

# UNIVERSITY OF GLASGOW

## Academic Standards Committee – Summer Powers

### Periodic Subject Review: Review of School of Mathematics and Statistics held on 17 and 18 March 2016

Mrs Catherine Omand, Clerk to the Review Panel

#### Review Panel:

Professor Neal Juster	Senior Vice Principal, Panel Convener
Professor David Leslie	University of Lancaster, External Subject Specialist
Professor Niall MacKay	University of York, External Subject Specialist
Professor Quintin Cutts	School of Computing Science, Cognate member
Ms Una Marie Darragh	Student member
Dr Duncan Ross	Senate Assessor on Court
Dr Michael McEwan	Learning and Teaching Centre
Mrs Catherine Omand	Senate Office and Clerk to the Review Panel

#### 1. Introduction

- 1.1 The School of Mathematics and Statistics was formed in 2010, following University restructuring, bringing together the Department of Mathematics and the Department of Statistics. It is one of seven schools of the College of Science and Engineering. Mathematics was last reviewed in February 2009 and Statistics in February 2010. Both Departments were commended for the quality of provision and conscientious approach to student support. All recommendations arising from the Departmental Reviews were satisfactorily addressed.
- 1.2 The Self Evaluation Report (SER) was prepared by a small steering group, composed of academic and administrative staff across the School chaired by the School's Learning and Teaching Convener, Professor John McColl. All staff had been invited to provide comments in relation to learning and teaching. Dr Angela Jaap, from the Academic Development Unit, had been invited to facilitate focus groups with Graduate Teaching Assistants (GTAs) and other tutors and demonstrators and with student representatives on the Student-Staff Liaison Committees. A final draft was uploaded onto Moodle to provide all staff and students an opportunity to comment on it, prior to the final submission to the Review Panel. Students who met with the Panel confirmed that they had been made aware of the Periodic Subject Review process and the SER had been made available to them, with some of the students contributing to it.
- 1.3 The Review Panel met with the Head of School, Professor Adrian Bowman, the Learning and Teaching Convener for Mathematics, Professor Tara Brendle, 14 Mathematics students, 10 Statistics students, 3 2+2 students, 5 Postgraduate Taught students, 23 members of staff (including senior and junior academics with a range of responsibilities, as well as administrative and IT staff), 7 GTAs, 4 probationary/early career staff and the Dean (Learning and Teaching) for the College of Science and Engineering. Unfortunately, Professor McColl was on sick leave at the time of the review and was therefore unable to meet with the Panel.

#### 2. Background information

- 2.1 The School has a total of 81 members of staff (77.45 FTE), with 57 academic staff (55.75) across Applied Mathematics, Pure Mathematics and Statistics. Most academic staff are research active and the School is ranked 8<sup>th</sup> in the UK for research intensity.

## 2.2 Student numbers for 2014-15 were as follows

	FTEs
Mathematics (UG)	662
Statistics (UG)	200
PGT	27

The School normally has 600-700 students (200+ FTEs) in Level 1 and approximately 150 (100 FTEs) in Levels 3 and 4. The large number in Level 1 reflects the level of service teaching undertaken by the School. There was a total of 84 international students in Session 2015-16.

## 2.3 The School offers a substantial range of provision:

	MSci	BSc (Hon)	MA (Hon)	BSc	BEng/MEng (with School of Engineering)	Collaborative	PGT	MRes
Mathematics	9	15	2	1	1 <sup>1</sup>	2 2+2 BSc Hon	2 <sup>2</sup>	
Statistics	3	4		2	1 <sup>3</sup>	1 double degree and 1 2+2 BSc Hon	6 <sup>4</sup>	1

A total of nine programmes are to be phased out: 8 Mathematics Undergraduate programmes and 1 MSc in Statistics. Please refer to Appendix 1 for full details.

## 3. Context and Strategy

### 3.1 Context and Vision

3.1.1 From the SER, and from discussion with the Head of School, the main strategic objective for the School was to remain broad based, offering a wide range of degree programmes, covering the main areas of Pure Mathematics, Applied Mathematics and Statistics. The School endeavoured to maintain a balance of staff appropriate to the workloads experienced by the different areas (SER, 2.1.2, page 3). At the initial meeting with the Head of School, the Panel was advised that teaching provision and student employability were central to the School's strategy and the breadth of provision reflected this, including collaborative provision. There were plans to further develop and enhance MSc activity. There had been significant staff changes during the last eight years, mainly due to a large number of retirements, with new international appointments having been made. It was considered that this had enhanced provision. The Review Panel was satisfied with this vision, acknowledging the substantial range of degree programmes available, including several new MSc programmes, three new collaborative undergraduate degrees (two with Chinese institutions, one with Bologna in Italy) and a new programme in Statistics offering a work placement year. The Panel **commends** the vision and effort by the School in its breadth and range of provision, although it recognised that student numbers were limited in relation to collaborative provision.

3.1.2 As a consequence of restructuring, the Review Panel acknowledged that the School had relatively recently been established and inquired as to how well the School was

<sup>1</sup> Two core courses

<sup>2</sup> also provision of courses for the Scottish Mathematical Sciences Training Centre (SMSTC)

<sup>3</sup> One core course

<sup>4</sup> As Mathematics, courses provided for SMSTC. Two of the MSc are joint: one with Computing Science (3 optional courses and 1 with the Adam Smith Business School – 6 core courses)

functioning, integrating the two subjects. The Head of School advised that there was a strong overall commitment to the provision of good teaching and restructuring had provided opportunities to share good practice, as well as strengthening research groups. However, it was acknowledged that it needed time to embed further. The School had only been functioning as a School for 5 years, but both the School and the College were developing strong collegiality.

- 3.1.3 The Panel queried as to why the School had separate Subject Learning and Teaching Committees (LTC). The Head of School clarified that these were formally sub-committees of the School LTC and this had been considered the most appropriate structure to address detailed teaching requirements for each subject. The Panel was advised that the Conveners of both subject LTCs, Professor Brendle and Dr Evers, worked closely together, benefitting from the exchange of ideas. Such exchanges fed into School strategy at the School Learning and Teaching Committee and Staff Student Liaison Committees. Merging of some systems, such as the on-line assessment in Mathematics, had not taken place as the software was not suitable for Statistics, which was better supported by the bespoke Moodle system designed. However, the School had been successful at merging a number of processes, such as the combined examination system. The Review Panel **commends** the work undertaken, to date, in merging some processes but, whilst acknowledging the distinctiveness between the subject areas, the Panel **recommends** the School continues to develop a strategic approach to quality enhancement, adopting a more systematic approach to the sharing and dissemination of good practice between colleagues in Mathematics and Statistics.
- 3.1.4 The Head of School was asked what the School's strategy was in relation to Postgraduate Taught provision. Professor Bowman confirmed that the capital cost of PGT provision was considerable, with interest in Mathematics small compared to Statistics, where there was a stronger market potential. Resourcing of PGT provision was not upfront which caused anxiety as existing School staff carried the increased teaching and assessment burden. There was also limitation in relation to project supervision and how many students could be allocated per member of staff. However, there were significant plans for expansion at MSc level under a data Analytics banner and a PhD with integrated study was also being put in place. Additional 2+2 arrangements may also be pursued.
- 3.1.5 The Review Panel was aware that, due to substantial University estates' plans, the building the School was based in was to be demolished. Discussions were underway in relation to both temporary and long-term accommodation. At the meeting with the Head of School, Professor Bowman confirmed that the move was unsettling and there was concern regarding the impact this would have on the student experience. Both Professor Bowman and Professor Brendle were members of the Project Board overseeing the potential move of Mathematics & Statistics and Estates and Buildings had given reassurance that re-location would only take place if the School was satisfied that the accommodation provided met their needs. The Student Representatives Council (SRC) Mathematics and Statistics representatives (both incoming and outgoing) had also been included in project board meetings and consulted with. Estates and Buildings had given assurance relocation would be delayed if the School was not satisfied. It is anticipated that the School would move in December 2016.

