University College Dublin

Periodic Quality Review

UCD School of Electrical, Electronic & Communications Engineering

November 2013

Accepted by the UCD Governing Authority at its meeting on 18 March 2014

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1. Introduction and Overview of UCD School of Electrical, Electronic & Communications Engineering

Introduction

1.1 This Report presents the findings of a quality review of the School of Electrical, Electronic & Communications Engineering, University College Dublin, which was undertaken on 25-28 November 2013. The School response to the Review Group Report is attached as Appendix 1. (*The School may choose to respond to the Review Group Report and this will be added as an appendix to the Report.*)

The Review Process

1.2 Irish Universities have collectively agreed a framework for their quality review and quality improvement systems, which is consistent with both the legislative requirements of the Universities Act 1997, and international good practice (e.g. Standards and Guidelines for Quality Assurance in the European Higher Education Area, 2007). Quality reviews are carried out in academic, administrative and support service units.

1.3 The purpose of periodic review is to assist the University to assure itself of the quality of each of its constituent units, and to utilise learning from this essentially developmental process in order to effect improvement, including :

- To monitor the quality of the student experience, and of teaching and learning opportunities
- To monitor research activity, including: management of research activity; assessing the research performance with regard to: research productivity, research income, and recruiting and supporting doctoral students.
- To provide an opportunity for units to test the effectiveness of their systems and procedures for monitoring and enhancing quality and standards
- To provide a framework within which the unit can continue to work in the future towards quality improvement
- To identify shortfalls in resources and provide an externally validated case for change and/or increased resources
- To identify, encourage and disseminate good practice
- To identify challenges and address these
- To provide public information on the University's capacity to assure the quality and standards of its awards. The University's implementation of its quality review procedures also enables it to demonstrate how it discharges its responsibilities for

assuring the quality and standards of its awards, as required by the Universities Act 1997.

1.4 Typically, the review model comprises four major elements:

- Preparation of a self-assessment report (SAR)
- A visit by a review group (RG) that includes UCD staff and external experts, both national and international. The site visit normally will take place over a two or three day period
- Preparation of a review group report that is made public
- Agreement of an action plan for improvement (quality improvement plan) based on the RG report's recommendations. The University will also monitor progress against the improvement plan

Full details of the review process can be found on the UCD Quality Office website: www.ucd.ie/quality.

1.5 The composition of the Review Group for the UCD School of Electrical, Electronic & Communications Engineering was as follows:

- Dr Declan Patton, UCD School of Nursing, Midwifery and Health Systems (Chair)
- Professor Lorraine Hanlon, UCD School of Physics (Deputy Chair)
- Professor David Limebeer, University of Oxford, UK (Extern)
- Professor Dr. Ir. Joos Vandewalle, Katholieke Universiteit Leuven, Belgium (Extern)

Ms Helen Condon, Trinity College Dublin participated as an observer for days 1 and 2 of the review site visit.

1.6 The Review Group visited the School from 25-28 November 2013 and held meetings with School staff; undergraduate and postgraduate students; the SAR Co-ordinating Committee; other University staff, including the College Principal. The site visit schedule is included as Appendix 2.

1.7 In addition to the Self-assessment Report, the Review Group considered documentation provided by the School and the University during the site visit.

Preparation of the Self-assessment Report (SAR)

1.8 Following a briefing from the UCD Quality Officer in February 2013, a Self-assessment Report Coordinating Committee (SARCC) was put in place. Members of the committee, in consultation with staff members and students, drafted sections of the Self-assessment Report. Committee membership and responsibility for Report chapters are set out below:

Member	**Position**	**Responsibility**
Professor Orla Feely	Professor; Subject Head, Electronic Engineering	Chair of SARCC Chapters 1,3,10
Professor Tom Brazil	Professor; Head of School	Chapters 2,6
Mr Liam Carroll	Chief Technical Officer	Technical staff representative
Ms Clare Davidson	PhD student	Student representative
Dr Mark Flanagan	Lecturer; School Head of Teaching and Learning	Chapter 4
Dr Andrew Keane	Lecturer	Chapter 9
Mr Brian Mulkeen	Lecturer	Chapter 5
Dr Ciara O'Connor	Research Manager, Electricity Research Centre	Research staff representative
Mr Oran O'Rua	School Office Manager	Secretary to SARCC Appendices Administrative staff representative
Mr Rick Watson	Lecturer	Chapters 7,8

1.9 The committee met on five occasions between April and October. Following the assignment of responsibilities at the first meeting, detailed outlines were prepared for each chapter and discussed by the SARCC. These were circulated to all School staff for comment either by email or at a special School meeting on 5 June. A full draft was prepared on this basis and, following discussion by the SARCC, was circulated to all School staff for comment either by email or at a special School meeting on 1 October. The Quality Review process was also discussed at all School meetings between April and October. The Report was updated in response to comments, and the final Self-assessment Report was signed off by the SARCC on 22 October 2013. Guidance from the UCD Quality Office was sought throughout the process.

The University

1.10 University College Dublin (UCD) is a large and diverse university whose origins date back to 1854. The University is situated on a large modern campus about 4 km to the south of the centre of Dublin.

1.11 The University Strategic Plan (to 2014) states that the University's mission is: "to advance knowledge, to pursue truth and to foster learning, in an atmosphere of discovery, creativity,

innovation and excellence, drawing out the best in each student, and contributing to the social, cultural and economic life of Ireland in the wider world".

The University is organised into 38 schools in seven colleges:

- UCD College of Arts and Celtic Studies
- UCD College of Human Sciences
- UCD College of Science
- UCD College of Engineering and Architecture
- UCD College of Health Sciences
- UCD College of Business and Law
- UCD College of Agriculture, Food Science and Veterinary Medicine

1.12 As one of the largest universities on the island of Ireland, UCD supports a broad, deep and rich academic community in Science, Business, Engineering, Health Sciences, Agriculture, Veterinary, Arts, Law, Celtic Studies and Human Sciences. There are currently more than 24,000 students in our UCD campus (approximately 15,500 undergraduates, 8,000 postgraduates and 2,000 Occasional and Adult Education students) registered on over 70 University degree programmes, including over 6,100 international students from more than 121 countries. The University also has over 5,400 students studying UCD degree courses on campuses overseas.

UCD School of Electrical, Electronic and Communications Engineering (SEECE)

1.13 The School is one of six schools that comprise the UCD College of Engineering and Architecture. The School is located in the UCD Engineering and Materials Science Centre, Belfield. The School has 17 academic staff members (16.6 FTEs), 6 technical staff, 15 research staff and a half-share (shared with the UCD School of Mechanical and Materials Engineering) of 3 administrative staff (1.5 FTEs).

1.14 The two major disciplines within the School are electrical engineering, which deals with the generation, control and use of energy in its electrical form, and electronic engineering, dealing with the production, transmission and processing of information in the form of electrical signals. A research activity in biomedical engineering, dealing with electrical signals in biomedical applications, grew from these two, and the School has significant involvement in the delivery of degree programmes in this area.

1.15 The School is a significant contributor to the suite of Engineering degrees offered at UCD, which includes a three-year Bachelor of Science (BSc Engineering Science), a four-year Bachelor of Engineering (BE), followed by a range of two-year Master of Engineering (ME)

degrees. The first year (stage 1) of undergraduate studies in UCD Engineering is common and at the end of that year, students can choose one of the traditional branches of engineering, or can choose to remain in the omnibus stream. After a further two years of study, students can choose to transfer to an ME programme (subject to an entry requirement), remain in the BE programme, or graduate with a BSc degree in Engineering Science. UCD also offers Master of Engineering Science (MEngSc) programmes. The School of EECE has a leading role in the MEngSc in Electronic & Computer Engineering. In addition, the School has a significant role in the new Beijing Dublin International College (BDIC) BE degree programme in Internet of Things Engineering, delivered in Beijing.

