

**Comhairle na nDámhachtainí Ardoideachais agus Oiliúna**

**The Higher Education and Training Awards Council**

**Report of the findings of the evaluation panel engaged to consider the application by Cork Institute of Technology for accreditation to maintain postgraduate research degree registers at doctoral level in Engineering (Electronic Engineering, Mechanical and Manufacturing Engineering, Chemical and Process Engineering), in Computing and at Masters level in Engineering (Building and Civil Engineering).**

20 December 2004

**Summary of findings**

Generally the Panel was pleased with the capabilities of the students presented in the areas of Engineering and Computing. Those students were very enthusiastic and well motivated to discuss their research in a confident and authoritative manner; it was evident that they felt ownership of and responsibility for their research projects.

Evidently then, the system as it stands presently is providing the students with a quality learning experience and the Institute, its staff and the students themselves should be congratulated on that.

The Panel is of the opinion that the Institute met the criteria for accreditation to maintain a register of postgraduate degrees at masters level

*in the areas in Electronic Engineering, Computing, Mechanical and Manufacturing Engineering, Chemical and Process Engineering and Building and Civil Engineering reflecting the expertise of the current research-active academic staff*

and at doctoral level

*in the areas in Electronic Engineering and Mechanical and Manufacturing Engineering reflecting the expertise of the current research-active academic staff.*

## 1 INTRODUCTION

Cork Institute of Technology submitted an application to HETAC for accreditation to maintain registers of postgraduate research degrees at doctoral level in Engineering (Electronic Engineering, Mechanical and Manufacturing Engineering, Chemical and Process Engineering) and in Computing and at Masters level in Engineering (Building and Civil Engineering).

Accreditation to maintain a register allows an institution to register postgraduate research degree students without referring the details of the individual research degree programme to HETAC for validation decision on a case-by-case basis.

Such accreditation is a prerequisite for an Institute of Technology to receive delegated authority from HETAC to make its own research degree awards.

### 1.1 Submission

The basic application for accreditation was received by HETAC on 31 May 2004 the CVs and lists of publications followed later and the *Summary report of self-evaluations* document was received 28 October 2004 in electronic form.

1. *Institute Submission*
2. *Submission for Accreditation to Maintain a register in a Discipline Area: Computing*
3. *Submission for Accreditation to Maintain a register in a Discipline Area: Engineering*
4. *Curricula vitae and Publications of research-active staff Computing*
5. *Curricula vitae and Publications of research-active staff Engineering*
6. *Computing and Engineering Research Accreditation: Summary report of self-evaluations.*

### 1.2 Assessors and preliminary reports

The Institute was invited to nominate four recent postgraduate research degree graduates (in each of the areas) and, for each field, persons who are independent recognised experts and can make national and international comparisons.

HETAC selected one learner representative and three independent experts from the nominations received from the Institute and a further four independent expert assessors. Professor John Orr (QUB) was invited to chair the Panel.

The constitution of the evaluation panel is as follows:

**Professor John Orr (chairman)**, *Department of Mechanical Engineering, Queens University Belfast.*

**Professor Anraoi de Paor**, *Department of Electrical and Electronic Engineering, University College Dublin*

**Professor Leo De Vin**, *Department of Mechanical Engineering, University of SKöVDE, Sweden*

**Professor Brian Fitzgerald**, *(Computing) University of Limerick*

**Professor Gerard Hurley**, *(Electronic Engineering) National University of Ireland Galway*

**Mr Ciaran O'Leary**, *(Building and Civil Engineering) Graduate of Cork Institute of Technology*

**Dr Khairi Hamdi**, *(Wireless Communications) University of Manchester Institute of Science and Technology*

**Professor Gary Montague**, *(Chemical Engineering) University of Newcastle upon Tyne*

*with*

*Dr Peter Cullen Higher Education and Training Awards Council.*

Each assessor received by e-mail a copy of the HETAC document “ *Accreditation to Maintain A Register for a specified Postgraduate Research Degree in a Specified Discipline Area- Issues for Assessors*” prior to being engaged by HETAC. This communication highlighted, among other things, issues (such as conflict of interest) that assessors must consider before agreeing to act.