### 3.2 Strategic approach to enhancing learning and teaching

- 3.2.1 From the SER and, in discussion with the Head of School, it was evident that the School was undertaking a number of learning and teaching initiatives. The Panel **commends** the School for the level of innovation being introduced, transforming how undergraduate Mathematics and Statistics was taught. The Panel had been impressed by the quality and commitment of the early career staff that they had met with. It was evident that these new members of staff were enthusiastic, bringing new

ideas on how to improve teaching which was clearly enhancing provision. The Panel **recommends** that the School consider mechanisms for ensuring that all staff developing and introducing new methods of teaching continue to be recognised.

- 3.2.2 The Panel discussed with the Head of School how all staff were encouraged to engage with learning and teaching enhancement and how teaching was arranged as different teaching styles could cause variation in experience (please see comment raised by students under 4.4.7). Professor Bowman confirmed that the School sought to build and develop enhancements across the School with discussion and feedback taking place at Learning and Teaching Committees as well as through open staff discussion. The recent appointment of two University Teachers reflected the School's commitment to teaching.
- 3.2.3 In addition to the increase in international students, the recent international staff appointments gave students an opportunity to experience different perspectives in relation to educational, cultural and scientific backgrounds. Careful consideration would also be given to future appointments, ensuring there was good coverage across Applied Mathematics, Pure Mathematics and Statistics.
- 3.2.4 The School undertook a substantial level of service teaching in Levels 1 and 2 Mathematics, but it was unclear to the Panel as to how the School liaised with other disciplines. The Panel therefore **recommends** that the School considers establishing a more formal relationship with 'client' subjects and Engineering to discuss teaching provision and possible alternative ways to support students from outside of the School (please also refer to recommendation under 5.1.1).

## 4. Enhancing the Student Experience

### 4.1 Admissions, Retention and Success

- 4.1.1 At the meeting with the Mathematics students, the benefit of the flexible degree structure at the University of Glasgow was highlighted. A few of them had been undecided on what they wished to study on entering university and the flexibility gave them an opportunity to decide whilst at university. A couple of the students indicated that they had originally entered the University to study other subjects but had switched to Mathematics. A couple of students from the UK, but outside of Scotland, highlighted that they had not been aware of the flexible degree structure and that the University should promote this aspect more in recruitment material and Open Days. It was also noted that one of the English students had been discouraged from applying to Scottish institutions due to the additional year of study, without recognition of the benefit of flexibility and range. However, one student highlighted that flexibility between Colleges was less so, as some Colleges now had specific requirements for progression. The Panel **recommends** that the Senate Office bring the issue of recruitment material to the attention of the Marketing, Recruitment and International Office (MaRIO) and the issue of limited flexibility of choice between Colleges to Academic Standards Committee.
- 4.1.2 The Panel was advised at the meeting with staff that recruitment to Statistics was different to Mathematics. As Mathematics was taught at School, it obtained wider, general interest, whilst Statistics was more subject-specific with students entering via Mathematics or from students with a particular interest in the subject. As such, the School catered for a diverse range of student.
- 4.1.3 The number of outreach activities was considered **impressive** by the Panel. This included the Schools Maths Challenge and Masterclasses arranged with local schools and week-long taster events held for fifth and sixth year secondary school children applying for University. The School participated in the University's Access Summer School organised over several weeks by Marketing, Recruitment and International Office (MaRIO). The School had advised the Scottish Qualifications Authority (SQA) when it was developing the syllabus of the new Statistics Advanced

Higher. The School had also hosted a workshop for teachers to assist with the delivery of the new course. The School planned to introduce further activities for teachers and pupils. (SER 3.1.3, page 8)

- 4.1.4 The Mathematics students highlighted the difficulty for new students navigating *MyCampus* with it being unclear how to choose subjects. New students appeared unaware of what type of support, both academic and pastoral, should be provided by their Adviser of Studies with experience of support varying. Some students indicated that advice had to be sought rather than received. The Panel anticipated better support following the review of the Adviser of Studies system (please see 4.3.7).
- 4.1.5 The PGT students who met with the Panel advised that they had chosen Glasgow as it had either been recommended by friends or because of the University's reputation. The structure of the programme was also a main consideration. One of the international PGT students advised the Panel that one of the attractions of studying at Glasgow had been the size of the Muslim community. However, lack of a prayer room within the School and variety of food available on campus had been disappointing. The Panel agreed to bring this feedback to the attention of Student Support Services.
- 4.1.6 The Panel discussed with the staff, the high number of First Class degrees awarded in Mathematics and Statistics (37%) as compared to the College average of 25%. The staff affirmed that the large number of combined students and students from the 2+2 programmes were particularly strong and capable students. The Panel noted the very positive comments made by the External Examiners on the quality of the Level 4 projects which demonstrated excellence. The staff were confident that they were providing their students good grounding in Mathematics and Statistics with a degree which was well respected.

## 4.2 Equality and Diversity

- 4.2.1 A number of processes appeared to be in place to ensure the University's equality and diversity policy was adhered to. All staff had been encouraged to complete the Equality and Diversity Essentials training course, of which 84% of staff had completed at the time the SER had been written (SER, 3.2.1, page 11). Professor Brendle had also co-organised an Unconscious Bias Training Workshop at the International Centre for Mathematical Sciences in Edinburgh.
- 4.2.2 It was noted that the School was currently preparing an application for an Athena SWAN Bronze award, recognising the importance of an appropriate gender balance. (SER, 2.1.3, page 4)
- 4.2.3 The School recognised that, as the student population diversified, it was likely that more students would have additional requirements. The School had noticed an increase in the number of students with a diagnosis of Asperger Syndrome or Autism and as a result the School's Disability Officer had arranged a lunchtime lecture for all staff to be given by a speaker from the National Autism Society. (SER, 3.2.3, page 12). At the meeting with staff, it was confirmed that information on disability was downloaded from MyCampus by the administrative staff and was provided to academic staff. Staff confirmed that the School offered training and, if additional support was required, the Disability Service could be contacted for advice. The Panel was satisfied that the School was addressing equality and diversity effectively.

