The University of Edinburgh

Internal Periodic Review
The School of Mathematics
UG & PGT

27th & 28th March 2023

Contents

Executive summary

This report comprises the outcomes from the internal review of UG & PGT provision in the School of Mathematics.

The review team found that the School has effective management of the quality of the student learning experience, academic standards, and enhancement and good practice.

The report provides commendations on the School's provision, recommendations for enhancement that the School will be asked to report progress on to the Senate Quality Assurance Committee and suggestions on how to support developments.

Key Commendations

The review team commend the School for its work in implementing the new student support system and provision of effective support, the dedication of its academic and professional services staff, and the expertise in creating and promulgating STACK and technology enhanced teaching.

Key recommendations

The top three recommendations identified by the review team for the School to prioritise were:

- Assessment and Feedback: The review team **recommend,** as a priority matter**,** that the School review the thread of assessment throughout programmes to relieve the pressure on students (where appropriate), avoid the clustering of deadlines, and ensure that the credits to course hours ratio is proportionate.
- Remit item 2- Best Use of Technology: The review team **recommend** that the School roll out their technology enhanced curriculum plans, once developed, in their own timeframe, whilst working in line with the known principles and guidance of CTP. This should include standard archetype course models, utilising STACK where appropriate, and a management driven approach that would create time in the Workload Allocation Model for this development role to ensure a successful roll-out.
- Tutors: the review team **strongly recommend** that the School reviews the tutoring commitment required for the next academic year to ensure that tutoring is properly resourced, expands the training of tutors to include teaching skills, and develops a long-term plan for the role of tutors in teaching provision.

Commendations, recommendations and suggestions

Commendations

Key strengths and areas of positive practice for sharing more widely across the institution.

No	Commendation	Section in report
1.	The review team **commend** the dedication and efforts of staff throughout School, who have worked to create a successful academic community.	1
2.	The review team **commend** the School for the high quality of its leadership on teaching throughout the pandemic. The School adopted new ways of teaching and working during that time, and is keen to retain the positive aspects of these changes.	1
3.	The review team **commend** the expertise in creating and promulgating STACK and technology enhanced teaching.	2.1
4.	The review team **commend** the publication of the teaching plan, which is made available to students in UG Year 1 core courses. Students find this useful as it enables them to plan ahead for the year.	2.1
5.	**Student Support** The review team **commend** the level of resource the School has committed to student support, and **commend** the overall management of the new student support model. The review team **commend** the work of the Professional Services staff to implement and engage with new system. The review team commend the work undertaken on mental health and wellbeing support, and also **commend** the weekly meetings where student advisors and senior staff discuss case management for at risk students. The review team **commend** the implementation of the Cohort Lead role in a short timeframe. The review team **commend** the consideration that has been given to phase 2 of the implementation process, and **commend** the work by current cohort leads to share good practice and lessons learned with incoming cohort leads.	2.3
6.	The review team **commend** the School on their initiative through the Principal's Teaching Award Scheme, through which the School is working with interns on a project to co-create student feedback mechanisms and is intended to improve the feedback cycle	2.4

7.	The review team **commend** the School for their work on decolonising the curriculum; it is recognised that there is much work to do here but conversations have started and a direction of travel in place.	2.5
8.	The review team **commend** the School for their efforts on widening participation.	2.5
9.	The review team **commend** the School on the development of their EDI action plan and the ongoing work of those involved.	2.5
10.	The review team **commend** Matt Vickers and the Careers Service for the work that is already taking place within the School to promote employability.	2.6
11.	The review team **commend** initiatives such as MathsBase, MathsPALS and MathsClans which are designed to facilitate a supportive academic and social community, and could provide a model to be promoted at university level.	2.8
12.	The review team **commend** the designated MSc Hub which is a popular study space with students and well-equipped with kitchen facilities.	2.8

Recommendations

Areas for development and enhancement – progress to be reported.