### **1.3 Declarations relating to conflicts of interest**

*All assessors were required to consider whether or not there might be a conflict of interest involved in acting. Some did mention past and present interactions with the Institute that did not constitute conflict:*

*Annraoi De Paor declared that he has acted as external examiner on the B.Eng programme for seven years up to about 2000 and that he had acted as external examiner for several research degrees both MEng and PhD.*

*Gerard Hurley declared that Dr Noel Barry of the Department of Electronic Engineering was a personal friend and that he had never discussed the issue of accreditation with him.*

### **1.4 Distribution of the submission material**

The submission material was dispatched to the assessors along with a covering letter and a copy of the document “ *Validation process, policy and criteria for the accreditation of providers to maintain a register for a specified research degree in a specified discipline area*” which set out the criteria that must be met.

### **1.5 Reporting**

Each assessor was invited to submit an independent preliminary report to HETAC prior to the site visit.

Following the site visit each assessor was provided with a report template to complete.

### **1.6 Preliminary meeting**

The Panel met on the evening of 10 November to discuss the written submission and plan the site visit. The broad objectives for the site visit were to evaluate both the Institution and the proposed research areas against the criteria for accreditation.

The Panel sought to use the site visit to

- converse with the senior management of the institute;
- converse with the research active staff and heads of departments;
- converse with registered postgraduate students;
- survey the research facilities; and
- evaluate the case for accreditation using the criteria in Appendix B of the HETAC policy document.

## **2 -SITE VISIT 11 NOVEMBER 2004**

The site visit took place between 09:00 and approximately 15:30 on 11 November at the Cork Institute of Technology. The outline schedule follows (the times are approximate)

**Plenary session 9:30-10:15** : Meeting with the Director (Dr Murphy) and other senior management staff.

**Parallel sessions 10:30-11:30**: Meeting with supervisors. The Panel split into two sub-Panels for this purpose. One group focused on Electronic Engineering and Computing it consisted Professor Fitzgerald, Dr Hamdi, Professor de Paor, Professor Hurley; the other focused on the remaining areas and consisted of Professor Montague, Professor de Vin and Mr. O'Leary. The Chairman and the HETAC representative divided their time between both groups.

**Parallel sessions 11:30-12:00**: Round-table meeting with students.

**Parallel sessions: 12:00-13:00** Meeting with students in their research environment (laboratories etc.).

**Lunch with CIT staff** Informal discussions.

**Parallel sessions 13:45-14:30** Research demonstrations and further discussion with staff and students.

**Private meeting of expert group 14:30-15:00**

**Final meeting with CIT senior staff 15:00** Final meeting with senior staff to thank them for their cooperation etc.

### 3 FINDINGS

#### 3.1 General

##### 3.1.1 Students

The Panel was pleased with the capabilities of the students presented in the areas of Engineering and Computing. Those students were very enthusiastic and well motivated to discuss their research in a confident and authoritative manner; it was evident that they felt ownership of and responsibility for their research projects.

Evidently then, the system as it stands presently is providing the students with a quality learning experience and the Institute, its staff and the students themselves should be congratulated on that.

Significant numbers of research students are CIT graduates, while this is a positive endorsement of the undergraduate experience, it might be useful for the Institute to explore ways of increasing the diversity of the students. It was encouraging that there are a number of overseas research students studying at CIT.

##### 3.1.2 Research-active staff

There is no doubt that a core of research active staff are well qualified, capable researchers in their own right and are enthusiastic supervisors of their research students.

Considering that a person who is supervising a student who is pushing back the frontiers of knowledge to gain a Doctorate (as outlined by the standards at Level 10) must be research active and that otherwise knowledge of where the research challenges lie is at best sparse and that the most reliable and generally accepted (necessary and sufficient) indicator of research-activity is publication in quality peer-reviewed journals and (in some cases) international conferences, the level of publication is a cause for concern. The claim in the Institute Submission which states that the researchers have an *excellent track record of publishing in both peer reviewed journals and conferences* (p15) is open to challenge because while there are individuals that have an excellent track record, not all the researchers have. There is a minority of staff put forward in each discipline who have recent (past 5 years) journal papers or a significant number of journal papers on their CVs. This concern arises in respect of all disciplines, possibly to a lesser extent in Mechanical & Manufacturing Engineering, where the balance of demonstrably active staff is a higher proportion of the numbers submitted.