## 4.3 Supporting Students in their Learning

- 4.3.1 The role and use of Help Rooms was discussed at the meeting with the Head of School. It was noted that these were led by Level 5 students and had initially been introduced to provide extra support for Mathematics Honours students. Those students who had used the help rooms had benefitted greatly, although they were under-utilised. Attendance had improved during Semester 2 of this Session, due to

changes made to the timetable. The MacSoc (Maclaurin Student Society) has also run a voluntary help room for Level 1 and 2 students since Session 2014-15 and the success of these were being monitored. Feedback from the students had been excellent, but there was concern that the volunteers may not have the appropriate knowledge and therefore, the SRC School representative was hoping to organise some training for the volunteers.

- 4.3.2 From the SER (3.3.2, page 14), the School was exploring the possibility of replacing Level 2 tutorials with help rooms to address issues with engagement. The Statistics students confirmed that they found the help rooms useful, particularly during the examination period. However, the Review Panel expressed caution regarding the removal of the one-to-one link between tutor and student provided within a tutorial setting and that further consideration should be given as to why students were not engaging with the tutorial and what would incentivise students to attend. (please see 4.4) Tutorials were also useful for providing valuable feedback on assessment. If students were getting sufficient feedback elsewhere, the purpose of the tutorial should be amended to provide alternative learning opportunities for the students. This is discussed in more detail at 4.4.
- 4.3.3 At both the meetings with the Mathematics and Statistics students, the students emphasised a sense of belonging to the School, with staff considered approachable and friendly. Staff had always made themselves available whenever emailed. The Mathematics students highlighted that the element of belonging was more heightened when entering Level 3, particularly as access was given to the staff and student common room at this level. The Statistics students advised that it was more difficult approaching staff in Levels 1 and 2, due to the large class sizes and therefore more anonymity. Students from the 2+2 programmes confirmed that they had been well supported on arrival at the School. The PGT students also confirmed that staff were approachable, friendly and supportive.
- 4.3.4 At the meeting with the Statistics students, the Panel sought feedback on the Maths Skills test. The students advised that it was useful as it allowed students to refresh their skills. It was considered particularly valuable for students who had entered University with Higher level mathematics rather than Advanced Higher or A level. Students from outside of the UK found it beneficial as it provided good feedback and gave them confidence that their ability matched requirements. Some frustration was caused by the way marks were calculated; if a mistake was made, a mark of zero was awarded, without highlighting where the error took place. Students were given 3 opportunities to correct before having to commence the test again. Those entering with Highers tended to find the test more difficult. It was suggested alternative provision could be made for those students who passed the test early in the year. Overall, the students considered the test served a valuable purpose and was worth undertaking.
- 4.3.5 Professor Bowman highlighted that, although the staff:student ratio had recently decreased, it was still high when compared with the Russell Group benchmark. The School had introduced a number of teaching, research and administrative initiatives to remove some pressure, and recent appointments had also alleviated this to a degree. The new appointments had been based on teaching ability as well as research.
- 4.3.6 At the meeting with the Head of School, the Panel inquired as to why Mathematics held 'Office Hours', whilst Statistics offered 'Open Door' to support students and whether the School had considered adopting one policy. It was noted that Mathematics had tried 'Open Door' but it had not worked, mainly due to the difference in student numbers. Mathematics staff each offered 2-3 hours Office Hours per week, depending on class. Students were also able to make an appointment with a member of staff if unable to make Office Hours. The students that the Panel met with were satisfied with these arrangements.

- 4.3.7 The Panel noted from the SER (Section 3.3.4, page 15) that the School planned to review the Adviser of Studies system to ensure greater consistency of advice. The current system of one Senior Adviser of Studies with all full-time members of staff acting as Advisers of Students was considered counter-productive as it prevented staff from gaining experience and therefore impeded confidence. A more defined and dedicated group of Advisers with continued support from the Administrative and IT team was being considered. At the staff meeting, the staff highlighted the invaluable support provided by their Senior Adviser of Studies, but the Panel acknowledged the level of work this must create for this individual. The Panel **commends** the School's careful review of the Advising system in order to provide a more responsive service to their students, whilst recognising the practical challenges the School faced in introducing a smaller number of Advisers.

#### 4.4 Student Engagement

##### *Tutorials*

- 4.4.1 The issue of low Level 2 tutorial attendance was discussed throughout the Review with both staff and students and possible reasons why students were not engaging were explored. At the meeting with the Head of School, a number of issues were highlighted including: timetabling constraints, suitable room allocation, large classes, where often there could be a 15:1 student:demonstrator ratio and lack of one-to-one consultations. The Panel further noted that assignment marking and feedback to students was not necessarily provided by the same tutor.
- 4.4.2 At the meeting with the Mathematics students, the Panel was advised that the quality of tutorials varied. The least useful style was when a tutor 'lectured' questions at the board with little interaction with the students. Tutorials normally comprised of the tutor going through a number of questions and the level of usefulness was based on what questions were covered within the specified timescale. This could be unhelpful if the students did not need assistance with these specific questions or the student had fallen behind and had not yet attempted these questions beforehand. Students who had to travel to Glasgow advised that it was often easier and, more time efficient, to work through the problems at home rather than attend the tutorial. Some tutorials were also considered too large, covering too wide a range of ability. It was suggested that it would be useful if students were advised on the questions to be covered in advance of the tutorial.
- 4.4.3 The Statistics students advised that the tutorials did not work due to insufficient time allocated with normally one hour allocated for 10 questions. Students experienced difficulty with different questions and there simply was not sufficient time to cover all the questions. The Statistics students believed that attendance was higher for the Level 2 workshops. Students in Levels 3 and 4 were more likely to approach staff during 'open hours', if they were experiencing problems.
- 4.4.4 At the meeting with the early career staff, one of the members of staff advised that, although he had taught Level 3 and 4, at the beginning of the semester, the students had been invited to indicate what they had wanted to obtain from the tutorial. Based on their comments, teaching had been amended accordingly. Throughout the semester, an opportunity for changing the tutorial had been given to the students. Attendance had been satisfactory, and although it had dipped in the middle of the session, this was considered normal.
- 4.4.5 The Panel considered the role of tutorial as a useful learning and teaching resource and therefore a high risk to remove from the curriculum. The Review Panel, whilst sympathetic to constraints caused by infrastructure and aware that limited student engagement in mathematics tutorials was a universal problem and not restricted to Glasgow, **recommends** that the School considers further ways to engage students within tutorials. The Panel further **recommends** the School takes into consideration some of the suggestions raised by the students, in relation to breadth of style as well

as good practice already established within the School (such as co-opting the students with tutorial design).

- 4.4.6 The PGT students indicated a preference for additional tutorials. Currently one was held every 2 weeks and this was considered insufficient. The PGT students also indicated that they would welcome more group work.

#### *Lectures*

- 4.4.7 Variation in lecture technique was brought to the attention of the Panel by the Mathematics students, with some more engaging than others. Students had concerns that some lecturers were over reliant on their notes with students perceiving this as limiting the benefit of the class. Accommodation was also highlighted as having an impact on lecture attendance which could either be too large or too small. Students considered face-to-face contact important, but in larger classes this was often not possible.

