The University of Edinburgh

Teaching Programme Review of Mathematics

22nd and 23rd March 2016

A. Introduction

1. Purpose of review

The Teaching Programme Review (TPR) of Mathematics at the University of Edinburgh is part of the University's Quality Assurance procedures, and is complemented by the Senatus and College Quality Assurance Committees' monitoring and reporting, and by the External Examiner system.

2. Scope of review

Range of provision considered by the review:

Undergraduate Taught Programmes
Applied Mathematics (BSc)
General MAT (BSc)
Mathematics (BSc)
Mathematics (MA)
Mathematics (MMath)
Mathematics (Pure Mathematics) (MA)
Mathematics (IFP) (BSc)
Mathematics and Biology (BSc)
Mathematics and Business (BSc)
Mathematics and Business Studies (BSc)
Mathematics and Music (BSc)
Mathematics and Physics (BSc)
Mathematics and Statistics (BSc)
Mathematics with Management (BSc)
Ordinary MAT (BSc)

Postgraduate Taught Programmes
Computational Mathematical Finance (MSc)
Financial Modelling and Optimization (MSc)
Financial Operational Research (MSc)
Operational Research (MSc)
Operational Research with Computational Optimization (MSc)
Operational Research with Energy (MSc)
Operational Research with Risk (MSc)
Statistics and Operational Research (MSc)

The MSc Financial Mathematics, a joint award with Heriot Watt University, is currently being managed by Heriot Watt and therefore not included in this review.

The TPR consisted of

- The University's standard remit for internal review http://www.ed.ac.uk/files/atoms/files//universitystandardremit201516.pdf

- The subject specific remit for the review, consisting of the following items:

  i) To review the current provision for supporting the increasing numbers of visiting undergraduate students, and how this can be scaled up; to review the standard of incoming students; and to review how better to support own students going abroad.

  ii) Guidance on how to continue to ensure the computing element of our degree programmes is contemporary and relevant.

iii) Review how the amount of summative assessments can be reduced, and advise on how to ensure that the School's assessment processes are clear, fair and efficient.

iv) Advise how often Personal Tutors should meet students and how the consistency of guidance might be improved

v) Views on establishing longer (or more highly-staffed) tutorials, and ways in which tutorials might be improved.

- The analytical report prepared by the School of Mathematics and additional material provided in advance of the review *(additional material listed in Appendix 1)*

- The visit by the review team to the School of Mathematics, including consideration of further material (*listed in Appendix 1)*

- The TPR report produced by the review team

- Following the review, action by the School and others to whom recommendations were remitted

Membership of review team

Professor Gary West, Convenor
Professor Alastair Spence, External Member
Professor Kevin Glazebrook, External Member
Professor Tara Brendle, External Member
Dr Geoff Bromiley, Internal Member
Polina Shipkova, Student Member
Paula Hamilton, Administrator

3. The position of the School within its College

The School of Mathematics is one of seven schools within the College of Science and Engineering. The school comprises 59 academic, 17 research, 17 administrative and 4 computing support staff; 551 undergraduate and 103 postgraduate taught students. The School also provides service teaching to some 700 undergraduate students matriculated on programmes in other Schools and in other Colleges within the University.

4. Physical location and summary of facilities

Year One undergraduate teaching takes place in the Central Area South Campus of Edinburgh University, with the Maths Base located in Appleton Tower.

Years Two to Five undergraduate and all postgraduate students' teaching and research is located at the King's Building site, with the exception of one Year 2 course. The James Clerk Maxwell Building at King's Building is the location of the Mathematics Teaching Organisation, staff offices, computing labs, undergraduate Maths Hub, postgraduate MSc Hub, teaching rooms and lecture theatres.

Within the King's Buildings site is also located the Noreen and Kenneth Murray Library which holds the University's principal printed book collection for mathematics as well as the Edinburgh Mathematical Society's book collection.

5. Date of previous review

The previous TPR remit covered only undergraduate taught provision within the school and was conducted on 17th and 18th March 2010. Postgraduate Taught provision was last reviewed within the PPR conducted on 5th and 6th March 2009.

