**UNIVERSITY OF ABERDEEN**

**MATHEMATICAL SCIENCES: INTERNAL TEACHING REVIEW**

**SUMMARY & RESPONSES FROM MATHEMATICAL SCIENCES**

This summary is extracted from the full report on the internal teaching review of Mathematical Sciences following the review carried out in November 2008. It includes the Panel’s overall impressions of the provision, a record of the Panel’s commendations and recommendations, the Panel’s conclusions and a list of the programmes which were revalidated. Responses from Mathematical Sciences are given following each recommendation.

**1 Overall impressions**

Mathematical Sciences became a member discipline of the then School of Engineering and Physical Sciences in the College of Physical Sciences in 2003. In 2007, the School was restructured as the School of Natural and Computing Sciences following the formation of the School of Engineering. The School includes Mathematical Sciences, Chemistry, Computing Science and Physics.

The Panel **strongly commended** the friendly and supportive attitude of staff towards students, a view confirmed by feedback from a number of students who were interviewed. Staff were clearly very ready to engage with and assist students, and the majority of students understood and valued that.

The Panel noted that there had been a high turnover of staff in Mathematical Sciences during the four years prior to the internal teaching review. Many of the newly-appointed academics were highly expert and experienced in their fields with excellent research records, now occupying senior academic positions. However, the Panel **strongly recommended** that all academic staff should become familiar with the guidance published by the University in the *Academic Quality Handbook* ([www.abdn.ac.uk/registry/quality)](http://www.abdn.ac.uk/registry/quality%29) and a system put in place for inducting new staff and teaching assistants in approved procedures.

Teaching staff were **commended** for their readiness to offer additional tutorial support to students experiencing difficulties. However, it was clear that a number of students, especially in the earlier years of study, did not know that such help was available and it was **recommended** that Mathematical Sciences should publicise the existence of catch-up tutorials more widely.

Students, especially those in undergraduate years 3 and 4 and at postgraduate level, valued the informal communication with staff possible in a small department. However, there was a need to formalise how decisions were taken and recorded so that, when numbers increased as was hoped, the structures would be in place to cope. Formal channels of communication with students, for example e-mail and the departmental website, should also be used and the development should be advertised to students. The Panel **recommended** that the Department review and revise committee structures to ensure that committee remits were stated and clearly understood, and to include greater elected student representation on the committees. It would be helpful to have student representation on the Departmental Teaching Committee. The Panel noted that the Departmental Steering Committee included in its remit areas to which both undergraduate and postgraduate students could usefully contribute. They invited the Department to consider whether an amendment to the latter Committee’s remit by, for example, reallocating student-related matters to the Departmental Teaching Committee would lead to greater student involvement to the benefit of both the Department and its students.

Mathematical Sciences was **commended** for its website which included much useful material and was very well structured. The use of WebCT was very good for most of the courses taught but, in response to comments from students regarding tutorial provision, it was **recommended** that Web CT be used more widely after tutorials for posting solutions to problems which could not be covered in tutorial time.

Departmental staff were very willing to assist students with disabilities. It was **recommended** that the Department use WebCT more extensively for supporting disabled students. The Panel agreed that many of the newer and more IT-based alternatives to blackboards were not well-suited to the teaching of mathematics and **recommended** that the University provide more and better-quality blackboards in teaching rooms. However, blackboard use could cause difficulties for some disabled students and it was **recommended** that the Department consult Dr Lucy Foley to ensure that the use of conventional or electronic blackboards was developed in ways which were appropriate for all students.

Mathematical Sciences were **commended** for the inclusion of presentation skills in the level 4 honours project. It was **recommended** that consideration be given to including the use of such skills in credit-bearing courses in earlier years of the undergraduate degree. It was also **recommended** that essay and/or report writing skills be included in early years’ assessments as preparation for the essay-style project report required in year 4.

The Panel **commended** the Department for its support of the activities of the student Maths Club. It was **recommended** that efforts should be made to publicise the Club more widely to encourage greater numbers of students to attend Club meetings and that topics should be chosen to attract as wide a range of participation as possible.

**2 Commendable features**

 *(Numbers in brackets refer to the relevant paragraph of the Panel’s full report.)*

 The Panel **highly commended** the following aspects of Mathematical Science’s provision.

2.1 the friendly attitude of staff towards students, a view supported by feedback from students. [6.4 & 15.2]

 The Panel **commended** the following aspects of Mathematical Science’s provision.

