



NUI MAYNOOTH

Ollscoil na hÉireann Mhúaid

**Quality Review of the
Department of Electronic Engineering**

6 – 7 April 2009

Peer Review Report

Peer Review Group:

External Reviewer: Professor Martin McGinnity,
University of Ulster, Northern Ireland.

Internal Reviewer: Dr Bernard Mahon,
Dean of Faculty of Science and Engineering,
NUIM.

1. Introduction

This document summarises the outcome of a quality review of the Department of Electronic Engineering at the National University of Ireland, Maynooth, in April 2009. The review was conducted by Professor T.M. McGinnity, University of Ulster (External Reviewer) and Dr. Bernard Mahon (Dean of Faculty of Science and Engineering), Internal Reviewer.

2. Period

The review was conducted in late March / early April 2009, with an onsite visit during the period 6-7th April 2009.

3. Scope and Terms of Reference

The remit of the review was confirmed in the introductory meeting with Quality Promotion Office staff on 6th April 2009.

4. Objective

The objective of the review was to perform a wide ranging, overall assessment of the teaching and research quality of the Department, including consideration of Departmental facilities and resources, sustainability and future growth plans. The quality review was intended to take due cognisance of the recently completed IET Accreditation Visit to the Department in February 2009.

5. Process

The review process consisted of the following.

5.1. Consideration of Documentation. A Complementary Quality Review Self-Assessment Report and documents on an accompanying CD was provided. The Self-Assessment Report (dated 24th March 2009) was supplemented by supporting documentation, as follows:

- Quality Review Self Assessment Report (27/02/2006).
- The Institution of Engineers of Ireland (IEI) Accreditation Submission for the B.E. Degree in Electronic Engineering (2009)
- Department of Electronic Engineering Strategic Plan (2008 – 2013).

The accompanying CD contained the following material:

- Book of Module Descriptors for the BE Electronic Engineering (2008 - 2009)
- Description of facilities including buildings, laboratories and equipment
- CVs of academic, technical and support staff
- Exam Papers 2007-08, Year 1, Year 2, Year 3 and Year 4
- External Examiner's Reports 2007-2008, 2006-2007
- Student Feedback - Summary MCQ Statistics (Semester 2, 2007 and Semester 1, 2008)

The documentation was provided well in advance of the site visit, enabling comprehensive consideration. The quality of the documentation both on paper and on CD was most impressive and assisted efficient conduct of the review.

5.2. Visit to the Department

An onsite visit supplemented consideration of the written documentation. During the onsite visit, a series of meetings was held with a broad range of academic, research, administrative and technical support staff, as well as undergraduate and postgraduate students. These included the President, Dean, Head of Department, staff of the Quality Promotion Office, Departmental staff and students. The schedule of these meetings is attached as Appendix 1.

A tour of the facilities was also provided by the Head of Department.

5.3. Preliminary Summary

A preliminary summary of the main findings of the review was presented to staff prior to the conclusion of the onsite visit on April 7th 2009.

5.4. Written report

A written report (this document) was subsequently provided after further consideration and deliberation.

6. Report

This report focuses on the following aspects:

- Courses and Teaching
- Research Activities
- Support for Teaching and Research
- Continuing Professional Development
- Ethos and Communication within the Department
- Strategic Plan and Future of the Department
- Challenges, Issues and Recommendations

It identifies a number of issues for further consideration by the Department and University.

7. Background

The Department of Electronic Engineering at NUI Maynooth was established in 1999 and received its first undergraduate students in September 2000 into the inaugural BE (Bachelor of Engineering) programme in Electronic Engineering.

The Department currently offers the following taught degree programmes:

- B.E. in Electronic Engineering
- B. Sc. in Product Design (Marketing and Innovation)
- M.E. (Electronic Engineering)

The Department also offers an MEngSc and PhD postgraduate research degrees.

It has been decided to relocate the Product Design course to another Department of the University at the end of the current academic year.

7.1. Staffing Level

Currently, the Department has 13 academic staff, 4 technical staff (one of whom is dedicated to support of research) and 1.5 administrators.

7.2. Facilities

The Department is housed in one wing of a modern attractive building. Teaching and office accommodation is of good quality. Laboratory teaching facilities are adequate for the number of students currently enrolled in the Department's courses. The growth of research (see section 9) has resulted in pressure on research accommodation.

