NUI MAYNOOTH

Ollscoil na hÉireann Má Nuad

DEPARTMENT OF MATHEMATICAL PHYSICS

QUALITY REVIEW 1999

PEER REVIEW REPORT 1999

Report on:

Quality Review Exercise: Department of Mathematical Physics, NUI Maynooth

Preamble

The external assessors, Alan C. Newell, of the University of Warwick, and Alastair D. Wood, of Dublin City University, visited the Campus 29-30th April 1999.

Prior to the visit, they were informed by

- Guidelines for a Pilot Review Exercise
- Guidelines for External Assessors of Academic Departments
- A Departmental Self Assessment Report

On arrival there was an informal reception with Departmental Staff, followed by a Dinner with the Vice-President (Dr. Mulligan), the Dean of Arts (Dr. Watson), the Quality Officer (Ms. Magennis) and the Head of Department (Prof. Heffernan).

In order, we spoke to:

- Dr Frank Mulligan, Vice-President
- Professor Danny Heffernan with whom we toured the departmental offices and computing laboratories
- Professor Tony O'Farrell, Departmental Chair, Mathematics.)

Faculty

- Dr Jason Twamley
- Dr Brian Dolan
- Professor Charles Nash

Because of illness, we did not have the opportunity to meet with Professor Tchrakian.

- A group of 18 students comprising a cross-section of first, second, third year undergraduate students and graduate students, and tutors Linda Murphy and Billy Hanan.
- All five postdoctoral research fellows Drs John Gough (DMH), Alex Lewis (BD), Bruno Muratori (CN), Burkhard Kleihaus (TT) and Frank Zimmerschied (TT). The initials of the associated faculty member are in parenthesis.
- The University President, Dr. Seamus Smyth and Vice-President Dr. Frank Mulligan to whom we delivered an oral report on the days events and our preliminary reflections.

Summary of Report

Overall, we were very impressed by what we read, saw and heard. We share the generally held view that, through his leadership and boundless enthusiasm, Professor Heffernan has greatly energised the department since his arrival as Head of Department, although perhaps too much of the everyday departmental load rests on his shoulders. The Undergraduate Programme is sound although we suggest that consideration be given to our remarks below. All of the undergraduate students whom we met spoke enthusiastically about the quality of lectures and personal attention they receive. The Graduate Programme requires attention in several ways and we speak of this below. The group of Postdoctoral Research Fellows is most impressive for such a small department. The department could well use this group more effectively in fulfilling its teaching mission. With one exception, we did not get the chance to explore the relationship of Mathematical Physics with its sister departments in the Faculty of Science but we did form the impression that, whereas formal relations between departments were good, the traditional vertical structure of the Faculty's organisation by department may frustrate some opportunities. The departmental facilities were good but we strongly advise a modest investment of a teaching assistant (approx. £6k IR per annum) to support the computing environment.

Undergraduate Programme

We would strongly recommend that the department, in close consultation with its sister and client departments, review the undergraduate curriculum. There was strong consensus among those faculty members whom we interviewed that such an exercise would be beneficial. The quality of both the content and delivery of the current curriculum appears good. However, it is heavily weighted towards field theories and their theoretical presentation (classical and quantum mechanics, electromagnetic theory, continuum and solid mechanics) and we question how relevant such a programme would be for students who choose not to continue on to higher level degrees. In fact, it was notable that the department was ignorant of the placement of most of its graduates other than those who went on to pursue graduate studies. Science Departments must recognise that perhaps 75% of its graduates may, in the current climate, seek to continue their careers outside of the academic arena and therefore much more emphasis on subjects such as computation is desirable. We also felt that it would be valuable to have a joint degree programme with Biology. The students want it and it is an area in which mathematically/quantitatively trained scientists can make a real contribution. Students claim that a timetabled mathematical physics/chemistry joint degree is not taken up, so space could be made. Some students also expressed concern that some lecturers were assuming mathematical prerequisites which not all members of their class possessed. It also seemed sensible to us that, somewhere in the science/mathematics curriculum, there be courses in computation/probability/statistics/combinatorics/finite mathematics suitable for students who wish to pursue careers in the finance/business/accounting sectors. But this may be already covered by other departments. Finally, it seemed to us that the distribution of resources was a little uneven.

