

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 the Institute of  
Technology Carlow for accreditation to maintain a  
postgraduate research degree register at Master's and  
Doctoral level in Biotechnology and Molecular  
Environmental Science**

15 May 2007

**Assessors:** Eda Sagarra (chairman), Teresa Attwood, Rosane Hazelman Cunha Curtis, Peter Hetherington, Laura Oakey, Kirk Semple, and Gary Walsh.

## **1 Introduction**

HETAC received, on 30 November 2006, an application by the Institute of Technology Carlow for accreditation to maintain a postgraduate research degree register at Master's and Doctoral levels in Biotechnology and Molecular Environmental Science.

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

HETAC assembled a panel of assessors chaired by Dr Eda Sagarra (Pro-Chancellor of the University of Dublin) to evaluate the case for accreditation and make a recommendation: details are provided in Section 6.

The site visit took place between 09:00 and approximately 15:15 on 28 March 2007 at the main campus of the Institute and the panel held a private meeting during the previous evening.

Assessors met and/or had discussions with the senior management team; research active academic staff; current and former graduate students; perused research outputs; and viewed relevant facilities.

## **2 Summary of Findings**

It is recommended that HETAC accredit the Institute of Technology Carlow to maintain a register of postgraduate degrees at Master's Level (Level 9) and Doctoral Level (Level 10)

*in the areas in Biotechnology and Molecular Environmental Science reflecting the expertise of the research-active academic staff* subject to the standard conditions and that

- 1) The Institute produce a response detailing how it will address the issues raised by the assessors.
- 2) Accreditation be granted for a period of *five years*.

### 3 Research environment (appendix B)

The Biotechnology and Molecular Environmental Science group has established a good research environment and its members are working hard to improve on all levels and seem aware of the main areas that need enhancement.

The panel is confident that Master's and Doctoral graduates attain a standard that is equivalent to the standard typical of universities in Ireland and the United Kingdom.

The remainder of this section addresses specific questions put to assessors.

***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?***

Yes.

Strengths

The panel encountered a tightly-knit, motivated, engaged and enthusiastic group of researchers (both staff and students). Within the group, it found evidence of academic guidance and leadership, and it was clear that more mature procedures for planning/monitoring post-graduate research programmes are in the process of being implemented. Scope for additional training is provided (i) in terms of research, through optional access to relevant taught undergraduate modules, access to seminar programmes and journal clubs, opportunities for placements, encouragement of students to attend and present their work at national conferences, *etc.*, and (ii) in terms of specific instrumentation, via company site visits, as appropriate.

Most of the research in the BMES area is of national and international importance and has attracted competitive funding from the public sector and industry. The research profile of one of the academic staff stands out from the others in terms of productivity (publications *etc.*) and research income.

Areas for improvement

While it was obvious that most of the research active members of staff have many non-research commitments, where possible, staff and students (especially doctoral students) should be encouraged to publish more in international, peer-reviewed scientific journals.

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

Yes.

Strengths

The Director and senior staff presented a vision for the future of the Institute and the BMES group that is ambitious and demonstrates a strategic intent to continue to engage industrial sponsorship and collaboration with proposals for future research development.

Academic staff and supervisors exhibited a high degree of competence and, based on interviews, have the academic respect of past and present students alike.

Areas for improvement

Departmental and institutional processes for addressing potential poor performance of a research supervisor should be established.

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

Yes.

Strengths

There are a number of such procedures in place ranging from induction training at the beginning (which also seems to continue through PG projects), regular informal meetings with supervisors, monthly meetings with the wider research community, where presentations are given and debate is stimulated and biannual reporting (by the student and supervisor) on student progress. The students are generally supportive and enthusiastic about these procedures.

Assessors saw evidence of close supervision especially at the early stages of the research programme.

Areas for improvement

Refer to the comments on page 4.

Formal arrangements for the preparation and submission of regular research reports by the student to his or her supervisor could be strengthened *cf.* the remarks elsewhere on standards for notebooks for recording research.