Laboratory facilities and instrumentation are modern and well maintained. Out of hours access to teaching laboratories is excellent.

There are limited "social" spaces to allow for informal gathering of staff and students.

7.3. Student Numbers

Prior to September 2008, the Department had approximately 20 to 25 students entering first year. In April 2006, the Department had a total of 89 students enrolled on taught courses. The number of first years entering the BE programme fell to 9 students in September 2008. The numbers entering the Department's M.E., introduced in 2006 has grown.

The target for student numbers across all years, for taught engineering programmes is illustrated in Table 1, for the period from April 09 to April 2013. The dominant planned growth is in the MEng course, with limited expansion of undergraduate numbers from the 2009 baseline.

(Note the table suggests a re-titling of the ME to MEng) with 18 students enrolled in April '09).

Table 1: Target Student Numbers¹

	Apr-09	Apr-10	Apr-11	Apr-12	Apr-13
u/g EE	72	77	77	78	81
ME		--	--	--	--
MEng	18	25	35	50	60
Total	90	102	112	128	141
FTE²	99	115	130	153	171

Notes: 1. Headcount; except last row = FTE
2. FTE weightings: Masters students = 1.5. Undergraduate students = 1.0.

The student (FTE) /staff ratio in the Department is currently 14.4.

8. Courses and Teaching

The three taught courses offered by the Department, namely the B.E. in Electronic Engineering, B. Sc. in Product Design (Marketing and Innovation) and M.E. (Electronic Engineering) are all of a very high standard. There are clear aims and objectives, and the courses address important technological areas with industrial and commercial need.

The BE in Electronic Engineering was accredited by the IEI (Engineers Ireland) in February 2009 for a period of five years without conditions.

All of the courses offered by the Department have module specification (descriptors) which are well presented. The standard of delivery of courses is good, the assessment procedures fair and reasonable and the overall structure and content appropriate.

The reviewers were pleased to note a very high standard of courses, both at undergraduate and at postgraduate level. There is evidence of quality, innovation and integration with research in the final year project topics.

A strong commitment to teaching quality was evident in discussions with staff and students. Staff are to be commended on their commitment to teaching, their energy and inventiveness and willingness to embark on and evaluate new innovations in teaching.

Undergraduate students were very supportive of the Department, happy with the standard of the courses, the delivery of teaching and assessment procedures.

Course administration is good, with a high level of organisation.

8.1. e-Learning

The Department makes extensive use of Moodle as an e-Learning tool. Student perception of Moodle was very positive; they liked the use of Moodle, which is available for almost all modules and would like to see all staff (even outside the Dept) utilise this eLearning modality.

8.2. Workload Balancing

The Department operates a workload balancing “Brownie points” system which seeks to enable the Head of Department to allocate teaching and administration jobs in an impartial equitable, effective and transparent manner.

9. Research Activities

The Department has a strong focus on research and is to be commended for the rapid development in research output since its inception. Currently there are 45 postgraduate

research students and 8 post-doctoral researchers. Of the 45 postgraduate students, 40 are registered for a Ph.D.).

There are five research groups in the Department, namely:

Biomedical Engineering Research Group
Institute of Microelectronics and Wireless Systems (IMWS)
Distributed Interactive Applications Group
Dynamics and Control Group
Digital Audio Processing Group

Staff of the department have published more than 120 research papers in the period 2006 to 2009, including 43 journal papers, 2 book chapters and 2 patents. Publications in high impact journals such as IEEE Trans. on Biomedical Engineering, Journal of Applied Physics and Electronic Letters are particularly noted.

Research income has been growing significantly. In the last three years, the Department's academic staff secured about €2M in research funding. The main sources of funding in 2008 are Enterprise Ireland and IRCSET, together with a proportion of a single large (> €7million) co-investigator SFI grant.

Approximately 50% of the academic members of staff are research active.

10. Support for Teaching and Research

The Department has four experienced technical support staff, with one person dedicated to supporting research. The level of technical support staff is adequate. However one member of the support staff is on a fixed term contract due to expire in November 2009 and another on a fixed term contract due to expire in two years.