MP101, Mechanics has a class of approximately 150 students whereas MP151, Mechanics (Honours section) has only five! Also it would seem that a lot of the responsibility for teaching the large courses falls on too few shoulders.

Specific recommendations include:

- The University supply the department with maintenance (approx. £6k IR per annum) to cover a TA who, in addition to pursuing a graduate degree, would be responsible for lab maintenance. Universities must recognise that modern Mathematics is a laboratory science and provide for the appropriate technical help. Currently the laboratory is maintained very ably by Nash and Twamley but it would seem foolish to expect faculty members to continue this work when they have so many other responsibilities and obligations.
- Continuous assessment is good but regular credit should be given as an incentive.
- There should be better organisation of the questionnaire given to students to gain feedback on teaching. The current practice lacks uniformity and is a little amateur. It is not clear that the majority of students are responding. This questionnaire should also include the performance of graduate students/tutors in recitation sections.
- Tutors should receive some formal training. The three day course run by the University for all staff is generally not adequate. One needs subject specific training.
- A joint Biology-Mathematical Physics degree option would be valuable.
- There could be more involvement of faculty in providing career information especially on careers outside of academia.
- Better records of departmental committee meetings (minutes of staff meetings and meeting with student representatives) would be useful.
- The department might consider appointing an extemal advisory committee consisting of successful men and women from the private sector.

Graduate Programme

We recognise that, because of the current job market and the competition from more established graduate programmes, it is difficult to recruit quality students. Nevertheless, because graduate students are such an integral part of the life of a modern department committed to both teaching and research, and because they are a vital part of the teaching process, extra effort to attract students should be made. Right now, the situation is unhealthy. All current students work with the same faculty member. There is consequently not enough personal attention given nor is there any structured training (e.g., postgraduate courses). Given the excellent senior/junior ratio in the Department, there is no reason for this situation to prevail. In small departments, much of the recruiting effort must be undertaken by individual faculty members and therefore it is necessary that the administration, through direct and unambiguous signals and judicious incentives, make abundantly clear its expectations. Perhaps if prospective students felt that the graduate student experience would expose them to a preparation for a range of careers beyond the academic, there might be more interest. It is not impossible for graduate students to work on those areas of principal research interest to faculty and to equip themselves for other careers at the same time.

Postdoctoral Fellows

The department is to be congratulated on both attracting and obtaining funding for five postdoctoral fellows. This is no mean achievement. Furthermore, we find each of the individuals to be enthusiastic and well prepared. We would simply offer two comments. First, in order to continue to attract a stream of quality postdoctoral fellows it is very important that faculty aid actively the present group in attaining the best possible positions to further their careers. This can be no better advertisement for future recruiting. Second, and connected with the first, to enhance their own career prospects, postdoctoral fellows should be fully integrated (with training and appropriate assignments) into the departments teaching responsibilities. This should be done not as a convenience for individual faculty members to relieve teaching but as an orchestrated policy designed to give advantage to the undergraduates, the postgraduates and the fellows themselves. New staff of all kinds, whether research fellows or lecturers, should receive staff development in teaching skills.

Research

Although we are not experts in the respective fields represented by the faculty members, the research records of all five departmental members are very impressive indeed. Their success with external funding and with publishing in first rate journals means that they are well respected by peers within their respective communities.

Final Recommendation

Although it is difficult (and not always wise) to disturb existing and traditional structures, the Faculty as a whole might consider whether there could be sufficient advantage gained in increased flexibility (and room for change and growth) to warrant an attempt to integrate some of the undergraduate and graduate programmes. It would appear to us that the Faculty might have too many small, competing departments (and therefore vertical constraints) for a student cohort of 1200. One possibility might be a jointly administered undergraduate (and possible graduate) degree in computational mathematics/physics. Discussions on the distribution of responsibilities for the expected Electronic Engineering programme might serve as a platform to kick-start such a dialogue.