6. Analytical report:

The analytical report was prepared by the Head of School, Director of Quality, Director of Teaching, Deputy Director of Teaching, PGT Programmes Coordinator, TPR Liaison, International Exchange Officer, Student Learning Advisor, Teaching and Recruitment Development Officer, Board of Studies Convenor, and two EUSA student representatives.

Drafts of the analytical report were presented to the Teaching Programmes Committee (which includes student representatives) and the School Policy and Advisory Committee; all members had the opportunity to input during this consultation phase.

B. Main report

1 Strategic approach to enhancing learning and teaching:

1.1 During the review it was evident that the School takes seriously the need for a strategic approach to learning and teaching, and this was evidenced in a number of ways:

- Undertaking a fundamental review of the undergraduate curriculum between 2011 and 2015;
- Establishing a Teaching Programmes Committee to cohere the enhancements in learning and teaching across pre-honours, honours and postgraduate taught students;
- Launching a MOOC in Statistics in 2015/16 to raise awareness of statistics teaching at University of Edinburgh and hence increase student numbers in future years;
- Planning to exploit the University's involvement with the Alan Turing Institute to develop further Data Science programmes;
- Appointing a Chair of Technology Enhanced Science Education (TESE) to support the learning of mathematics and mathematical assessment online.

1.2 The review team **commends** the achievement of the students at undergraduate and postgraduate levels.

1.3 The review team **commends** the leadership and staff of the School for its professionalism and commitment to delivering a high quality teaching and learning experience.

1.4 The review team **commends** the School on its significant improvement in the National Student Survey (NSS) overall satisfaction score from 66% in 2014 to 94% in 2015, and **recommends** that the School continue to build on this upward trend by maintaining progress in improving the quality of its feedback to students.

1.5 The review team **commends** the Mathematics Teaching Organisation (MTO) on its immense contribution to undergraduate and postgraduate taught student support, and **commends** the School's creation of the Deputy Director of Teaching post and this role's close collaboration with staff within the MTO.

1.6 Over the last three years the number of student enrolments on courses and the number of taught courses offered by the School has increased by more than 50% but with no increase in the number of administrative support staff within the MTO. The 0.25FTE extra resource introduced recently is specifically for UKVI Tier 4 data monitoring and input.

In light of this the review team **recommends** that the School carefully consider whether the current level of staffing in the MTO is sufficient given this recent growth and the proposed introduction of new courses and programmes. The review team also **recommends** that the School more actively seeks the views of, and engages with, the MTO staff including issues related to change management and the introduction of new courses.

2 Enhancing learning and teaching and the student experience

Supporting students in their learning

2.1 The review panel **commends** the quality of the School's undergraduate handbook, undergraduate Induction event during Fresher's Week, with breakout sessions, and the follow-up event later in semester one.

2.2 The review panel noted the School Personal Tutor statements for both undergraduate and postgraduate students and the well-defined minimum level of provision set out within these. There are University discussions ongoing with regard to the proportion of time allocated to the Personal Tutor role, and the School will incorporate any necessary changes. The panel **recommends** that the School makes the undergraduate Personal Tutor role and responsibilities clearer in light of the existence of the Student Learning Advisor post.

2.3 The review panel **commends** the commitment of the School to the creation of the Student Learning Advisor post; that the incumbent is a Maths specialist and a tutor to year one undergraduate students; and the performance and visibility of this role within the School. The review panel **suggests** that the School shares the success of the Student Learning Advisor post across the College and the rest of the University, and also considers a similar role for Mathematics postgraduate taught students.

2.4 Postgraduate students were happy with the availability of their Personal Tutors, either in person or via Skype, but it became clear that they were uncertain as to their second point of contact should their Personal Tutor be unavailable. The review panel **recommends** that the School consider the amount of information on Personal Tutor systems and the general communication with postgraduate students to ensure that this is of an equally high standard as that provided to undergraduate students.