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

Yes.

Strengths

Specialised training is provided either on site or externally as needed. Examples: PCR basic techniques course and a course on fluorescence microscopy.

Areas for improvement

The Institute should establish a more structured approach to training.

It is important that students be informed about, and regularly reminded of, Standard Operating Procedures for all equipment.

***Are there staff who:***

***-are willing to lead research programmes?***

Yes – there is a good ratio of research supervisors to students

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

Yes

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

Yes. The majority of Principal Investigators involved in the research programmes have been involved in the supervision of research students to successful completion and appropriate systems are in place at group level to support and mentor new supervisors but there aren't yet procedures in place to monitor research supervisors and (as already stated) to manage potential poor performance.

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

Yes

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

Yes.

Strengths

Assessors observed laboratory facilities and equipment to be of a suitable standard. Access is available, where necessary, at other institutions to some very specialised equipment that is lacking at the Institute.

Substantial progress is being made towards improving the Institute's physical resources, with a five-fold increase in space promised within the next few years. In parallel with this, two major grant applications have been made: (i) a €7M, ITC-led Agribiotics Research Centre, with NUIM, NUIC and Teagasc, together with universities in Germany, Russia and China; and (ii) a €46M, industry-focused National Bioenergy and Industrial Biotechnology Research Centre, in collaboration with NUIG, NUIC, NUIM, NUID, TCD and Teagasc. These activities demonstrate a strong commitment to the future strategic development of the BMES group and its research and teaching activities, and, if successful, would allow the group to substantially strengthen its current rather limiting technical/administrative support structures.

Areas for improvement

There are problems of access to laboratories out of hours and out of term; although the Institute has made (somewhat complex) arrangements to facilitate the students, more remains to be done.

The technical and administrative support structures available to researchers, while adequate, could be rationalized.

When talking to the students, one issue that arose was the irksome process for ordering chemicals and so on, a system that requires three quotes to be sought before orders can be placed. As there is no technical support, students have to tackle this themselves, consequently wasting much of their time. Although some exposure to these kinds of processes can be considered a useful and necessary part of student training (*e.g.*, to ensure that exactly the right item is being ordered), nevertheless it ceases to be useful if it hinders a student's progress.

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

Yes.

Strengths

There are several suitably qualified research staff, either in the process of establishing or having already established research groups. *Depending* on the size of the research group to which they are assigned, students are encouraged to attend monthly meetings, both to discuss their work and to share any problems arising. In addition, the students have organised themselves, a student rep arranging social events and liaising with relevant formal bodies within ITC on behalf of the rest of the student body. The students are enthusiastic and seemed to enjoy and benefit from these activities.

Areas for improvement

For those students joining relatively new research groups with only one PI, although at an advantage in terms of competition for contact with their supervisors, they are potentially disadvantaged in terms of peer interactions (of course, this would be true in *any* newly established research group; however, the BMES group is intimate enough that, while new students are finding their feet, they could perhaps be assimilated temporarily into existing research group meetings in order that they could benefit from increased peer and academic support).

***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.?***

Yes. The Institute is attempting to promote such interaction through collaborative projects, which are either on-going or at the development stage.

Strengths

The various research groups appear to collaborate freely.

The Institute facilitates good social opportunities for the students to interact.

Students also have the opportunity to attend annual national conferences.

Areas for improvement

Recognising the value of existing interactions, it is suggested the group might consider building on this success by establishing additional formal links with external organisations (whether universities, industry or others), in order to (for example) (i) extend the current system for placements and (ii) give industry in particular greater visibility of ITC's activities (*e.g.*, through industry forums or open days).

While it may be dependent on the level of funding, improvements could be made by the attendance of students at more International Conferences.

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

Yes. There are institutional procedures, and assessors observed these to operate satisfactorily at the school level for the BMES research programmes. At the institutional level, particular strengths and areas for improvement are outlined in the next section.

