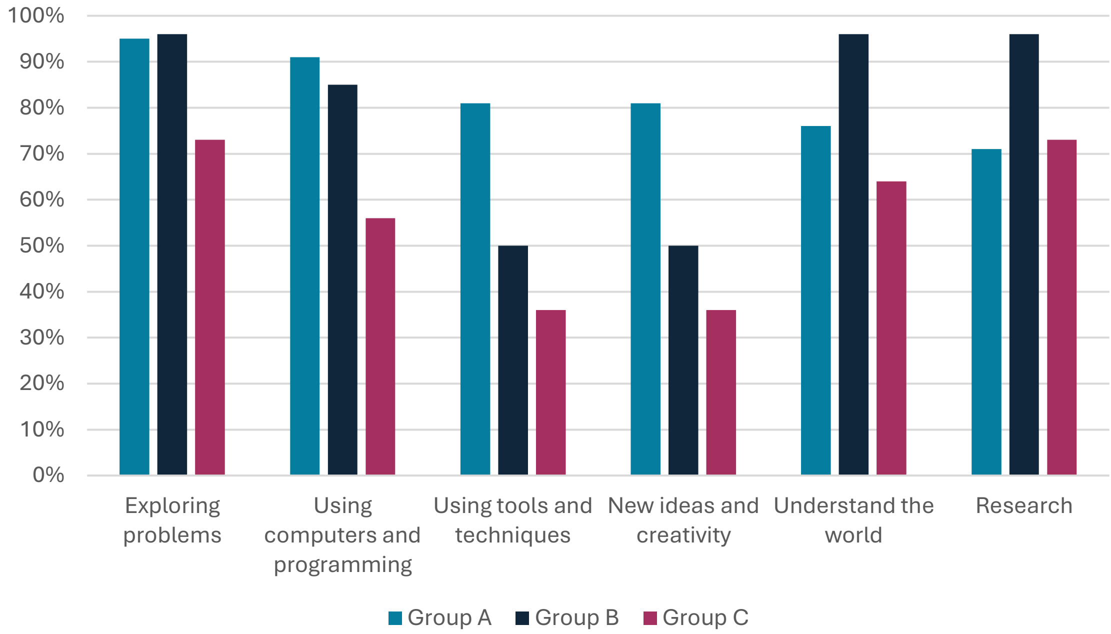

Figure 11 Proportion of degree programmes that mention selected beliefs about the nature of mathematics, by degree group.

3.3 Typology of BSc Mathematics degrees – Six types

Further sub-dividing each degree group into two types highlights differences within the three original groups (see Appendix 5.1 for the list of universities by type). The degree types range in size from 19 universities (Type 1) to just two universities (Type 2). Figures 12, 13 and 14 illustrate how these differences relate to the three dimensions of the Multiple Correspondence Analysis. Labelled on these figures are typical examples that are close to the type mean across three dimensions: Sheffield Hallam University (Type 1), Swansea University (Type 2)[8], Newcastle University (Type 3), University of Essex (Type 4), University of Manchester (Type 5), and University of Warwick (Type 6).

Group A universities are split between Types 1 and 2, although Type 2 is a very small cluster consisting of only 2 degree programmes. While all Group A degrees have low choice and entry requirements, they differ somewhat in relation to Dimension 2, with Type 2 degrees having a broader offer than most Type 1 courses. However, there appears to be little difference between Types 1 and 2 with respect to Dimension 3, both being relatively neutral with respect to the implicit or explicit description of the nature of mathematics. Group B is formed of Type 3 and Type 4 mathematics degrees. While both types have moderate choice & entry requirements, those for Type 3 tend to be slightly higher than for Type 4 (Dimension 1). Likewise, Type 4 courses are slightly more likely to have a broad degree offer, while Type 3 degrees are more balanced between breadth and mathematics-focus. Type 3 degrees are also more likely to be explicit regarding the nature of mathematics (Dimension 3). Group C divides into Types 5 and 6, both with relatively high choice and entry requirements (Dimension 1). However, Dimension 2 distinguishes between mathematics-focused programmes (Type 6) and those with a broader offer (Type 5). There are also differences in terms of Dimension 3, with Type 5 course descriptions in general being more implicit, while Type 6 are more overt about the nature of mathematics.

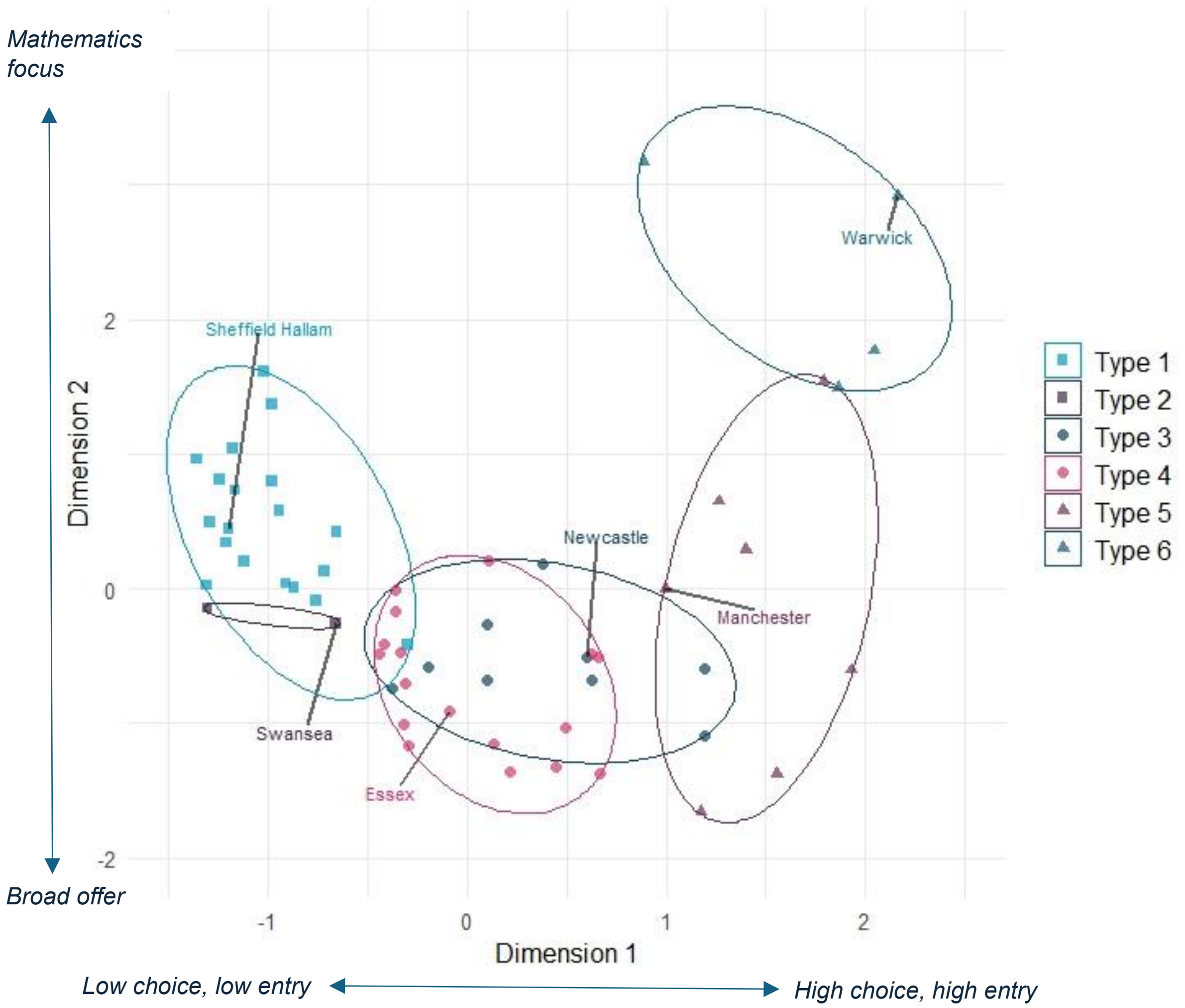

Figure 12 BSc Mathematics degrees plotted against Dimensions 1 and 2. Colours indicate the six degree types and ellipses indicate the boundaries of each type. Shapes represent the three overarching groups. A typical example of each type is labelled.