2.5 The review team **commends** the School's very clear and defined strategy for supporting undergraduate students through their degrees with MathsPAL, Piazza as an online discussion forum, open book exams in Year One and Two, and the provision of the Maths Base and the Maths Hub for pre-honours and honours students. However, the high level of student support particularly in Year One sets students' expectations for future years and although the School wishes to develop students as independent learners the review panel **recommends** that the School consider the transition of support from year one to year two to possibly rebalance the level of support given between the two prehonours years.

2.6 In meeting with the Computing Manager the review panel learnt that the School computing team currently support the postgraduate students and staff with plans to extend this provision to undergraduate students during summer 2016. This will take place by establishing a joint helpdesk with the School of Physics and Astronomy, which will be operated by three students employed on a sandwich placement from Napier University. The review team **commends** the policy for computing support, the standard of support offered by the computing support team currently and its active planning to extend this to undergraduate students.

Student engagement

2.7 With the implementation of the Maths Base in Appleton Tower, the Maths and MSc Hubs in James Clerk Maxwell Building, MathPALs, weekly workshops/tutorials, and Piazza as an online discussion forum the School has encouraged student engagement on many levels. The postgraduate students appreciated receiving regular emails from the Head of School, finding them interesting, but would like more organised postgraduate social events for greater interaction across the programmes. In discussion with undergraduate students it was clear that the Maths Base and its staffing by PG

tutors who also tutor year one courses is much appreciated. The review panel **commends** the School for establishing a strong academic and learning community.

2.8 It is evident that the School welcomes student feedback through various channels including the Staff Student Liaison Committees (SSLC) at undergraduate and postgraduate levels, through 'Dear Head of School' suggestion boxes, and by inviting student representatives on the Teaching Programmes Committee and Working Parties set up to propose new ways of working. The review panel **commends** the School for responding to student feedback/views in particular responding to the undergraduate SSLC request that the exam diet be split to December and May and to keep this under review going forward.

2.9 Graduate attributes are developed through group work/presentations/projects across the undergraduate curriculum, and through discussions with either Personal Tutors or the Careers Service with regard to career progression for both undergraduate and postgraduate students. Postgraduate students have also had the opportunity to attend workshops delivered by external companies and receive many emails offering potential PhD positions.

Approach to promoting an accessible and inclusive learning environment for all students

2.10 The undergraduate student population in the School is currently 50:50 female to male, and 60:40 female to male in postgraduate taught student population. The proportion of female academic staff is 11%, or 17% if including Post-Docs (which is close to the Russell Group average).

2.11 The School ensures female representation during Outreach events in local secondary schools and the Workload Allocation Model for the female staff is adjusted to reflect their greater involvement on interview panels and outreach events.

2.12 'Is there a PhD in my future' was set up to encourage female students to continue to postgraduate research studies, and the School is currently writing an application for an Athena Swan silver award.

2.13 As evidenced in Appendix 1, all course materials are made available to undergraduate and postgraduate students on the virtual learning environment, LEARN. These materials are provided in advance of lectures, as far as possible, in compliance with the University's Accessible and Inclusive Learning Policy.

Learning and Teaching

2.14 The curricula design and development has been a major focus within the School over the last few years at undergraduate and postgraduate level as evidenced by flipped classrooms, Top Hat, online reading tests, open book exams, and establishing new BSc and MSc programmes.

2.15 The School manifestly wishes to develop learning and teaching methods further with the appointment of the Chair in Technology Enhanced Science Education (TESE) to embed computing and eAssessments more in the curriculum. The Head of School has set up a Working Party to review computing in the curriculum with a remit to report to the Board of Studies in autumn 2016, with agreed outcomes being implemented in 2017/18 academic year. The review panel **commends** the School for the establishment of the Working Party to explore computing and programming in the curriculum.

2.16 To support the University's Internationalisation theme the School hosts Visiting Students, and students on the School's undergraduate programmes have the opportunity to study abroad during year three of their undergraduate degree, however, it is the School's intention to move the current year abroad for MMath students from year three to year four. These arrangements are either set by the School (through

ERASMUS) or by the International Office. Visiting Students either enrol for a whole academic year or for one semester.

