College of Science and Engineering

POSTGRADUATE PROVISION REVIEW

SCHOOL OF MATHEMATICS

March 2009
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Review Structure and Process

Composition of the Review Panel

The Review Panel comprised

Professor Don Sannella (School of Informatics and Chair of the Review Panel)
Professor John Elgin (Imperial College, London and external assessor)
Professor Martin Hyland (University of Cambridge and external assessor)
Professor Jeremy Bradshaw (College Medicine and Veterinary Medicine)
Dr Tom Bruce (School of Engineering)
Professor Simon Parsons (School of Chemistry)
Professor Graeme Reid (School of Biological Sciences)

Secretariat: Miss Lynda Henderson (CSE Academic Affairs Officer)

Review Arrangements

The review, which was held over two days on 5th and 6th March 2009, took the form of a series of meetings with relevant individuals and groups, looking at matters concerning postgraduate research students, the provision of taught masters and finally the administration and management structures and strategic issues of the Graduate School.

Review documentation

The Review Panel considered the following documents

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General comments on the review process

The review was carried out under the rubric and practice recommendations approved by SPGSC in 2003. The process is aimed at enabling schools to develop their postgraduate provision and build on good practices. The review system is designed to look at the total postgraduate provision of a school, including all taught programmes and research degrees and the supporting managerial and administrative structures. The Review covered the period September 2003 – September 2008.

The School of Mathematics was first reviewed under the (then) Quinquennial Review process in May 2003.

One of the stated objectives of the University’s strategic plan is to increase the number of postgraduate students. In view of this development, one of the aims of the review process is to help schools take a longer-term view of development of their postgraduate strategy, as well as providing reflection on previous and current practice.

Overview of the school’s postgraduate provision

The Head of School, Professor Michael Singer, has overall responsibility for the provision of both undergraduate and postgraduate programmes in the school and the Head of Graduate School, Professor Andrew Ranicki has delegated day-to-day management responsibility for the provision of postgraduate degrees and programmes. The Head of School is supported by a team of administrators under the direction of the School Administrator with one member of the secretarial staff responsible for the administration processes for the research students and one part time member providing administrative support for the postgraduate taught programme.

The average number of student registering for PhD over the years under review is 13 with the highest number being 18 in the year 04/05. The majority of students are home/EU with overseas students representing approximately 33% of the intake.

The School currently offers one taught Masters programme – MSc in Operational Research and collaborates with Heriot-Watt University on the MSc Financial Mathematics. The MSc Operational Research is a long standing programme with the numbers registered on the programme rising steadily in the period under review. In recent years the intake has been dominated by overseas students who have made up 64% and 67% of the intake in the last two years of the review period.
Review of Taught Masters Programmes

Review arrangements

The panel conducted group interviews with academic staff and masters students.

MSc Operational Research

General comments

The MSc Operational Research degree is offered as a generic degree of Operational Research and as four themed degrees – OR with risk, OR with finance, OR with computational optimization and OR with energy (this stream new in 08/09). Students who take one of the themed degrees are required to choose options from topic related groupings and to undertake their dissertation in an area related to the theme.

The programme has a high external input from experts in industry and academia and encourages students to undertake projects in external organisations to gain practical experience.

Programme Review

The programme is managed by a small team of academic staff consisting of the programme director, academic selector and project coordinator. Pastoral care is provided by the programme director and the academic selector. The team is supported by a part time secretary. The School had recently upgraded the teaching and study provision and the programme now had its own dedicated teaching studio and a computer laboratory. This was working well.

The numbers of students had steadily increased over the years and it was believed by the team that the current level of intake was at the maximum for available resources. Further expansion would be dependent on additional academic staff being available for both teaching and for dissertation supervision. It was felt however that the new teaching and study facilities would be able to support additional numbers. The team noted that they had already received a higher number of applications for the 09/10 intake. The standard of the students attending was good and the high numbers of overseas students ensured a diverse mix of backgrounds and experience. A short maths test had been introduced in Freshers week to identify any requirements for remedial work and this had been successful.