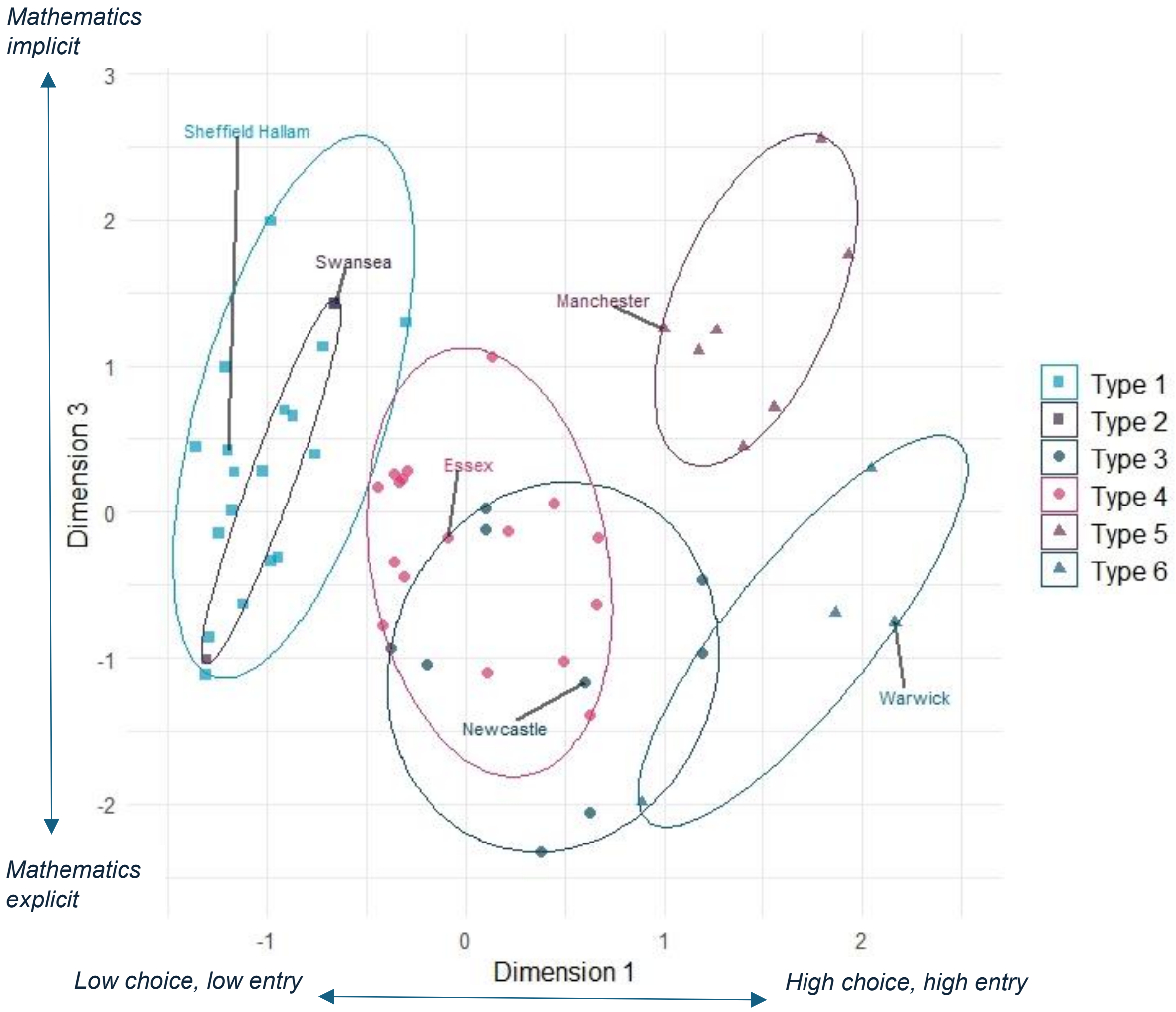

Figure 13 BSc Mathematics degrees plotted against Dimensions 1 and 3. Colours indicate the six degree types and ellipses indicate the boundaries of each type. Shapes represent the three overarching groups. A typical example of each type is labelled.

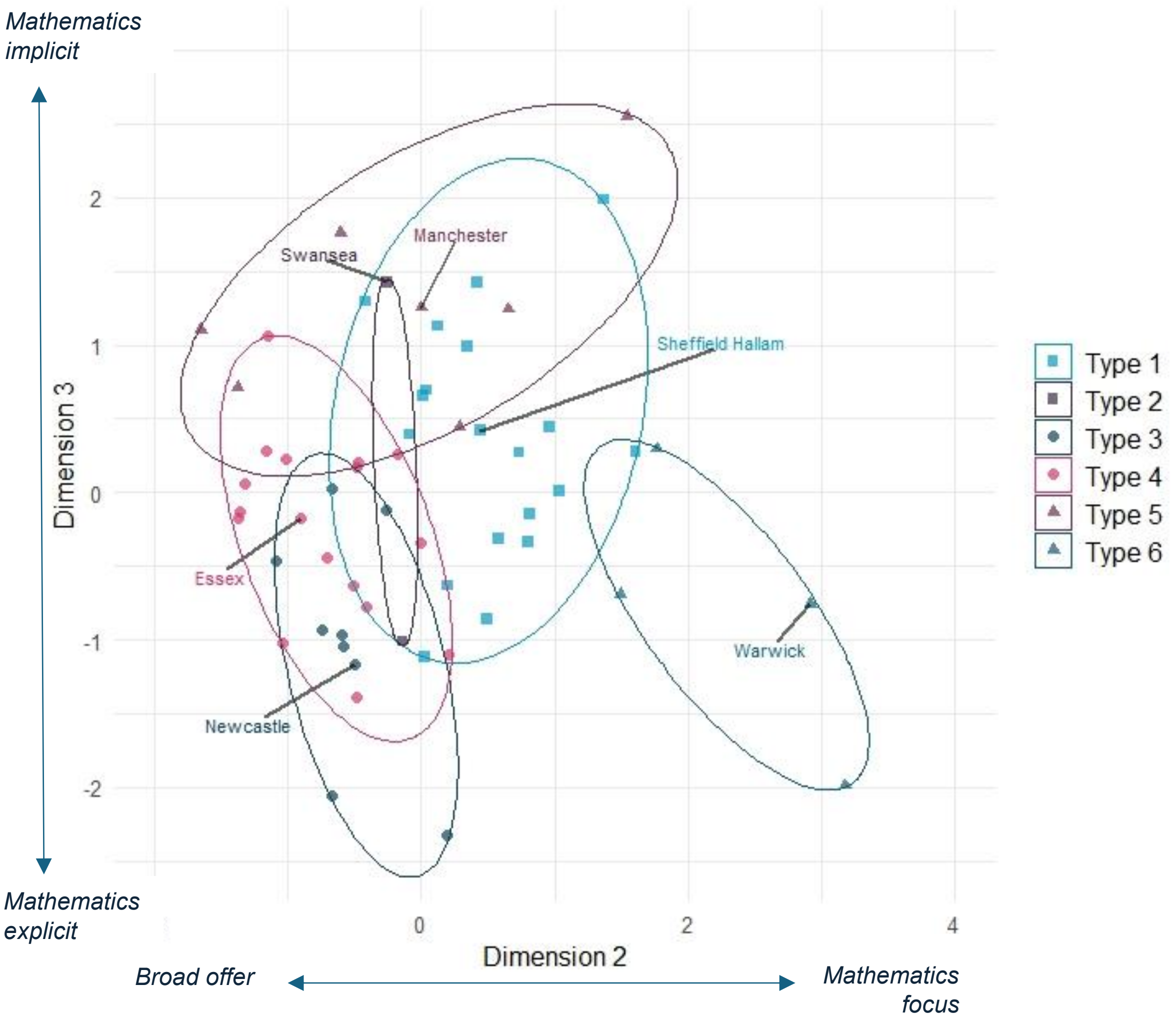

Figure 14 BSc Mathematics degrees plotted against Dimensions 2 and 3. Colours indicate the six degree types and ellipses indicate the boundaries of each type. Shapes represent the three overarching groups. A typical example of each type is labelled.

3.3.1 Group A within-group differences – Types 1 and 2

As described above, course descriptions for Group A mathematics degrees tend to be characterised by low entry requirements and low choice, a high focus on mathematics, and are generally more implicit than explicit in communicating the nature of mathematics in course descriptions. There are 21 Type 1 universities, including the University of Chester, London Metropolitan University, and Sheffield Hallam University, while Type 2 consists of the University of Plymouth and Swansea University only.

The primary difference between types within this group appears to be associated with Dimension 2, with Type 2 degrees advertising a somewhat broader offer than Type 1. For example, Type 2 degrees offer a wider variety of joint honours degree subjects (4 subject options in both cases) compared to the average for Type 1 courses (median 1, range 0-7). Type 2 universities are also more likely to offer broader student experiences through a year in industry (100%) or year abroad (50%), compared to Type 1 (84% and 21% respectively). In addition, Type 2 degrees were the only ones in the study to describe mathematics as involving *'remembering definitions, formulas, and facts'.* Both also mentioned mathematics as involving *'social responsibility'*, compared to only 16% of Type 1 courses.