There are 1.5 experienced administrative staff who support the various activities of the Department. It was evident that the administration of the Department is very professionally organised.

It was evident that there are good working relationships between the various administrative and technical support staff.

11. Continuing Professional Development

The small size of the Department clearly presents difficulties in enabling staff to take periods of leave on secondment for skills updating and personal continuing professional development. The reviewers were pleased to note that despite this difficulty, one member of staff was on a sabbatical at the time of the visit.

12. Ethos and Communications within the Department

There is a very collegiate atmosphere in the Department. Staff, students and researchers integrate well, help each other out and there is a strong sense of a learning community. This was evident in all of the meetings the reviewers had with individual groups.

13. Strategic Plan and Future of the Department

The material presented for review included the Department's Strategic Plan for 2008-2013. In summary this plan foresaw:

- Maintenance of a clear programme path offering a robust, high-quality path to Engineers Ireland CEng accreditation
- Maintenance of high quality in teaching
- Maintenance of growth in research income
- An increase in taught engineering numbers by 100% over the period of the plan
- Consolidation and development of the undergraduate Product Design programme
- Development of a new MSc in Design and Innovation
- Development of a new BSc in Technology Education
- Growth of permanent academic staff numbers
- An increase in registered PhD students to exceed 50 by April 2013
- Acquisition of extra space to accommodate research activities
- Development of strong, mutually supportive relationships with industry and business communities at national and international level.

In terms of the plan, the following have been achieved:

- Maintenance of a clear programme path offering a robust, high-quality path to Engineers Ireland CEng accreditation (renewed accreditation Feb 2009 for 5 years)
- Maintenance of high quality in teaching (as evidenced from external examiners' reports and student feedback)
- Maintenance of growth in research income
- An increase in registered PhD students; this is well on track to exceed 50 by April 2013, assuming the current trajectory can be maintained. However see section 14.2
- Development of mutually supportive relationships with industry and business; this is clearly an ongoing matter but it is evident that the Department has a strong collaborative focus.

14. Challenges, Issues and Recommendations

There are a range of pressures on the Department, internal and external, and the Department is unlikely to be immune from pressures arising from the national and global economic situation.

14.1. Teaching

- **Student Numbers:** The number of taught students enrolled in the Department is a serious cause for concern and the decline in student numbers is perceived as the most pressing problem facing the Department. The fact that the Department is small is not the real issue per se, but nevertheless the decline in numbers, coupled with the departure of the Product Design course, and other internal and external pressures mean that the viability of the Department is questionable if current trends continue.
- **Product Design:** The departure of the Product Design course and three associated staff poses a problem on a number of fronts – timing, organisation, and leadership of the EE Department afterwards, student numbers. Conversely it may offer the Department the possibility of re-using the released laboratory space (assuming this is retained by the Department and is in fact released).
- **Staffing Numbers:** staffing numbers at present are appropriate for the students enrolled. However the Department is finding itself in the situation where low student numbers limit scope for expansion in staff numbers, which in turn limit scope for the introduction of new courses to boost student numbers.
- The extent of teaching delivered by postgraduate students is substantial and is considered excessive. It is understood why this has occurred but there are risks in this in terms of quality of delivery and assessment.
- The high failure rate in early years of the course is a cause for concern and efforts to address this should be given serious consideration.

14.2. Research

- **Research Student Numbers;** The Department has a substantial number of PhD students; this is a tribute to the Department's commitment to developing a strong research ethos.
- Further growth in research numbers to the level proposed in the strategic plan will be extremely challenging. In addition there will be a need for new staff to address the supervisory load if this does in fact occur. Additional technical support staff to support research would also be necessary.
- Research income is overly concentrated on a small number of staff. This is not only undesirable, but poses a substantial risk to the Department's research development (e.g. should a major research income attractor seek employment elsewhere). There is

a need to mitigate this risk, by expansion of the number of research active staff, and in particular the number of research active staff who attract research income.