2.2 the moving of material to earlier years of the undergraduate curriculum, especially the more abstract algebra and set theory, while maintaining and reinforcing the analysis curriculum. [2.2]

2.3 the provision of a dedicated annual budget (additional to that provided centrally) for buying mathematics books for the University Library, the operation being the responsibility of the Departmental Library Representative. [3.2]

2.4 the Department’s acting to make the statistics course ST1505 Understanding Data less vulnerable to staff changes by training younger staff members to deliver it. [3.3]

2.5 the consideration being given by Mathematical Sciences to the possibility of extending statistics provision by offering a level 2 statistics course which would build on ST1505. [3.3]

2.6 the pooling of teaching support resources at School level which was expected to bring benefits to both students and staff. It was noted that the new School Office was on the ground floor of the Meston Building, thereby improving accessibility. In addition, the bringing together of support staff in one place meant that the Office could remain open from 9.00 am to 5.00 pm. [3]

2.7 the Department’s support of the activities of the Maths Club and the attempts made to expand its activities to years 1 and 2. [6.1 & 15.5]

2.8 the Departmental website which is helpful for current students. [6.2]

2.9 the Department’s WebCT which is very good for most of the courses taught. [6.2]

2.10 the Department’s provision of tailored catch-up tutorials and their on-request nature. [6.4 & 15.2]

2.11 the friendly attitude of staff towards students, a view supported by feedback from students. [6.4 & 15.2]

2.12 the Department’s appointment of a Programme Review Officer to oversee the process of periodic programme review. [7.5]

2.13 the Department’s participation in, or support for, the annual symposia for postgraduate mathematics students run by Scottish universities and annual two-day meetings for postgraduate mathematics students organised by the Edinburgh Mathematical Society. [8.3]

2.14 the Department’s awareness that exams are an effective, but over-late, indicator of weaknesses. [8.4]

2.15 the Department’s delivery of advanced material and its efficient handling of the examination process. [8]

2.16 the provision of its own generic skills training for research students. [9.3]

2.17 providing support for research students who wished to attend conferences and workshops in the UK and in other countries. [9.6]

2.18 encouraging students to participate in ERASMUS exchanges at postgraduate level. [9]

2.19 the numbers of academic staff who were members of mathematical societies. [11.3]

2.20 the detailed statistics maintained regarding continuous assessment, exam and final degree results, which could usefully be copied by other departments/schools. [14.3]

2.21 the introduction of two optional second half-session Maths courses at levels 1 and 2, and the introduction of the MA2505 Probability course. [15.4]

2.22 the Department’s experiment in including a link to the Google site in an attempt to improve recruitment. [16.1]

2.23 the support given by the Department for the Mathematics Challenge competition for Scottish school pupils. [16.3]

2.24 the mathematics masterclasses given for school pupils in 2006 and 2007 by Professor Archbold. [16.3]

2.25 the provision of continuing professional development courses for school teachers. [16.4]

**3 Recommendations**

 *The Panel invites Mathematical Sciences to consider the recommendations in this section and asks that the Heads of Teaching and Research, Mathematical Sciences, in consultation with the Head of School, the Head of College and, where appropriate, the College Director of Teaching and Learning, provide an agreed response to each*.

 The Panel **highly recommended** that Mathematical Sciences:

 ***Staffing***

3.1 that all academic staff should become familiar with the guidance published by the University in the *Academic Quality Handbook* ([www.abdn.ac.uk/registry/quality](http://www.abdn.ac.uk/registry/quality)), especially regarding teaching, examination and assessment. The Panel noted that there had been a high turnover of staff in Mathematical Sciences during the four years prior to the internal teaching review. Many of the newly-appointed academics were highly expert and experienced in their fields. In addition, it was clear that the academic staff in the Department worked together closely in a collegiate manner. However, it was the Panel’s view that, while there was much to be gained from a cohort of teaching staff with international experience of higher education, support should be given to all new appointees to ensure that they accessed information about the procedures and practices approved by the University Committee on Teaching and Learning and the Senate for use within the University of Aberdeen. [3.7]

*Response: HoT/HoR will bring the Academic Quality Handbook, as well as other relevant information about procedures and practices, to the attention of every member of staff, in particular the newly appointed ones.*

 ***Teaching, learning and assessment***

3.2 ensure that their assessment policies were redrafted to bring them in line with the guidance provided in the University’s *Academic Quality Handbook* (<www.abdn.ac.uk/registry/quality>). [6.6]