The prime issue then for the Panel is that while are some people at CIT who are demonstrably research active there are others who are some way from being so. In such circumstances, the Institute should have a clear policy for identifying the research active individuals and the up and coming researchers. The capacity to secure industrial research funding while it enables research does not suffice to demonstrate satisfaction of the level 10 criteria for research-activity. Clear criteria for deciding on what constitutes research-activity are necessary to ensure, by matching student with supervisor and project, that the student learning experience is maintained at the highest levels.

The numbers of research active staff being small and also leads to a concern about critical mass, particularly in the event of an individual supervisor leaving, retiring etc. This concern was expressed during the visit and the Panel were given some confidence that such eventualities can be managed to ensure that students are not disadvantaged.

The issue of incentives for research performance was addressed during the visit. The Institute has established measures to remove the barriers to research. Research supervisors are permitted up to six hours reduction in teaching contact hours (16 hours per week). Researchers may buy reduction in hours if they have funds to do so. There was evidence of judicious pragmatism on the part of Heads of Department in terms of reducing administratively onerous tasks for research-active staff. Discretionary funds were available for seed funding especially for young researchers. A sum of about €50K had been earmarked for those without much by way of other funding. This is available to buy equipment, hire students over summer, travel to conference, etc. This was used to fund a large number of small grants. In this context it is difficult to understand

why the Institute has no plans for charging overheads to research projects. It is appreciated that charging overheads is a difficult and sensitive issue, as it could be a great disincentive if the grant did not allow for it adequately. Perhaps it is a matter that could be negotiated by individual researchers and decided on in each case by the Head of Research or other appropriate officer, in the light of what is available under each individual grant (SFI allow 30%). Overheads could be used it to grow research infrastructure, and to provide seed funding for non-funded researchers etc.. It is not clear that any significant incentives were in place for researchers working on their own (who may not be supervising students or working towards a research degree) or with colleagues on research leading to peer-reviewed journal publications.

The difficulties of attracting new academic staff with PhD degrees to the normal entry grades is recognised by the Panel and needs to be confronted by the Institute.

### 3.1.3 Head of research

The Institute plans to appoint a Head of Research who will report to the Head of Development. While this is a welcome development, the Institute is urged to make this appointment at a senior management level (as suggested in the submission) in order to underline the importance of research..

The Panel found the Head of Development to be well aware of research needs and it could understand the constraints that seem to make this a thorny issue.

### 3.1.4 Training

The Institute needs to review its provision of research training and consider providing mandatory training in research methodology to all research students. Training experiences-including course and conference attendance and industrial visits/collaborations should be recorded and it is suggested that a minimum number of such experiences be required each year. A postgraduate handbook is provided to students for guidance (however this document was not offered for the panel's review). While direction and supervision is good in all departments, it appeared that training of students has unfortunately, not being at the forefront of the research ethos within CIT this is changing partly as a result of demands being made by the students themselves.

### 3.1.5 Assessment

Examples of external examiners' reports were reviewed and deemed to be appropriate.

### 3.1.6 Teaching

While time did not allow an in-depth exploration of the teaching-research nexus, the staff expressed enthusiasm for bringing research awareness to undergraduate teaching.

### 3.2 Accreditation criteria

The criteria for accreditation are set out in the Appendix B to the HETAC document entitled *Validation process, policy and criteria for the accreditation of providers to maintain a register for a specified research degree in a specified discipline area 2003*. Each criterion is addressed in the following sub-sections. In reaching its decision the Panel considered each criterion and in *some cases* made specific comments: these are set out below.

#### 3.2.1 *Research environment : Is there an active, supportive academic environment and research community in the subject or discipline area for which accreditation is sought demonstrated by traditional research performance indicators?*

All students are encouraged and in some cases required to publish material. Many research students have experience of conference presentations and some are co-authors on journal papers. The latter reflects a healthy, proactive research environment.