As the programme had a high external input from guest speakers the timetabling structure of the programme reflected the fact that external speakers tended to be only available for short distinct periods of time. Although the level of external input was one of the major strengths of the programme this structure did not lend itself well to integration with other
Schools programmes and timetables thereby restricting the scope of sharing options. The team would however be supportive of more integration with other Schools for projects as this would increase the diversity of practical and theoretical problems for students to tackle. This would also assist in increasing the intake levels as more projects could be supported.

The level and range of opportunities for students to undertake external projects was a major strength of the programme. Students were encouraged to seek out their own projects with companies but the School also had a ‘pool’ of projects which were either industry based or academic based. It was however becoming increasingly difficult to attract new projects and sponsors. All students were allocated two supervisors for projects. In the case of a student undertaking an industrial project the student would have one external and one internal supervisor. The students were required to maintain regular contact with both their supervisors if they were ‘off campus’ to ensure that the student was well supported. The Project Coordinator also maintained regular email contact with students during the project period.

The OR students indicated that they were all enjoying living and studying in Edinburgh and that the city had been a major factor in their choice of study. They were all supportive of the programme structure and found the high level of external input stimulating and enriching. They all found the programme challenging (as they had expected it to be) however they felt that the quantity of assignments was too high which just encouraged them to go into ‘work mode’ rather than encouraging in-depth, self lead learning. They also expressed concern over the balance of required work load of assignments which could vary enormously and in some cases did not appear to be consistent with the overall weighting of the assignment to the final credits.

The students reported that the standard of teaching was high, on the whole, however the standard of feedback was not. The quality of the feedback and the length of time to get the feedback were variable and ranged from excellent to non-existent. Ideally they would like to have constructive feedback before they had to hand in the next assignment. This would allow them to improve from assignment to assignment.

The students were very supportive of the academic team and felt that the information available to them in the handbook, on the web and in emails was very clear and timely. However they did feel that some of their concerns expressed at the Student Liaison Committee were not being taken forward or fully considered.

The Panel noted that the tuition fees charged were at the lower end of the University’s fee structure and were concerned that the programme was in fact considerably undervalued and did not reflect the prestige of the programme given the strong reputation of the School.
MSc Financial Mathematics

This programme was a joint degree with Heriot-Watt University with HW acting as the administrating university. In this role they were responsible for admissions, academic management of the programme and the examination/graduation process.

The School of Mathematics provided teaching and project supervision. One member of academic staff acted as liaison with HW. The programme was reviewed regularly through Heriot –Watt’s quality assurance procedures.

The programme was well established and had been running successfully. The students were enjoying the programme which they felt was very practical in nature. This programme did not have a high level of assignments however the balance of examinations between the semester 1 and 2 was heavily weighed to end of semester 2 so students had to continue to study semester 1 courses for examinations in semester 2. They also reported difficulties in obtaining quality feedback. Comments would be passed back to Heriot-Watt via the School liaison processes.

Development of taught provision

In terms of extending the taught provision there were no new programmes under development. The School would be contributing teaching to a new programme in Heriot-Watt but this was not a formal joint degree. There was a good synergy between the two universities and this could have the potential to develop new joint programmes in the future. The team was not aware of any formal strategy to develop programmes in either pure or applied mathematics.

The OR team was considering introducing two new themes: OR with statistics and OR with financial mathematics but this could not be resourced with the current number of teaching staff.

The panel commends:

- the quality of the MSc programme currently on offer
- the commitment of the staff to the programme
- the strong contribution from external speakers
- the good range of industrial projects
The School is recommended to develop a recruitment strategy to manage further steady growth in recruitment in both home/EU and overseas markets. The School is recommended to strengthen existing overseas promotion and to develop and establish markets in new countries such as USA and Europe for long term recruitment. The School should look to exploit the resources available through the International Office and Communications and Marketing.

The main constraint cited in increasing numbers was the provision of supervision for projects. The Panel supports the development of a ‘group’ of external experts to act as supervisors over the summer period. The Panel strongly recommends that the Project Coordinator contacts the Development Manager in the Science and Engineering Scholarships section of The Edinburgh Campaign to discuss opportunities to expand the range and number of industrial contacts and projects. The Panel also recommends that the School investigates the use of group projects.