*Response: HoT will review assessment policies and redraft them where necessary to bring them in line with the guidance provided by the Academic Quality Handbook.*

 The Panel **recommended** that Mathematical Sciences:

 ***Staffing***

3.3 enhance the provision of statistics teaching. [3.3]

*Response: The recommended enhancement of the provision of statistics teaching will be addressed in the framework of the discussions on the planned “applied” branch of our teaching, in cooperation with colleagues from Physics.*

3.4 give high priority to replacing the teaching software, CALMAT. It was useful in that, in addition to fulfilling a teaching role, it also marked homework and small-scale assessments. However, the Department were aware that the software was outdated and no longer supported by the manufacturer. It was clear that some students did not like the method of delivery. [3.3]

*Response: The CALMAT software is used for the teaching of the otherwise resource-intensive courses “Introductory Mathematics I/II”. We are currently investigating possibilities for replacing this software, e.g., by Maple TA. In particular, the costs involved in such a replacement need to be taken into account. For the time being, we are reluctant to abandon a system which admittedly has a few glitches but otherwise does the job.*

*On a more general level: If we agree that ``eLearning’’ or computer-aided learning and teaching is a useful thing to develop, then it would make sense not to leave the development and implementation of such tools to individual departments, but take at least university-wide initiatives (e.g., through the Centre for Learning & Teaching or the Centre for Lifelong Learning). There should then also be a more general discussion as to which courses might be suitable for ``eLearning’’ (e.g., the new 6th Century Courses).*

3.5 review training and development provision for postgraduate students who undertook tutoring and that they monitored more closely postgraduate marking of summative assessments to ensure full compliance with University-approved processes as described in the *Academic Quality Handbook* ([www.abdn.ac.uk/registry/quality/](http://www.abdn.ac.uk/registry/quality/)). [3.5]

*Response: In combination with the general College Induction for postgraduate students, subject-specific training for tutoring will be provided in the Mathematics Department. We suggest to have a staff member sit in a couple of times on a postgraduate tutorial, and provide some feedback to the student. Subject-specific training to beginning postgraduate students in Mathematics is also provided by the SMSTC (Scottish Mathematical Sciences Training Centre). In addition to this, the Teaching Committee will discuss the possibility of inviting the MSTOR (Maths, Stats & OR Network) to host a one-day workshop to support postgraduate students.*

 ***School/Departmental organisation***

3.6 review undergraduate and postgraduate student representation on departmental committees with a view to including elected student members. It would be helpful to have student representation on the Departmental Teaching Committee. The Panel noted that the Departmental Steering Committee included in its remit areas to which both undergraduate and postgraduate students could usefully contribute. They invited the Department to consider whether an amendment to the latter Committee’s remit by, for example, reallocating student-related matters to the Departmental Teaching Committee would lead to greater student involvement to the benefit of both the Department and its students. [4]

*Response: After full consultation, it is consensus in the Department that it is the SSLC (Staff Student Liaison Committee) where formal student representation in departmental matters and mechanisms for student feedback have their place.*

*We do not believe that regular student representation is appropriate for the Teaching Committee and, even less so, for the Steering Committee. However, in cases where student involvement is desirable, student representatives will of course be invited to individual meetings of the Teaching Committee, bearing in mind that any such meeting would probably have to be scheduled for term-time.*

3.7 draw up explicit remits for all departmental committees. [4]

*Response: This will be done in the context of the re-organisation of our webpage. The organisational structure of the new Institute of Mathematics, including remits for departmental committees, is planned to be visible on that webpage.*

3.8 ensure that all meetings of the Departmental Teaching Committee should be minuted and that two student members should be elected as Committee members. [4.1]

3.9 arrange for minutes of any committee on which there was student representation to be e-mailed to students, either direct or via class representatives, if that was not already being done. [4.3 & 7.5]

*Response: The formal meetings of the Teaching Committee (and any other committee) are and will be minuted, but as far as student representation is concerned, see answer to 3.6. The minutes of the SSLC meetings are sent to student representatives. The suggestion of sending them to all students will be discussed in the Teaching Committee.*

 ***Course and programme design, accessibility and approval***

3.10 consider how to develop a proactive approach to programme and course design and how to embed such an approach in its procedures. For example, given the recent collaboration with the School of Education, it might be worth considering whether a joint degree in mathematics and music might be feasible. [5.1]