#### *Electronic Engineering and Computing*

Following the meeting with senior staff of the Institute, members of the panel had meetings with research active staff and with research students of Electronic Engineering and Computing, took part in a student-conducted visit to some of the research facilities in Electronic Engineering and perused some of the research papers provided.

Students revealed examples of support from other academic staff and postgraduate students. The fact that supervisory staff were perceived to be available outside office hours to answer queries was much appreciated. Students expressed their satisfaction with the infrastructure support from the Development Office for their (own) annual Postgraduate Research Symposium. In some cases, students were aware of paper submission deadlines for conferences and were working on papers.

Research at the department of Electronic Engineering is organised in five research groups. Only two of these groups were presented at the site visit: The Adaptive Wireless Group and the Advanced Control Group. Each of the other three groups includes only one member of staff so it is difficult to see how they can be regarded as real groups. The evidence for an active and supportive environment at Doctoral level is clear in electronic engineering in the areas relating to the activities of the Advanced Control Group (ACG), and the Adaptive Wireless Systems Group (AWSG) and not so in other areas.

The evidence for an active and supportive environment at Doctoral level is less clear in Computing owing to a deficiency with regard to critical mass: there are comparatively few demonstrably research-active staff.

#### *Mechanical and Manufacturing Engineering, Chemical and Process Engineering and Building and Civil Engineering*

There is no doubt that the some academic staff have the necessary experience and enthusiasm and show evidence of traditional performance indicators. However, they are a minority, even in the cohorts of active staff submitted. In the two Departments seeking to maintain a register at doctoral level experience of supervising students to PhD completion is very limited, however each discipline has had at least one graduate.

The experience gained at the site visit together with prior reading the documentation submitted by the Department of Chemical and Process Engineering, presents a compelling case for accreditation at the Masters level. There is insufficient experience in this field of supervision of doctoral studies to completion to recommend accreditation at this level at present. The research of this Department seemed to be quite narrowly focussed, principally on the Clean Technology Centre, and would need to be broadened before moving on to accreditation at Doctoral level.

Considering the submission by the department of Mechanical and Manufacturing Engineering, the Panel had no hesitation in proposing accreditation at Masters level. This discipline did not have the advantage of recording a successful PhD graduate at the time of submission, however a PhD degree has since been awarded and the candidate was present to meet the assessment panel. The Panel was convinced that Department had the critical mass required to support PhD level research and therefore, overall, that it could meet the HETAC criteria for doctoral accreditation.

Strong efforts are being made by Building and Civil Engineering to establish a research culture and to meet the criteria for accreditation at Masters level. With the very positive institutional backing available, the Panel is convinced that this culture will be well established in a relatively few years. There are two demonstrably research active staff and three Masters students have successfully completed to date. There is some distance to be gone before a high level of experience in supervision to completion will have been built up. On the other hand, it was considered that this Department if supported by the other Departments in the School of Engineering would have access to sufficient supervisory experience. Overall, it could meet the HETAC criteria for Masters accreditation.

*3.2.2 Is there evidence of academic guidance, authority and leadership?*

The refocusing of the Electronic Engineering strategic research plan every 2 years is promising. Recently, for example, the focus has moved to biomedical engineering. The Department is also aware of the need to be flexible for promising new researchers in 'non-strategic' areas.

The Chemical and Process Engineering research facilities seemed to be too narrowly focussed on the Clean Technology Centre.

*3.2.3 Are there procedures for the planning and monitoring of postgraduate programmes of research within the discipline area?*

Generally the Panel was convinced that satisfactory procedures were in place. The 6-monthly progress reports from both staff and students appeared to be working well.

It was observed that all doctoral candidates first enrol for an MSc and that transfer to PhD research is subject to assessment.

Progression from MSc to PhD involves a transfer report which is externally assessed.

*3.2.4 Is there specialised training dictated by the discipline and the nature of the research being undertaken?*

Generally, while there is certainly provision of some training, a more systematic approach by the Institute and the Departments is required.

The Panel learned of the training opportunities that do exist; these are relevant and are co-ordinated through the Postgraduate Society and Industrial Liaison Office. Attendance is not mandatory.