Given the strong reputation of and demand for the MSc Operational Research programme the Panel expressed deep concern regarding the placing of the tuition fees at the lower end of the market. There was no evidence that the fee was based on comprehensive market research and it is the Panel’s conviction that the fees currently charged are not commercially astute or sustainable in the longer term. The Panel therefore strongly recommends the School
- take appropriate steps to consider an increase in tuition fees to be in line with the College of Science and Engineering standard Fee ‘Band 2’
- commissions market research liaising with the University’s Communications and Marketing department to establish demand and market strength
- instigates a series of cautious incremental rises in tuition fees to maximize return from the market and to ensure and enhance the prestige of the programme

The Panel recommends that the School integrates the provision of masters teaching and administration into the School’s Teaching Organisation (MTO) in line with College strategy. This will increase efficiency and increase the support for administrative tasks to maximize the input of the academic staff to the teaching and management of the programme.
Review of Research Degrees

Review arrangements

The panel conducted interviews with a group of postgraduate supervisors and a group of postgraduate research students.

The findings of the panel have been incorporated under the following broad headings: recruitment and admissions, supervision and pastoral care provision and research and generic training.

Recruitment and admissions

The School has appointed an Admissions Officer to manage the application and admissions processes for research students. The School’s priority is PhD degrees and it does not routinely offer students MSc by Research degrees. Processes have been reviewed to improve quick turnaround from application to offer. All applications forms are received by the Research Secretary who sends them to the appropriate recommendation panel in each research group. Response times are monitored and outstanding decisions are chased up. Where practical all potential students are interviewed. The Admissions Officer allocates supervisors to students ensuring that the student to staff ratio is maintained and the research interests of the group are enhanced. These recommendations are presented to the annual funding meeting in April. The School has a number of sources of funding such as research councils, grants and internal University funding. The Maxwell Institute funding created around 6 scholarships between the University and HW. These places have all been taken up. The School does try to maximize the use of the funding offering part funding and teaching scholarships where it can.

There is scope for expansion of numbers and the School would like to attract more overseas students however funding is a constraint as they do not appear to attract many good quality, self funding overseas applicants. The School does not hold an Open Day but it will be participating in the University’s first Postgraduate Open Day at the end of the month. At the moment the Admissions Officer does not work closely with the International Office as the majority of applicants apply directly to the School. The School does not have a Marketing Strategy but it does have a presence on a selected group of web sites. Posters are used internally to promote research study to UG students.
Supervision and Pastoral Care Provision

Supervisors

The majority of the supervisors reported that they met with their student at least once a week however it was not common practice to take notes of these meetings. Only one supervisor routinely asked his student to summarise the meeting in an email afterwards as a means to ensure that the student has understood what had been discussed. The School had formalized the annual reporting/monitoring processes for first years. First year students were now required to prepare a report and give a presentation to supervisors, and other members of the Graduate School. A short report was prepared and passed to the monitoring group to consider. Where appropriate the group could recommend amendments to the report and ask the student to re-present in 3 months. The new processes had been effective and the School was more cautious of allowing a student who was underperforming to progress. Progress was formally monitored in second and third year in accordance with University regulations. Students were required to submit a short report on their research and this was assessed and commented on by the supervisors.

The supervisors were largely supportive of the formal training programme that had been introduced through the Scottish Mathematical Sciences Training Centre. There were still some concerns that the courses were too broad based for some research areas but there was flexibility in the system to be able to adapt to the student’s background and specific technical needs. The main reservation expressed was that the prescribed period of 36 months was not sufficiently long for a PhD in maths and that the time taken on these courses detracted from the development of the research project. It was recognized that the School did try to make funding available for 42 months wherever possible.

All members of academic staff were now Directors of Studies for undergraduates and they were all required to attend DoS training and Supervisors Briefing session. Recently the School had hosted an in-house Supervisors Briefing and this had been very useful. All the supervisors felt that there were strong mechanisms to pick up and resolve problems if they occurred.