#### *Employability and Graduate Attributes*

- 4.4.8 The limited number of students taking part in the Erasmus scheme was discussed with the Head of School. Professor Bowman advised that the scheme was well publicised and the skills gained by participation promoted. Students who had participated had been invited to speak to students about their positive experiences. However, the language barrier was still considered to be the main reason for non-participation. The Panel encouraged the School to continue with its efforts to increase participation.
- 4.4.9 At the meeting with the Mathematics students, employability and graduate attributes being attained were recognised, such as group work, presentation and communication skills. However, both the undergraduate and postgraduate Mathematics students, the Panel met with, had the impression that there was limited opportunity for group work, particularly when compared to other courses. The undergraduate students recognised the benefit of study groups, and arranged these themselves, although some anxiety was expressed in relation to the potential of plagiarism when studying together. Some Level 1 students had developed a Facebook page to discuss mathematics and provided hints. The PGT students that the Panel met with, advised that this aspect was not well integrated into the curriculum with general skills recognised only in the 'professional skills' course. More workshops on report writing and research would be welcomed as well as more group work. It was suggested that this could possibly be undertaken in tutorials, if specific tasks were set. The Review Panel, whilst acknowledging that students were obtaining a range of graduate attributes, considered these tended to be specific to particular programmes or tailored courses. The Panel **recommends** that the School considers ways of ensuring graduate attributes are embedded throughout the curriculum, in a manner which is clearly identifiable to the students.
- 4.4.10 It was clearly evident to the Panel that Statistics provided a professional environment to its students, offering a range of opportunity to learn professional skills, in particularly, the MSci (Work Placement) Statistics. The Panel agreed that this was an innovative and excellent addition to the School's portfolio, providing relevant industrial training. The Panel considered the use of Away Days which brought together students from the previous cohort with the current cohort with invited guest speakers and employers as **good practice**.
- 4.4.11 The Panel **commends** the use of the Maths Ambassador Scheme. This provided students with an opportunity to experience teaching and to explore an educational issue as part of an extended report, exposing the student to literature on Mathematics Education and learning and teaching in general. A weekly log book encouraged the students to reflect on learning (SER, pages 17 & 18, 3.4.3).

### **4.5 Effectiveness of Student feedback mechanisms**



- 4.5.1 At the meeting with the Mathematics and the Statistics students, satisfaction was expressed that the School responded to student feedback with students encouraged to complete end of course questionnaires. The Statistics students confirmed that changes had been made to Semester 2 teaching following feedback given at the end of Semester 1. At the staff meeting, it was confirmed that it was School policy to provide feedback from course evaluation both in class and on Moodle. However, during discussion with the students and staff, it became apparent to the Panel that, sometimes when the School had considered it had responded to an issue raised, the student perception was different (please see 4.5.3 and 4.5.4).
- 4.5.2 The students advised that some lecturers sought informal feedback near the beginning of the course, with a view to amending course delivery if required, but this was not standard practice. At the final meeting with the Head of School, it was acknowledged that Level Heads also received copies of course evaluation to take action as necessary. The Review Panel **commends** both the formal and informal course feedback mechanisms in place and **recommends** that the additional informal mechanism for obtaining feedback at the beginning of the course used by some members of staff be considered for adoption across the School.
- 4.5.3 The Panel sought clarification at the staff meeting as to whether there was a School mechanism in place for resolving potential issues. It was confirmed that students were encouraged to bring any issues to the attention of their class representative for discussion at the Staff Student Liaison Committee (SSLC). Minutes from SSLC were placed on Moodle. Alternatively, issues could be highlighted at 'Office Hours'. The Head of School dealt with complaints involving particular members of staff. If there was a perceived problem with a course, the Head would discuss with the teaching team/individual concerned to identify the level of the problem and often a workshop or focus group would be held with students for feedback. However, from the minutes of the SSLC, it was not apparent to the Panel as to how the School closed the feedback loop and the Panel **recommends** that, where action was taken to resolve issues, this should be clearly evidenced and communicated to the students ensuring closure of the feedback loop.
- 4.5.4 Those students who were class representatives advised that they attended the Staff Student Liaison Committee held each semester and would follow up or chase up issues raised by the students. In relation to the closure of the feedback loop, it was confirmed that most issues had been acted upon. One issue appeared unresolved this year, in relation to standard provision of solutions following tutorials. The Mathematics students would like to see this made compulsory and part of School policy as not all staff provided solutions. This was discussed further at the staff meeting, where it was confirmed that it was not School policy to provide solutions; although many staff did so, some staff had good reasons for not doing so. The Panel **recommends** that the reasons for not introducing a standard policy on the provision of solutions should be clearly communicated to students, including an explanation of why, in some instances, it was beneficial not to receive them, thus ensuring closure of the feedback loop.
- 4.5.5 The Statistics students advised that class representation was less effective in Levels 1 and 2 due to the size of classes. Level 3 and 4 students were also more confident and more likely to approach the class representative when an issue arose. It was noted that students voted for their class representative and that class representatives had established Facebook pages for students to voice their concerns.
- 4.5.6 At the meeting with staff, it was highlighted that the School held focus group meetings called "Town Hall" meetings which encouraged both staff and students to come together to discuss issues. The Panel **commends** the use of focus group meetings which encouraged both staff and students to discuss specific topics.

## 5. Enhancement in Learning and Teaching

## 5.1 Learning and Teaching

### *Curriculum Design*

- 5.1.1 The SER stated that the School regularly reviewed all degree programmes to ensure content reflected the range of knowledge and skills required by its graduates. (SER page 22, 4.1.1). Both the Mathematics and Statistics Honours programmes, as well as Level 2 courses, had been substantially revised in 2012-13. Mathematics Level 1 was currently undergoing a major review with an emphasis on how to balance the requirements of students who would only take one or two years of Mathematics with those who would specialise in the subject. It was anticipated that the new arrangements would be implemented from 2017-18. Following which the School would commence a new cycle of reviews, with Level-2 courses following in 2018-19, Level 3 the following year, and so on. The Review Panel **commends** the attention the School was giving to curriculum design but, due to the level of service teaching provided in Level 1, the Panel **recommends** that client Subjects are given an opportunity to provide feedback in any review undertaken.
- 5.1.2 It was noted that students had been consulted in the curriculum reviews via student representatives and SSLC. Feedback had also been sought throughout the first year of implementation and would continue to be sought from students to monitor the success of the revisions. Time students spent on coursework was also being monitored. The Panel **commends** the student consultation undertaken during curriculum reviews and continued consultation following introduction of revisions made.
- 5.1.3 The large number Level 1 and 2 Mathematics classes was discussed with the staff. It was queried as to how a sense of identity and belonging could be instilled, particularly when a substantial number took the course as part of other disciplines, which brought additional challenges. At the staff meeting, it was indicated that all students were treated the same and the Panel queried whether or not this was the most suitable way of treating the diverse student population. It was acknowledged that students from a non-mathematics background tended to struggle with the mathematical content but were offered additional support. This was predominantly by undertaking the Skills test and the use of 'Office Hours'. The Panel accepted the range of support given was good but queried how motivation was addressed and what practices could be introduced to address this. (Please refer to recommendations made under 3.2.4 and 5.1.1)
- 5.1.4 The Panel queried what lessons had been learnt from the review of Level 2 that would benefit the review of Level 1. The staff verified that the mix of assessment offering on-line and traditional types of assessment would likely be adopted for Level 1.
- 5.1.5 The Statistics staff advised that they had been consulted in the re-design of Levels 1 and 2 Mathematics. Level 1 Mathematics was more general, but Statistics and Mathematics were more clearly aligned in Level 2.
- 5.1.6 PGT students shared some UG courses as well as PGT courses only. The PGT students enjoyed the shared courses as it made them feel more included in University life.