Type 1 case study – Sheffield Hallam University

Located in Yorkshire in the North of England, Sheffield Hallam is in the smallest quartile of mathematics departments, with a cohort of around 30 undergraduates per year. The entry requirements for the course include A level Mathematics grade C.

The BSc Mathematics programme is accredited by IMA and students have the option to undertake a year in industry. Mathematics is only offered as a single honours degree and there is no integrated master's in mathematics. The course description mentions a variety of teaching approaches, such as tutorials, support classes, and online learning, and a moderate range of assessment types compared to other courses, including presentations and projects, as well as coursework and examinations. The degree content at Sheffield Hallam is entirely prescribed, with students following compulsory modules in all three years of the course. The course description places an emphasis on the real-world relevance of mathematics, including using mathematics to understand the world and to solve real-life problems. Mathematics is presented as a socially responsible discipline, since it can be applied to issues such as sustainability, as well as to industry problems. Mathematics is also described as a creative subject, involving both proof and computer programming.

"Supporting you to develop your understanding of mathematical concepts and your ability to apply them in various contexts. These contexts are informed by our links with industry, including live projects where you work in partnership with local companies and charities on issues they're facing."

Type 2 universities – Swansea University & Plymouth University

Swansea University in Wales has a medium-sized mathematics department (3rd quartile), with around 70 undergraduates a year. Located in South West England, the Plymouth University mathematics department is substantially smaller, having around 35 students in an undergraduate cohort. Both degree programmes require A level Mathematics grade B and have IMA accreditation, as well as offering an optional year in industry.

Unlike Sheffield Hallam, which only offers mathematics as a single honours course, Swansea and Plymouth both have joint honours degrees with three other subject areas, suggesting a broader view of mathematics as connected to other disciplines. At Plymouth these are data science, computer science and physics, while Swansea has joint programmes with computer science, finance and science subjects.

While the course description for Swansea is more detailed about the nature of mathematics than for BSc Mathematics at Plymouth, both describe mathematics as beautiful and as a language, as well as involving remembering mathematical information. Both also present mathematics as a socially responsible discipline and emphasise that university mathematics is different to school mathematics.

"Our Mathematics department is actively contributing to the United Nations Sustainable Development Goals through world-leading research, in areas such as Cancer research, further mathematics in schools and mathematical and statistical modelling." – Swansea University

"Explore profound and beautiful ideas and understand how they can be applied to the key challenges facing us today and tomorrow." – Plymouth University

3.3.2 Group B within-group differences – Types 3 and 4

Overall, Group B degrees have moderate levels of choice and entry requirements compared to other groups. Within Group B, Type 3 degrees have on average more positive loadings for Dimension 1 than Type 4 degrees, indicating slightly higher choice and entry requirements.The modal requirement for A level Mathematics is grade A for both Types 3 and 4. However, a greater proportion of Type 3 universities require a grade in A level Further Mathematics (44%) than Type 4 universities (18%). Similarly, Type 3 programmes advertise a slightly higher average number of second and third year elective modules than Type 4 courses (Table 6), and hence offer greater student choice.

Type 3	Year	Median	Range	Type 4	Year	Median	Range
	1	0	0-6		1	0	0-4
	2	6	0-10		2	4	0-16
	3	24	12-30		3	16	1-32

Table 6 Number of advertised elective mathematics modules by year of the programme for Type 3 and Type 4 programmes.

While Group B degree courses generally have a broad outlook that includes recognising and promoting experiences beyond the discipline of mathematics, Type 3 degrees are more neutral than Type 4 with respect to this dimension. Thus, Type 4 degrees are slightly more likely than Type 3 to advertise contextual offers for students from disadvantaged backgrounds (88% and 78% respectively), recognizing prior experiences outside of mathematics. A greater proportion of Type 4 degrees (88%) compared to Type 3 (67%) promote links between mathematics and industry through advertising their IMA accreditation. Likewise, Type 4 universities are more likely than Type 3 to offer an optional year in industry (88% and 67% respectively).

Type 3 degrees are also more likely to be explicit regarding beliefs about mathematics than Type 4 programmes (Dimension 3). Hence, the average number of beliefs about the nature of mathematics found in course descriptions was slightly higher for Type 3 (median 8, range 7-13) than Type 4 programmes (median 6, range 4-10). A third of Type 3 course descriptions suggested that '*university mathematics is different school mathematics*', while a similar proportion of Type 4 courses (29%) presented university mathematics as *'the same as school mathematics'*.

Type 3 case study – Newcastle University

Located in North East England, Newcastle University mathematics department is above average in size, with around 200 students per year group. A level Mathematics grade A and Further Mathematics grade B are entry requirements for BSc Mathematics, while additional entry tests are optional. Mathematics students at Newcastle choose 25% of degree credits in year 2 and 100% in year 3 of the programme, with a total of 25 elective modules available.

Newcastle's mathematics degree is accredited by the IMA. The university offers joint honours degrees with six other subject areas, as well as an integrated master's option. For BSc Mathematics, the course description highlights a wide range of teaching and assessment types used on the course. For example, teaching includes computer labs, example classes and lectures, while forms of support include drop-ins, peer learning and specific transitions support. Assessments range from computer-based assessment to group work, presentations and examinations. Also elaborated is the nature of mathematics, which is presented as involving multiple aspects including creativity and new ideas, problem solving and the study of numbers, as well as being both abstract and applicable to understanding the world.

"Learn about the key skills and knowledge that all mathematicians and statisticians need. We'll also cover the main areas of pure mathematics, applied mathematics, algebra, probability and statistics."

Type 4 case study – University of Essex

The University of Essex, in the East of England has a relatively small (2nd quartile) department, with just under 50 mathematics undergraduates per cohort. Entry to study BSc Mathematics requires A level Mathematics grade B, with no requirement to study Further Mathematics. The degree is structured so that students take compulsory modules for the first two years but then choose 100% of credits in the third year from a total of 17 available third year modules. Both entry requirements and the extent of choice are therefore slightly lower at Essex than at Newcastle University.

Like Newcastle, the degree at Essex is IMA accredited, while students at Essex have broader options in being able to undertake a year in industry or year abroad. The mathematics department offers joint honours degrees with five other subject areas, as well as three single honours options and an integrated master's.

The course description for undergraduate mathematics gives slightly less detail than Newcastle about teaching and assessment, although there is an emphasis on support available through the mathematics support centre, drop-ins and the student mathematics society. Similarly, the nature of mathematics is presented less explicitly. Nevertheless, mathematics is presented as a creative discipline, exploring problems and helping to understand the world.

"Our School recognises the stand-alone and interdisciplinary aspects of mathematics, and your degree provides an exceptional range of in-demand transferrable skills for mathematically oriented careers, from business, to finance and commerce, industry, research, government, education and beyond."

3.3.3 Group C within-group differences – Types 5 and 6

Group C degrees are characterised by high choice and high entry requirements, with Type 6 slightly higher than Type 5 on this dimension. While almost all Group C universities (91%) require A* in A level Mathematics, the modal requirement for A level Further Mathematics for Type 5 universities is grade A, compared to grade A* for Type 6. Similarly, 71% of Type 5 universities either require or request additional entry tests, compared to 100% of Type 6 universities. Type 6 degrees also have a higher median number of elective mathematics choices in the final year compared to Type 5 degrees (Table 7).

Type 5	Year	Median	Range	Type 6	Year	Median	Range
	1	0	0		1	0	0-5
	2	12	7-19		2	9.5	7-19
	3	35	23-48		3	46	19-70

Table 7 Number of advertised elective mathematics modules by year of the programme for Type 5 and Type 6 programmes.

While the group as a whole can be said to have a relatively high level of focus on mathematics as a discipline, there are differences apparent within the group, with Type 5 universities having a broader offer and Type 6 universities presenting their degrees as more mathematics-focused. Thus, none of the Type 6 universities offer year in industry or year abroad options, whereas most Type 5 degrees have an optional year in industry (71%) and over half have an optional year abroad (57%). Type 6 universities also offer, on average, fewer joint honours subject combinations (median 4) compared to Type 5 degrees (median 5).