Priority	Recommendation	Section in report	Responsibility of
1.	**Assessment & Feedback** The review team **recommend,** as a priority matter**,** that the School review the thread of assessment throughout programmes to relieve the pressure on students (where appropriate) avoid the clustering of deadlines, and ensure that the credits to course hours ratio is proportionate. The review team **recommend** that the timetabling service provide schedules in a	2.2	School

	timely manner, to allow Schools to better plan and communicate with students about examinations.		Timetabling
2.	**Remit item 2: Best use of technology**		
	The review team **recommend** that the School roll out their technology enhanced curriculum plans, once developed, in their own timeframe, whilst working in line with the known principles and guidance of CTP.	1	School
	The review team **recommend** that the School include standard archetype course models, utilising STACK where appropriate.	2.1	School
	The review team also **recommend** that a role, or space in the existing WAM tariff for an academic member of staff, is created to lead on this and is well supported by School management.	2.1	School
	The review team **recommend** that a training and learning process is in place to facilitate competency in digital pedagogies and to encourage knowledge sharing amongst staff.	2.1	School
	The review team **recommend** that the School reviews its equipment and facilities to make sure hybrid teaching and the proposed technology enhanced curriculum is properly equipped (in particular, lecture capture).	2.8	School
3.	**Employment of Tutors**	2.7	
	The review team **strongly recommend** that the School reviews the tutoring commitment required for the next academic year to ensure that tutoring is properly resourced.		School
	The review team also **recommend** that the School develop a long-term plan for their use of tutors, both to ensure appropriate resource is in place and to avoid undue pressure on the		School

	Teaching Office as it plans for each year ahead.		
4.	**Curriculum mapping** The review team **recommend** the School undertakes a review of the co-ordination of delivery, especially at postgraduate taught level, to consider mapping of prerequisites across courses & programmes.	2.1	School
5.	**Remit item 1: Student Employability** The review team **recommend** that the School brings conversations around employability further into the curriculum. The review team also **recommend** that the School, in order to better understand industry requirements and to build industry partnerships, create an industrial liaison board and involve the Student Voice in this activity. The review team **recommend** that Student Analytics, Insights and Modelling work with the Careers Service to develop a data management system that allows for better targeted support for students.	2.6	School School Student Analytics, Insights and Modelling
6.	**Recruitment / pre-arrival** The review team **recommend** that space be created in the WAM tariff for an academic roles' involvement in UG recruitment, and work with the relevant Professional Service staff on recruitment and admission activities. The review team **recommend** that the School review communication of material with PGT students at pre-arrival stage and include details of the list of software to be used so that students are better prepared	1 2.3	School School

No		Section in report
7.	**EDI Development** The review team **recommend** that the School and College allocate resource to EDI development in order to best support ongoing work and activities.	2.5	School and College

Suggestions

For noting – progress reporting is not required.

No	Suggestion	Section in report
1.	The review team **suggest** that the School create a central list of preferred platforms and digital tools, to be shared with all academic staff and updated annually to ensure relevance.	2.1
2.	The review team **suggest** that the School extend the use and publication of the teaching plan, where possible, for the benefit of all students.	2.1
3.	The review team **suggest** that the School cut down the number of formative quizzes and increase the number of more engaging workshops to support student learning.	2.2
4.	The review team **suggest** that the School include a senior tutor, or equivalent, at induction events.	2.3
5.	The review team **suggest** that better signposting of Study Abroad opportunities and eligibility information would be beneficial to students, particularly for those students on joint degree programmes.	2.3
6.	The review team **suggest** that another useful mechanism could be "exit interviews" with groups of students at key transition phases, with an aim to focus discussion and understand timely issues.	2.4
7.	The review team **suggest** that the Student Advisors and the PTAS project team monitor feedback that arrives through interacting with the new student support model, and work with the School to report good practice or proposed mechanisms to the central student support project team.	2.4
8.	The review team **suggest** that the School use survey data from students about summer jobs and internships to better understand the opportunities that are available to students, and the impact of	2.6

	these roles. The review team also **suggest** that the School surveys alumni to gather information about their destinations.	
9.	The review team **suggest** that the School strengthen mechanisms for peer observation of tutoring and **suggest** that the School include tutoring skills part of career development discussions through Annual Review. The review team also **suggest** that the School expand training of tutors to include teaching skills e.g. drawing out issues and helping students.	2.7
10.	The review team **suggest** that initiatives such as MathsBase, MathsClans and MathsPALS are better advertised for benefit of all students in the School.	2.8

Section A – Introduction

Scope of review

Range of provision considered by the review (see Appendix 1).