The supervisors were supportive of research students undertaking demonstrating and tutoring and worked with their students to ensure that they did not take on too much to the detriment of their PhD studies.

Postgraduate Advisor

The School had appointed a Postgraduate Advisor to provide pastoral care. The second supervisor was the first point of contact after the first supervisor if a student has any problems and second supervisors are required to meet with their students at least once a semester. If there are problems that can not be discussed with or resolved by the second supervisor then the student is advised to contact the PGR advisor. The PGR Advisor
reviews all first year and annual reports to try to identify any potential problems as early as possible and he meets with every student annually to discuss their progress and how they are getting on.

If a student is experiencing difficulties then the PGR Advisor’s role is to find a solution to the problem or to refer the student to the appropriate support service for professional help. If a student is not performing academically the PGR Advisor will advise the student on options such as re-registration to another degree, training needs etc.

Research and generic skills training

Scottish Mathematical Sciences Training (SMSTC)

An International Review of Mathematics carried out in March 2004 highlighted the narrowness of PhD training in mathematical sciences. In July 2006 SMSTC was set up supported by a grant from EPSRC. SMSTC is a consortium of seven Scottish universities (University of Stirling as an associate) to provide a spectrum of broad based mathematical training courses to all participating universities by video conferencing. SMSTC was formally launched in 2007.

There are eight streams (3 pure, 3 applied and courses for probability and statistics) delivered to first year students during October to late March in weekly 2 hour sessions. Tutorial support is provided locally. Each course is assessed by assignments with the student gaining an overall grade for the stream (A, B, C or U if unsuccessful). These courses are not formal credit bearing courses.

Each stream had a stream leader and a designated team of academics who were responsible for the academic content and delivery of the courses. The stream leader submitted an annual report to the Management Group.

In the School of Mathematics student attendance at the courses is monitored and the supervisor is notified if there appears to be a problem. The overall grade is considered at the First Year Report stage. Student participation was influenced by the research grouping attitude. The majority of supervisors now supported the training but there were still some supervisors who did not support the concept and resented the time away from ‘research’. This would take time to overcome.

The SMSTC also supports two symposia annually. The first takes place at the beginning of the academic year and is primarily aimed as an induction and networking event to help the students settle into their studies. The students get the opportunity to attend ‘taster’ lectures and transferable skills courses. In the second symposium the emphasis is on generic skills courses, a feedback session and a guest lecture. The symposium concludes with a reception. The second symposium had just taken place and had been very successful.
The Management Group is responsible for the management and the overall academic content of the series and symposia. The initial funding was primarily for development and equipment costs and student costs up to 2010/2011 session. The Management Group is looking to ensure sustainability in the longer term.

**Transferable Skills**

The Transferable Skills Unit provides a programme of generic skills courses. In general attendance on these courses by students from the School of Mathematics was fairly good with 23 students having attended at least one course in the current academic year.

In addition Transkills had worked with the School to provide three training sessions in 2008 designed specifically for maths PhD students. These had been very successful.

The University devolves a third of the Roberts funding directly to Schools to provide tailored training. The School of Mathematics used this money to support the development of the three tailored session and ICMS skills development workshops. In 2008/09 the School will use some of the money to provide the students with a budget to develop their own colloquia series.

The Panel noted that the students did not appear to be as well informed about career development opportunities as perhaps would be expected. Transkills had provided a generic presentation on career development opportunities as part of the annual Graduate School Firbush trip but this had not been well attended. Transkills were not aware of any career development courses provision in the School but would be willing to work with the Schools and the Careers Service to provide training if this was asked for.

**PhD students**

The students were very supportive of the SMSTC programme and the students who had taken the courses felt that they had been very useful in expanding their base knowledge. Students studying in more specialized areas of mathematics felt that it would be helpful to be able to have flexibility to substitute some broad based courses for specialized courses perhaps from another School. A big plus for the students was that these courses brought all first years together which had helped to develop a real sense of community.