Research methodology and research approaches are critical areas for research degrees. In discussion with students in Electronics and Computing, there did not appear to be sufficient awareness of such issues. While the Panel did not have sufficient opportunity to probe this issue with the staff it is essential that there is provision of training in this area.

*3.2.5 Are there staff who:*

*are willing to lead research programmes?*

*are sufficiently qualified to the level of the programmes of research for which accreditation is being sought?*

*have prior experience in the supervision of research students to successful completion?*

*are engaged in research, advanced study and other activities relating to practice in the subject or discipline area concerned?*

There are staff in both Electronic Engineering and Computing that have prior experience in the supervision of research students to completion but in relatively scarce supply as the number of

students that have graduated is not large, particularly at PhD level. In Electronic Engineering there are quite evidently staff who are willing to lead research programmes. In Computing there seem to be fewer 'leaders', although the few that are, appear very capable and committed.

There are staff in both Electronic Engineering and Computing that are engaged in research, and are particularly oriented towards research which relates to practice (perhaps overly so, as some diversity with some pure conceptual research would make a nice complement).

There are staff in Mechanical and Manufacturing Engineering who only just (due to low doctoral-level experience) meet these criteria at Doctoral level.

In the other Departments there are staff who meet these criteria for research accreditation at Masters level.

*3.2.6 Are there adequate physical resources as well as technical and administrative support structures and attendant staff appropriate to the research being undertaken?*

The library is well-resourced and online access to research publication is available. The institution scores well in this regard.

The laboratory facilities for Electronic Engineering and Computing were impressive.

The Mechanical and Manufacturing Engineering and Building and Civil Engineering research students occupied pleasant office areas with individual areas of workspace-resources clearly conducive to research study and a group ethos among the students.

The laboratory facilities of the Department of Building and Civil Engineering are more limited however the current research is substantially theoretical/computer modelling. It was learned that a new structures laboratory is scheduled to be equipped. The latter seems to be a priority to provide a balanced research resource.

The Chemical Engineering laboratory facilities were of a high standard with the researchers receiving good technical support. They were well suited to supporting the planned research programmes.

*3.2.7 Are there seminars, both focused and interdisciplinary, to facilitate the dissemination and exchange of the fruits of research, enabling peer review and quality assessment?*

Generally there is room for improvement. The Postgraduate Society runs an annual Postgraduate Research Symposium. Such initiatives are important to help build a research ethos. While there appears to be a high level of student attendance, the turnout of academic staff, suggested by the students to be "about 20 to 30 staff" from the entire institution is disappointingly low and suggests that not all of even the research-active staff support the initiative. It would be useful if attendance were increased and broadened to include aspiring research staff.

In the Departments of Electronic Engineering and Computing it appeared that there are several seminar initiatives. For example, a special computing symposium is running every year by the Department of Computing. However, there was an impression that the staff research seminars need to be better supported.

In some cases students make presentations prior to conference attendance.

*3.2.8 Are there opportunities for interaction with other postgraduate research candidates and their supervisors, both within and outside the institution and opportunities, where appropriate, for collaboration with other providers of higher education, industry and commerce and the public sector etc.?*

The research in Electronic Engineering and Computing at CIT is quite industry-focused so such industry interactions are possible. This area is also formalising links with UCC, and have links with UL.

The Electronic Engineering students have opportunities to interact with researchers in the University of Valencia and University of Castellón through the EU FP5 SmartSpectral project. In Computing, there is an effective partnership with Darmstadt which has resulted in student interchange.

20/12/2004

3.2.9 *Are there procedures for the implementation of quality assurance within the schools / departments concerned?*

There is evidence of formal monitoring of research progress including declaration of frequency of meetings with supervisors. Industrially based students submit a monthly report and quarterly industrial consultation meetings take place.

As already mentioned, the 6-monthly progress reports from both staff and students are reported to be working well. Also, the quality assurance review meetings were mentioned. In the Department of Computing the 'computing postgraduate research board' monitors activities relating to research degrees.

Research activity is relatively limited in all disciplines and there was not doubt regarding the quality of the supervision, however more formal and systematic quality assurance procedures should be established and will become essential as postgraduate numbers increase.