The Internal Periodic Review of the School of Mathematics in 2022/2023 consisted of:

- The University's remit for internal review (see Appendix 2)
- The subject specific remit items for the review:

  - Subject Specific Remit Item 1: Student Employability
  - Subject Specific Remit Item 2: Best Use of Technology

- The Reflective Report and additional material provided in advance of the review
- The meeting of the review team including consideration of further material (see Appendix 3)
- The final report produced by the review team
- Action by the School and others to whom recommendations were remitted following the review

Review Team Members

Dr Gail Duursma (Convener)	Senior Lecturer/School Director of Quality School of Engineering
Dr Tony Turner (Internal member) *Unable to attend review visit	Senior Lecturer Exercise Physiology Institute for Sport PE & Health Sciences Moray House School of Education & Sport
Professor Gavin Brown (External member)	Mathematics Institute Warwick University
Professor Diana Laurillard (External member)	Faculty of Education and Society University College London
Dr Antonia Wilmot-Smith (External member)	School of Mathematics and Statistics University of St Andrews
Zhi Kang Chua (Student member)	Edinburgh Futures Institute

Sinéad Docherty (Administrator)	Academic Policy Officer, Academic Services

The School

The School of Mathematics is one of seven Schools within the College of Science and Engineering.

Physical location and summary of facilities

The majority of teaching is based at the King's Buildings Campus. Some first year undergraduate courses are taught at the George Square campus. Some space in the new Nucleus Building is available to students at the School of Mathematics, and is intended to accommodate the first year undergraduate courses from 2023/24.

Date of previous review

22nd & 23rd March 2016 (Teaching Programme Review of Mathematics)

Reflective Report

Prof Bernd Schroers, Head of School

Dr Nikola Popovic, Director of Quality

Dr Stuart King, Director of Teaching

Ms Alice Heatley, Head of Student Services

Mr Chris Jowett, Director of Professional Services

Ms April Willis, Student Development Manager

Ms Grace Sansom, External Engagement and Communications Officer

Mr Matt Vickers, Mathematics Careers Consultant

Ms Riahn Holcomb-Seibert, EUSA Student Representative

Dr George Kinnear, Reader in TEMSE

Dr Steven O'Hagan, Learning Designer

Dr Bruce Worton, Deputy Director of Teaching (Community)

Dr Richard Gratwick, Deputy Director of Teaching (Curriculum)

Dr Robbie Bickerton, Deputy Director of Teaching (Resources)

Dr Francesca Iezzi, Mathematics Engagement Officer

Ms Maria Tovar Gallardo, Business Development Executive

Ms Fiona Carmichael, Strategic Change Manager

The School noted in the report that student involvement was ensured through repeated consultation with student representatives at UG and PGT Student-Staff Liaison Committees (SSLCs); these also involve relevant staff, such as Cohort Leads and Student Support Officers (SSOs). Moreover, a survey was circulated to the UG and PGT cohorts in the School to gather wider student views. The agreed remit was put to the College Quality Assurance Committee (CQAC) for discussion. Finally, the review and remit were presented to, and discussed at, the all-School Forum.

Section B – Main report

1 Strategic overview

The School of Mathematics is a large School in the College of Science and Engineering, and provides 11 undergraduate programmes and 12 postgraduate taught programmes to its students, covering the breadth of Mathematical Sciences. The review team **commend** the dedication and efforts of staff throughout School, who have worked to create a successful academic community, especially in recent challenging years.

The School effectively reviews and manages its provision of programmes through its Teaching Programme Committee and Board of Studies. The student population has increased in recent years and the School has increased its provision of certain courses and programmes accordingly (as examples, provision of statistics courses and Python programming). Students are well supported by the Teaching Office and Student Support model (this is fully covered in section 2.3 of this report).

Teaching in the School is managed by the Director of Teaching, and supported by the Deputy Directors of Teaching (with individual responsibilities for curriculum, community and resources). The review team **commend** the School for the high quality of its leadership on teaching throughout the pandemic. The School adopted new ways of teaching and working during that time, and is keen to retain the positive aspects of these changes. Whilst much teaching has returned to face-to-face, the School has identified that there are opportunities to enhance the learning and teaching experience with technology, and to improve assessment and feedback processes. The best use of technology was one of the subject specific remit items covered during the review, and is addressed in section 2.1 of this report.

During conversations about the overall strategy of the School and the development of a technology enhanced curriculum, it became apparent that the School was considering its plans within the context of the institution-wide Curriculum Transformation Project. Whilst this context is important, the review team felt it would be remiss of the School to not take any action until 2026 (the expected implementation date for CTP). Therefore, the review team **recommend** that the School roll out their technology enhanced curriculum plans, once developed, in their own timeframe, whilst working in line with the known principles and guidance of CTP. This will allow the School take ownership of tools and opportunities that will enhance their provision, and not depend on a centrally set timeline in which to achieve this.