*Response: The recommended proactive approach has been in place since about 2005, long before the current ITR: Our Discipline has actively undertaken, out of its own initiative, a full review of undergraduate teaching. Whole course syllabuses have been redesigned, new course notes been written. The process is fully monitored and is subject to ongoing fine-tuning, where the requirements of the Curriculum Reform will also be taken into account.*

*The Teaching Committee will investigate the feasibility of a joint degree in Mathematics and Music.*

*Discussions have been engaged with colleagues from the Physics Department in order to create to a new branch with more applied courses. The plan is to work out the technical details (programme compatibilities, course design etc.) within one year.*

3.11 explore with Dr Lucy Foley how best to ensure that those teaching, whether staff members or postgraduate students, were made aware when a class included a student or students with disabilities.

3.12 address pro-active Disability Discrimination Act conformity and teachability issues in discussion with Dr Lucy Foley in order to identify solutions which would help students and staff. [5.3]

*Response: HoT will get in contact with Dr Lucy Foley to address these issues.*

 ***Teaching, learning and assessment***

3.13 seek Dr Lucy Foley’s advice in actively exploring ways in which the use of blackboards (traditional and/or electronic) might be made more accessible for students with visual disabilities. [6.1 & 5.3]

*Response: HoT will get in contact with Dr Lucy Foley to address these issues.*

3.14 consider adding introductory Mathematics courses to the University’s current distance-learning provision in order that Mathematical Sciences might benefit from a widening market in distance learning. [6.1]

*Response: This issue will be discussed in the Teaching Committee.*

3.15 try to publicise the Maths Club more widely to encourage greater numbers of students to attend Club meetings. [6.1 & 15.5]

*Response: Yes, of course.*

3.16 make greater use of Web CT after tutorials for posting solutions to problems which could not be covered in tutorial time. [6.2]

*Response: In most 1st and 2nd year courses, full written solutions are provided in electronic form for at least a representative set of exercises. The use of WebCT is often not easy, because of its incompatibilities with otherwise highly common web browers (e.g., current versions of firefox). The issue will be further discussed in the Teaching Committee.*

3.17 use WebCT more extensively for supporting disabled students. [6.2]

*Response: Staff will be encouraged to use WebCT (or similar forms) more extensively in this respect.*

3.18 advertise the tailored catch-up tutorials and their on-request nature more actively as it was noted that few students seemed to know about them. [6.4 & 15.2]

*Response: Staff will be advised to announce these provisions more clearly at the beginning of their classes.*

3.19 provide marking schemes for all courses rather than leaving the provision of such schemes to the discretion of the relevant course co-ordinators. [6.6]

*Response: The Department annually reviews its assessments and marking schemes (Course Review Meetings). All exam papers are normally accompanied by model answers and marking schemes to external examiners. All teaching staff are advised that, wherever exam questions are clearly structured into relatively independent parts, then the exam paper (as seen by students) should also indicate the allocation of marks for each part.*

3.20 clarify its policy regarding the use of calculators in exams as current practice seemed to vary between course co-ordinators. [6.6 &13.1]

*Response: This issue will be addressed where clarification is required.*

***Course and programme monitoring and review***

3.21 prepare a remit for the Programme Review Officer showing the responsibilities of that person as regards programmes and courses offered by the Department. [7.5]

*Response: This will be done in the context of the re-organisation of our webpage. See also response to 3.7. The programme review on the whole is overseen by HoT and the Teaching Committee.*

3.22 give active thought to ways in which attendance could be encouraged (for example, by the setting of a summative class test) at sessions at which SCEFs were circulated and returned. It would help the Department to achieve better rates of return. [7.5]

*Response: While we certainly agree that return rates for SCEF's are very low, we do not believe that the right way of increasing this is by setting a summative class test. (The question of setting a class test or not should only have to do with the course programme and didactic considerations.) The issue will be discussed in the Teaching Committee, with the aim of formulating recommendations for course coordinators (especially newly appointed ones) concerning suitable strategies for increasing return rates. It might also be useful to explore web-based forms of student course evaluation (e.g., through WebCT), in cooperation with DIT.*

 ***Academic standards and the academic infrastructure***

3.23 use more continuous assessment to help identify students experiencing difficulty at as early a stage as possible. [8.4]