There is wide variation within Group C in terms of how overtly course descriptions communicate the nature of mathematics as a discipline. Type 5 degrees tend to be more implicit in course descriptions, presenting on average 3 beliefs about mathematics (range 1-6), compared to 8 for Type 6 programmes (range 3-13). Type 6 course descriptions therefore seem to pay more attention to describing what mathematics is. In particular, all Type 6 course descriptions included the beliefs that mathematics is *‘separate from the real world’* and *‘research-oriented’,* compared to 0% and 57% of Type 5 degrees respectively.

Type 5 case study – University of Manchester

The University of Manchester is in the North West of England and has around 460 undergraduates per cohort, putting it in the highest quartile of mathematics departments by size. Entry requirements to study BSc Mathematics include A level Mathematics grade A* and Further Mathematics grade A. Students choose 25% of course credits in year 2 and 75% of credits in year 3 of the BSc course, with a total of 45 elective mathematics modules to choose from.

The BSc Mathematics degree is IMA accredited and students can take an optional year in industry, both of which indicate a view of mathematics beyond the academic discipline. However, the course description only includes mention of four beliefs around the nature of mathematics, including mathematics as a socially responsible discipline, and as involving the use of computers, along with mathematical tools and techniques. Mathematics at university is described as a continuation of school mathematics. Only three teaching methods are advertised: computer labs, online learning, and tutorials. There is slightly more elaboration about assessment methods, which include class tests, group work and projects, as well as examinations.

“Every course at Manchester contributes towards the UN's Sustainable Development Goals, so no matter what you're studying you'll be playing an active role in the protection of people and planet.”

Type 6 case study - University of Warwick

The University of Warwick in the West Midlands has the largest mathematics department in the study, with almost 700 students per year group. Entry requirements for the course are slightly higher than for Manchester, since they include A level Mathematics grade A* and Further Mathematics grade A*, along with the requirement to take an additional entry test. The degree course is organised slightly differently to Manchester in that all modules are compulsory for the first 2 years of the course. However, in the third year students choose almost all of their course credits (83%) and have over 90 elective modules available.

Warwick does not offer a year in industry to BSc Mathematics students and the degree is not IMA accredited, suggesting that a greater focus is placed on mathematics itself rather than its applications. The course description provides a high level of detail about the nature of mathematics, including that mathematics is a creative, broad discipline which involves proof and research as well as the use of computers. Like Manchester, university mathematics at Warwick is viewed as a continuation of school mathematics. Warwick describes teaching, support and assessment approaches in a greater level of detail than Manchester, with teaching including example classes, support classes and workshops, as well as lectures and tutorials. Forms of assessment are highly varied, for example essays, group work, presentations, programming and vivas.

"Mathematics enhances your ability to think clearly, learn new ideas quickly, manipulate precise and intricate concepts, follow complex reasoning, construct logical arguments and expose dubious ones. Our challenging Mathematics (BSc) degree will harness your strong mathematical ability and commitment, enabling you to explore your passion for mathematics."

3.4 Differences in mathematics degree provision

3.4.1 By region

The location of universities offering BSc Mathematics degrees is weighted towards the South East of England, with 17 courses (29%) based in the South East and London regions (Figure 15, see also Appendix 5.8). North East England and Wales have the least provision, with 3 universities offering undergraduate mathematics degrees in each. A third of Group A degree courses are located in the North West region, while the highest concentration of Group B degrees are in the South East (23%) and the highest proportion of Group C degrees are in London (27%). Although most regions have at least one mathematics degree from each of the three groups in our typology, the East Midlands only has Group B courses, while Wales has no Group C degree programmes. This has implications for students who are not able to relocate to attend university, and are therefore limited to local degree options.

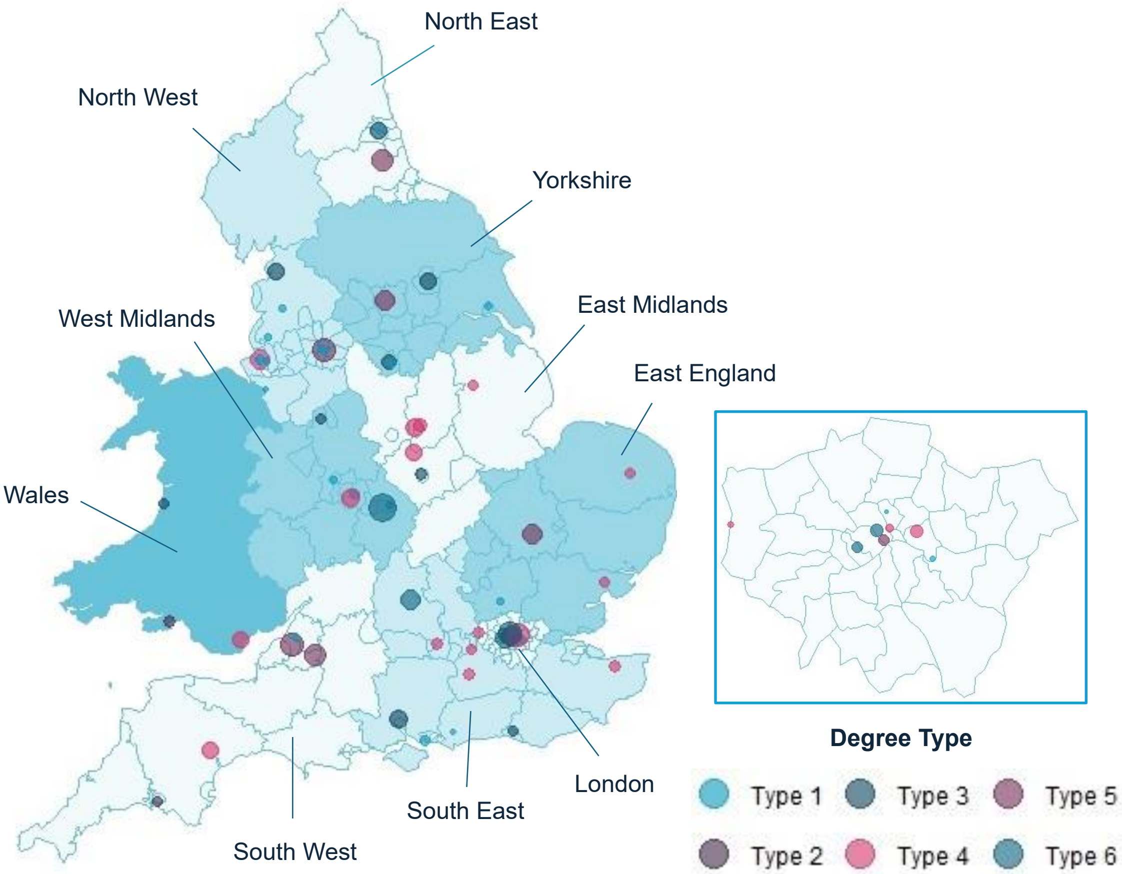

Figure 15 Location of BSc Mathematics courses in England and Wales. Inset shows London region in more detail. Colours represent degree types; dot size is proportional to the number of mathematical sciences undergraduates in 2023-24[4].

3.4.2 By department size

In academic year 2023-24, university mathematics departments ranged in size from 25 to 2,045 students on all mathematical sciences undergraduate programmes (approximately 8 to 682 students per cohort) (Table 8). Group A degrees are largely offered by small mathematics departments with below median numbers of undergraduate students, while Group C degrees are all located in the largest 25% of departments. Group B degrees are offered mainly by moderately sized departments, with few very small or very large departments. There are no programmes with small cohort size and high entry requirements, or large cohort size and low entry requirements, limiting student choice with respect to these variables.

Size of mathematics department	Approximate students per cohort	Group A		Group B		Group C		
		Type 1	Type 2	Type 3	Type 4	Type 5	Type 6	**Total**
Quartile 1	8 - 33	15	0	0	0	0	0	15
Quartile 2	34 – 67	4	1	3	5	0	0	14
Quartile 3	68 – 217	0	1	6	8	0	0	14
Quartile 4	218 - 682	0	0	0	4	7	4	15
Total		**19**	**2**	**9**	**17**	**7**	**4**	**58**

Table 8 Size of mathematics department for degree courses in Groups A, B and C. Student numbers are from HESA (2025).

3.4.3 By Russell Group membership

Of the 21 Russell Group universities in England and Wales, 20 offer BSc Mathematics (or BA Mathematics in the case of the University of Oxford). All these 20 programmes are in Groups B and C, meaning that Group A has no Russell Group institutions (Table 9). All Group C universities are in the Russell Group, with the exception of the University of Bath, while 38% of Group B universities are Russell Group members. Hence, while there is some association between the three groups and Russell Group membership, there is not complete alignment. The London School of Economics and Political Science is the only Russell Group university not to offer BSc Mathematics.