The students reported mixed satisfaction with the level of contact with their supervisors with some reporting that their supervisor was very supportive and others reporting that they did not see their supervisors regularly enough. The variance was particularly marked with second supervisors with some students having not even met their second supervisor. While the students accepted that they were responsible for their research there was a feeling that they did not receive enough general guidance or direction and reassurance from their supervisors when things were not going well. This could sometimes lead to feelings of underachieving when they were facing challenges with their research.
There was a lack of constructive feedback on progress both on an informal basis and at the formal yearly progress reports. The students did not receive feedback from their annual reports and were not given the opportunity to comment on the report that was submitted to College. They did however meet with the PG Advisor once a year for a general discussion on their progress.

All the students participated in the School’s teaching and marking activity and all felt that this was a worthwhile experience. The students who had attended the School based training session had found this useful and interesting. The students did however comment that the level of interaction with the course organizer and the level of information available on the web for courses were variable across courses. This did make advance preparation for tutorials more difficult. In addition the students did not receive any feedback on their performance so they were not able to make best use of this experience to develop their skills and techniques.

The students felt that overall they had access to all the facilities that they needed although a small number commented on the length of time it had taken to get a computer. This had been addressed by the School and computer resources were improving. All of the students felt very strongly that the School did not provide sufficient funding to support attendance at conferences. Currently each student is allocated £250 each year which had to be used within that academic year. It would be useful to be able to accumulate the money to support attendance at conferences in their later years of study when it was most beneficial. They believed that attending conferences was very important academically and they would wish to see this better supported by the School.

Postgraduate Seminar programme

This is a student led programme of seminars where students present seminars on topics of interest to them. It is not common for students to present aspects of their own work. The organizer reported that it was often quite difficult to get people to volunteer to present a seminar. He had had discussions with the Head of Graduate School on developing seminars on wider generic topics such as careers but this had not taken off partly due to lack of interest by the student themselves.

The Panel commends

- the high quality of the PhD handbook
- the appointment of an Admissions Officer
- the appointment of a PGR advisor to provide pastoral care
- the standard, quality and breadth of the courses provided under the SMSTC
- the level of interaction with the University’s Transkills Unit to develop School orientated training for supervisors and students
Although the School has procedures to ensure that the students meet with their supervisors on a regular basis there appeared to be discrepancies in the actual levels of interaction with supervisors, in particular second supervisors, across the School. The Panel requires that the School takes steps to ensure that all supervisors, wherever acting as a first or second, are aware of the minimum requirements to meet with their students and make themselves available for regular meetings.

The Panel noted the students’ concerns regarding the feeling of lack of guidance and reassurance on their progress. The Panel recommends that the School develops stronger supervision mechanisms and procedures to increase the engagement of the academic staff with students.

The Panel recommends that the School investigates ways to develop the monitoring regime to provide both the supervisor and the students with more effective opportunities for constructive and reflective review of progress, particularly in the first and third years. The School is encouraged to speak to the School of Informatics which has recently enhanced its monitoring scheme.

The Panel recommends that the School strengthens the Annual Interview/Review process to ensure appropriate record keeping and reporting and to develop a formal feedback mechanism for the students. Students must be given an opportunity to comment on any report.

The Panel noted the constructive use of PhD students with pre-Honours years teaching and assessment marking. However the Panel would strongly recommend that the Graduate School works more closely with the Teaching Organisation to ensure that the students have the appropriate level of interaction with academic staff in advance, during and after the teaching period to maintain standards and to enhance the learning experience for the graduate students. The School should also instigate procedures to provide ‘teaching references’ for the students.

The Panel recommends that the School investigates ways to increase the financial support available to students to attend conferences. All students should have the opportunity to attend at least one international or major national conference at some point during his/her programme of study. One possibility is to allocate a lump sum to the student and supervisor at the start of the prescribed period to allow them to plan how the money would be best spent over the 36 months to support the student’s development.
Management of the Graduate School

The overall responsibility for the School lies with the Head of School. The responsibility for the management of the Graduate School is the remit of the Head of Graduate School. The day-to-day management of MSc taught programme lies with the Programme Director. The responsibility for the management of the administration of the School lies with the School Administrator. A team of postgraduate secretaries supports the Head of School and Head of Graduate School and the programme director.