During discussions with School staff, the review team noted that undergraduate recruitment appears to be the remit of Professional Services staff and functions without dedicated assistance from an academic member of staff. It is understood that staff members from the Directors of Teaching team volunteer to support recruitment activity when possible, at online events and open days, but the review team **recommend** that space be created in the WAM tariff for an academic roles' involvement in UG recruitment, and work with the relevant Professional Service staff on recruitment and admission activities.

2 Enhancing the student experience

2.1 The approach to enhancing Learning and Teaching

As its second subject specific remit item, the School asked the review team to consider the best use of technology. The School has already implemented STACK in a number of its courses, and the review team **commend** the expertise in creating and promulgating STACK and technology enhanced teaching.

The School has identified Research Themes which feed into the organisation and strategy of the School. The dedicated TEMSE Theme (Technology Enhanced Mathematical Sciences Education) promotes the design, development, and evaluation of innovative instructional strategies, course formats, and delivery methods, with a focus on blended learning, online assessment, and pedagogical research.

This research theme will be instrumental in helping the School to enhance its curriculum through technology, and the review team formed the view that the School, overall, is well-placed and well-equipped to implement technology enhanced education. The review team **recommend** that the School roll out their technology enhanced curriculum plans, once developed, in their own timeframe, whilst working in line with the known principles and guidance of CTP. This should include standard archetype course models, utilising STACK where appropriate, and a management driven approach that would create time in the Workload Allocation Model for this development role to ensure a successful roll-out.

Throughout the review, the School expressed its preference that this development is driven from the top, rather than the "bottom-up" approach that was required in the pandemic (when all staff did their best to perform their roles and make use of the technology and skills they had available). It is vital that a coherent and consistent approach is taken to ensure that the design, development and implementation of technology enhanced teaching meets quality standards and is understood by all relevant stakeholders. The review team **recommend** that a training and learning process is in place to facilitate competency in digital pedagogies and to encourage knowledge sharing amongst staff. To complement this, the review team **suggest** that the School create a central list of preferred platforms and digital tools, to be shared with all academic staff and updated annually to ensure relevance. This would assist with consistency in the use of technology across the School.

Also connected to the curriculum, the review team **recommend** the School undertakes a review of the co-ordination of delivery, especially at postgraduate taught level, to consider mapping of prerequisites across courses & programmes. During discussions, some students identified issues with skills and knowledge being taught out of sync, which is a frustrating experience for students to encounter. One student gave the example of having combined programming courses with their Maths programme but found that more time and learning was needed for the mathematics behind the programming. The School must ensure that knowledge is built up in the appropriate order during the student journey and that programmes are designed with this in mind.

The review team **commend** the publication of the teaching plan, which is made available to students in UG Year 1 core courses. Students find this useful as it enables them to plan ahead for the year. The review team **suggest** that the School extend this, where possible, for the benefit of students in their honours years and at postgraduate level.

2.2   Assessment and Feedback

A recurring theme from both staff and students during the review was workload and the expectations placed upon students. Students felt under significant pressure with their weekly workload, including high amounts of both formative and summative assessment. Assessments are sometimes found to culminate in a cluster of deadlines at the end of the semester. During the student meetings, the review team heard from some students that they were "drowning" in their workload, and had no time for any leisure activities. The impact of the high workload appears to be detrimental to the overall student experience.

The School highlighted that assessment weightings were rebalanced during the pandemic in favour of continuously assessed work to help students demonstrate engagement, and maintain academic standards, in the absence of closed book final examinations. The School signalled that efforts to redress the balance of assessment have been deferred until after the ongoing, wider Curriculum Transformation Programme across the University has made its recommendations.

However, the review team **recommend,** as a priority matter**,** that the School review the thread of assessment throughout programmes to relieve the pressure on students (where appropriate), avoid the clustering of deadlines, and ensure that the credits to course hours ratio is proportionate. The review team **suggest** that the School cut down the number of formative quizzes and increase the number of more engaging workshops to support student learning. Whilst the ongoing CTP context is relevant, it is important that the School looks beyond the contingency measures introduced during the pandemic, and works to ensure that assessment load is fair and balanced across courses. In giving this consideration to assessment and workload, the School can enhance the student experience for current and incoming students, as well as future students who will enrol after the implementation of CTP.

During discussion with the students, some frustration was expressed with late notice or changes to examination timetables. The review team **recommend** that the timetabling service provide schedules in a timely manner, to allow Schools to better plan and communicate with students about examinations.