	Group A		Group B		Group C		
	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6	**Total**
Russell Group institution	0	0	4	6	6	4	20
Non-Russell Group institution	19	2	5	11	1	0	39
Total	**19**	**2**	**9**	**17**	**7**	**4**	**58**

Table 9 Russell Group membership for degree courses in Groups A, B and C.

4. Discussion

4.1 Conclusion

Some undergraduate mathematics programmes can trace their lineage back to the 1700s or earlier, while others were founded within the past generation; some courses boast hundreds of students and a broad module catalogue, others a more student-centred yet limited offer to just a handful; some require multiple A* grades at A level and others more modest entry requirements. Despite sitting side-by-side in the higher education qualification framework, not all mathematics degrees are the same. Taken at face value, potential students, along with politicians, regulators, industry and parents, might think that one programme could easily be interchanged or replaced with another. Those who work in mathematics departments may know that no two BSc Mathematics programmes are the same in terms of structure, content and emphasis, but is this apparent to others? This project set out to investigate the dimensions of variability that distinguish one BSc Mathematics degree from the next, and some clusters of degrees from others.

The above analysis shows there are substantial differences between programme descriptions in terms of entry qualifications, the extent of degree pathway and module choice, the mathematical focus or breadth, and how implicit or explicit the programme is about the nature of mathematics. These dimensions of variability have consequences for which branches of mathematics students learn, how they are taught and how they are assessed. These different types of mathematics degrees are distributed unevenly across the country, and there are gaps in provision both in terms of geography, but also which combinations of characteristics can be found together. There are no programmes, for example, which offer a large amount of module choice to those with lower entry qualifications.

The fact that there is further variation between mathematics degrees that is not explained by these first few dimensions of variability in the multiple correspondence analysis (MCA) is additional evidence of sector complexity. Recognising these nuances is crucial, as they could influence how prospective students choose a course, and once enrolled, how they engage with their studies, particularly during the crucial transition to university. For example, mathematics students at three different universities with Group C characteristics (large department, high entry requirements) reported having received very different levels of feedback and assessment marks six months into the course[9]. Yet many of these differences are not articulated and so remain hidden from applicants and limit the extent to which the mathematics community can represent itself to external audiences.

Crucially, the BSc Mathematics landscape is much more complicated than a simple divide between Russell Group and non-Russell Group, or a one-dimensional scale suggested by a league table. Even courses with similar entry requirements present themselves very differently. In fact, the group containing degrees that demand the highest entry qualifications has the greatest variability in other dimensions. Some of these programmes place great focus on the mathematics itself, pursued for its own sake, while others stress the important connections between mathematics and other disciplines or industry. Of course, there is value in both of these things and no attempt is made to rank one university, or type of university, relative to another. However, articulating the differences between programmes may help better align applicants with courses and may help the sector communicate the full breadth and depth of mathematics.

These academic distinctions ripple into the labour market. Do employers recognise what a BSc Mathematics degree means from one institution compared with another? Subject knowledge and mathematical skills can differ markedly between institutions, yet employers may have to choose between graduates from different universities with apparently the same qualification. Even two graduates on the same course may find themselves unequally prepared for specific careers depending on their module choices. By focusing on documents available to applicants, this report has not investigated the equivalence of degree classifications between institutions, but this is a further, albeit potentially contentious, dimension of variability.

In principle, programme diversity is healthy for the discipline and for student choice. Smaller departments, where limited staffing typically restricts the breadth of modules on offer, frequently host lower-entry-tariff degrees which could be perceived as lower status but nevertheless play a vital role in widening participation and as a route to teacher training. However, the sector could be clearer about the diversity in provision that exists. This project deliberately focused its analysis on information presented in the main webpage for BSc Mathematics at each university, since this is the 'shop window' to attract potential students to the programme. More substantial documentation, like programme specifications, detailed module descriptions and assessment patterns, is often buried deep within university websites, if available at all. Making this information more transparent and accessible would help applicants, teachers, parents and employers alike understand what each mathematics degree represents. Finding a good fit is essential for student retention and completion. By providing plain-language course factsheets and quick-read guides, prospective students will be able to choose which course to study with greater confidence.

4.2 A changing landscape

This report has mapped the current BSc Mathematics provision, but the landscape is continuing to shift. In recent years the number of students studying undergraduate mathematics programmes has fallen slightly (Figure 16), despite a rise in the number of students studying A level Mathematics in England. However, the distribution of students between universities has evolved, with larger programmes expanding at the expense of smaller departments. If this trend continues, an even greater proportion of mathematics students will be studying at Group C universities in the future, while options for those who achieve a grade B or lower at A level will be more limited. This trend has potential consequences for the accessibility of undergraduate mathematics for those who do not have access to A level Further Mathematics or those who wish to commute from their permanent address. This could exacerbate current inequalities regarding socio-economic status, ethnicity, and gender in the population of undergraduate mathematicians. A more diverse array of courses, within and between Groups A, B and C, may cater for a wider cross-section of potential students. For example, more students with lower entry qualifications might be attracted to BSc Mathematics programmes if there were universities that offered them greater module choice or more joint-honours pathways, while higher attaining students could be swayed to study mathematics if they had the option of a small cohort size and individual attention.

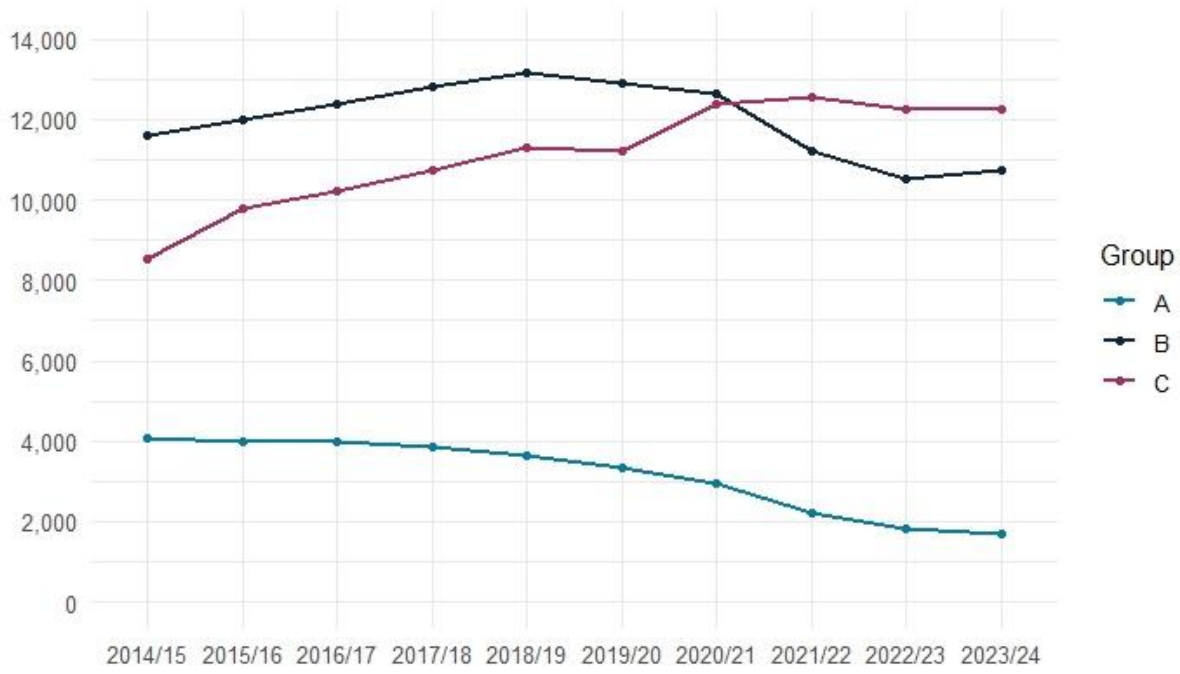

Figure 16 The total number of mathematical sciences students enrolled on undergraduate degrees in England and Wales over a 10-year period, by degree group. Student numbers data from (HESA, 2025).

The higher education sector is also currently facing financial challenges connected with rising costs and reduced numbers of international students. In the past 18 months, 43% of universities in this analysis have announced plans to reduce jobs and budgets, with potential impact on mathematics departments (Table 10). Group B programmes are disproportionately affected (62%), compared to a smaller proportion of Group A universities (38%) and only one Group C university (9%). These effects have already been seen, as the University of Brighton, Oxford Brookes University and Birkbeck, University of London, have already closed or reduced their undergraduate mathematics provision. Having smaller mathematics departments, these universities would likely have been in Group A or B in this typology. Moreover, the University of Wolverhampton also seems to have withdrawn its BSc Mathematics programme since the data for this project was collected. Cardiff University has also proposed a potential merger between the School of Mathematics and the School of Computer Science and Informatics, which is likely to change not only the amount of mathematics provision but also the types of degrees offered.