2.17 Students receive a transcript from the hosting institution indicating their results, and those students who receive a 'pass' are awarded 120 credits for their year abroad study. However the year abroad is not considered in the classification of their degree award (i.e. it is based on their Year 4 average alone; or Years 4 and 5 on the MMath programme). Students studying abroad will continue to be supported by their Personal Tutors. To encourage more students to exploit the year abroad opportunities the review panel **suggests** that there is a formal debrief of returning students with the chance for them to share their experiences with year two students considering studying abroad in year three or four.

2.18 A growth in Visiting Student numbers within the School will have resource implications e.g. setting exams outside the normal exam diet. The review panel **recommends** that the School allocate more resource upfront to accommodate increased Visiting Students, 2+2 students, and greater study abroad options in order to maintain the current high standards provided.

2.19 The analytical report and discussions with the School demonstrate the wish to strengthen industrial links and placements to increase career orientation for initially postgraduate students and, in the longer term, for undergraduate students.

2.20 In discussions with the postgraduate students most expressed an expectation that a summer placement with an industry partner would be available. Students conveyed differing levels of information and support in choosing their industry placement / theoretical project. Some students weren't sure of the process or deadlines for choosing projects whilst others felt they had good support from their Programme Director and other staff.

2.21 Currently the School has one part-time resource for a part of the academic year to source projects or placements for postgraduate taught students. There is currently competition amongst the postgraduate students for the industrial placements; allocation is made either through student choice, outcome of interviews by the industrial partner, or allocation by School to the student with the highest marks in coursework and assessments. The review panel **recommends** that the School and College consider whether the postgraduate taught programmes are adequately resourced in relation to their strategic ambitions and in particular appoint a Business Engagement Manager and convene an Industrial Advisory Board to support the enhanced development of postgraduate industrial links.

Assessment and Feedback

2.22 The School reported that it is in favour of the University agenda to reduce the quantity of summative assessment placed on undergraduate students particularly during the later years of their degree courses. Year one and year two undergraduate students currently receive weekly summative assessments and a large number of exams in single diets. The School wishes to be more creative in reducing summative assessment possibly by using more formative assessment, restricting each exam diet to no more than three exams or eAssessments where possible and appropriate.

2.23 In discussion with pre-honours students they expressed a liking for the open book exams however the majority of those present felt confident enough not to use text books during the exam. The students were also happier that some of the semester one courses were examined in December rather than all exams taking place in May; however this can allow little time between the end of teaching and the exam diet.

2.24 The School would wish to return to offering 15-credit courses, and hence eight exams in total in any academic year, however these were eliminated by the University Curriculum Project and now only exist within the School on the joint MSc with Heriot Watt University. An alternative would be to bundle two 10-credit courses together and

examine on one paper but this is not seen by some members of the School as a viable alternative as this would reduce student choice, and might mean that the full extent of the courses could not be assessed.

2.25 Postgraduate students also have a spread of exams between the December and May diets. Some of the semester one courses are 100% assessed on coursework and the majority of exams continue to be timetabled for May.

2.26 The review panel **recommends** that the School continue to actively explore various possibilities of reconfiguring aspects of the curriculum in favour of courses attracting larger number of credits in relation to reducing summative assessment.

2.27 With regard to the clarity, fairness and efficiency of the School's assessment processes undergraduate external examiners asked that the Board of Examiners consider how overall grade drift might be assessed, and what mechanisms are available to compensate for it.

2.28 The School recognises that there is variation in standards and approach of assessment across courses, but that consistency needs to be maintained. Scaling of grades is one way of ensuring this consistency, however this is currently only available at the pass/fail and A/B boundaries. The panel felt that this two-point scaling system is limiting and does not support a numerical marking system appropriate for Mathematical Sciences.

2.29 The review panel **recommends** that the School gives careful consideration to the issue of scaling in light of the external examiners' comments and the panel feels that scaling is appropriate and that scaling points at all boundaries between grades should be used.