2. Organisation and Management

2.1. Organisation of the School

2.1.1. The School of EECE is led by the Head of School, supported by two Subject Heads. In broad terms the Subject Head for Electrical Engineering is in charge of the power systems aspects of the course, while the electronics components are the responsibility of the Subject Head for Electronic Engineering. It is the unanimous opinion of the Review Group (RG) that this is a highly competent management team that works hard in the best interests of the School.

2.1.2. The College of Engineering and Architecture is led by the College Principal and is managed by an Executive Committee that meets about once per month during the academic year. Meetings of the entire College take place biennially and these meetings are mainly for information dissemination. The College Principal recognises that financial resourcing, the rapidly changing landscape of engineering and maintaining staff incentives and motivation are significant challenges. Student recruitment is another very important College-level activity with significant implications for the School.

2.1.3. Responsibility for day-to-day management, budgetary oversight and resourcing decisions within the School of EECE is exercised by the Head of School. The School's administration is supported by three administrative staff who are shared with the UCD School of Mechanical and Materials Engineering. It is the opinion of the RG that this group functions well, but work overload is a problem that is set to deteriorate with the planned increases in student numbers and non-exchequer income; there is no safety margin in place in respect of absences and illness.

2.2. School Meetings

2.2.1. The main formal governance structure is the School Meeting. There are at least three such meetings per semester with extraordinary meetings called as and when necessary. The technical and administrative staff are represented at each meeting, and all staff with teaching responsibilities are encouraged to attend. The Review Group found no fault with these arrangements.

2.3. Communications

2.3.1. The primary medium for external communications is via the School website. Social media channels are also used for this purpose, but on a very limited basis.

2.3.2. Internally, email is used by the Head of School to inform staff of major developments. Targeted emails are also sent to students, informing them of important deadlines, job opportunities, and opportunities for further study. The Review Group found no significant fault with these arrangements.

2.4. Workload and Roles within School

2.4.1. The School is relatively small in comparison to large electrical and electronic engineering schools (such as those found in the UK for example). As a result there are difficult choices to be made between overall coverage and achieving a critical mass in important areas. Within these constraints, which are subjected to significant granularity issues, the Review Group feels that the teaching and research burden is satisfactorily distributed across the academic staff. The Review Group also felt that the overall load on the academic staff is high, but not apparently prohibitive.

2.4.2. There appears to be an unresolved issue relating to the uneven workloads being carried by different members of the academic staff, which is on a rising trajectory. In order to address this perception, the Review Group feels that a formalised workload allocation and monitoring framework is of potential benefit. One can reasonably expect that the development of a workable workload allocation framework will generate some contrary opinion.

2.4.3. The topic of workload and roles within the School in relation to the technical and administrative staff will be dealt with in Chapter 3.

2.5. School Finances

2.5.1. The difficult financial environment in which the School is operating is a matter of paramount concern. One way or another, this harsh financial environment is frustrating virtually all of the School's endeavours and aspirations, including staff appointments in all categories, equipment and facility replacement and new experimental facilities.

2.5.2. The Review Group came to the conclusion that the resource allocation systems within the University are opaque, highly complex and poorly understood, even at Head of School level. It also appears that the RAM is infrequently updated and made available retrospectively, therefore it is of very limited use in financial planning at School level.

2.5.3. It is the opinion of the Review Group that the costs of the central administration and facilities are prohibitively high. As a consequence, the School's salary bill is roughly 50% of the School's total annual running cost; this figure is in the 75% to 85% range in most engineering schools in the UK.

2.5.4. The sense of the Review Group is that the financial model applied by the University, which largely reflects the external funding model applied by the Higher Education Authority, disadvantages research-active lab-based disciplines with significant numbers of technical staff such as this School, in favour of disciplines that teach large undergraduate classes.

2.5.5. The Review Group understand that a 35% charge is applied to consulting income that is generated and processed through the University. This charge is much higher than is typical elsewhere and acts as a deterrent, for example, in the UK a figure of 15-20% would be the norm. It is noted that this rate reflects the costs of Professional Indemnity insurance cover in Ireland which compares unfavourably to international comparators in the 10% to 20% range. (See also 6.11).

2.5.6 The Review Group regrets that there is a poor rate of transfer of overhead income from the University to the School for funding incremental expenditure. The low rate of return of research overhead from the University directly to the School is a matter of concern to the Review Group since these funds are crucial for the maintenance of research equipment and other research-related activities.

2.5.6. The School's technical staff are keen to support researchers outside the School on a wide range of design, technical advice and equipment repair tasks. Nonetheless, as far as the Review Group can tell, this work is not reflected on the School's financial books.

Commendations

2.6 The School has a competent and committed management team.

2.7 The School has a cohesive, hard-working and mutually supportive academic staff.

2.8 The School has a cohesive, hard-working and mutually supportive technical staff.

2.9 The School has an excellent administrative support staff, although there are signs of overload that is undoubtedly getting worse.

Recommendations

2.10 The Review Group recommends that the School considers improving its publicity of engineering as an important discipline to the outside world in order to increase future student numbers and industrial support.

2.11 The Review Group recommends that the School's management team monitors and adjusts the profiling of the student population to prevent an overloading of the teaching assistant (TA) pool in the light of planned increases in the UG student population.

2.12 The RG recommends that the School's management team encourages an increase in the number of research active staff. While this is certainly meritorious in its own right, it will also lead to an increase in the research student population, the size of the TA pool and hence a reduction in the teaching loads of the academic staff.

2.13 The RG recommends that a formalised workload allocation and monitoring framework is developed. While short-term controversy might be expected, a settled system will improve the perception of fairness and openness in the assignment of teaching and administrative tasks.

2.14 In the opinion of the Review Group the resource assignment mechanisms of the University are overly complex and at the root of wide-spread discontentment within the academic staff. Consideration should be given to simplifying the RAM and/or to improving the communication of the model.

2.15 The Review Group recommends that the parameters within the RAM are reviewed on an annual basis by a finance committee that represents all the Colleges within the University.

2.16 The Review Group recommends that the RAM is made available to all the units within the University so that they can use it for financial planning and "what if" type studies.

2.17 The Review Group recommends that every attempt is made to reduce the cost of the UCD central services.

2.18 The Review Group recommends that administration of academic consulting is put on a formal and support oriented basis so as to encourage an increase of UCD administered consulting. In the opinion of the Review Group the UCD charge of the consulting income stream is far too high and should be adjusted down to the 10 to 20% range.

3. Staff and Facilities

3.1 Staff

3.1.1 The School has 17 academic staff members, 6 technical staff, 15 research staff and a half-share of 3 administrative staff.

Academic Staff

3.1.2 The School's three Professors have earned national and international recognition for their research contributions and subject leadership skills, as is evidenced by for example the Head of School's term as Secretary of the Royal Irish Academy, the

appointment of Subject Head for Electrical Engineering to the EU Horizon 2020 Energy Advisory Group and the appointment of the Subject Head for Electronic Engineering as Chair of the Irish Research Council.