### *Approach to Intended Learning Outcomes*

- 5.1.7 In relation to the School's approach to Intended Learning Outcomes (ILOs), the Review Panel was satisfied that these had been given careful consideration in terms of skills and knowledge acquired.

### *Technology Enhanced Learning and Teaching*

- 5.1.8 The Panel was impressed and **highly commends** the use of technology to deliver learning and assessment. It was noted from the SER (4.1.5, page 23) that the School had a leading and promoting role for technology-enhanced learning and teaching with projects funded by national initiatives, such as the continuing Scottish Mathematical Sciences Training Centre (SMSTC), an EPSRC-funded consortium, as well as past initiatives including the Computers in Teaching Initiative (CTI) and Teaching and Learning Technology Programme (TLTP). The introduction of Teleform, for scanning coursework submission, marking and feedback was recognised as an excellent innovation which had significantly streamlined the process.
- 5.1.9 The Panel was impressed with the introduction of continuous assessment in Mathematics Level 2 and the introduction of the weekly or fortnightly on-line assessment using WebAssign. In response to Mathematics good practice using online assessment with WebAssign, Statistics had built on its longstanding but now outdated bespoke quiz system to develop an innovative assessment system based on Moodle quizzes which gave similar functionality to WebAssign.

#### *Assessment*

- 5.1.10 A wide range of assessments including report writing, coding and use of software packages, presentations, poster presentations and extended essays was practiced, although this depended on the programme of study.
- 5.1.11 The School was steadily transforming formative coursework assessment. The Panel was pleased to note that the Level 2 Mathematics teaching team (including academic and support staff) had received a University Teaching Excellence Award from the College of Science and Engineering in 2014 and from the University in 2015 for WebAssign.
- 5.1.12 Writing and Presenting Mathematics was a compulsory course undertaken by Level 3 Single Honours Mathematics students. Professional Skills, Data Analysis and Advanced Data Analysis courses were available to Statistics students, both providing a range of skills.
- 5.1.13 The Panel **commends** the effort to combine two exam processes into one. This was a streamlined, semi-automated process used for the initial recording of continuous assessment and examination marks, grading, informing progress decisions and finalising degree awards.
- 5.1.14 At the final meeting with the Head of School, the projects undertaken at Level 4 and Level 5 (undergraduate Masters) were discussed. This assessment had been highly rated by the External Examiners and the Panel queried how the School promoted this valuable resource. It was noted that the project was credited differently between Statistics and Mathematics (and combined degree programmes) with 30 credits awarded for the Statistics project compared to 20 credits for Mathematics. The main reason for the difference was that the project was a major element of final year assessment in Statistics which included analysis of scientific data. The Panel **recommends** that the School considers offering a showcase event for Final Year undergraduate students, such as a poster presentation and/or talk session of their projects or conference, thus providing an opportunity for both the students to display their work as well as provide a platform for the School to highlight a major success.

#### *What/How do students receive feedback on assessed work?*

- 5.1.15 At the meeting with Mathematics students, the on-line software WebAssign was commented favourably on as a useful tool for revision and understanding solutions to calculations. At the meeting with staff, it was confirmed that WebAssign allowed for students to receive their mark instantly. The students were given an opportunity to have two further attempts when an incorrect answer was given. Hints were

provided when a student indicated that they did not know the answer. Solutions were given following the deadline of the assessment. The Panel was impressed with this initiative, although noted at the meeting with the Statistics students that they found feedback could be more limited in Levels 1 and 2 as compared to Levels 3 and 4, although this depended on the lecturer. A couple of minor technical issues were also noted in relation to loss of marks due to typing errors which caused frustration.

- 5.1.16 The class quizzes also provided an opportunity to provide formative feedback to the students.
- 5.1.17 The Statistics students highlighted that the mark for class tests were returned quickly, but since the paper was not returned, it was unclear where mistakes had been made and how to improve. After the class test had been undertaken, the lecturer would go over common mistakes made. The Statistics students the Panel met with confirmed that they were aware that they could have access to examination papers if requested.

## 5.2 Engaging and Supporting Staff

### *Probationer and early career support*

- 5.2.1 The Head of School advised the Panel that career paths were available for University Teaching staff. Under the new Early Career Development Programme (ECDP) operated by the University, promotion to grade 9 was expected after around five (from grade 8) or eight (from grade 7) years' experience. Specific objectives had been set to guide this process.
- 5.2.2 The Panel **commends** the mentoring arrangements adopted for all new members of staff. The mentor was from among more experienced staff and took an interest in the member of staff, including observation of teaching and giving constructive feedback. It was noted at the meeting with early career staff that whilst their teaching was observed, no opportunity was given for them to observe others teaching. This was discussed further at the final meeting with the Head of School. He agreed that peer review did not take place beyond early year career staff, but was being trialled in Mathematics. Following a review, the School planned to adopt this more widely. The Panel fully endorses the introduction of peer review for all staff and **recommends** that the School considers a reflective and structured process for staff, including established academics, with parameters established which would allow the School to recognise excellent teaching, promote good teaching practice as well as provide developmental and supportive measures.
- 5.2.3 At the meeting with probationer and early career staff, the Panel was advised that they had felt well supported by the School. Prior to arrival, they had been advised on teaching they would be expected to undertake and given course material, including lecture notes and assignment requirements. The Panel **commends** this level of support provided to new staff prior to arrival.
- 5.2.4 One of the early career staff who was on a University Teacher contract advised that his contract was on a temporary basis, meaning that he was unable to participate on the Postgraduate Certificate in Academic Practice (PGCAP) programme. In addition, the Panel recognised the lack of security this offered this well respected member of staff. This was discussed further at the final meeting with the Head of School where it was confirmed that the matter was under discussion with the College.
- 5.2.5 Another member of the early career staff had found the number of students higher than originally anticipated and consequently had found lecturing challenging, but agreed that it would be easier next session. It was confirmed that teaching loads had been reduced in accordance with University guidelines for early career staff.