2.30 The School noted that the quality of feedback to students could be problematic with between thirty to forty tutors marking assessments in year one undergraduate courses alone, however it wishes to maintain a consistently high quality of feedback to students whether from PG Tutors, lecturers or Course Organisers.

2.31 Postgraduate students stated that the quality of feedback they received for assessments was variable with some being allocated a mark with no written feedback, and others waiting much longer than the designated three weeks for marks or feedback. The students asked that the best example of coursework/or the best solution submitted be available to view by other students on the course.

2.32 The issue is monitoring the quality of feedback being given to students as the coursework is being handed directly back to the student without the Course Organiser having sight of it. The review panel **recommends** that the Course Organiser role needs to have overall ownership of, and responsibility for, the delivery and quality of the tutoring and feedback; and that mechanisms are put in place to highlight early in the semester any potential problems.

2.33 The monitoring of turnaround times for the assessment and feedback of larger pieces of work is currently self-reporting through course reports completed at the end of each semester. For the majority of undergraduate courses tutors are allocated one hour of marking for each hour of contact with the students, although the multiplier has been revised for certain courses to allow one and a half hours of marking to each contact hour. The review panel **recommends** that the School revisit the Workload Allocation Model to review whether sufficient time has been allocated to feedback in all cases.

Supporting and developing staff

2.34 The review panel heard from PG Tutors and the Training and Recruitment Development Officer about the induction and training provided to PG Tutors. The School has been innovative in its approach to tutor training with 'marking parties' following the submission of the first piece of coursework by year one undergraduate students;

organising peer observations to commence in the coming weeks; and offering a 'good feedback and bad feedback' session during each Innovative Learning Week since February 2014. The review panel **commends** the School for these initiatives in its aim for a consistently high level of feedback to undergraduate and postgraduate students; and **suggests** that the School continues to encourage attendance at these for both PG tutors and staff.

2.35 The analytical report and discussions during the review highlighted the well-structured staff induction and development opportunities within the School, support from mentors and encouragement to develop through the Edinburgh Teaching Award. The review panel **commends** the School for embedding good practice and career development for the teaching staff through the Edinburgh Teaching Award and its accreditation to the Higher Education Authority.

3 Academic Standards

3.1 The School Board of Studies operates consistently with the UK Quality Code Chapter B1 (Programme design, development and approval), and also ensures that all courses and programmes align with the University's Curriculum Framework, SCQF Framework levels and credit values, and subject benchmark statements.

3.2 The School has a robust, multi-layered set of processes in place for the approval of changes to existing courses and programmes, or for the approval of new courses and programmes. Proposals are put forward and discussed at working parties, teaching committees and the Board of Studies. Membership of the Board includes student representatives and staff external to the School (usually related to combined degrees).

3.3 The information provided to the panel prior to the review included external examiner reports, as evidenced in Appendix 1. The 2014/15 reports demonstrate that the School's academic standards for undergraduate and postgraduate taught programmes are higher than, or excellent in comparison with, most other institutions within the UK.

3.4 These reports also demonstrate that the School is responsive to external examiner comments, which are considered by the Teaching Programmes Committee whose responses are coordinated by the School Director of Quality and further considered by the College Quality Assurance Committee. One of the Honours external examiner comments expressed concern over the scaling of marks; this has been considered within sections 2.27, 2.28 and 2.29 above.

3.5 Annual monitoring of courses is undertaken through electronic questionnaires completed by all lecturers and course organisers at the end of each semester. The results from these questionnaires are considered by School teaching committees and included in the School QA report to the College. In discussion the panel were provided with examples of measures taken to address any concerns raised through this monitoring process.

3.6 It is evident that the School welcomes student feedback and responds to requests for changes in processes, as detailed in section 2.8 above.