3.1.3 This strength reaches down to the less senior members of the School's academic staff. Notable examples of leadership roles held by members of School staff include: the College Vice-Principal for Research and Innovation; the Chair of the Institute of Electrical and Electronics Engineers (IEEE) Task Force on Open Source Software; the chairmanship of the IEEE Power and Energy Society UKRI Chapter and of the IEEE PES Taskforce on Optimal Methods for Distributed Generation Planning; and the co-leadership of the SFI ICT International Strategic Co-operation Award between Ireland and China.

3.1.4 Three staff members have joined the School in 2013. These appointments brought the School back to its steady-state staffing level of recent times. The appointment of these new members was supported by increases in the School's non-exchequer funding. The RG understands that two additional appointments have been agreed with the University for the BDIC.

3.1.5 Two new professorial appointments are planned in the areas of Intelligent Energy Systems and Electronic Circuits.

3.1.6 The School is making increased use of adjunct faculty as a means of boosting the School's teaching capacity and as a way of forming closer ties with industry. This is thought by the RG to be most sensible.

3.1.7 There is undoubtedly an increase in the academic staff workload due to an increase in undergraduate student numbers as well as an increase in the number of courses being offered.

Technical Staff

3.1.8 The technical staff are an important part of any engineering school, in particular, their assistance with the delivery of both teaching and research.

3.1.9 The technical staff provide a high-quality service, which is greatly appreciated by the School. In addition, the students and staff from several other units of the University benefit from their expertise.

3.1.10 The School is concerned about its inability to support and maintain its technical staff contingent which has already dropped from seven down to four. Technical staff who leave or retire are apparently not being replaced. The retirement of the School's only mechanical technician has left the School with no mechanical workshop facilities.

3.1.11 The demands on the electronic workshop in the School have increased significantly as electronic technicians are lost to other units of the University. Rationalisation of workshop capability could, in principle, bring advantages of scale as well as removing replication. That said, past experience suggests that this is sometimes easier said than done.

3.1.12 The freezing of promotional opportunities for technical staff is a source of concern to both the technical and academic staff.

3.1.13 The technical staff would very much appreciate the opportunity to upgrade their skills.

Research Staff

3.1.14 There are 15 research staff in the School, with 10 associated with the Electricity Research Centre. These numbers may need to increase as this activity is scaled up in response to new opportunities.

3.1.15 The career progression for postdoctoral researchers is an important matter within the School. UCD has initiated a number of schemes in support of the career development of these staff - the School is fully supportive of these initiatives.

3.1.16 As the number of postdoctoral teaching staff increases, issues related to their training, career development, remuneration and management are going to become more and more important.

Administrative Staff

3.1.17 The three administrative support staff are shared with the School of Mechanical and Materials Engineering. These comprise a School office manager, a graduate programmes administrator and a senior executive assistant.

3.1.18 The administrative staff provides administrative support for both schools in areas such as HR, financial management, graduate taught and research programme administration and day-to-day office support.

3.1.19 The administrative support structure currently provides an excellent service, but is in danger of becoming over-burdened as the number of students, particularly Master's students and international students, increases in both schools.

3.1.20 As with technical staff, there are currently no promotional opportunities for administrative staff, the closest being the possibility of competing for positions at a higher grade in other units of the University.

3.2 Facilities

3.2.1 There is a low-level concern that the 19th century beam engine does not convey the excitement of electronic and electrical engineering. That said, the facilities and equipment are generally in good order and match the needs of the School.

3.2.2 The School points out that a major omission in their facilities is a significant fabrication capability, but that they can access national and international facilities as required. Any shortcoming here must clearly be considered alongside competing financial, strategic and facility demands.

3.2.3 The lecturing and laboratory spaces are generally up-to-date and in good condition.

3.2.4 The School anticipates increasing difficulties relating to both the number and capacity of the teaching facilities and the undergraduate population increases.

3.2.5 There is apparently no provision in the School budget for the renewal of aging laboratories and equipment. This is a source of ongoing and increasing concern, somewhat alleviated by the School's excellent technical staff.

3.2.6 A related difficulty is the growing demand for project space within the School. A space committee has been established to address this issue.

Commendations

3.3 The School's academic staff have made a research, industrial and leadership impact that scales beyond the relatively small size of the School.

3.4 The cohesion, sense of purpose, work ethic and mutual support present in all of the School's staff, including the technical and administrative staff, is noteworthy.

Recommendations

3.5 While the percentage of research active staff within the School is above the University average, the Review Group recommends that every effort is made to facilitate further improvement in this area.

3.6 The Review Group recommends that the planned new appointments in the BDIC go ahead as soon as possible.

3.7 The Review Group supports the two proposed appointments of the Professor of Intelligent Energy Systems and the professor of Electronic Circuits.

3.8 The Review Group recommends that the School moves appointment of new members of academic staff in the biomedical and connected health areas. If this is done carefully, these appointments should result in a net improvement in the School's bottom line.

3.9 The Review Group recommends that the School moves towards treating the TA population as a core element of the teaching resource rather than as an opportunistic "add on". This change would involve increasing the population, introducing a "fit-for-purpose" selection process and providing them with training.

3.10 The Review Group recommends that the School strives to ensure that increases in the graduate student population keep pace with the increases in the undergraduate population so that the undergraduate student/TA ratio is held constant. This ratio appears to be drifting upwards to the detriment of the teaching quality.

3.11 The Review Group recommends that the School makes every effort to stabilise the technical staff numbers at a level commensurate with the load on the workshops. It also recommends opening up training opportunities for these staff during dips in their workloads.

3.12 The technical staff promotion freeze is a matter of concern to these staff and appears to be having a negative impact on their morale. The Review Group recommends that the promotion cycle is reintroduced as soon as possible.

3.13 The Review Group recommends that the promotion cycle for the administrative staff is reintroduced as soon as possible.

3.14 The administrative support of two schools, including this one, is provided by only three people. If one of these staff goes on leave, or is ill, the level of support provided will be significantly reduced. The Review Group recommends that the schools that are sharing this support seek to de-risk this fragility in their administrative cover.

3.15 There is an oft repeated issue relating to the slow appointment processing of new fixed-term research staff in areas where there is a strong demand for a small pool of skilled people. Long response times have led in some cases to the loss of the best applicants in an already small pool. The Review Group recommends that UCD Human Resources and the associated contracts administration staff work towards a significant reduction in the appointment delays associated with the processing of fixed-term appointments.

4. Teaching, Learning and Assessment

4.1 Module Delivery

4.1.1 The School's 17 academic staff deliver approximately 40 modules, projects, laboratories and tutorials.

4.1.2 Lectures form the largest (time-wise) component of student contact hours for the taught modules within the School. Lectures are often supplemented by notes or copies of the lecture slides.

4.1.3 Taught module class sizes currently vary from 294 in the level-1 module Electronic & Electrical Engineering to 5 in the level-4 module Energy Economics and Policy. The majority of lectures have class sizes between 20 and 100 students, and are delivered in the lecture rooms in the UCD Engineering and Materials Science Centre. Rising student numbers in electronic and electrical engineering and in mechanical engineering have led to very significant increases in student numbers on School modules.

4.1.4 Laboratory work takes place in two- or three-hour sessions. In them, students learn to design and conduct experiments in a manner that complements and reinforces the material covered in lectures.