- It would be beneficial to put in place a structured review of PhD student progress to incorporate early assessment in year 1; this would be an extension of the proposed annual review which seems limited in scope.
- There does not appear to be a career development path for contract research staff (postdocs) e.g. a process of being able to apply for promotion. It would be useful to consider this as the postdoctoral activity grows; this is of course a University level issue but a recommendation from the Department might be worth considering.
- There is a serious imbalance in the distribution of PhD students among staff, ranging from one member of staff with 13 students, to six staff with zero students. Joint supervision of research students is implemented however in an attempt to alleviate this imbalance. Nevertheless further growth in research student numbers will become impractical without additional research academic staff eligible and willing to supervise.
- The number of research groups (stated as five) appears excessive relative to the size of the Department and the number of research active staff. It would be efficient to create a smaller number of highly effective research units, possibly by means of an agreed merger.
- An Industrial Liaison panel would assist in the Department's stated aim of developing strong supportive relationships with industry and business communities at national and international level, particularly in those areas of mutual interest not specifically addressed by dedicated research projects.
- The previous quality review suggested strong research links with the Hamilton Institute. This does not appear to have happened but is still perceived a very worthwhile objective.

14.3. Physical Space

- A number of staff commented on the issue of insufficient laboratory space for PhD students. This was also raised by the existing PhD students who believe there is no spare capacity at present. It would be useful to benchmark existing Departmental space against similar Departments in Maynooth and elsewhere so as to determine the relative position and if necessary, put forward a substantiated argument to the University authorities. Alternatively the departure of the Product Design course may offer opportunities in this respect. Further growth in research will certainly require additional research laboratory facilities or desk space for research assistants, depending on the nature of the work.

14.4. Support Staff

- The issue of support staff on fixed term contracts, while understandable, poses risks to the continuity of research and the potential loss of key skills. It would be prudent to ensure that sufficient support staff are engaged on longer term contracts so as to ensure a stable and highly experienced support environment.

14.5. Strategic Plan

- There is an urgent need to review the strategic plan in the light of changed circumstances, including the departure of the Product Design course, seriously adjusted national economic circumstances, pressure on commercial organisations' research budgets, and continued low recruitment etc. The proposed change of name is no longer appropriate. The opinion of the reviewers is that a number of the targets are overly optimistic and thus the robustness of the figures is questionable. For example it is not clear if sufficient staffing resources exist to establish the BSc in Technology Education. Growth of academic staff to 25 and technical support staff to 7 seems ambitious, particularly with the loss of the planned 153 Product Design students.

14.6. Future of the Department

- The Department is small and faces significant challenges. There is serious danger that a set of interconnected issues impact negatively on the current excellent work in teaching and research and cause an unsatisfactory spiral, i.e. low student numbers, leading to limitations of growth of academic staff numbers, leading to limitations on volume of research achievable, leading to limitations on research income, leading to limitations on ability to supervise additional research students, leading to pressure on department finances, leading to further limitations of growth of academic staff numbers and so on. This would be a very regrettable outcome for such a dynamic and innovative young Department.
- This outcome may be overly pessimistic; renewed growth in student numbers (and there are some positive indicators of this) would avert this situation.
- However other electronic engineering departments in the country face similar challenges and it is unlikely the recruitment position will radically change in the near future. Furthermore the issue of student numbers was raised in the 2006 self-assessment report. Clearly the problem has not been alleviated in the meantime.
- The reviewers are aware that opportunities for reorganisation have been discussed and in particular a potential merger with computer science. The latter could offer the critical mass to allow the Department to grow and develop while maintaining the excellent teaching and research ethos. The reviewers would encourage the Department to engage actively in such discussions, which we believe do not threaten the integrity of the discipline but would if handled appropriately, provide security and significant opportunities for innovative teaching and research, and the development of new courses, thus ensuring the sustainability of the discipline in Maynooth.

Conclusions

The Department has been remarkably successful in the short period since its inception. It delivers quality programmes in teaching and has been very successful in developing a strong research portfolio.

It is small however, and faces significant challenges. Opportunities for reorganisation currently under discussion should be progressed to ensure the critical mass to allow the department to grow and develop, within a structure which does not threaten the integrity of the discipline but which would if handled appropriately, provide security and significant opportunities for innovative teaching and research, the development of new courses, and the sustainability of the discipline in NUIM.

Acknowledgements

The Reviewers would like to thank the staff of the Quality Promotion Office, Richard Watson and Ms Marguerite Lohan, for assistance with logistics and arrangements. The arrangements for the review were very comprehensive.