3.7 Professional body requirements pertain to two of the School's undergraduate programmes: BSc (Hons) Mathematics and Business which was accredited in 2014-15 by the Association to Advance Collegiate School of Business (AACSB), and BSc (Hons) Mathematics and Statistics which was accredited in February 2016 by the Royal Statistical Society. These accrediting bodies were not invited to comment on the teaching and academic standards of the School as the accreditations have been awarded so recently.

4 Collaborative activity

4.1 Currently the School offers one programme in collaboration with an outside Institution: MSc Financial Mathematics. It is delivered in coordination with Heriot Watt

University; the programme management committee, with members from both Universities, oversees the planning, strategy and quality control of the programme.

4.2 The School also offers five combined undergraduate programmes, with teaching from other schools within the University of Edinburgh, for which it is administratively responsible. A further six undergraduate and one postgraduate programmes involve teaching from Mathematics but are administered from outside the School.

5 Self-evaluation overview

The review team identified the following areas as particularly successful within the School of Mathematics:

Building an academic community

The School has built a strong academic community despite the year one pre-honours students being situated on a different campus. With Induction events, the UG handbook, the student hubs, MathPALs, Piazza, and the ongoing support of the Personal Tutors and Student Learning Advisor the School offers an accessible and inclusive learning environment providing numerous opportunities for students to engage with staff and other students throughout their degrees.

Increased NSS overall satisfaction score

Following a fundamental review of undergraduate curricula from 2011 to 2015 the School now benefits from a strong syllabus with innovative teaching and assessment methods (flipped classroom and reading tests) in years one and two and a wider choice of subjects in the honours years. The positive impact of this renewal of curricula can be seen in the increase of the NSS overall satisfaction score from 66% in 2014 to 94% in 2015.

6 Confidence statement

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

7 Prioritised list of commendations and recommendations

Key Strengths

Priority	Section	Commendation
1	1.3	The review team **commends** the leadership and staff of the School for its professionalism and commitment to delivering a high quality teaching and learning experience
2	1.2	The review team **commends** the achievement of the students at undergraduate and postgraduate levels.
3	1.4	The review team **commends** the School on its significant improvement in the National Student Survey (NSS) overall satisfaction score from 66% in 2014 to 94% in 2015.
4	2.7	The review panel **commends** the School for establishing a strong academic and learning community.

5	1.5	The review team **commends** the Mathematics Teaching Organisation (MTO) on its immense contribution to undergraduate and postgraduate taught student support.
6	2.5	The review team **commends** the School's very clear and defined strategy for supporting undergraduate students through their degrees with MathsPAL, Piazza as an online discussion forum, open book exams in Year One and Two, and the provision of the Maths Base and the Maths Hub for pre-honours and honours students
7	2.3	The review panel **commends** the commitment of the School to the creation of the Student Learning Advisor post; that the incumbent is a Maths specialist and a tutor to Year One undergraduate students; and the performance and visibility of this role within the School.
8	2.8	The review panel **commends** the School for responding to student feedback/views in particular responding to the undergraduate SSLC request that the exam diet be split to December and May and to keep this under review going forward.
9	1.5	The review team **commends** the School's creation of the Deputy Director of Teaching post and this role's close collaboration with staff within the MTO.
10	2.1	The review panel **commends** the quality of the School's undergraduate handbook, undergraduate Induction event during Fresher's Week, with breakout sessions, and a follow-up event later in semester one.
11	2.35	The review panel **commends** the School for embedding good practice and career development for the teaching staff through the Edinburgh Teaching Award and its accreditation to the Higher Education Authority.
12	2.34	The review panel **commends** the School for its initiatives in supporting and developing PG tutors in its aim for a consistently high level of feedback to undergraduate and postgraduate students.
13	2.15	The review panel **commends** the School for the establishment of the Working Party to explore the increased use of computing and programming in the curriculum.
14	2.6	The review team **commends** the policy for computing support, the standard of support offered by the computing support team currently and its active planning to extend this to undergraduate students.