4.1.5 Student feedback indicates that labs successfully consolidate the students' understanding of lecture materials.

4.1.6 The quality of the students' laboratory experience is heavily dependent on the quality of the TAs. It is very important, therefore, to maintain the motivation and preparedness of TAs, which is becoming more and more important as the reliance on TAs increases.

4.1.7 Discussions with a group of postgraduate students revealed some discontentment with the TA system. Concerns included the late notification of teaching duties, unevenness in the level of work expected and the absence of a formal payment scheme.

4.1.8 Tutorials are used specifically to develop the students' problem-solving skills, as well as to give them a chance to reflect on material covered in lectures. Feedback on tutorials is generally positive, with the students expressing confidence that their understanding of the module materials is being properly consolidated.

4.1.9 The undergraduate projects conducted in their fourth-year are substantial and of a good standard, and in some cases have led to publications at international conferences.

4.1.10 Projects of a more research-focused nature are mandatory for ME and MEngSc students. The projects on offer are generally in line with the research focus of the academic supervisor and his/her research group.

4.1.11 ME students must take a professional work experience (PWE) module, where they undergo a structured (and formally assessed) placement within a company. This mechanism is proving to be very beneficial to the School in creating and maintaining links with the relevant employers.

4.1.12 In common with other quality institutions, the modules appearing in earlier stages of programmes have a strong concentration on fundamentals.

4.1.13 The Review Group saw evidence of several examples of innovative teaching and high-quality module design, which were all quite different in character and included training in softer subjects such as business and entrepreneurship.

4.1.14 The School recognises that there is scope for further innovation including the use of web-based teaching and the spread of best practise in teaching innovation.

4.2 Feedback from Students

4.2.2 The School provides a framework in which students can provide feedback on their teaching modules. This feedback is generally strong, but the return rate tends to be low and possibly too low to ensure a reliable interpretation of this data.

4.2.3 The Review Group did not detect any systematic difficulties with the delivery of teaching modules, or with industrial employer satisfaction.

4.2.4 There is little doubt that the technical staff are of great assistance to the students in the laboratories and with their projects. The School should therefore consider carefully any further reductions in the technical staff numbers, which are already low.

4.3 Examination Assessment

4.3.2 The module assessment processes were found to be broadly satisfactory except for the use of TAs in the grading of work that counts for a large percentage of module marks; this is a particular issue in senior-year laboratory marking by TAs.

4.3.3 Continuous assessment (CA) is useful in provoking the students to engage with the material at an early stage in the module. Students have generally expressed a positive view of CA, especially when prompt feedback is provided on their submissions. The students indicated that long delays occurred in the return of CA in some cases.

4.3.4 The staff workload associated with CA is substantial, and is set to grow with increasing student numbers. This is likely to lead to deterioration in CA marking delays and so this issue requires vigilance.

Commendations

4.4 The importance of TA training has been recognised with a formal training regime already in place. Noteworthy is the fact that excellence in TA support teaching is recognised by an 'Outstanding TA Award' that is based on student nominations.

4.5 The quality of the teaching and examinations is recognised as being high and well aligned with those at other world-class institutions.

4.6 Interviews with a number of industrialists indicated a strong appreciation of the course and the training the student receive. The School is to be congratulated on this achievement.

4.7 Overall, the commitment of staff to high-quality module design, delivery and enhancement is to be commended. This excellence is in no small part due to excellent technical support.

Recommendations

4.8 The Review Group recommends that the School considers implementing a scheme that gives the TAs greater notice of their teaching duties.

4.9 The Review Group recommends that the School considers implementing a process that will lead to a more even distribution of teaching assignments that are matched to their expertise.

4.10 The Review Group recommends that the School considers ways of improving the response rate in student feedback in teaching; this is currently rather low.

4.11 The Review Group recommends that the School reviews the use of TAs to grade work (particularly laboratory work) that comprises a high percentage of the module marks. Making module marks too reliant on inexperienced staff is potentially problematic.

4.12 The Review Group recommends that the School tries to ensure that continuous assessment marking is returned promptly. There was some student feedback suggesting that long delays occur in some cases. As the staff workload associated with CA increases with increasing student numbers, there is likely to be a deterioration in CA marking delays unless new processes are introduced.

4.13 The Review Group recommends that the School remains vigilant to the mixed communication and teaching skills of some of the TA staff. Some undergraduate feedback indicates that there is an issue to address in this area.

4.14 Student feedback indicates that there are sometimes substantial delays in the laboratories with regards receiving help from TA staff. The Review Group recommends that the School monitors continuously the student TA ratio, which is high and set to increase.

4.15 Student feedback indicates that a course in technical writing would be well received. The Review Group recommends that the School considers this possibility.

4.16 The Review Group recommends that the technical staff is maintained at present numbers and opposes any further reductions.

4.17 The TAs expressed concerns regarding the lack of a payment structure. The Review Group recommends that the School looks at this issue and comes to some affordable and equitable arrangement.

5. Curriculum Development and Review

5.1 The School is strongly involved in many programmes related to electronics, communication, and electrical energy systems, both at the bachelor and master level. In fact the Review Group feels that there are too many programmes, but this is probably due to the introduction of the Bologna system. Of course the programmes have a considerable amount of overlap in terms of courses, concepts, methodologies, and laboratories related to the electrical devices, circuits, and systems. The topics are presented at a high international level, and the strong links with industry and spinoffs creates a smooth transition to industry after graduation.

Commendations

5.2 The School has succeeded in significant and sustained recruitment of undergraduate and postgraduate students. Students are satisfied with the educational provision on these courses. Employers are also exceptionally satisfied with the quality of graduate educated by the School.

5.3 There is a clear commitment from all staff to quality review and curriculum enhancement. For example, the stage one curriculum was significantly redesigned in 2010, with a particular focus on introducing engineering design topics at an early stage.

5.4 The School has shown tremendous innovation and responsiveness in being a central player in developing the BDIC undergraduate degree.

5.5 Being part of the BDIC arrangement was a visionary move for the School as there is clear opportunity for growth in the number of high quality postgraduate students from BDIC.

5.6 Accreditation processes have been successfully completed with strong links to employers for accredited programmes.

5.7 The School makes effective use of adjunct staff from industrial/employing bodies.

5.8 Some School staff play an active role in Engineering Programme Board committees with three steering committees based within the SEEC. Involvement at this level ensures that the School maintains a pivotal position within the UCD College of Engineering and Architecture.

5.9 External examining processes are robust with positive and constructive feedback. The School has also demonstrated prompt action on issues raised by examiners.

5.10 Constructive linkages exist with other schools, for example, the School of Computer Science and Informatics.

Recommendations

5.11 Given the low number of academic staff in the School and possible expansion of programme provision, the School may find it more difficult to provide a quality education to students. The School should be aware of the possibility of spreading its staff too thin. The School should seek to prioritise taught graduate areas for future expansion and target the employment of key staff to lead these programmes. The School should be supported by the College of Engineering & Architecture and University in fulfilling this mission. The Review Group believes that any new taught course provision should match the research portfolio of leading international academics that the School wishes to recruit. An added bonus to the School and University would be that these leading academics could acquire a substantial number of PhD students for the School and University.

5.12 The School should continue to maintain its excellent relationships with industry partners and seek to establish new ones. This will enhance the learning experience of students who go on placement.

5.13 The School should continue to appoint senior adjunct staff, for example, at Associate and full Professorial level, from key industry partners. The School should consider involving relevant adjunct staff in programme review. The School should also consider holding an annual event for adjunct staff where the School can showcase its range of programmes, feedback, and refinements made in the past year etc.