Some students also expressed difficulty when coursework and group work is assigned at random. For students who experience a language barrier, it is easy to feel excluded and there is a challenge in developing a sense of community within the group. The review team encourage the School to consider the language barrier aspect when designing assessment and group work, and to facilitate inclusive ways of working.

The School had highlighted the impact of the Extensions and Special Circumstances Service on their marking and feedback timeframes, both in the Reflective Report and during review meetings. Staff highlighted issues with the current ESC arrangement cutting out contact with School staff, which leads to challenges when students do not understand the outcomes of this process and have different expectations of what their preferred outcome ought to be.

2.3   Supporting students in their learning

The School has implemented the new student support model for all first year undergraduate students and PGT students. The review team **commend** the level of resource the School has committed to student support, and **commend** the overall management of the new student support model.

The review team **commend** the work of the Professional Services staff to implement and engage with new system. During the meetings with students, the level of student support provided by Professional Services was described as "incredible" and "amazing". Students also voiced appreciation of the mental health and wellbeing support, and the review team **commend** the work done by the Student Support team in these areas. The review team also **commend** the weekly meetings where student advisors and senior staff discuss case management for at-risk students.

The review team **commend** the implementation of the Cohort Lead role in a short timeframe. In meetings with academic staff in the Cohort Lead role, it was evident that staff were giving consideration as to how to progress to phase 2 of the implementation in the next academic year and the review team **commend** this approach. The review team also **commend** the work by current Cohort Leads to share good practice and lessons learned with incoming Cohort Leads.

During discussion with PGT students, the review team heard there was hesitation around "bothering a professor" in the Cohort Lead role, despite encouragement from Cohort Leads for students to come forward and reach out, and this especially affected non-UK students. It can be a challenge for PGT students to build up a sense of connection over the course of just one year, and the review team encourage Cohort Leads to give consideration to this dynamic in their contact with students and their cohort-building activities. Some students also expressed apprehension about moving from the Personal Tutor model to the new system, with concerns around whether staff in the new model are knowledgeable enough about programmes and courses. This is covered by the new model, but the review team encourage the School to emphasise the provision of support and advice to all students.

It appears that improved communication with PGT students, prior to their arrival at the University, would be appreciated by some of this cohort. The review team **recommend** that the School review communication of material with PGT students at pre-arrival stage and include details of the list of software to be used so that students are better prepared. The review team also **suggest** that the School include the equivalent of a senior tutor at induction stage.

Some undergraduate students expressed uncertainty with regard to their eligibility for Study Abroad opportunities, especially when on a joint degree programme. The review team were satisfied that this information is available, but **suggest** that better signposting of the online information would be beneficial to students.

2.4.   Listening and responding to the Student Voice

The School detailed the challenge of gathering feedback from students including low response rates to surveys, which reflects the experience across the institution. The School has its SSLCs set up but it was noted that these meetings tend to be staff-heavy, with few student representatives in attendance. The School also highlighted the challenge with surveying students now that this process is not managed by the central University.

In a discussion with UG students during the review visit, some students shared that they find it hard to see what follow-up happens once they have provided feedback, that they cannot imagine anything changing from SSLC and that there is a long term feeling that the School does not genuinely care about their feedback. It was also noted by several students that the amount of emails they receive from the School and University is overwhelming, and results in disengaging from information provided and School/University requests for feedback. Students felt positive about the opportunity to discuss their experience with the review team, and receptive to this being an "in-person event". Some students expressed the view that they would be happy for academic staff to visit their social/study spaces as informal ways to build connections and provide opportunities for feedback conversations to take place.

Different approaches to engage with the Student Voice are clearly required, and therefore the review team **commend** the School on their initiative through the Principal's Teaching Award Scheme; the School is working with interns on a project to co-create student feedback mechanisms and is intended to improve the feedback cycle. The review team encourage the School to continue in their efforts to get feedback and to continue to listen receptively to that feedback. The review team **suggest** that another useful mechanism could be "exit interviews" with groups of students at key transition phases, with an aim to focus discussion and understand timely issues.

Some students did note their appreciation of Piazza, which is seen as lowering barriers to communication with tutors, but did also express a wish for better/increased office hours with lecturers. Increased opportunities for communication with academic staff may well improve the overall relationship with the Student Voice and enhance the sense of community within the School.

It was highlighted that Student Advisors will get feedback in their interactions with students, and a mechanism is required to capture this in a meaningful way. The review team **suggest** that the Student Advisors and the PTAS project team consider this aspect and channel for student feedback, and work with the School to report good practice or proposed mechanisms to the central student support project team.