Recommendations for enhancement/areas for further development

Priority	Section	Recommendation
1	1.4	The review panel **recommends** that the School continue to build on the upward trend of the NSS scores by maintaining progress in improving the quality of its feedback to students.
2	2.32	The review panel **recommends** that the Course Organiser role needs to have overall ownership of, and responsibility for, the delivery and quality of the tutoring and feedback; and that mechanisms are put in place to highlight early in the semester any potential problems.

3	2.2	The review team **recommends** that the School make the undergraduate Personal Tutor role and responsibilities clearer in light of the existence of the Student Learning Advisor post.
4	2.5	The review panel **recommends** that the School consider the transition of support from Year One to Year Two to possibly rebalance the level of support given between the two prehonours years.
5	2.4	The review panel **recommends** that the School consider the amount of information on Personal Tutor systems and the general communication with postgraduate students to ensure that this is of an equally high standard as that provided to undergraduate students
6	1.6	The review team **recommends** that the School carefully consider whether the current level of staffing in the MTO is sufficient given this recent growth and the proposed introduction of new courses and programmes
7	1.6	The review team also **recommends** that the School more actively seeks the views of, and engages with, the MTO staff including issues related to change management and the introduction of new courses
8	2.21	The review panel **recommends** that the School and College consider whether the postgraduate taught programmes are adequately resourced in relation to their strategic ambitions and in particular appoint a Business Engagement Manager and convene an Industrial Advisory Board to support the enhanced development of postgraduate industrial links.
9	2.26	The review panel **recommends** that the School continue to actively explore various possibilities of reconfiguring aspects of the curriculum in favour of courses attracting larger number of credits in relation to reducing summative assessment.
10	2.29	The review panel **recommends** that the School gives careful consideration to the issue of scaling in light of the external examiners' comments and the panel feels that scaling is appropriate and that scaling points at all boundaries between grades should be used.
11	2.18	The review panel **recommends** that the School allocate more resource upfront to accommodate increased Visiting Students, 2+2 students, and greater study abroad options in order to maintain the current high standards provided
12	2.33	The review panel **recommends** that the School revisit the Workload Allocation Model to review whether sufficient time has been allocated to feedback in all cases.

C. Appendices

Appendix 1 additional information considered by review team

Prior to the review visit

- School Quality Assurance Reports (2011/12, 2012/13, 2013/14, QA taught Model December 2015)
- External Examiner reports and responses (2012/13, 2013/14, 2014/15)
- School organisation chart
- Current School staff information
- Student Staff Liaison Committee meeting minutes (Undergraduate 2012/13, 2013/14, 2014/15; Postgraduate 2012/13, 2013/14, 2014/15)
- Undergraduate Student Handbook, Programme handbooks and sample of course handbooks
- Course Assessment Rules (Postgraduate and Undergraduate)
- Undergraduate course information on LEARN
- PTES results (2012/13, 2013/14, 2014/15)
- NSS results (2012/13, 2013/14, 2014/15)
- ESES results (2012/13, 2013/14, 2014/15)
- UG and PGT statistical information
- University Learning and Teaching Enhancement Strategy
- College of science and Engineering Learning and Teaching Strategy
- UG and PGT degree programme specifications
- UG and PGT degree programme tables
- Overview of key features of relevant Student Support Services provisions (Careers Office, Disability Office, International Office, Student Administration)
- University of Edinburgh Standard Remit
- School Remit
- 2009/10 TPR report and response
- 2014/15 PPR report and response
- Quality Assurance Agency subject benchmark statement
- Reflective overview of key findings for internal review
- Background data for first destination information
- Institute for Academic Development Case Study wiki
- Undergraduate degree classification report
- Undergraduate Personal Tutor survey results

During the review visit – Not Applicable

Appendix 2 Number of students

Undergraduate Student Numbers (full-time and part-time headcount)