Group A	Group B	Group C
Type 1	**Type 3**	**Type 5**
Aston University	Aberystwyth University	Durham University
Central Lancashire, University of	Keele University	
Edge Hill University	Newcastle University	**Type 6**
Hull, University of	Sheffield, University of	-
Sheffield Hallam University	Sussex, University of	
Wolverhampton, University of	York, University of	
Type 2	**Type 4**	
Plymouth, University of	Birmingham, University of	
Swansea University	Brunel, University of London	
	Cardiff University	
	East Anglia, University of	
	Essex, University of	
	Kent, University of	
	Lincoln, University of	
	Liverpool, University of	
	Nottingham, University of	
	Reading, University of	

Table 10 Universities that announced plans to reduce jobs and budgets, March 2024 - May 2025[10].

As this report shows, each of these threatened university mathematics programmes occupies a unique position in the undergraduate landscape. Geographical distribution is important for access to these degrees, for example Cardiff University is over 100 miles from the nearest Group B university. However, even then, Group B courses are not homogeneous and one cannot simply be replaced with another. Any programme closure, regardless of group, size, location or other characteristic, would reduce the full diversity of mathematics degree available, only some of which has been captured in this typology. Unless there is action by government, further reshaping of the landscape is inevitable. This potentially has long-term economic consequences for the ongoing recruitment of mathematically confident teachers in secondary schools, as well as for the wider UK workforce in an increasingly digital and data-driven world.

5. Appendices

5.1 List of BSc Mathematics courses by group and type

Group A (*n* = 21)	**Group B (*n* = 26)**	**Group C (*n* = 11)**
Type 1 (n = 19)	**Type 3 (n = 9)**	**Type 5 (n = 7)**
Aston University	Aberystwyth University	Bath, University of
Central Lancashire, University of	Keele University	Bristol, University of
Chester, University of	Lancaster University	Cambridge, University of
Chichester, University of	Leicester, University of	Durham University
Coventry University	Newcastle University	King's College London
Edge Hill University	Sheffield, University of	Leeds, University of
Greenwich, University of	Southampton, University of	Manchester, University of
Hertfordshire, University of	Sussex, University of	
Hull, University of	York, University of	**Type 6 (n = 4)**
Liverpool Hope University		Imperial College London
Liverpool John Moores University	**Type 4 (n = 17)**	Oxford, University of
London Metropolitan University (London Met)	Birmingham, University of	University College London (UCL)
Manchester Metropolitan University (Manchester Met)	Brunel, University of London	Warwick, University of
Northumbria University	Cardiff University	
Portsmouth, University of	City St George's, University of London	
Salford, University of	East Anglia, University of	
Sheffield Hallam University	Essex, University of	
University of the West of England (UWE)	Exeter, University of	
Wolverhampton, University of	Kent, University of	
	Lincoln, University of	
Type 2 (n = 2)	Liverpool, University of	
Plymouth, University of	Loughborough University	
Swansea University	Nottingham, University of	
	Nottingham Trent University	
	Queen Mary, University of London	
	Reading, University of	
	Royal Holloway, London	
	Surrey, University of	

Table 11 Classification of BSc Mathematics programmes by groups and types.

5.2 Teaching and support methods

	Group A (n = 21)	Group B (n = 26)	Group C (n = 11)	**Total (n = 58)**
Lecture	16	24	11	**51**
Tutorials	16	23	11	**50**
Computer labs	15	16	5	**36**
Seminars	15	15	4	**34**
Feedback	13	13	5	**31**
Workshops	12	11	4	**27**
Supervision	6	10	5	**21**
Online learning	13	6	2	**21**
Mathematics society	4	10	3	**17**
Peer learning	7	8	2	**17**
Drop-ins	6	6	1	**13**
Example classes	0	9	3	**12**
Practical	4	5	2	**11**
Transition support	2	8	1	**11**
Individual support	5	2	1	**8**
Mathematics support centre	3	4	1	**8**
Reading	3	4	1	**8**
Office hours	2	5	1	**8**
Personal tutor	1	4	3	**8**
Support classes	3	0	2	**5**
Interactive classes	0	2	0	**2**

Table 12 Teaching and support approaches mentioned in course descriptions, by group.

5.3 Assessment methods

	Group A (n = 21)	Group B (n = 26)	Group C (n = 11)	**Total (n = 58)**
Project	21	26	11	**58**
Examination	18	23	11	**52**
Coursework	18	23	8	**49**
Presentation	14	19	6	**39**
Report	11	21	4	**36**
Group assessment	7	15	5	**27**
Viva	6	7	3	**16**
Dissertation	8	5	2	**15**
Worksheets	5	7	2	**14**
Essay	6	5	2	**13**
Class tests	5	8	3	**13**
Poster	5	4	2	**11**
Online test	5	4	2	**11**
Programming	2	5	2	**9**
Portfolio	4	3	0	**7**
Homework	0	3	3	**6**
Computer-based	2	1	0	**3**
Practical	0	3	0	**3**

Table 13 Assessment approaches mentioned in course descriptions, by group.

5.4 Nature of mathematics

	Group A (n = 21)	Group B (n = 26)	Group C (n = 11)	**Total (n = 58)**
Exploring problems	20	25	8	**53**
Helps us understand the world	16	25	7	**48**
Research-oriented	15	25	8	**48**
Using computers and programming	19	22	5	**46**
Using tools and techniques	17	13	4	**34**
The study of numbers	14	13	3	**30**
New ideas and creativity	9	15	4	**28**
Separate from the real world	9	13	4	**26**
Beautiful	6	9	4	**19**
A language that people can use to communicate	8	6	0	**14**
Provable truths	4	8	2	**14**
University maths is the same as school maths	5	5	2	**12**
A versatile subject	5	4	3	**12**
Using rules and equations	4	3	1	**8**
University maths is different from school maths	3	3	2	**8**
Social responsibility	5	1	1	**7**
Calculations	1	5	0	**6**
Can be solved in many ways	3	1	1	**5**
Remembering definitions, formulas, and facts	2	0	0	**2**

Table 14 Beliefs about the nature of mathematics mentioned in course descriptions, by group.