Strengths

In terms of regulations and establishing the necessary formal and informal procedures, most are already in place and others are in the process of being implemented. The set-up that has been realised to date is obviously working – the group has a good current postgraduate student cohort, and a successful set of past graduates, *etc.* Overall, things are going well and students and staff appear to have close and productive working relationships.

Research quality assurance processes continue to be developed by the Institute Quality Steering Group.

Areas for improvement

The careful maintenance of laboratory notebooks is a necessary part of research quality assurance and is required for the protection of intellectual property. This is an area where the BMES group (and, as stated later, the Institute) should immediately develop best international practice protocols.

### ***Summary***

Overall, the group is doing well with the resources it has, and is making an honest attempt to be innovative and progressive, trying hard to be outward looking, while at the same time monitoring its own achievements; for this, it should be congratulated.

Structural improvements are clearly underway, with a Major Capital Development project to yield a future new Teaching and Research Wing and strategic plans to improve the Institute's support for its emerging research centres. These developments will have a very positive impact on the working conditions of the BMES group.

The group is clearly improving on many different levels. One area that might benefit from further scrutiny concerns how it might strengthen its international research profile. In terms of publications in the 8-year period from 1996-2004, the balance is about 70:30 in favour of conference papers to journal articles, with the vast majority being in national rather than international meetings. While national meetings are important both to disseminate the work of the BMES group, and to give students experience of presenting their work and the opportunity to learn more about research outside Carlow, nevertheless, improving this ratio more in favour of international meetings and peer reviewed publications would doubtless benefit staff and students alike (note – the panel is advocating here that the group might usefully review the *balance*, not that they should simply waste time generating more papers for the sake of it).

## **4 Comments relating to General criteria (appendix A)**

### ***Regulations and code of good practice***

Regulations and an institutional code of good practice in research are on the Institute's website.

These are easy to navigate and widely accessible.

#### Areas for improvement

Institutional standards for notebooks for recording of research are lacking. Currently there is little appreciation of the need to cross out blanks or number pages – a good CGMP (current good manufacturing practice) like system is required to ensure the authenticity of the work can be validated.

### ***Research Performance Indicators***

#### Strengths

Research performance indicators are addressed: namely publications, grant income, numbers of research students, collaborations.

#### Areas for improvement

While peer-reviewed publication is an indicator of quality, the mere number of publications is not a robust indicator of quality. The quality and relevance of the research is the key deliverable, the depth of focus on the subject, the degree of innovation and creativity exhibited during the research, and the quality of the postgraduate student and his or her ability to secure good positions in future employment. It is recommended that the Institute focuses more on the real quality indicators (as listed) rather than just trying to increase the number of publications.

### ***Intellectual Property***

#### Strengths

There is some relevant training for staff and students.

#### Areas for improvement

Further enhancement of competence in this area would serve to attract great interest from industry in co-sponsoring research projects: *e.g.*, tighter controls upon student lab books and more training of the researchers, both staff and students, during induction and regularly thereafter, on good practice in the documentation of, protection of, and dealing with IP.

### ***Research administration and Quality assurance***

#### Strengths

A robust system appears to be in place and operative: there is a dedicated Research Committee with members from a variety of disciplines.

#### Areas for improvement

Comments made for the BMES group in the previous section may be generalized *mutatis mutandi* to the whole institution.

A particular issue that needs to be addressed is the development of protocols for the supervision of, provision of equipment for, and arrangements for health and safety of, researchers while working off-campus.

### ***Research leadership and motivation***

Excellent- several of the research active BMES staff hold senior managerial positions within the Institute, which ensures the research agenda is understood and addressed at the highest levels within the Institute.

### ***Monitoring research progress***

#### Strengths

Good systems are in place, including report writing on a routine basis and regular reviews of progress.

There is a policy in place for addressing poor performance by a student.

#### Areas for improvement

Not all research students are required to attend the seminars—attendance should be mandatory.