Administrative Structure

The panel conducted an interview with the School’s PG administration team.

The team comprised the Research Administrator, one full time administrator officer responsible for PGR and one part time secretary who supports the PGT team. All of the staff had other duties in addition to their PG work. It was noted that some of this work was substantial in nature eg personal secretary to academic staff and administrator for 4th year UG cohort.

The post of Research Administrator was a new post and was primarily a strategic role to assist with the development of the Graduate School. She was responsible for the research grant administration and the development of future applications and appointments to projects. The School did not have a separate Business Development Executive (although a part time post was associated with ICMS) and the Research Administrator’s role encompassed some of the development aspects of the BDE role. The School wished to increase the number of research students and she was working with the Head of School to develop new opportunities for projects, sources of funding and research grants. She had recently had her first experience with dealing with ERI and she had found that the process could be quite involved and it was time consuming.

The PG Administrator Officer was responsible for providing the administrative support for PhD application and admissions processes and for the formal first year and annual monitoring processes. She also acted as one of the main points of contact for the students if they needed advice and assistance etc.

The PGT secretary felt that the administration of the programme was running well with no serious problems. The new teaching facilities were good and the majority of previous problems with timetabling had disappeared now that they had their own dedicated space. The PGT secretary was not formally part of the Mathematics Teaching Organisation.

They were encouraged to attend training and other career development opportunities and felt that they were well supported by both the Head of School and the Head of Graduate School.
Head of School

The development of postgraduate provision was a priority and he considered the postgraduates to be a very important part of the academic community.

He felt that the recent RAE results were reflective of the School but he anticipated that the School would not gain any increased funding as a result of these results. The development of the Maxwell Institute had been very constructive for the School and had succeeded in strengthening the overall research capacities of both Schools. The Institute had also attracted extra funding that had supported the creation of important Chair positions and the appointment of additional high quality academics.

He was aware that there was spare research and supervisory capacity in the School and he would wish to increase the numbers of postgraduate students by a factor of two. The priority over the last few years had been to divert as much money as possible to scholarships. Consequently they had increased the numbers of part funded scholarships and developed specific teaching scholarships. He was aware that the School was not attracting the level of external funding that it could perhaps expect and he was working to improve this. It was however proving very difficult in the short term due to the current financial climate but he was developing a strategy to improve this over the longer term.

Historically the School had not developed cross school/college research collaboration but he was aware that there were opportunities to develop interdisciplinary research with other Schools. He was aware that there may be some reluctance initially by academic staff to engage in this but these collaborations did offer the prospect of additional funding sources and interesting research.

The Panel noted that although the School was still receiving a respectable number of applicants there appeared to be reluctance on the part of the supervisors to take on any students who did not have excellent qualifications or who did not have degrees from top overseas universities. The Panel wondered if the School should consider greater levels of recruiting to MSc by Research as a means to allow applicants with a wider range of entry qualifications the opportunity to study. At the end of the first year the student could be awarded a masters degree or offered continuation to a PhD degree based on their performance.

In terms of postgraduate taught provision the current programme was successful and the Head of School was looking to develop two new streams. He was in the process of appointing an additional member of staff who would be able to support both the research capacity and the teaching. One of the resource implications of increasing student numbers was the need to provide increased supervision of dissertations. This year the School was planning to appoint a pool of research visitors to act as dissertation supervisors. The School was developing a research strategy to broaden the areas of research and increase the numbers of researchers who could support PG teaching. The Panel noted that there did not appear to be any real level of enthusiasm amongst academic staff towards the development of new programmes although the Panel felt that there were real
opportunities for the School to provide more programmes for example a programme in Pure Mathematics.

The Head of School felt that he was well supported by the College although he had strong reservations about the demise of the Postgraduate Studies Committee which he felt had been an effective committee in both operational and strategic terms.