5.5 All universities plotted against MCA dimensions, by three groups

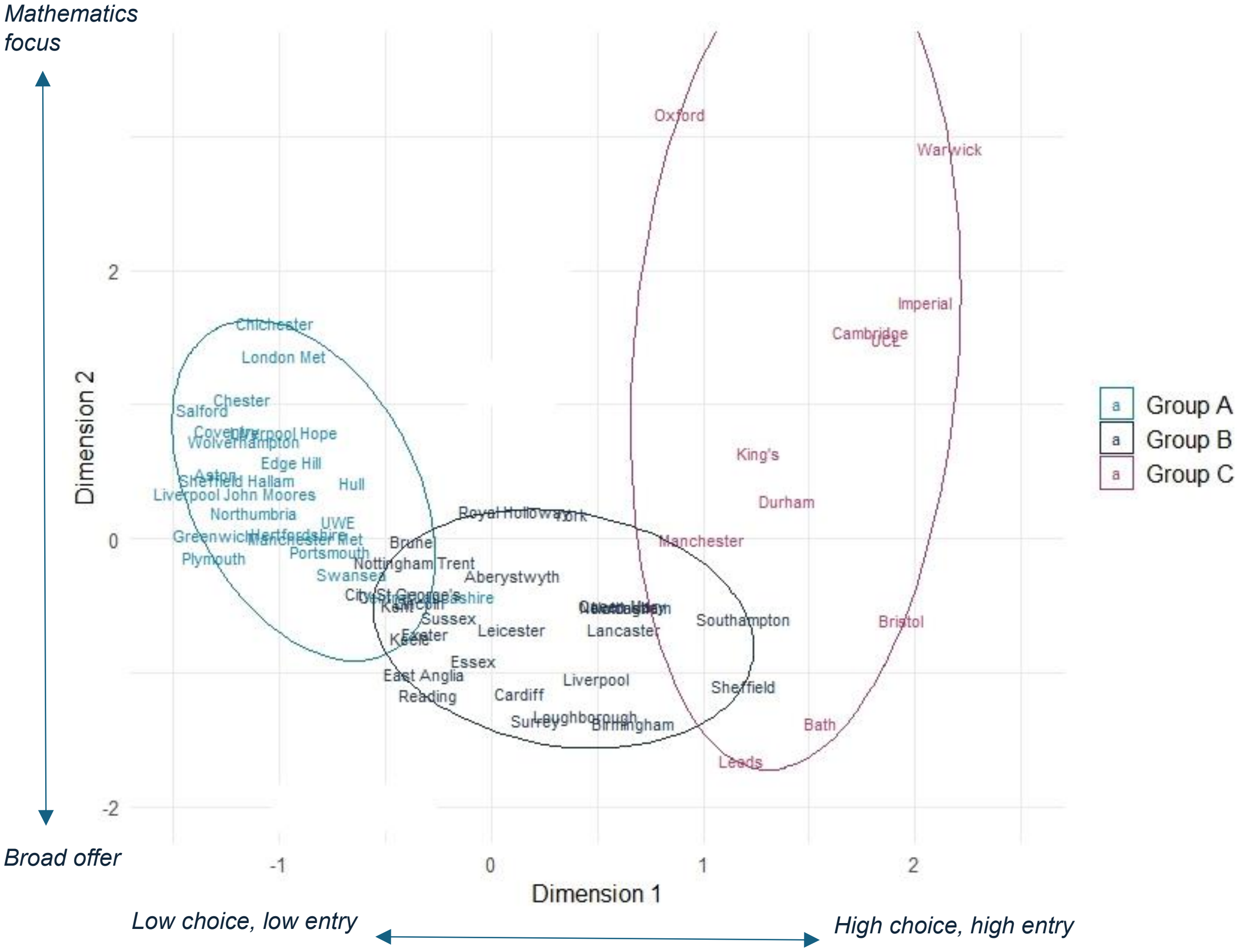

Figure 17 University names plotted against Dimensions 1 and 2. Colours represent the degree groups and ellipses indicate the boundaries of each group. Some university names are abbreviated (see Table 11 in Appendix 5.1 for the list of abbreviations).

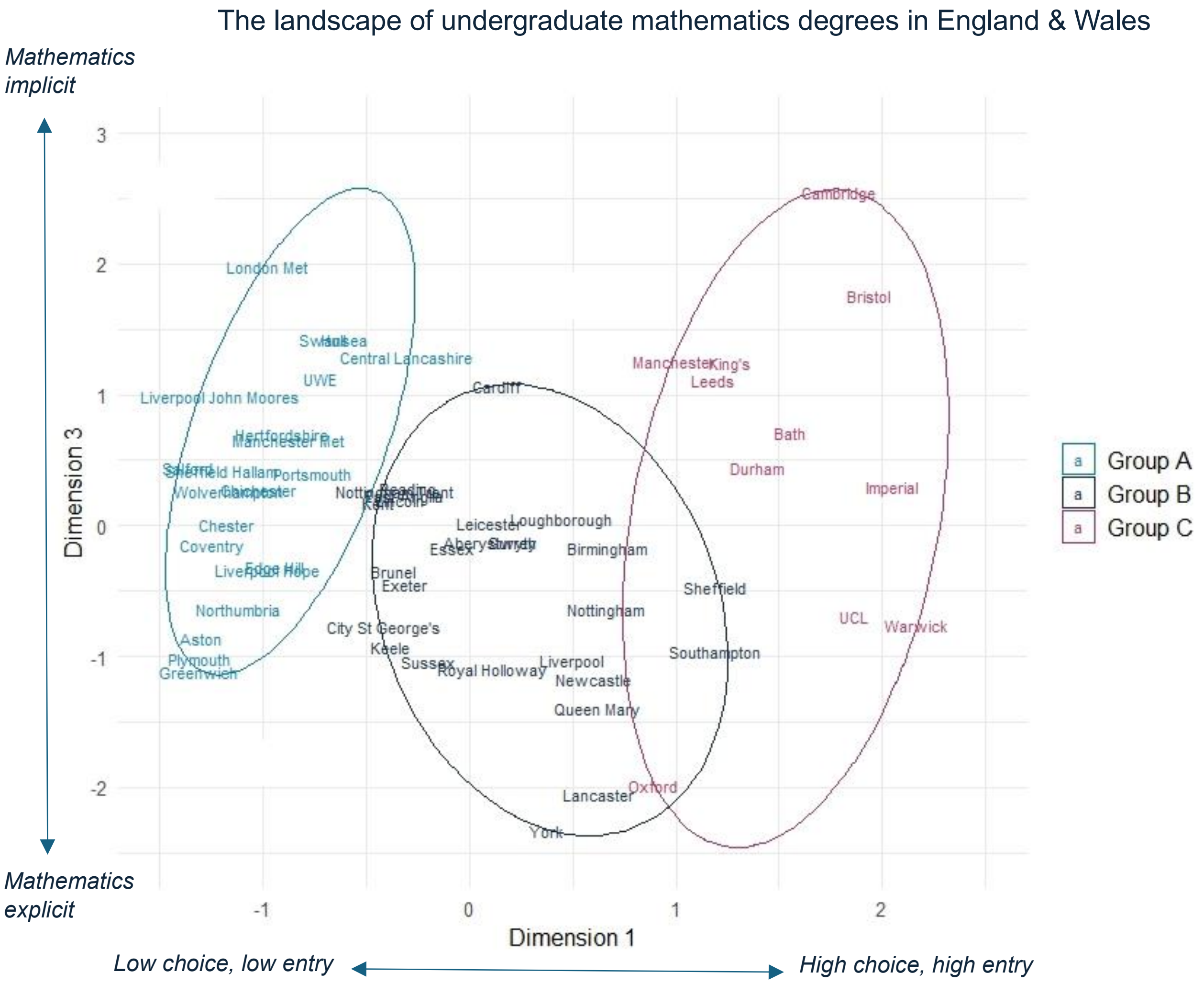

Figure 18 University names plotted against Dimensions 1 and 3. Colours represent the degree groups and ellipses indicate the boundaries of each group. Some university names are abbreviated (see Table 11 in Appendix 5.1 for the list of abbreviations).