2.5 Accessibility, Inclusivity and Widening Participation

The review team **commend** the School for their work on decolonising the curriculum; it is recognised that there is much work to do here but conversations have started and a direction of travel is in place. The School promote mathematics as a global subject area, and identified in their strategy the need to acknowledge and celebrate the universal nature of mathematics and the diversity of the mathematical community in its teaching.

The review team **commend** the School for their efforts on widening participation; the School is involved in outreach through local Schools, participation in the Edinburgh Science Festival and public engagement, and funds the Mathematics Access Scholarship for WP students. Student Advisors seek to understand the profile of their students, asking about their access to Wi-Fi and laptops, and about their financial situation. Again, the review team acknowledge there is continuous work to do with regard to widening participation, but the School have demonstrated good practice and their commitment to WP.

The School have stepped away from the Athena Swan award, citing the long application process (which can take 6-9 months), the disproportionate workload on female staff and amount of resource it takes to obtain the award. The School have developed an action plan for Equality, Diversity & Inclusion (EDI) which is published on the School website and open to input via a suggestion box. The review team **commend** the School on the development of their EDI action plan and the ongoing work of those involved. Work has included co-ordinating with other projects/subject areas across the School and College to implement change and run activities.

The review team **recommend** that the School and College allocate resource to EDI development in order to best support ongoing work and activities. As the School steps away from the Athena Swan Award, focus and resource must still be consistently directed to EDI action and engagement. Time and space must be created in job roles to facilitate work in this area.

2.6 Development of Employability and Graduate Attributes

The School selected Student Employability as one of its subject specific remit items, and therefore it was a key component in discussion throughout the review. As detailed in the reflective report submitted by the School, student satisfaction reflected in the PTES with "Employability" and "Skills Development" has dropped since 2020 and there has been a corresponding drop in the undergraduate rate of satisfaction with their learning community.

It was evident throughout the review that the Careers Service, and specifically Matt Vickers, are providing a useful service that is highly regarded by both staff and students. The review team **commend** Matt Vickers and the Careers Service for the work that is already taking place within the School, including weekly drop-in sessions available to all students, a careers focus at induction and during lectures in the first

year of undergraduate courses and the referral system where Student Advisors refer students to the Careers Service for support with their next steps.

To build on this work, the review team **recommend** that the School brings conversations around employability further into the curriculum. Rather than "add-on" sessions to address employability, the topic embedded more deeply into the curriculum would allow all students to explore their options as a Maths graduate at an earlier stage, with their subject as both a core skill and transferable skill in many industries. This could be enhanced through experiential learning (which again can be aligned with the Curriculum Transformation Project). The review team also **recommend** that the School, in order to better understand industry requirements and to build industry partnerships, create an industrial liaison board and involve the Student Voice in this activity.

The review team further **suggest** that the School use survey data from students about summer jobs and internships to better understand the opportunities that are available to students, and the impact of these roles. The review team also **suggest** that the School involves alumni, perhaps through another survey, to gather information about their destinations to have more specific knowledge of the nature of employment for the School of Mathematics graduates.

The review team acknowledge that the availability and quality of data is vital for surveys and information gathering to be most useful, and therefore **recommend** that Student Analytics, Insights and Modelling work with the Careers Service to develop a data management system that allows for better targeted support for students in the School of Mathematics (and indeed across the institution).

2.7   Supporting and developing staff

The School employs tutors to assist teaching, particularly at pre-honours undergraduate level, and employs both postgraduate students and full-time tutors to meet the demand. This model may leave the School stretched in providing students with tutor support, as the pool of candidates change each year, and the School intends to step away from using full-time tutors. The review team identified this as a risk and therefore **strongly recommend** that the School reviews the opportunities available for the next academic year to ensure that tutoring is properly resourced. The review team also **recommend** that the School develop a long-term plan for their use of tutors, both to ensure appropriate resource is in place and to avoid undue pressure on the Teaching Office as it plans for each year ahead. If the School continues to employ full-time tutors, consideration must be given to the career development opportunities for those who take up the role.

The School demonstrated good practice in its approach to tutor training, through initiatives such as the Tutor Café, and encouragement of the Edinburgh Teaching Award (EdTA). In order to achieve consistency and skills development for this cohort, it is important for the School to continually review its package of support and training to tutors. The review team **suggest** that the School strengthen mechanisms for peer observation of tutoring and **suggest** that the School include tutoring skills part of career development discussions through Annual Review. The review team also **suggest** that

the School expand training of tutors to include teaching skills e.g. drawing out issues and helping students.