5.14 The growing numbers of ME programme students in the School indicate that these programmes are popular. The School should continue to aggressively market these programmes nationally and internationally. The School should receive support from the College in achieving this. With international marketing, the School may have to consider the possibility of developing programmes online in their entirety or partially. If the School decides to develop online learning it would require the addition of an educational technologist.

5.15 The ME Biomedical Engineering is an area of growth. To maintain quality in this programme the School should be supported in staff investment in this area, particularly in the area of imaging.

5.16 The School should be supported in meeting its teaching and research obligations with the BDIC. This collaborative arrangement holds huge potential for UCD in terms of the number of high quality taught and research degree students that could potentially enter UCD after completing their undergraduate degree.

5.17 The School should move to appoint external examiners for the ME programmes in Biomedical Engineering and Energy systems.

6. Research Activity

6.1 The comprehensive information supplied and the evidence obtained from the site visit meetings confirm that the School has a strong research activity at an excellent international level. This is definitely remarkable in view of the limited number of research active academics. Of course this implies that not all research topics are equally well covered that one would typically expect in large electrical and electronic engineering departments abroad. The research functions are divided into three complementary research lines:

- Electrical Energy (Electricity Research Centre): extremely high international/national profile, mainly in grid integration of renewable energy. Basis for SFI Strategic Research Cluster and UCD Energy Institute (including major new donor investment);

- Physical Layer Communications and Circuits (now being re-titled as "Enabling Technologies for the Internet of Things"): wireless systems, RF and microwave engineering, digital signal processing, communications, coding, nonlinear circuits and control, optical engineering;

- Biomedical Engineering: neural engineering, signal processing of biomedical signals for diagnostics, therapy, rehabilitation etc.

6.2 At the research and teaching level these research lines often draw on the same concepts, design methods and practical applications and exhibit interesting synergies.

6.3 Research output has been substantial and includes some very high impact journals and leading conferences. Moreover the School has been successful in launching several successful spinoffs, thereby generating new companies for the country. The Review Group however feels that the percentage of research active academics can increase, certainly in view of the rather low thresholds for the definition of research active academic staff. Also the papers often exhibit a better than average citation counts, and several researchers have received international awards.

6.4 The attempts for ERC grants have not been successful so far, but the Review Group feels that there is good potential for success in diverse fields, and new applications should be encouraged, and supported. Presently the Electricity Research Center is more concerned with attracting the right researchers with the already acquired research money, than searching for more projects. The field of biomedical engineering has lost some important academics by various shifts of tasks or departures and is now reduced to one academic. It has an important role in research and education, since it is strong in attracting a large population of students, and especially female students. It has nice opportunities for connected health and the internet of things, and would benefit from hiring a fresh academic in the field of biomedical signal processing.

6.5 The internet of things has the opportunity to move up from the physical layer to more system levels and make the bridge towards the upper layers that are researched in the UCD

School of Computer Science and Informatics. It has definite synergy with the BDIC. This initiative can bring strong and motivated Chinese PhD students to UCD.

6.6 As a result of these positive initiatives, together with the full deployment of the recent hires and the Electricity Research Centre, the number of doctoral and postdoctoral researchers is expected to grow. This will alleviate some of the problems related to the growing teaching load caused by the increase in the number of undergraduate students. It will also ease the load imbalances and the quality issues of the teaching activities for labs and tutorials. Moreover more senior postdoctoral researchers are crucial to the success of such a large scale research effort.

Commendations

6.7 With the limited number of research active academic staff members, the scale and quality of the School's research activity are extraordinary by any standards. This has been achieved by a productive climate of supportive human interactions among researchers who have a long history of good understanding and cooperation genuinely committed to one another's success. Moreover they have been enriched by a limited number of good recent academic recruitments with good potential.

6.8 The School now has a good cohort of PhD students and they seem to be highly motivated, well-managed and capable of delivering significant research. The School's effective use of the Structured PhD approach has helped to shorten the PhD duration.

6.9 The spirit of collaboration has extended well beyond traditional electrical, electronic and communication engineering subject areas and has given rise to promising multi-disciplinary research with colleagues in Mathematics, Physics, Mechanical Engineering, Medicine and Business.

6.10 The research leaders responded with remarkable efficiency, clarity and good common sense to the Review Group's questions on their ambition to be world leading with such a small unit.

6.11 Several academics have interesting consulting activities for industry that are enhancing their teaching and other more fundamental research. However the large overhead of 35% charged on external consulting activities, when it is processed via UCD, is de-motivating, and encourages staff to handle it privately within the 20% time for private research allowed by the University. (See also 2.5.5).

Recommendations

6.12 The School should move quickly to increase the number research active academics.

6.13 The School might reflect on the strategic impact of identifying ways for bridging the gap with the UCD School of Computer Science and Informatics. It might thereby ensure that any such development is mutually acceptable and synergistic. There are opportunities for such

cooperation in intelligent energy systems as well as in the internet of things, and optimization of systems.

6.14 The School may search for ways to finance and launch a new academic position in biomedical signal processing.

6.15 The School should continue the training of new PhD students in teaching activities. Also there is room for more training in various professional skills, communication and spinoff/innovation activities during the PhD programme and for cooperation on this with other institutions, for example, Trinity College Dublin.

6.16 The School should consider ways to streamline the TA tasks of PhD students. The School is encouraged to develop processes that are lightweight yet effective.

7. Management of Quality and Enhancement

7.1 Academic staff of the School contribute to quality review processes nationally and internationally through reviewing and editing activities for journals and conferences; reviewing research proposals, research programmes and research agencies; and serving on accreditation, quality review, interview and promotions panels, as well as selection panels for very high level awards such as IEEE Fellowships and European Research Council grants. This work contributes to the dissemination of best practice into and out of the School, and provides a further mechanism for quality benchmarking.

Student Intake

7.2 The points at entry into omnibus engineering have increased in recent years, reflecting renewed interest in the discipline and prioritisation nationally. Although there is still a low uptake of engineering by female students across the College of Engineering and Architecture, the trends identified in the data from 2011/12 show that the cohort in Years 2 and 3 selecting electrical, electronic and communications engineering as their major are roughly in the ratio 25%; 75% F: M. Broadly speaking this is comparable to the average for engineering graduates in the US. Among the graduate research students, 27% are female.

Commendation

7.3 The quality of the student intake into the undergraduate engineering programme is good.

Recommendation

7.4 The School should monitor the impact of the leaving certificate Project Maths syllabus on the preparedness of students for engineering.

Staff Development

7.5 There is a large range of training opportunities which are available to staff within UCD. These typically have a higher take-up by administrative staff and are well regarded by the administrative staff. The more specialised training needs of technical staff cannot be met locally. Recently, the mechanical workshop facilities in the School have become defunct with the retirement of the remaining technician.

Commendation

7.6 The School displays a good *esprit de corps* and staff appear to work collectively to support and help each other to carry out the excellent work of the School. Administrative staff are doing a highly commendable job of effectively supporting the needs of 2 schools. The technical staff are playing a heroic role, not only in supporting the School's teaching and research needs, but in making themselves available across the University to support activity in other schools such as Food Science and Physics, against a backdrop of an absence of any promotional rounds for technical staff and without acknowledgement or visibility of this contribution. Academic staff continue to develop their research and teaching, at a time of increasing student numbers; shrinking TA support; poor promotional opportunities and an ever-increasing administrative load.