- 5.2.6 Those staff that had participated on the PGCAP had found it to be very useful, even when they had undertaken similar training in their previous institutions. They have found discussion on student learning and the focus on assessment insightful. One other member of staff commented that he was still waiting to start the PGCAP but due to limited numbers, had been unable to do so. Another member had undertaken a previous programme at a previous institution and therefore had applied for a fellowship of the Higher Education Academy (HEA) instead. The Panel acknowledged the frustration of not being able to access the PGCAP on entering the University. The Review Panel **recommends** that the Academic Development Unit gives consideration to introducing further cohorts to allow all new members of staff to enrol on the PGCAP when they first commence at the University.
- 5.2.7 The Panel was advised that the School had been receptive to new ideas from staff as long as Intended Learning Outcomes (ILOs) were met. Consequently, new assessment methods had been introduced. It was noted that whilst most staff were receptive, others were not. The Panel **recommends** that staff should be encouraged to consider new teaching and assessment techniques, taking into consideration the evolving educational landscape. (*Please see 3.2.1*)
- 5.2.8 The early career staff had felt well received by the students and considered the students to be hard working. It was acknowledged that lectures were well attended (approximately 70%) but tutorial attendance varied. (*Please see 4.4.2*)

#### *Graduate Teaching Assistants*

- 5.2.9 The GTAs who met with the Panel advised that they were well supported and that they had been given appropriate training and advice. They were made aware of students with special requirements, in advance. The Head of Year also provided an end-of-session update which included discussion on what could be improved. If a GTA had an idea on how to improve the course, the first point of contact would be the lecturer and it was confirmed that they felt listened to. It was noted that some had been involved in changing laboratory material. GTAs participated in the generic university training and also observed classes before taking tutorials themselves. Questions and solutions were provided a week in advance. In relation to low tutorial attendance, in earlier discussions, the GTAs suggested improved attendance may be brought about by tutorial attendance contributing to the final mark. GTAs were not invited to School meetings. The Panel **commends** the level of support provided to their GTAs and suggests that it would be worthwhile inviting GTAs to the School's yearly teaching team meetings.
- 5.2.10 Main GTA duties included the supervision of Level 1 laboratories (one GTA for every 40 students) and demonstrating for Level 2 tutorials (one for every 14 students). The Head of Course provided support to GTAs by providing a run through laboratory and worked through an examination. Arrangements for teaching were flexible with GTAs able to decide on teaching style. Statistics GTAs were peer reviewed with tutors providing feedback. GTAs were also evaluated by the students and provided with the feedback. Informal feedback was also provided by more senior GTAs. The Panel **commends** the use of peer observation in Statistics to help Graduate Teaching Assistants develop their teaching skills and **recommends** that Mathematics considers adopting this good practice.
- 5.2.11 Most GTAs had applied to become tutors with the expectation of having 2-4 contact hours per week. The GTAs indicated they were satisfied with the number of contact hours given. Marking was undertaken most weeks, laboratories for Mathematics and workshops for Statistics. The Statistics GTAs were given a session on marking and feedback from more experienced tutors and general information on the University was provided to non-University of Glasgow graduates. The Panel **recommends** that any additional information provided to Statistics GTAs should also be provided to Mathematics GTAs.

### 5.3 Resources for Learning and Teaching (staffing and physical)

#### *Academic staff*

- 5.3.1 At the meeting with staff, the Panel discussed whether staff identified with the School, particularly since there had been a recent turnover of staff. Staff highlighted the benefits new colleagues had brought to the School with different perspectives on learning and teaching. Staff discussed teaching informally and the Common Room was identified as a useful space for such discussion. Formal discussion took place at the Learning and Teaching Committees. The examples of the new combined examination system and on-line assessment were highlighted as developments undertaken at School level, working alongside IT and teaching administrative staff.
- 5.3.2 At the meeting with the Head of School, the Panel was advised that the School Management Committee held Away Days to examine particular issues and how to tackle these as a School. The School remains concerned about its Staff-Student Ratio (SSR) although this had fallen over the past two years, at 18.0, it still remained high, particularly when compared against comparable institutions.

#### *Administrative staff*

- 5.3.3 The Review Panel considered the use of and support given by the administrative and IT staff as **highly commendable**. The development of procedures not only freed up academic staff time, but provided good student support. It also provided a community, where the importance of all staff contribution to learning and teaching was identified. The Panel was particularly impressed with the creative support the administrative team provided Advisers of Studies in relation to enrolment queries and the support provided for on-line assessment. The current Head of School Administration had commenced in 2012 and, at the time of appointment, had reviewed the administrative function and strategically reviewed which tasks could be taken away from academics.
- 5.3.4 The Head of School confirmed that the School had a well-functioning administrative team, providing additional support to academics within existing resources. The Panel suggested that the School continued to review workload to ensure administrative staff were not overloaded.

#### *Postgraduate Students*

- 5.3.5 The PGT students advised that, although they shared some classes with undergraduate students, they had additional facilities, such as access to their own study room, their own PGT library and had out-of-hour access to the Mathematics building.

## 6 Academic Standards

### *Approach to setting, maintaining and reviewing academic standards*

- 6.1 The Panel was confident that the procedures in place to set and maintain academic standards were appropriate. The Review Panel, guided by the views of the External Subject Specialists, confirmed that the programmes offered by the School remained current and valid in light of developing knowledge in the discipline, and practice in its application.
- 6.2 The School followed standard university procedures such as Annual Monitoring, Course and Programme Approval and External Examining. The External Examiners comments indicated that the School actively responded to suggestions made. The Review Panel noted some excellent comments, particularly in relation to the support the School offered their students and the work produced in relation to the Honours and Masters' project work.

- 6.3 The Panel considered the use of annual meetings of teaching teams to review the year which included a review of the action plans from student course evaluation as **good practice**.
- 6.4 The Statistics degrees were accredited by the Royal Statistical Society (RSS) thus meeting RSS requirements.
- 6.5 As discussed under 3.1.3 and 3.2.1, whilst the Panel recognised that the School was still settling following restructuring in 2010, a more formal and systematic approach to enhancement would be beneficial, ensuring that mechanisms were in place for peer review, support and for sharing good practice whenever possible. A more structured process would provide the School with an opportunity to recognise excellent teaching as well as provide a mechanism to develop and support staff.
- 6.6 During the discussion with staff, the Panel noted that student names were used during Examination Boards. The School was reminded that it was University policy that the review of students work should be anonymised where practical<sup>5</sup> and therefore the Panel **recommends** that this standard procedure was adopted at Examination Boards.

## 7 Collaborative provision

- 7.1 The School offered three new collaborative degree programmes which appeared to be successful, although recruitment was currently low. The intention was to develop further bilateral links with Chinese and other universities, using the Bologna partnership as an exemplar.

### *Supporting staff in transnational context*

- 7.2 The collaborative provision had enhanced internationalisation, but it was noted at the meeting with the Head of School, that the cultural and educational differences between China and the UK, in particular, had required sustained effort to establish the programmes. Initially, initiatives had been driven by individual members of staff with research connections; however further expansion was now supported at College level. The Panel was advised that the students on the 2+2 programmes were very dynamic from which the School benefitted, but numbers were relatively small.