2.8 Learning environment (physical and virtual)

First year undergraduate students currently take some their classes at the George Square campus, due to space constraints, and are then based at King's Buildings in subsequent years. Some students did acknowledge the logistical challenge of travelling between campuses, and the impact this has on course selection. From academic year 2023/24, first year students will have their Maths classes in the new Nucleus building. The Nucleus building will also provide additional study space and facilities for all students in the School. It is expected that this will improve the sense of community for the School of Mathematics. The review team **commend** the existing MSc Hub in the James Clerk Maxwell Building which is a popular study space with PGT students and well-equipped with kitchen facilities.

The review team **commend** initiatives such as MathsBase, MathsPALS and MathsClans which are designed to facilitate a supportive academic and social community. The review team **suggest** that these are better advertised for benefit of all students in the School.

The review team **recommend** that the School reviews its equipment and facilities to make sure hybrid teaching, and the proposed technology enhanced curriculum (remit item 2), is properly equipped. The School should involve the Student Voice in this activity, and report up to College & Learning Spaces Technology in a collaborative approach to improving facilities. Some students reported that some rooms are not well set-up for recorded lectures, with the camera unable to pick up what is written on the board. As the School plans to develop its use of technology in teaching, it is vital that the equipment and platforms can fully support this approach.

3 Assurance and enhancement of provision

The School has appropriate approaches to setting, maintaining and reviewing academic standards across undergraduate and postgraduate taught provision. Standards are continuously reviewed through annual monitoring via Annual Programme Reviews and the School's Annual Quality Report. In addition, standards are maintained and reviewed through effective admissions procedures, internal committee structures, moderation of student assessment, external examiner reporting and alignment with the SCQF framework and QAA subject benchmarking. Overall, the setup of School committees and exam boards is appropriate for maintaining academic standards.

Appendices

Appendix 1: Range of provision considered by the review

Undergraduate Programmes
Applied Mathematics (BSc Hons)
Applied Mathematics (MMath)
Mathematics (BSc Hons)
Mathematics (MA Hons)
Mathematics (MMath Hons)
Mathematics and Biology (BSc)
Mathematics and Business BSc (Hons)
Mathematics and Music (BSc Hons)
Mathematics and Physics (BSc Hons)
Mathematics and Statistics (BSc Hons)
Mathematics with Management (BSc Hons)

Postgraduate Programmes
Computational Applied Mathematics (MSc)
Computational Mathematical Finance (MSc)
Financial Mathematics (jointly with Heriot-Watt University - Non UoE Lead) (MSc)
Financial Mathematics (jointly with Heriot-Watt University - UoE Lead) (MSc)
Financial Modelling and Optimization (MSc)
Financial Operational Research (MSc)
Operational Research (MSc)
Operational Research with Computational Optimization (MSc)
Operational Research with Data Science (MSc)
Operational Research with Risk (MSc)
Statistics and Operational Research (MSc)
Statistics with Data Science (MSc)

Appendix 2 – University remit

The University remit provides consistent coverage of key elements across all of the University's internal reviews (undergraduate and postgraduate).

It covers all credit bearing provision within the scope of the review, including:

- Provision delivered in collaboration with others
- Transnational education
- Work-based provision and placements
- Online and distance learning
- Continuing Professional Development (CPD)
- Postgraduate Professional Development (PPD)
- Provision which provides only small volumes of credit
- Joint/Dual Degrees
- Massive Open Online Courses MOOCs (even if non-credit bearing)

1. **Strategic overview**
   The strategic approach to:

   - The management and resourcing of learning and teaching experience,
   - The forward direction and the structures in place to support this.
   - Developing business cases for new programmes and courses,
   - Managing and reviewing its portfolio,
   - Closing courses and programmes.