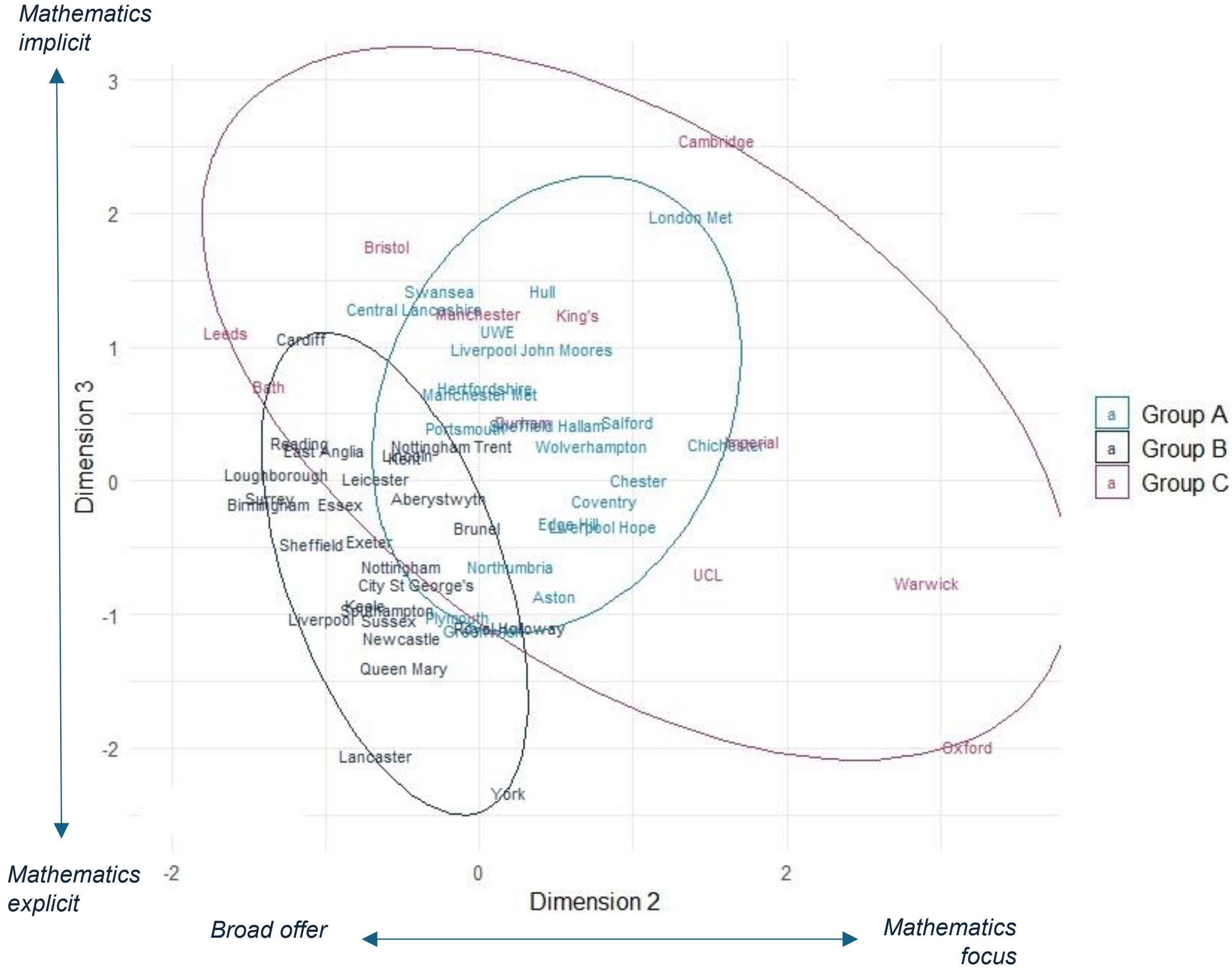

Figure 19 University names plotted against Dimensions 2 and 3. Colours represent the degree groups and ellipses indicate the boundaries of each group. Some university names are abbreviated (see Table 11 in Appendix 5.1 for the list of abbreviations).

5.6 Categorisation of mathematics module titles

The method of categorising module titles is shown below. Module titles were extracted from the website for each university. Modules were then arranged based on year of study (1, 2 or 3/final year) and as either a compulsory or an elective module. Module titles were then classified into one of the eleven categories according to the subject area (Table 15). For instance, if the module is named as “Introduction to Abstract Algebra”, it is classified into the category of abstract mathematics. Categorisation was based on module titles only, since module descriptions were not available for all programmes.

Mathematics topic	Subject named in module title
Abstract Mathematics	Abstract Algebra Analysis Geometry
Fundamental mathematics	Algebra Introduction to Mathematics Mathematical Modelling Mathematical Methods
Calculus	Applied Mathematics Mechanics Calculus Differential Equation
Pure Mathematics	Discrete Mathematics Game Theory Number Theory Pure Mathematics, Sets, Logic, Proof
Mathematical Physics	Dynamics Mathematical Physics
Financial Mathematics	Financial Mathematics Financial Mathematics related modules
Mathematical Biology	Mathematical Biology
Computational Modules	Optimisation/Simulation Programming Introduction to Coding
Probability and Statistics	Probability Statistical Inference Data Methods Regression Statistical Modelling Data Science
Education/Employability/Communication	Career related modules Mathematics Education Communication related modules
Project	Project

Table 15 Framework used to categorise mathematics module titles.

5.7 Curriculum map by year of programme

The curriculum mapping shows the number of programmes that contain at least one module covering a given mathematical topic (see Appendix 5.6), broken down by year of module and compulsory/elective status. First year elective modules are excluded from the analysis due to small numbers. Similarly, a small number of programmes in Group C only offer a 4-year undergraduate degree; for comparability, only third year modules are included here. The number of Group C degrees offering a final year project is therefore likely to be underestimated, since some courses offer this in the fourth year.

Compulsory modules

First year	Group A (n = 21)	Group B (n = 26)	Group C (n = 11)	**Total (*n* = 58)**
Fundamental mathematics	19	25	10	**54**
Probability & statistics	18	23	9	**50**
Calculus	17	20	7	**44**
Abstract mathematics	11	13	9	**33**
Education, communication or employability	12	13	2	**27**
Computational modules	11	11	4	**25**
Pure mathematics	6	7	1	**14**
Mathematical physics	1	3	4	**8**

Table 16 Mathematics topics found in first year compulsory modules, by group. Topics are listed in descending order of total frequency.

Second year	Group A (n = 21)	Group B (n = 26)	Group C (n = 11)	**Total (*n* = 58)**
Calculus	20	20	6	**46**
Abstract mathematics	13	19	8	**40**
Fundamental mathematics	10	20	5	**35**
Probability & statistics	13	14	1	**28**
Education, communication or employability	8	10	3	**21**
Computational modules	5	8	4	**17**
Mathematical physics	1	5	1	**7**
Pure mathematics	2	3	0	**5**

Table 17 Mathematics topics found in second year compulsory modules, by group. Topics are listed in descending order of total frequency.

Final year	Group A (n = 21)	Group B (n = 26)	Group C (n = 11)	**Total (n = 58)**
Project	17	16	2	**35**
Calculus	7	3	0	**10**
Education, communication or employability	6	4	0	**10**
Abstract mathematics	5	3	0	**8**
Probability & statistics	6	1	0	**7**

Table 18 Mathematics topics found in final year compulsory modules, by group. Topics are listed in descending order of total frequency.

Elective modules

Second year	Group A (n = 21)	Group B (n = 26)	Group C (n = 11)	**Total (n = 58)**
Probability & statistics	8	16	8	**32**
Abstract mathematics	5	13	11	**29**
Fundamental mathematics	8	11	8	**27**
Calculus	4	8	6	**18**
Computational modules	1	7	7	**15**
Financial mathematics	4	4	2	**10**
Mathematical physics	1	6	2	**9**
Pure mathematics	1	2	3	**6**
Education, communication or employability	1	1	0	**2**
Mathematical biology	0	0	1	**1**

Table 19 Mathematics topics found in second year elective modules, by group. Topics are listed in descending order of total frequency.

Final year	Group A (n = 21)	Group B (n = 26)	Group C (n = 11)	**Total (n = 58)**
Probability & statistics	14	22	8	**44**
Mathematical physics	10	21	10	**41**
Abstract mathematics	5	23	11	**39**
Computational modules	9	19	10	**38**
Calculus	11	18	9	**38**
Fundamental mathematics	7	20	10	**37**
Financial mathematics	9	19	8	**36**
Mathematical biology	5	13	11	**29**
Pure mathematics	2	15	9	**26**
Education, communication or employability	4	14	7	**25**
Project	4	8	3	**15**

Table 20 Mathematics topics found in final year elective modules, by group. Topics are listed in descending order of total frequency.

5.8 Undergraduate mathematics degree groups and types by region

	Group A		Group B		Group C		
Region	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6	**Total**
East England	1	0	0	2	1	0	**4**
East Midlands	0	0	1	4	0	0	**5**
London	2	0	0	3	1	2	**8**
North East	1	0	1	0	1	0	**3**
North West	7	0	1	1	1	0	**10**
South East	2	0	2	4	0	1	**9**
South West	1	1	0	1	2	0	**5**
Wales	0	1	1	1	0	0	**3**
West Midlands	3	0	1	1	0	1	**6**
Yorkshire	2	0	2	0	1	0	**5**
Total	**19**	**2**	**9**	**17**	**7**	**4**	**58**

Table 21 Region of England and Wales by degree group and type.

The Observatory for Mathematical Education

The Observatory for Mathematical Education is undertaking an unprecedented ten-year programme of longitudinal research from reception to postgraduate level. This holistic, multi-scale and mixed-method programme aims to better understand our national system of mathematical education and support those trying to improve it. Further details can be found in the Introductory Report on the website.

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Citation details

Observatory for Mathematical Education (2025). *The landscape of undergraduate mathematics degrees in England & Wales.* University of Nottingham.

Endnotes

1. Ortus Economic Research. (2023). *Mathematical Sciences recruitment and graduate outcomes*. The Council for the Mathematical Sciences and the Heads of Departments of Mathematical Sciences. https://www.cms.ac.uk/wp/wp-content/uploads/2024/01/CMS_HoDoMS_MathematicalSciencesRecruitmentDiversity_FINAL120124.pdf
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6. Le Roux, B., & Rouanet, H. (2010). *Multiple Correspondence Analysis.* SAGE Publications Inc. https://doi.org/10.4135/9781412993906

7. Although the focus of this report is BSc Mathematics programmes, the number of subject options considers how many different subject areas mathematics can be combined with in joint or major/minor programmes. The areas considered were: Accounting, Arts, Business, Computer Science, Data, Economics, Engineering, Education, Finance, Humanities, Languages, MORSE, Physics and Science (other).
8. As Type 2 consists of only two universities, the choice of Swansea University as a typical example is therefore arbitrary.

9. Observatory for Mathematical Education. (2025). *Transitions to university mathematics*. https://www.nottingham.ac.uk/observatory/documents/reports/transitionstouniversitymathematics-themedreport-202502.pdf
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