Recommendations

7.7 The University should implement a round of internal promotion for technical staff as a matter of urgency.

7.8 The School should be supported in replacing retired (and retiring) technical staff.

Teaching, Learning and Programmes

7.9 The School operates a number of feedback mechanisms, both internally and externally, to maintain and enhance the quality of their teaching, learning and programmes. School and College level staff:student committees give an opportunity to air issues as they arise. Teaching is taken seriously, with a commitment to maintaining strong foundations of the discipline. The uneven levels of training and motivation among some of the TAs could be problematic for the School in maintaining quality of delivery of tutorials and practicals across the portfolio of modules.

Commendation

7.10 The lab facilities available to students are modern and well-maintained by the committed technical and academic staff. The new numerical methods course is in high demand among a large student population across the University.

Recommendations

7.11 To address issues relating to the quality of the learning and research environment, the Review Group recommends the School invite post-graduate and post-doctoral representatives onto its Committee to ensure good lines of communication and a greater sense of involvement in the life of the School.

7.12 The Review Group recommends that 1st year students be exposed (possibly through an elective Engineering module) to formal training in, for example, research skills, technical writing, using the research literature, plagiarism etc.

Research and Innovation

7.13 Quality management in research is an implicit function of a research-intensive unit such as the School of EECE. Research publications from the School target the leading international journals and conferences, where they undergo detailed peer review. Research proposals are also subject to detailed peer review and, most notably in the case of major SFI grants, panels of international experts visit the research group to assess delivery midway through the grant. PhD students undergo a transfer process around month 18 to formalise their progress to the next stage of the PhD.

7.14 The School has a strong innovation track record, well established industry links and a lot of potential to bring in income through consulting, which is usual in engineering schools internationally. This activity can bring added benefit to the University in terms of new industry partners for research initiatives.

Commendation

7.15 The School's strategy to increase its complement of research active staff in areas of strategic national interest is an effective approach to ensure its sustained research excellence, building capacity in key research areas while supporting the School's teaching mission at undergraduate and taught graduate levels in a robust way.

Recommendation

7.16 The School should be supported by the University in hiring new academic staff in strategically important and high impact research areas to maintain quality.

7.17 Staff should be supported in developing consulting practise where appropriate.

7.18 The School should be congratulated with its success in launching spinoff activities, and should be encouraged to continue with these efforts in order to contribute to the establishment of high-tech companies in Ireland.

8. Support Services

8.1 UCD provides a range of support services appropriate to a large and complex University, and the School of EECE interacts with almost all of these on a regular basis. Most of these have significantly developed in scope and quality over the past decade, often in ways necessitated by the demands of more complex systems (such as modularisation). Some recent cutbacks to services for financial reasons have had a discernible negative effect. School staff expressed a generally good level of satisfaction with the quality of support services.

8.2 In parallel with the increasing complexity of the University's activities (research growth, increased student numbers, massive growth of overseas recruitment, etc.), a plethora of new administrative structures have been put in place. Although required to implement UCD's ambitious plans and manage risk, some of these structures can become obstacles to the efficient conduct of the School's business. The recruitment procedures for research staff are now highly onerous on staff time and in some instances have resulted in the loss of skilled staff to research projects of strategic importance to the University. The School reported issues with the responsivity and agility of HR Support Services in respect of the needs of the School.

8.3 The opportunities available to the University in the recruitment of international students to programmes in electrical and electronic engineering are so promising as to merit the focused attention of support units. As the link with BDIC is demonstrating, recruitment of international students should draw significant return on any investment required.

Commendations

8.4 Staff in support units are highly dedicated and professional.

Recommendations

8.5 The Review Group recommends that UCD Human Resources streamline the A-Z of recruitment procedures with a tracking website service for research-funded staff to ensure research-active staff remain highly motivated to carry out their research and that resources are not duplicated.

8.6 Discipline-specific marketing of School programmes abroad should receive particular consideration, in partnership with the College and the International Office.

9. External Relations

9.1 The School has well established contacts and partnerships with industry and other academic units both in Ireland and abroad. In addition, staff members are actively involved with professional societies, in the organisation of conferences and other events; and have made numerous contributions to the wider community and society. The spectrum and depth of external engagement demonstrates a pattern of networks linking the School within UCD,

with other leading universities in Ireland and around the world, as well as with industry, professional bodies and the wider community. The strong research activity of the School is in many cases a driver for the establishment and maintenance of these links and it is envisaged that this will continue and expand into the future.

9.2 The School is also active in engaging school children and the general public with engineering as part of individual's outreach efforts.

9.3 Finally, an important component of the School's external relations is with its alumni, many of whom occupy senior positions in Ireland and abroad.

Commendations

9.4 The School's involvement in BDIC underpins an important commitment by UCD, and the School is providing important leadership within the University as it seeks to further develop its presence in China.

9.5 Staff of the School are playing leadership roles in the development of national networks in the area of Energy Systems Integration and in Internet of Things, allowing the School to develop in both scale and impact.

9.6 Employers highly value the quality of the School graduates that they employ.

Recommendations

9.7 The setting up of comprehensive alumni database, perhaps as a dedicated task for an intern, could open up an important communications channel not only with past graduates, but also with potential future donors.

10. Summary of Commendations and Recommendations

A. Organisation and Management

<u>Commendations</u>

A.1 The School has a competent and committed management team.

A.2 The School has a cohesive, hard-working and mutually supportive academic staff.

A.3 The School has a cohesive, hard-working and mutually supportive technical staff.

A.4 The School has an excellent administrative support staff, although there are signs of overload that is undoubtedly getting worse.

Recommendations

A.5 The Review Group recommends that the School considers improving its publicity of engineering as an important discipline to the outside world in order to increase future student numbers and industrial support.

A.6 The Review Group recommends that the School's management team monitors and adjusts the profiling of the student population to prevent an overloading of the teaching assistant (TA) pool in the light of planned increases in the UG student population.

A.7 The RG recommends that the School's management team encourages an increase in the number of research active staff. While this is certainly meritorious in its own right, it will also lead to an increase in the research student population, the size of the TA pool and hence a reduction in the teaching loads of the academic staff.

A.8 The RG recommends that a formalised workload allocation and monitoring framework is developed. While short-term controversy might be expected, a settled system will improve the perception of fairness and openness in the assignment of teaching and administrative tasks.

A.9 In the opinion of the Review Group the resource assignment mechanisms of the University are overly complex and at the root of wide-spread discontentment within the academic staff. Consideration should be given to simplifying the RAM and/or to improving the communication of the model.

A.10 The Review Group recommends that the parameters within the RAM are reviewed on an annual basis by a finance committee that represents all the Colleges within the University.

A.11 The Review Group recommends that the RAM is made available to all the units within the University so that they can use it for financial planning and "what if" type studies.

A.12 The Review Group recommends that every attempt is made to reduce the cost of the UCD central services.

A.13 The Review Group recommends that administration of academic consulting is put on a formal and support oriented basis so as to encourage an increase of UCD administered consulting. In the opinion of the Review Group the UCD charge of the consulting income stream is far too high and should be adjusted down to the 10 to 20% range.

B. Staff and Facilities

Commendations

B.1 The School's academic staff have made a research, industrial and leadership impact that scales beyond the relatively small size of the School.

B.2 The cohesion, sense of purpose, work ethic and mutual support present in all of the School's staff, including the technical and administrative staff, is noteworthy.