2. **Enhancing the Student Experience**
   The approach to and effectiveness of:

   - Supporting students in their learning
   - Listening to and responding to the Student Voice
   - Learning and Teaching
   - Assessment and Feedback
   - Accessibility, Inclusivity and Widening Participation
   - Learning environment (physical and virtual)
   - Development of Employability and Graduate Attributes
   - Supporting and developing staff

3. **Assurance and Enhancement of provision**
   The approach to and effectiveness of maintaining and enhancing academic standards and quality of provision in alignment with the University Quality Framework:

   - Admissions and Recruitment
   - Assessment, Progression and Achievement
   - Programme and Course approval
   - Annual Monitoring, Review and Reporting
   - Operation of Boards of Studies, Exam Boards, Special Circumstances
   - External Examining, themes and actions taken
   - Alignment with SCQF (Scottish Credit and Qualifications Framework) level, relevant benchmark statements, UK Quality Code
   - Accreditation and Collaborative activity and relationship with Professional/Accrediting bodies (if applicable)

Appendix 3 Additional information considered by review team

Prior to the review visit:

- Reflective Report
- Academic Standards Scrutiny document
- List of programmes and courses
- External Examiner reports
- Organisational charts and staff information
- Programme handbooks (online)
- Statistical reports
- SSLC minutes
- NSS & PTES reports, and associated school reflection reports
- University Remit
- Previous Report - Teaching Programme Review of Mathematics (2016)
- 1 Year Response to previous IPR (2017)
- Graduate Outcomes report (Careers)
- Study and Work Away report (2022)

Appendix 4 Number of students

Undergraduate programmes

Entrant for Selected Programmes

Entry Programme Name		2016/7	2017/8	2018/9	2019/20	2020/1	2021/2
Applied Mathematics (BSc Hons)	11	4	8	13	8	16	34
Applied Mathematics (MMath)	0				1	2	7
Mathematics (BSc Hons)	80	75	75	91	98	123	157
Mathematics (MA Hons)	3	11	8	8	3	11	12
Mathematics (MMath Hons)	34	31	52	41	41	44	56
Mathematics and Biology (BSc)		7	5	5	3	7	
Mathematics and Business BSc (Hons)	9	5	5	5	7	28	32
Mathematics and Music (BSc Hons)	7	0	5	6	4	8	4
Mathematics and Physics (BSc Hons)	21	10	7	10	12	14	19
Mathematics and Statistics (BSc Hons)	44	23	14	21	29	37	72
Mathematics with Management (BSc Hons)		2	3	6	0	0	

Postgraduate programmes

Entrant for Selected Programmes

Entry Programme Name	2015/6	2016/7	2017/8	2018/9	2019/20	2020/1	2021/2
Computational Applied Mathematics (MSc) - 1 Year (Full-time)	23		8	19	25	37	30
Computational Mathematical Finance (MSc) (Full-time)	19	14	17	17	16	15	30
Computational Mathematical Finance (MSc) (Part-time)	0	0	0	0	2	0	0
Computational Mathematical Finance (PgDip) (Full-time)			0		0		
Financial Mathematics (jointly with Heriot-Watt University - Non UoE Lead) (MSc) - 1 Year (Full-time)	37			42	69	54	67
Financial Mathematics (jointly with Heriot-Watt University - UoE Lead) (MSc) - 1 Year (Full-time)		18	37				
Financial Modelling and Optimization (MSc) (Full-time)	17	15	22	21	30	17	13
Financial Modelling and Optimization (MSc) (Part-time)	0		0	0	0	0	
Financial Modelling and Optimization (PgDip) (Full-time) - 9 Months			0	0	0		
Financial Operational Research (MSc) (Full-time)			0				
Operational Research (MSc) (Full-time)	17	18	13	23	18	23	12
Operational Research (MSc) (Part-time)		0	0			1	0
Operational Research (PgDip) (Full-time) - 9 Months			0				
Operational Research with Computational Optimization (MSc) (Full-time)	5	4	4	6	4	11	6
Operational Research with Computational Optimization (MSc) (Part-time)			0		0		
Operational Research with Computational Optimization (PgDip) (Full-time) - 9 Months			0				
Operational Research with Data Science (MSc) - 1 Year	27	10	19	29	30	37	29
Operational Research with Data Science (MSc) - 2 Years (Part-time)	0	0	1	0	0	1	1
Operational Research with Data Science (MSc) - 3 Years (Part-time)		0					
Operational Research with Risk (MSc) (Full-time)	8	10	10	19	19	10	7
Operational Research with Risk (MSc) (Part-time)	0	0	0		0		
Statistics and Operational Research (MSc) (Full-time)	19	24	12	19	18	14	14
Statistics and Operational Research (MSc) (Part-time)	0	0	0	0	0	0	0
Statistics with Data Science (MSc)	76	10	40	69	106	97	105
Statistics with Data Science (MSc) - 2 Years (Part-time)	0	1	2	0	1	0	0
Statistics with Data Science (MSc) - 3 Years (Part-time)		0	0	0			