The Institute might wish to consider if there might be value in introducing, after the biannual report has been submitted, a mini *viva* involving the supervisor, the student and an independent assessor. This would not only give the student some experience in a *viva* situation, but also the opportunity to vocally air grievances, which they may not feel comfortable discussing with their supervisor alone or including in a written report.

Although assessors didn't hear any horror stories about non-completion, it was clear that a number of students were finishing their theses after leaving the Institute and taking on a full-time job. On the plus side, this shows that the students are highly employable; nevertheless, writing up while holding down a full-time job is a difficult path to follow and is likely to lead to longer and longer completion times. This probably needs to be monitored quite carefully.

The Institute might wish to consider if there would be value in the introduction of some kind of student-mentoring and/or advisor system: *e.g.*, a mentoring system would offer pastoral support to

students; by contrast, an advisor system has the benefit of supporting both the supervisor and the student academically – this is particularly useful as a safety net or reality check, helping to ensure that the project is both feasible and on track (such a system could help to avoid or reduce long completion rates).

***Equality of opportunity***

Very satisfactory.

***Feedback, complaints and appeals***

Areas for improvement

Some procedures are in place and the examination appeals procedure specific to research postgraduate students is currently being developed by the R&D committee.

Areas for improvement

While the current system clearly works well and is well regarded by the students, a more structured system needs to be in place, should, at some future time, difficulties arise.

There must be some mechanisms to monitor and redress unsatisfactory research supervision.

The Institute might wish to consider if its students would benefit by having a mentor as suggested already under monitoring research progress.

***Information: Research Studies Programme***

IT Carlow publishes information for stakeholders about its postgraduate research programmes mainly through its website.

***Access to research degree programmes***

Satisfactory

***Transfer between the Doctoral and Master's Registers***

Strengths

There are good policies in place, which conform to international practice, and the process is very properly formalized, with a central role given to an extern.

An aspect of the MSc/PhD programme that has both strengths and weaknesses is that progression to PhD occurs after two years of study. This is a positive point, as it gives more time for students and supervisors to assess the suitability of transfer (in the UK, this assessment is carried out in months 9-12, which is often too short a period to make a properly informed decision); this, in turn, should have a positive impact on completion rates.

***Direction, supervision, support and training of students (including access to information)***

Strengths

Supervision is of good quality and interviews revealed that there is a lot of interaction in the early part of the programme, which then tapers off to allow students to become more autonomous researchers.

The training received by the students is good and this was reflected in the quality of the students. They are articulate, motivated, feel well supported by the Institute, are able to confidently discuss their work and are aware of the implications for industry, etc.

The programme for developing students' generic skills is a commendable initiative.

The monthly seminar in (part of) the BMES group provides a good practice model of the kind of support that should be available to all research students.

The library provides direct access to many relevant journals and an interlibrary loan service for access to the rest.

There is a high level of support for overseas students in finding accommodation and ensuring they are supported on their arrival (feedback from student.)

#### Areas for improvement

Ideally, the induction training should take place as soon as possible after registration. Another area that might benefit from further attention relates to how some of the initial training modules are organised and delivered – *e.g.*, there might be some merit in making certain modules mandatory, and in spreading out the modules across a greater proportion of the first year (*e.g.*, specific modules on critical writing skills could be included here).

Feedback from past and present students suggested to assessors that direct (download) access to a broader range of journals is necessary because reliance on the traditional interlibrary loan system introduces a delay that puts students and staff at a disadvantage to those with access to services such as The Irish Research Electronic Library.

Another important concern is that access to the Institute is reduced after hours; this may encourage a 9-5 mentality in students if arrangements to gain out-of-hours access are cumbersome. This is not to say that all postgraduate students must always work after 5pm, but the reality is that research is not a 9-5 activity: the Institute needs to encourage students in every way it can to adopt research-focused, goal-oriented working practices.

The complex processes for purchasing small batches of consumables places a burden upon the researchers with little discernible benefit to anyone; it needs to be changed immediately, whereby the threshold is raised to over €1000 before the complex process is required.