Recommendations

B.3 While the percentage of research active staff within the School is above the University average, the Review Group recommends that every effort is made to facilitate further improvement in this area.

B.4 The Review Group recommends that the planned new appointments in the BDIC go ahead as soon as possible.

B.5 The Review Group supports the two proposed appointments of the Professor of Intelligent Energy Systems and the professor of Electronic Circuits.

B.6 The Review Group recommends that the School moves appointment of new members of academic staff in the biomedical and connected health areas. If this is done carefully, these appointments should result in a net improvement in the School's bottom line.

B.7 The Review Group recommends that the School moves towards treating the TA population as a core element of the teaching resource rather than as an opportunistic "add on". This change would involve increasing the population, introducing a "fit-for-purpose" selection process and providing them with training.

B.8 The Review Group recommends that the School strives to ensure that increases in the graduate student population keep pace with the increases in the undergraduate population so that the undergraduate student/TA ratio is held constant. This ratio appears to be drifting upwards to the detriment of the teaching quality.

B.9 The Review Group recommends that the School makes every effort to stabilise the technical staff numbers at a level commensurate with the load on the workshops. It also recommends opening up training opportunities for these staff during dips in their workloads.

B.10 The technical staff promotion freeze is a matter of concern to these staff and appears to be having a negative impact on their morale. The Review Group recommends that the promotion cycle is reintroduced as soon as possible.

B.11 The Review Group recommends that the promotion cycle for the administrative staff is reintroduced as soon as possible.

B.12 The administrative support of two schools, including this one, is provided by only three people. If one of these staff goes on leave, or is ill, the level of support provided will be significantly reduced. The Review Group recommends that the schools that are sharing this support seek to de-risk this fragility in their administrative cover.

B.13 There is an oft repeated issue relating to the slow appointment processing of new fixed-term research staff in areas where there is a strong demand for a small pool of skilled people. Long response times have led in some cases to the loss of the best applicants in an already small pool. The Review Group recommends that UCD Human Resources and the associated contracts administration staff work towards a significant reduction in the appointment delays associated with the processing of fixed-term appointments.

C. Teaching, Learning and Assessment

Commendations

C.1 The importance of TA training has been recognised with a formal training regime already in place. Noteworthy is the fact that excellence in TA support teaching is recognised by an 'Outstanding TA Award' that is based on student nominations.

C.2 The quality of the teaching and examinations is recognised as being high and well aligned with those at other world-class institutions.

C.3 Interviews with a number of industrialists indicated a strong appreciation of the course and the training the student receive. The School is to be congratulated on this achievement.

C.4 Overall, the commitment of staff to high-quality module design, delivery and enhancement is to be commended. This excellence is in no small part due to excellent technical support.

Recommendations

C.5 The Review Group recommends that the School considers implementing a scheme that gives the TAs greater notice of their teaching duties.

C.6 The Review Group recommends that the School considers implementing a process that will lead to a more even distribution of teaching assignments that are matched to their expertise.

C.7 The Review Group recommends that the School considers ways of improving the response rate in student feedback in teaching; this is currently rather low.

C.8 The Review Group recommends that the School reviews the use of TAs to grade work (particularly laboratory work) that comprises a high percentage of the module marks. Making module marks too reliant on inexperienced staff is potentially problematic.

C.9 The Review Group recommends that the School tries to ensure that continuous assessment marking is returned promptly. There was some student feedback suggesting that long delays occur in some cases. As the staff workload associated with CA increases with increasing student numbers, there is likely to be a deterioration in CA marking delays unless new processes are introduced.

C.10 The Review Group recommends that the School remains vigilant to the mixed communication and teaching skills of some of the TA staff. Some undergraduate feedback indicates that there is an issue to address in this area.

C.11 Student feedback indicates that there are sometimes substantial delays in the laboratories with regards receiving help from TA staff. The Review Group recommends that the School monitors continuously the student TA ratio, which is high and set to increase.

C.12 Student feedback indicates that a course in technical writing would be well received. The Review Group recommends that the School considers this possibility.

C.13 The Review Group recommends that the technical staff is maintained at present numbers and opposes any further reductions.

C.14 The TAs expressed concerns regarding the lack of a payment structure. The Review Group recommends that the School looks at this issue and comes to some affordable and equitable arrangement.

D. Curriculum Development and Review

Commendations

D.1 The School has succeeded in significant and sustained recruitment of undergraduate and postgraduate students. Students are satisfied with the educational provision on these courses. Employers are also exceptionally satisfied with the quality of graduate educated by the School.

D.2 There is a clear commitment from all staff to quality review and curriculum enhancement. For example, the stage one curriculum was significantly redesigned in 2010, with a particular focus on introducing engineering design topics at an early stage.

D.3 The School has shown tremendous innovation and responsiveness in being a central player in developing the BDIC undergraduate degree.

D.4 Being part of the BDIC arrangement was a visionary move for the School as there is clear opportunity for growth in the number of high quality postgraduate students from BDIC.

D.5 Accreditation processes have been successfully completed with strong links to employers for accredited programmes.

D.6 The School makes effective use of adjunct staff from industrial/employing bodies.

D.7 Some School staff play an active role in Engineering Programme Board committees with three steering committees based within the SEEC. Involvement at this level ensures that the School maintains a pivotal position within the UCD College of Engineering and Architecture.

D.8 External examining processes are robust with positive and constructive feedback. The School has also demonstrated prompt action on issues raised by examiners.

D.9 Constructive linkages exist with other schools, for example, the School of Computer Science and Informatics.

Recommendations

D.10 Given the low number of academic staff in the School and possible expansion of programme provision, the School may find it more difficult to provide a quality education to students. The School should be aware of the possibility of spreading its staff too thin. The School should seek to prioritise taught graduate areas for future expansion and target the employment of key staff to lead these programmes. The School should be supported by the College of Engineering & Architecture and University in fulfilling this mission. The Review Group believes that any new taught course provision should match the research portfolio of leading international academics that the School wishes to recruit. An added bonus to the School and University would be that these leading academics could acquire a substantial number of PhD students for the School and University.

D.11 The School should continue to maintain its excellent relationships with industry partners and seek to establish new ones. This will enhance the learning experience of students who go on placement.

D.12 The School should continue to appoint senior adjunct staff, for example, at Associate and full Professorial level, from key industry partners. The School should consider involving relevant adjunct staff in programme review. The School should also consider holding an annual event for adjunct staff where the School can showcase its range of programmes, feedback, and refinements made in the past year etc.

D.13 The growing numbers of ME programme students in the School indicate that these programmes are popular. The School should continue to aggressively market these programmes nationally and internationally. The School should receive support from the College in achieving this. With international marketing, the School may have to consider the possibility of developing programmes online in their entirety or partially. If the School decides to develop online learning it would require the addition of an educational technologist.

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D.15 The School should be supported in meeting its teaching and research obligations with the BDIC. This collaborative arrangement holds huge potential for UCD in terms of the number of high quality taught and research degree students that could potentially enter UCD after completing their undergraduate degree.

D.16 The School should move to appoint external examiners for the ME programmes in Biomedical Engineering and Energy systems.

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Commendations

E.1 With the limited number of research active academic staff members, the scale and quality of the School's research activity are extraordinary by any standards. This has been achieved by a productive climate of supportive human interactions among researchers who have a long history of good understanding and cooperation genuinely committed to one another's success. Moreover they have been enriched by a limited number of good recent academic recruitments with good potential.