**Head of Graduate School**

The panel conducted an interview with the Head of Graduate School. The Head of Graduate School's overall role was the day-to-day management of the postgraduate research provision.

The priority had been to work closely with the Admissions Officer to increase numbers of students. Considerable work had been carried out on the School's web pages to improve accessibility and the School’s image. The processes surrounding the selection process had been reviewed and the priority was to ensure good turnaround time of offers. It was important to present the School as an excellent place to study and considerable effort was put into the student interviews. Work was now being undertaken to strengthen the links with the School’s alumni and it was hoped that they would be able to include some testimonials to inspire potential applicants.

He would like to increase the recruitment of overseas students and he was looking at ways to offer small bursaries (~ £1000) to self funding students to encourage them to choose Edinburgh. Unfortunately the School was not succeeding at the moment in attracting sufficient numbers of applications from good quality self funding students. The School had appointed a Research Officer who would be working to create opportunities to maximize the School’s research grant applications and funding which could then be used to support good overseas students.

The Panel noted that all the reports on student progress that had been included in the documentation indicated that all their students were excellent and wondered how the Head of the Graduate School identified and resolved issues. He had not had to deal with many major problems as Head of Graduate School but when issues arose he worked closely with the supervisor and PGR Advisor to resolve any issues. He had started work on developing a School database to improve the mechanisms to monitor student progress. It was hoped that this would improve the School’s ability to spot potential problems earlier.

The Head of Graduate School felt that he was supported by the Head of School and the College overall but he did express concern regarding the recent re-organisation of the College Office. He felt that the College Postgraduate Studies Committee had been an important committee and he had found it very effective and supportive. The Heads of Graduate Schools had now convened an informal committee to ensure that they could
continue to maintain consistency in their approach to PGR management, spread good practice and support each other if needed.

The Panel \textit{commends} the level of support given by the administrative staff.

The Panel \textit{commends} the School on its excellent international profile and reputation.

The Panel \textbf{strongly recommends} that the School develops a clearer strategy to support the development and management of the provision of postgraduate education and the development of new income streams. It is \textit{recommended} that the plan focuses on a minimum total intake of 20 research students per academic year.

The Panel \textbf{particularly recommends} that the School looks to develop new markets in the USA, South America and India. The School should also look to capitalize on its strong reputation in the eastern European countries, Germany and Switzerland who have strong traditions in undergraduate maths teaching.

The Panel observed that the School appeared to be failing to capitalize on its strong reputation to develop collaborative arrangements with other universities in the UK and worldwide to increase recruitment of PhD students. The Panel therefore \textit{recommends} as a matter of priority that the School works with other Schools and the International Office to explore opportunities to participate in existing formal collaborations and to develop new collaborations.

The Panel \textit{recommends} that the School works with the College management and learn from other Schools experiences to create a flexible and responsive funding plan to increase student numbers while maximizing return and increasing the scope of funding packages for students.

The Panel \textit{recommends} that the School works with the International Office to develop country specific recruitment information including guidance on international qualifications and comparability to UK qualifications directly relevant to mathematics.

The Panel noted the apparent lack of School activity or enthusiasm for the development of new taught programmes. The Panel felt that there were real opportunities for the School to develop new programmes in both pure and applied mathematics utilizing a mixture of existing and new courses in the School and the wide range of courses provided by other schools eg engineering, informatics and physics in CSE and management and business courses in CHSS. The Panel therefore \textbf{strongly recommends} that the School develops a strategy to develop a portfolio of new masters programmes. The School is \textit{advised} to work with the University’s Communication and Marketing department to undertake market research to determine potential opportunities for new programmes.
Summary and Recommendations

The Panel would like to thank all the students and staff who took part and contributed constructively to the process. The College would like to thank the Panel members for their work and their valuable contribution to the process.