### *Supporting students*

- 7.3 At the meeting with the Mathematics and Statistics students, the 2+2 students confirmed that they had been well supported by the School on arrival. Induction had been informative and staff had been friendly and approachable. They found the skills test useful to provide reassurance on their ability (as discussed under 4.3.4). It was suggested that the University could provide an overview of facilities and services and provide a general induction in relation to culture and language as well as academic issues. There was a perception of the 2+2 students as 'separate' from the student community as they joined the University and School two years after the other students and they expressed a wish for more social opportunities for making new friends. It was suggested that the MacSoc might usefully assist with integration.

## 8 Summary of perceived strengths and areas for improvement

### 8.1 Key strengths

The Review Panel identified the following areas as good practice:

- Innovative practices being introduced to enhance learning and teaching

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<sup>5</sup> University Calendar, Code of Assessment, Gen 16.58

- Highly motivated and respected administrative staff, assisting academic staff in the support of students in their learning
- Review of the Adviser of Studies system to ensure consistent student support
- Introduction of the innovative MSci (Work Placement) in Statistics providing relevant industrial training
- Impressive outreach activity
- Good Transnational Educational activities
- Use of technology to enhance learning and teaching as well as assessment and feedback
- Support given to new and early career staff
- Support given to GTAs

## **8.2 Areas for improvement**

The Review Panel highlighted the following areas as opportunities for improvement:

- A more systematic approach to quality enhancement to ensure:
  - procedures in place to review and evaluate new developments
  - dissemination of good practice across the School
  - consistency of provision and support for students
  - consistency of provision and support for staff
  - consistency of support for GTAs
  - to assist with the promotion and identity of the School
- A review of tutorials to ensure student engagement. Tutorials should be a valuable commodity for student learning
- Graduate attributes and employability more fully integrated into the curriculum
- To include all staff, including 'client' subjects, in curriculum review and development

## **8.3 Conclusion**

It was evident to the Panel that the School provided a supportive and friendly learning environment, managing to take into account two distinct subject areas, with Statistics being a smaller and cohesive subject with a strongly engaged student body and Mathematics, covering a substantial range of programmes and therefore dealing with a bigger and more diverse student population. From the meetings undertaken as part of the Review, the Panel had a general sense of a coherent, engaging School for its staff, students and GTAs. The School was committed to providing a wide range of degree programmes whilst undertaking a number of initiatives to enhance learning and teaching provision. The School was strongly committed to outreach activities as well as further developing its international portfolio. The School was responsive to student feedback having established good feedback mechanisms and linking this to other quality processes such as annual monitoring and annual teaching reviews. The previous six years has seen a great deal of change and transition for the School and the Review Panel commends the School for its excellent practices and encourages it to continue its excellent work in enhancing the student learning experience.

## **Commendations**



The Review Panel commends the School of Mathematics and Statistics on the following, which are listed **in order of appearance** in this report:

#### **Commendation 1**

The Panel **commends** the vision and effort by the School in its breadth and range of provision, although it recognised that student numbers were limited in relation to collaborative provision. [Paragraph 3.1.1]

#### **Commendation 2**

The Review Panel **commends** the work undertaken, to date, in merging some processes, such as the combined examination system, whilst acknowledging the distinctiveness between the subject areas. [Paragraph 3.1.3 and 5.1.13]

#### **Commendation 3**

The Panel **commends** the School for the level of innovation being introduced, transforming how undergraduate Mathematics and Statistics was taught. [Paragraph 3.2.1]

#### **Commendation 4**

The Panel **commends** the School's careful review of the Advising system in order to provide a more responsive service to their students, whilst recognising the practical challenges the School faced in introducing a smaller number of Advisers. [Paragraph 4.3.7]

#### **Commendation 5**

The Panel **commends** the use of the Maths Ambassador Scheme. [Paragraph 4.4.11]

#### **Commendation 6**

The Panel **commends** both the formal and informal course feedback mechanisms in place [Paragraph 4.5.2] (but please see Recommendations 7 and 8)

#### **Commendation 7**

The Panel **commends** the use of focus group meetings which encouraged both staff and students to discuss specific topics. [Paragraph 4.5.6]

#### **Commendation 8**

The Panel **commends** the attention the School was giving to curriculum design and **commends** student consultation undertaken during curriculum reviews and continued consultation following introduction of revisions made [Paragraphs 5.1.1 and 5.1.2]

#### **Commendation 9**

The Panel was impressed with and **highly commends** the use of technology to deliver learning and assessment. [Paragraph 5.1.8]

#### **Commendation 10**

The Panel **commends** the mentoring arrangements adopted for all new members of staff. [Paragraph 5.2.2]

#### **Commendation 11**

The Panel **commends** the level of support given to new staff prior to arrival. [Paragraph 5.2.3]

#### **Commendation 12**

The Panel **commends** the level of support provided to their GTAs and the use of peer observation in Statistics to help Graduate Teaching Assistants develop their teaching skills. [Paragraph 5.2.9 and 5.2.10]

### **Commendation 13**

The Review Panel considered the use of and support given by the administrative and IT staff as **highly commendable**. [Paragraph 5.3.3]

## **Recommendations**

The following recommendations have been made to support the School in its reflection and to enhance provision in relation to teaching, learning and assessment. The recommendations have been cross-referenced to the paragraphs in the text of the report to which they refer and are **grouped together** by the areas for improvement/enhancement and are **ranked in order of priority within each section**.

For the attention of the School of Mathematics and Statistics

### *Quality enhancement*

#### **Recommendation 1**

The Panel **recommends** the School continues to develop a strategic approach to quality enhancement, adopting a more systematic approach to the sharing and dissemination of good practice between colleagues in Mathematics and Statistics. [Paragraph 3.1.3]

**For Action: Head of School**

#### **Recommendation 2**

The Panel **recommends** that the School consider mechanisms for ensuring that all staff developing and introducing new methods of teaching continue to be recognised. [Paragraph 3.2.1]. The Panel further **recommends** that staff should be encouraged to consider new teaching and assessment techniques, taking into consideration the evolving educational landscape. [Paragraph 5.2.7]

**For Action: Head of School**

#### **Recommendation 3**

The Panel fully endorses the introduction of peer review for all staff and **recommends** that the School considers a reflective and structured process for staff, including established academics, with parameters established which would allow the School to recognise excellent teaching, promote good teaching practice as well as provide developmental and supportive measures. [Paragraph 5.2.2]

**For Action: Head of School**

### *Tutorials*

#### **Recommendation 4**

The Review Panel, whilst sympathetic to constraints caused by infrastructure and aware that limited student engagement in mathematics tutorials was a universal problem and not restricted to Glasgow, **recommends** that the School considers further ways to engage students within tutorials. The Panel further **recommends** the School takes into consideration some of the suggestions raised by the students, in relation to breadth of style as well as good practice already established within the School (such as co-opting the students with tutorial design). [Paragraph 4.4.5]