Programme	**2010/11**	**2011/12**	**2012/13**	**2013/14**	**2014/15**
Applied Mathematics (BSc)	2	3	2	7	4
Mathematics (BSc)	47	44	50	63	64
Mathematics (MA)	13	5	2	6	8
Mathematics (MMath)	1	24	35	38	25
Mathematics (Pure Mathematics) (MA)	11				
Mathematics (IFP) (BSc)		1			1
Mathematics and Biology (BSc)					
Mathematics and Business (BSc)				1	6
Mathematics and Business Studies (BSc)	11	6	7	4	
Mathematics and Music (BSc)	6	2	2		4
Mathematics and Physics (BSc)	7	5	10	11	4
Mathematics and Statistics (BSc)	8	11	16	8	14
Mathematics with Management (BSc)	3	2	2	1	2
UG Programme Total	**109**	**103**	**126**	**139**	**132**

Postgraduate Taught Student Numbers (full-time and part-time headcount)

Programme	**2010/11**	**2011/12**	**2012/13**	**2013/14**	**2014/15**
Computational Mathematical Finance (MSc)					
Financial Modelling and Optimization (MSc)	6	12	14	18	14
Financial Operational Research (MSc)			20	9	9
Mathematics (MSc)	10	6	9	2	
Operational Research (MSc)	23	17	22	10	14
Operational Research with Computational Optimization (MSc)	5	2	9	5	5
Operational Research with Energy (MSc)	3	1			
Operational Research with Finance (MSc)	21	31			
Operational Research with Risk (MSc)	4	3	10	5	5
Statistics and Operational Research (MSc)	5	8	13	14	14
PGT Programme Total	**77**	**80**	**97**	**63**	**61**

Increased workload within the MTO

	2012/13	**2013/14**	**2014/15**	**2015/16**
Enrolments across Courses	4,016	4,479	5,146	6,146
MTO Course Count	82	93	106	121

D. Responsibility for actions

Recommendation	Responsibility of
The review panel **recommends** that the School continue to build on the upward trend of the NSS scores by maintaining progress in improving the quality of its feedback to students.	School
The review panel **recommends** that the Course Organiser role needs to have overall ownership of the delivery and quality of the tutoring and feedback; and that mechanisms are put in place to highlight early in the semester any potential problems.	School
The review team **recommends** that the School make the undergraduate Personal Tutor role and responsibilities clearer in light of the existence of the Student Learning Advisor post.	School
The review panel **recommends** that the School consider the transition of support from Year One to Year Two.	School
The review panel **recommends** that the School consider the amount of information on Personal Tutor systems and the general communication with postgraduate students to ensure that this is of an equally high standard as that provided to undergraduate students	School
The review team **recommends** that the School carefully consider whether the current level of staffing in the MTO is sufficient given this recent growth and the proposed introduction of new courses and programmes	School/College Learning & Teaching Committee
The review team also **recommends** that the School more actively seeks the views of, and engages with, the MTO staff in relation to change management and the introduction of new courses	School
The review panel **recommends** that the School and College consider whether the postgraduate taught programmes are adequately resourced in relation to their strategic ambitions and in particular appoint a Business Engagement Manager and convene an Industrial Advisory Board for postgraduate industrial links.	School / College Learning & Teaching Committee
The review panel **recommends** that the School continue to actively explore various possibilities of reconfiguring aspects of the curriculum in favour of courses attracting larger number of credits in relation to reducing summative assessment.	School / College Learning & Teaching Committee
The review panel **recommends** that the School gives careful consideration to the issue of scaling in light of the external examiners' comments and the panel feels that scaling is appropriate and that scaling points at all boundaries between grades should be used.	School
The review panel **recommends** that the School allocate more resource upfront to accommodate increased Visiting Students and greater study abroad options in order to maintain the current high standards provided	School/College Learning & Teaching Committee
The review panel **recommends** that the School revisit the Workload Allocation Model to review whether sufficient time has been allocated to feedback in all cases.	School

Follow-up to the review

The following reports and response are made in the first instance to Senate Quality Assurance Committee, copied to the Associate Dean Quality Assurance & Enhancement:

- The review report
- The 14 week response from the subject area/School
- The year-on report

Thereafter annual reporting on progress towards meeting recommendations will be made through the annual School report to the College Quality Assurance committee or equivalent, which in turn reports to Senate Quality Assurance Committee.