It was clear that there were no major issues which were undermining the postgraduate training environment however the Panel did identify procedural and strategic issues that were negatively impacting on the standard of research training and support given to the students. The issues that have been identified where further development is required or amendment of existing procedures is needed are summarized in the list below:

Commendations

The Panel commends the School of Mathematics for:

1. the high quality of the MSc programme currently on offer
   • the commitment of the staff to the programme
   • strong contribution from external speakers
   • good range of industrial projects

2. the high quality of the PhD handbook

3. the appointment of an Admissions Officer

4. the appointment of a PGR advisor to provide pastoral care

5. The standard, quality and breadth of the courses provided under the SMSTC

6. The level of interaction with the University’s Transkills Unit to develop School orientated training for supervisors

7. the level of support given by the administrative staff

8. its excellent international profile and reputation.
Recommendations

The panel makes the following recommendations:

To the School:

Taught Masters programmes

1  The School is recommended to develop a recruitment strategy to manage further steady growth in recruitment in both home/EU and overseas markets.

2  The main constraint cited in increasing numbers was the provision of supervision for projects. The Panel strongly recommends that the Project Coordinator contacts The Edinburgh Campaign to discuss opportunities to expand the range and number of industrial contacts and projects. The Panel also recommends that the School investigates the use of group projects.

3  It is the Panel’s conviction that the fees currently charged are not commercially astute or sustainable in the longer term. The Panel strongly recommends the School
   - take appropriate steps to consider an increase in tuition fees to be in line with the College’s Fee Band 2
   - commissions market research to establish demand and market strength
   - instigates a series of cautious incremental rises in tuition fees to maximize return from the market

4  The Panel recommends that the School resources the integration of the provision of masters teaching and administration into the MTO in line with College strategy.

Research programmes

5  The Panel requires that the School takes steps to ensure that all supervisors, wherever acting as a first or second, are aware of the minimum requirements to meet with their students and make themselves available for regular meetings.

6  The Panel recommends that the School develops stronger supervision mechanisms and procedures to increase the engagement of the academic staff with students.

7  The Panel recommends that the School investigates ways to develop the monitoring regime to provide more effective opportunities for constructive and reflective review of progress.

8  The Panel recommends that the School strengthens the Annual Interview/Review
process to ensure appropriate record keeping and reporting and to develop a formal feedback mechanism for the students.

9 The Panel would **strongly recommend** that the Graduate School works more closely with the Teaching Organisation to ensure that the students have the appropriate level of interaction with academic staff in connection with their role in undergraduate teaching.

10 The Panel **recommends** that the School investigates ways to increase the financial support available to students to attend conferences. All students should have the opportunity to attend at least one international or major national conference.

**Management of the Graduate School**

11 The Panel **strongly recommends** that the School develops a clearer strategy to support the development and management of the provision of postgraduate education and the development of new income streams. It is **recommended** that the plan focuses on a minimum total intake of 20 research students per academic year.

12 The Panel **particularly recommends** that the School looks to develop new markets in the USA, South America and India and capitalize on its strong reputation to increase recruitment in eastern European countries, Germany and Switzerland.

13 The School was not capitalizing on its strong reputation to develop collaborative arrangements with other universities. The Panel **recommends** as a matter of priority that the School works with other Schools and the International Office to explore opportunities to participate in existing formal collaborations and develop new collaborations.

14 The Panel **recommends** that the School works with the College management to create a flexible and responsive funding plan to increase student numbers while maximizing return and increasing the scope of funding packages for students.

15 The Panel **recommends** that the School works with the International Office to develop country specific recruitment information on international qualifications and comparability to UK qualifications.

16 The Panel noted the apparent lack of School activity or enthusiasm for the development of new taught programmes. The Panel **strongly recommends** that the School develops a strategy to develop a portfolio of new masters programmes.
To the College and University:

1 The Panel asks the College management to support the Head of School in developing clear strategic plans to drive development forward.

2 The Panel asks the College management to provide College level support for identifying and developing applications for new funding streams.

3 The Panel asks the College management to provide assistance to the Head of School to develop the Schools links to industry.

4 The Panel asks the International Office to work with the School of Mathematics to develop an international recruitment strategy.

5 The Panel asks the Communications and Marketing department to work with the School of Mathematics to develop effective market research activities and a marketing strategy.