In addition, thanks are due to all the academic staff, technical staff, administrative staff, undergraduate and postgraduate students, and post-doctoral staff of the Department for their assistance, and forthright and constructive comments in meetings.

Professor T.M. McGinnity
External Reviewer

Dr Bernard Mahon
Internal Reviewer

Appendix 1

Schedule of Meetings during Onsite Visit

**DEPARTMENT OF ELECTRONIC ENGINEERING COMPLEMENTARY QUALITY REVIEW
DAY 1 – MONDAY 6 APRIL 2009**

TIME	DETAIL	VENUE	PRESENT
12.00	Welcome & Introduction	Council Room	Professor Martin McGinnity Dr Richard Watson Ms Marguerite Lohan
12.30	Lunch & Meeting with Internal Reviewer (Confirmed)	Council Room	Professor Martin McGinnity Dr Bernard Mahon
1.30	Meeting with VP for Research (Confirmed)	Council Room	Professor Martin McGinnity Professor Ray O'Neill
1.55	Walk over to Dept of Electronic Engineering		Professor Martin McGinnity Dr Richard Watson
2.10	Informal Meeting with Dept of Electronic Engineering Staff and Light Refreshments	Seminar Room, Engineering Building	Professor Martin McGinnity Dr Richard Watson Dept of Electronic Engineering Staff
2.40	Meeting with Head of Dept followed by Tour of the Dept	Room E3.02, Engineering Building	Professor Martin McGinnity Dr Frank Devitt
3.50	Meeting with Postdocs	Seminar Room, Engineering Building	Professor Martin McGinnity Postdocs x 8
4.20	Meeting with Undergraduate Students & Refreshments	Seminar Room, Engineering Building	Professor Martin McGinnity Undergraduate Students x 12-15
5.20	Meeting with Director of Institute of Microelectronics & Wireless Systems	Room E3.05, Engineering Building	Professor Martin McGinnity Dr Ronan Farrell
6.15	Return to the Glenroyal Hotel		Professor Martin McGinnity
7.15	Depart by taxi to Becketts Hotel	Lobby of Glenroyal Hotel	Professor Martin McGinnity Dr Richard Watson
7.30	Dinner (Table booked under the name of Richard Watson)	Becketts Hotel	Professor Martin McGinnity Dr Bernard Mahon Dr Frank Devitt Professor John Ringwood Dr Ronan Farrell Dr Sean Doherty Dr Richard Watson
10.00	Return by taxi to Glenroyal Hotel		Professor Martin McGinnity Dr Richard Watson

DAY 2 – TUESDAY 7 APRIL 2009

TIME	DETAIL	VENUE	PRESENT
9.30	Welcome from the President	Council Room	Professor Martin McGinnity Professor John Hughes
9.50	Walk over to Dept of Electronic Engineering		Professor Martin McGinnity Ms Marguerite Lohan
10.00	Meeting with Academic Staff	Seminar Room, Engineering Building	Professor Martin McGinnity Academic Staff x 13
11.00	Meeting with Associate Dean of Science & Engineering	Seminar Room, Engineering Building	Professor Martin McGinnity Professor John Ringwood
11.20	Meeting with Administrative Staff & Coffee	Seminar Room, Engineering Building	Professor Martin McGinnity Administrative Staff x 2
11.40	Meeting with Technical Staff	Seminar Room, Engineering Building	Professor Martin McGinnity Technical Staff x 4
12.00	Meeting with Postgraduates & Demonstrators	Seminar Room, Engineering Building	Professor Martin McGinnity Postgraduates & Demonstrators x
1.00	Light Lunch & Meeting with Heads of other Academic Departments	Seminar Room, Engineering Building	Professor Martin McGinnity ? Dept of Economics To be confirmed
1.45	Meeting with Internal Reviewer (Confirmed)	Seminar Room, Engineering Building	Professor Martin McGinnity Dr Bernard Mahon
2.30	Prepare for Exit Presentation	Seminar Room, Engineering Building	Professor Martin McGinnity
3.30	Exit Presentation followed by Refreshments	Seminar Room, Engineering Building	Professor Martin McGinnity Dr Bernard Mahon Dept of Electronic Engineering Staff Dr Richard Watson
4.30	Departure		Professor Martin McGinnity