**For Action: Head of School**

### *Graduate Attributes*

#### **Recommendation 5**

The Review Panel, whilst acknowledging that students were obtaining a range of graduate attributes, these tended to be specific to particular programmes or tailored courses. The Panel **recommends**

that the School considers ways of ensuring graduate attributes are embedded throughout the curriculum, in a manner which is clearly identifiable to the students. [Paragraph 4.4.9]

**For Action: Head of School**

*GTA support*

### **Recommendation 6**

The Panel commends the use of peer observation used in Statistics to help Graduate Teaching Assistants develop their teaching skills and **recommends** that Mathematics considers adopting this good practice. In addition, the Panel **recommends** establishing more formal aspects to GTA support to ensure both sets of GTAs received the same level of assistance. [Paragraph 5.2.10]. The Panel **recommends** that any additional information provided to Statistics GTAs should also be provided to Mathematics GTAs. [Paragraph 5.2.11]

**For Action: Head of School**

*Enhancing the Student Experience*

### **Recommendation 7**

The Panel **recommends** that the School considers offering a showcase event for Final Year undergraduate students, such as a poster presentation and/or talk session of their research projects or conference, thus providing an opportunity for both the students to display their work as well as provide a platform for the School to highlight a major success. [Paragraph 5.1.14]

**For Action: Head of School**

*Feedback and closing the feedback loop*

### **Recommendation 8**

The Review Panel **recommends** that, where action was taken to resolve issues, this should be clearly evidenced and communicated to the students. [Paragraph 4.5.3]. The Panel **recommends** that the reasons for not introducing a standard policy on the provision of solutions should be clearly communicated to students, including an explanation of why, in some instances, it was beneficial not to receive them, thus ensuring closure of the feedback loop. [Paragraph 4.5.4]

**For Action: Head of School**

### **Recommendation 9**

The Review Panel **recommends** that the additional informal mechanism for obtaining feedback at the beginning of a course used by some members of staff be considered for adoption across the School. [Paragraph 4.5.2]

**For Action: Head of School**

*Service teaching*

### **Recommendation 10**

The Panel **recommends** that the School considers establishing a more formal relationship with 'client' subjects and Engineering to discuss teaching provision and possible alternative ways to support students from outside of the School [Paragraph 3.2.4]. The Panel **recommends** that client subjects are given an opportunity to provide feedback in any review undertaken. [Paragraph 5.1.1]

**For Action: Head of School**

*Examination Board procedures*

### **Recommendation 11**

The Panel **recommends** that the standard practice of student anonymity should be applied at Examination Boards, where practical, following University policy. [Paragraph 6.6]

**For Action: Head of School**

**For the attention of the Academic Development Unit, Learning and Teaching Centre**

**Recommendation 12**

The Review Panel **recommends** that the Academic Development Unit gives consideration to introducing further cohorts to allow all new members of staff to enrol on the PGCAP when they first commence at the University. [Paragraph 5.2.6]

**For Action: Director of Learning and Teaching Centre and Head of Academic Development Unit**

**For Information: Head of School**

**For the attention of Marketing, Recruitment and International Office**

**Recommendation 13**

The Panel **recommends** that the Senate Office bring the issue of recruitment material to the attention of the Marketing, Recruitment and International Office and the issue of limited flexibility of choice between Colleges to Academic Standards Committee. [Paragraph 4.1.1]

**For Action: Clerk of the Panel**

**For Information: Head of School**

**Periodic Subject Review: Review of School of Mathematics and Statistics held on 17  
and 18 March 2016**

**Programmes of Study**

**Undergraduate – Mathematics**

MSci in Applied Mathematics ♣  
 MSci in Applied Mathematics and Statistics ♣ Φ  
 MSci in Applied Mathematics and another subject [being phased out]  
 MSci in Mathematics ♣  
 MSci in Mathematics and Statistics ♣ Φ  
 MSci in Mathematics and another subject  
 MSci in Pure Mathematics  
 MSci in Pure Mathematics and Statistics Φ  
 MSci in Pure Mathematics and another subject [being phased out]  
 MA (Honours) in Mathematics ♣  
 MA (Honours) in Mathematics and another subject  
 BSc (Honours) in Applied Mathematics ♣  
 BSc (Honours) in Applied Mathematics and Statistics ♣ Φ  
 BSc (Honours) in Applied Mathematics and Accounting [being phased out]  
 BSc (Honours) in Applied Mathematics and Finance [being phased out]  
 BSc (Honours) in Applied Mathematics and another subject [being phased out]  
 BSc (Honours) in Mathematics ♣  
 BSc (Honours) in Mathematics and Statistics ♣ Φ  
 BSc (Honours) in Mathematics and Accounting  
 BSc (Honours) in Mathematics and Finance  
 BSc (Honours) in Mathematics and another subject  
 BSc (Honours) in Pure Mathematics  
 BSc (Honours) in Pure Mathematics and Statistics Φ  
 BSc (Honours) in Pure Mathematics and Accounting [being phased out]  
 BSc (Honours) in Pure Mathematics and Finance [being phased out]  
 BSc (Honours) in Pure Mathematics and another subject [being phased out]  
 BSc in Mathematics  
 BEng/MEng (School of Engineering) – 2 core courses

**Undergraduate – Statistics**

MSci in Statistics Φ  
 MSci in Statistics with Work Placement Φ  
 MSci in Statistics and another subject  
 BSc (Honours) in Statistics Φ  
 BSc (Honours) in Statistics and another subject  
 BSc (Honours) in Statistics and Accounting  
 BSc (Honours) in Statistics and Finance  
 BSc in Statistics  
 BSc in Statistical and Mathematical Studies

BEng/MEng in Biomedical Engineering (School of Engineering) – 1 core course  
3

### **Postgraduate Taught – Mathematics**

MSc in Applied Mathematics

MSc in Mathematics

Courses for the Scottish Mathematical Sciences Training Centre (SMSTC)

### **Postgraduate Taught – Statistics**

MRes in Advanced Statistics  $\Phi$

MSc in Biostatistics  $\Phi$

MSc in Environmental Statistics  $\Phi$

MSc in Social Statistics  $\Phi$  [being phased out]

MSc in Statistics  $\Phi$

MSc in Data Science (School of Computing Science) – 3 optional courses

MSc in Financial Modelling (Adam Smith Business School) – 6 core courses

Courses for the Scottish Mathematical Sciences Training Centre (SMSTC)

### **Collaborative Provision – Mathematics**

BSc (Honours) Applied Mathematics – 2+2 Degree with the Northwestern Polytechnical University, China

BSc (Honours) Mathematics – 2+2 Degree with the Zhongnan University of Economics and Law, China

### **Collaborative Provision – Statistics**

BSc (Honours) Statistics & Laurea in Scienze Statistiche (Classe L41) – Double Degree programme with the University of Bologna, Italy  $\Phi$

BSc (Honours) Statistics – 2+2 Degree with the Zhongnan University of Economics and Law, China  $\Phi$

♣ programme accredited by the Institute of Mathematics and its Applications (IMA)

$\Phi$  programme accredited by the Royal Statistical Society (RSS)