*Response: The Continuous Assessment in 1st year courses involves two one-hour class tests and at least two assessed homeworks; for 2nd year courses, there are two or more assessed homeworks. The work load connected with these assessments is considered by the students to be high. We do not believe that increasing the number of such assessments will help to identify students with difficulty. Instead, we encourage course coordinators to set a diagnostic class test at the beginning of their course.*

 ***Personal development and employability***

3.24 work to include the development of good communication skills in students considerably earlier than year 4 of students’ programmes. Any new provision of oral skills training should be a component of a credit-bearing course. [10.2]

*Response: This will be discussed in the Teaching Committee. A possible suggestion: In selected courses, it could be part of every student's participation in tutorial groups to present the solution to one full problem on the blackboard.*

3.25 consider how courses in levels 1-3 could be amended to help students to maintain and develop writing skills throughout the undergraduate years and before they had to write an essay-type project report in year 4. [10.2]

*Response: The requirements in courses in levels 1-3 include class tests and/or written homeworks. The Teaching Committee will discuss the possibility of expanding the scope of written homeworks by including essay-type elements.*

3.26 explore ways of encouraging tutorial participation by including it as a component of credit-bearing courses. [10.2]

*Response: This will be discussed in the Teaching Committee; see also answer to 3.24.*

 ***Staff training and educational development***

3.27 introduce and maintain a record of courses and other activities undertaken by academic staff in furthering their own training and development. [12.1]

*Response: Keeping informal records of courses and other activities undertaken by academic staff is part of HoT's responsibilities.*

 **Matters to be taken up outside Mathematical Sciences**

 ***Staff training and educational Development***

3.28 The Panel **recommended** that the Department work with the School of Natural and Computing Sciences to ensure that new staff have mentors assigned to them immediately upon their arrival in the University. [12.2]

*Response: The* *School* *has* *instigated* *a* *new* *procedure* *for* *the* *allocation* *of* *mentors* *to* *new* *staff* *which* *ensures* *that* *this* *happens* *immediately* *on* *arrival.*

 **Matters to be taken up outside the College of Physical Sciences**

 ***Teaching, learning and assessment***

3.29 The Panel **recommended** that the University seriously consider improving the quality of traditional blackboards in teaching rooms and equipping more rooms with blackboards of acceptable standard. The nature of mathematical notation made a number of more IT based alternatives unsuitable for the discipline. It was clear that the number and quality of blackboards provided centrally had decreased. [6.1 & 5.3]

*Response: We agree.*

**Conclusions**

Mathematical Sciences had a strong sense of identity and collegiality. Staff were strongly committed to the development and support of students at all levels. Students were broadly very positive about their experiences and clearly valued the benefits of a small academic unit in which staff-student relations could be less formal than is often the norm.

There was a clear commitment on the part of staff to the development of students as mathematicians both through teaching within the Department and, at postgraduate research level, by development through activities held elsewhere. Great care was taken to ensure assessments were well-structured. There was a need to ensure that all members of academic staff were fully aware of University-approved guidance as published in the *Academic Quality Handbook* ([www.abdn.ac.uk/registry/quality](http://www.abdn.ac.uk/registry/quality)) and for an ethos of proactivity in quality processes.

The Panel wished to thank all members of staff within Mathematical Sciences for the work that had gone into producing the ITR documentation and for their participation in the review process. They also wanted to thank all students and members of staff whom they met during the review visit.

**Revalidation of programmes**

The following programmes (or, where appropriate, Mathematical Sciences programme elements) were revalidated:

*Undergraduate programmes*

BSc Mathematics

BSc Mathematics and Engineering Mathematics

BSc Mathematics with French

BSc Mathematics with Gaelic

BSc Mathematics with German

BSc Mathematics with Spanish

BSc Mathematics-Physics

BSc Chemistry with Mathematics

BSc Computing Science-Mathematics

BSc Education-Mathematics

MA Mathematics

MA Computing-Mathematics

MA Economics-Mathematics

MA Entrepreneurship-Mathematics

MA Education (Primary)-Mathematics

MA Education (Secondary)-Mathematics

MA French-Mathematics

MA German-Mathematics

MA Hispanic Studies-Mathematics

MA History-Mathematics

MA Management Studies-Mathematics

MA Mathematics-Philosophy

MA Mathematics-Physics

MA Mathematics-Sociology

MA Mathematics with Gaelic

*Postgraduate programmes*

PhD Mathematics (Arts)

PhD Mathematics (Science)