#### ***Supervisor training and support***

##### Strengths

A formalised training system is planned and due to be operative.

##### Areas for improvement

The planned training system should be implemented immediately.

#### ***Postgraduate research degree: Assessment of the student***

##### Strengths

A carefully thought out system appears to exist

##### Areas for improvement

The Institute does not provide detailed guidelines for the production of a thesis.

## 5 Additional comments

While the Panel wishes to make some recommendations for improvement, there is no doubt in our collective mind that accreditation is well merited.

An impressive desire to embrace commercialisation of research was observed and the two current research funding proposals to further develop the capability of the college demonstrate ambitions in an appropriate direction. However, a reliance at this point on initiatives such as the Competence Centres and Innovation Grants that have yet to fully evolve will not provide the necessary level of desired or industrial collaboration in the short term. It would be useful to consider proactively advocating linkages with industry through advertising of in-house capability and seeking mutual areas of interest.

The employment of a business incubation manager is a positive initiative.

The Institute is in a state of transition as an evolving research environment, in a manner reminiscent of the UK's old polytechnics (its 'new universities'), which are endeavouring to bolster their research profiles against tough competition from the older, established universities. The Institute is clearly not a university, and hence the research environment it offers is rather different; accordingly, it is not really appropriate to rigidly apply the metrics used to assess universities to an evaluation of the Institute.

Rather ironically, an issue raised by the students was that they did not have sufficient opportunities to become involved in teaching, presumably owing to the drop in overall student numbers and hence less resources being available to pay for postgraduate tutors. Naturally, this is a financial argument dictated to a large extent by student intake; nevertheless, exposure to some amount of teaching (laboratory demonstrations and such) is an important part of postgraduate training; and, in light of the tensions outlined above, might be a valuable way of ameliorating current staff teaching loads.

Of major importance for the future survival of the BMES group is the need to maintain an appropriate and flexible balance between the imposition of mandatory teaching loads and the desire to increase the level of high-quality research outputs. To some extent, this is the perennial problem of all educational environments that combine teaching and research; here, however, it poses a particular threat if the dangers of not getting the balance right are ignored. In the UK, the former two-tier system of teaching polytechnics and research universities was abolished some years ago, presumably with the aim of improving both teaching and research through greater levels of interaction between them within the same organisation. It's clear that this approach has not worked in any meaningful sense: the two-tier system still exists with the 'new' and the 'old', and the tensions between quantity and quality of teaching and research remain. If careful attention is not given to these issues, ITs in Ireland could suffer in a similar way: if the goal is international research excellence, teaching-load models must be sufficiently flexible both to facilitate, rather than impede, those staff who wish to be research active and to recognise that staff who excel at teaching may not wish to follow the same route.

## 6 The panel

Dr Eda Sagarra (Chairman), Pro-Chancellor of the University of Dublin;  
Professor Teresa Attwood, Faculty of Life Sciences, University of Manchester;  
Dr Rosane Hazelman Cunha Curtis, Rothamsted Research Limited, Division of Plant Pathogen Interactions;  
Dr Peter Hetherington, Director of Technical Services, Pfizer Ireland  
Dr Laura Oakey, Pinewood Healthcare, Co. Tipperary (A recent doctoral graduate of the Institute)  
Dr Kirk Semple, Environmental Microbiology and Ecotoxicology, Lancaster University;  
Dr Gary Walsh, Senior Lecturer, Industrial Biochemistry, CES Department, University of Limerick;

*In attendance: Dr Peter Cullen HETAC.*

### 6.1 Declarations

Dr Gary Walsh declared that he was a contemporary of Dr Patricia Mulcahy at NUI Galway, some 17 years ago, that he acted as an external examiner for a PhD student of Dr Patricia Mulcahy about 5 to 7 years ago. Also that he had social interaction with the Director of IT Carlow Dr Ruaidhri Neavyn, when Dr Neavyn was an employee of Limerick IT.