E.2 The School now has a good cohort of PhD students and they seem to be highly motivated, well-managed and capable of delivering significant research. The School's effective use of the Structured PhD approach has helped to shorten the PhD duration.

E.3 The spirit of collaboration has extended well beyond traditional electrical, electronic and communication engineering subject areas and has given rise to promising multi-disciplinary research with colleagues in Mathematics, Physics, Mechanical Engineering, Medicine and Business.

E.4 The research leaders responded with remarkable efficiency, clarity and good common sense to the Review Group's questions on their ambition to be world leading with such a small unit.

E.5 Several academics have interesting consulting activities for industry that are enhancing their teaching and other more fundamental research. However the large overhead of 35% charged on external consulting activities, when it is processed via UCD, is de-motivating, and encourages staff to handle it privately within the 20% time for private research allowed by the University. (See also 2.5.5).

Recommendations

E.6 The School should move quickly to increase the number research active academics.

E.7 The School might reflect on the strategic impact of identifying ways for bridging the gap with the UCD School of Computer Science and Informatics. It might thereby ensure that any such development is mutually acceptable and synergistic. There are opportunities for such cooperation in intelligent energy systems as well as in the internet of things, and optimization of systems.

E.8 The School may search for ways to finance and launch a new academic position in biomedical signal processing.

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E.10 The School should consider ways to streamline the TA tasks of PhD students. The School is encouraged to develop processes that are lightweight yet effective.

F. Management of Quality and Enhancement

Student Intake

Commendation

F.1 The quality of the student intake into the undergraduate engineering programme is good.

Recommendation

F.2 The School should monitor the impact of the leaving certificate Project Maths syllabus on the preparedness of students for engineering.

Staff Development

Commendation

F.3 The School displays a good *esprit de corps* and staff appear to work collectively to support and help each other to carry out the excellent work of the School. Administrative staff are doing a highly commendable job of effectively supporting the needs of 2 schools. The technical staff are playing a heroic role, not only in supporting the School's teaching and research needs, but in making themselves available across the University to support activity in other schools such as Food Science and Physics, against a backdrop of an absence of any promotional rounds for technical staff and without acknowledgement or visibility of this contribution. Academic staff continue to develop their research and teaching, at a time of increasing student numbers; shrinking TA support; poor promotional opportunities and an ever-increasing administrative load.

Recommendations

F.4 The University should implement a round of internal promotion for technical staff as a matter of urgency.

F.5 The School should be supported in replacing retired (and retiring) technical staff.

Teaching, Learning and Programmes

Commendation

F.6 The lab facilities available to students are modern and well-maintained by the committed technical and academic staff. The new numerical methods course is in high demand among a large student population across the University.

Recommendations

F.7 To address issues relating to the quality of the learning and research environment, the Review Group recommends the School invite post-graduate and post-doctoral representatives onto its Committee to ensure good lines of communication and a greater sense of involvement in the life of the School.

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Research and Innovation

Commendation

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F.10 The School should be supported by the University in hiring new academic staff in strategically important and high impact research areas to maintain quality.

F.11 Staff should be supported in developing consulting practise where appropriate.

F.12 The School should be congratulated with its success in launching spinoff activities, and should be encouraged to continue with these efforts in order to contribute to the establishment of high-tech companies in Ireland.

G. Support Services

Commendations

G.1 Staff in support units are highly dedicated and professional.

Recommendations

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G.3 Discipline-specific marketing of School programmes abroad should receive particular consideration, in partnership with the College and the International Office.

H. External Relations

Commendations

H.1 The School's involvement in BDIC underpins an important commitment by UCD, and the School is providing important leadership within the University as it seeks to further develop its presence in China.

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H.3 Employers highly value the quality of the School graduates that they employ.

Recommendations

H.4 The setting up of comprehensive alumni database, perhaps as a dedicated task for an intern, could open up an important communications channel not only with past graduates, but also with potential future donors.

APPENDIX 1

UCD School of Electrical, Electronic and Communications Engineering Response to the Review Group Report

The School welcomes the report of the Review Group. Members of the School consider that they have derived immense value from the experience of undergoing a thorough Quality Review by such a distinguished and hard-working Group, and they wish to thank all the members of the Group for their time and engagement with the exercise. The School is very pleased at the highly positive overall tone of the Report and in particular appreciates the strong endorsement that the Report provides in terms of the School's ethos, its research achievements and future strategy, its teaching aims and outcomes, the quality of its graduates and the commitment and cohesiveness demonstrated by the academic, technical and administrative staff under increasingly difficult working conditions. Nevertheless, the Report presents some important issues for the School to consider and address, and has several useful suggestions to improve the quality of its activities and to enhance the student experience. These will be carefully assessed and acted upon within a structured and planned Quality Improvement process. Many of the more forceful recommendations in the Report are directed at the wider environment within which the School operates, and these may require appropriate action at University level. This review has taken place at a time when the School sees huge and exciting opportunities for research growth and when it is experiencing extremely high demand from industry for its graduates. The Report, and the improvement plan based on it, will undoubtedly help the School build on its past achievements and create a strong platform for future success.

APPENDIX 2

Review Visit Timetable
UCD School of Electrical, Electronic and Communications Engineering
25th – 28th November 2013

Pre-Visit Briefing Prior to Site Visit: 25th November 2013

17.15 - 18.45 Review Group meet to review preliminary issues and to confirm work schedule and assignment of tasks for the following two days.– ***RG and UCD Quality Office only***

19.30 Dinner hosted for the Review Group by the UCD Registrar and Deputy President – ***RG, UCD Deputy President and UCD Quality Office only***

Day 1: 26th November 2013
Venue: Room 206, UCD Engineering and Materials Science Centre, Belfield

08.45 - 09.15 Private meeting of Review Group with tea, coffee and refreshments

09.15 - 10.00 Review Group meet with **Head of School** and **Heads of Subject** (School Management Team)

10.15 - 11.00 Review Group meet with **Self-assessment Report Coordinating Committee** (SARCC)

11.00-11.30 Tea/coffee break

11.30 - 12.45 Review Group meet with **Academic Staff** (focus on Research and Innovation) and representatives from the research staff of the School

13.00 - 14.00 **Working lunch (buffet)** – meeting with employers

14.15 - 15.00 Review Group meet with **College Principal**

15.00 - 15.30 Tea/coffee break

15.30 - 16.15 Review Group meet with **Administrative and Technical Staff**

16.15 - 16.45 Review Group only - Review of Day 1

16.45 **Tour of facilities**

17.30 Review Group depart

Day 2: 27th November 2013
Venue: Room 206, UCD Engineering and Materials Science Centre, Belfield

08.45 - 09.15	Private meeting of the Review Group, with tea, coffee and refreshments
09.15 - 10.00	Review Group meet with **Representatives of Internal UCD Units**
10.15 - 10.45	Review Group meet with **Representatives of the Beijing-Dublin International College (BDIC)**
10.45 - 11.15	Tea/coffee break
11.00 - 11.45	Review Group meet with **College Finance Manager** and **Head of School** to outline School's financial situation
12.00 - 13.00	Review Group meet with a representative group of **postgraduate students** (research)
13.15 - 14.00	**Working lunch (buffet)** – meeting with a representative group of **undergraduate and taught Masters students**
14.15 - 15.00	Review Group meet with representative group of **international students** (with a focus on issues of particular relevance to international students)
15.00 - 15.30	Tea/coffee break
15.45 - 17.00	Review Group meet with **Academic Staff** (focus on Teaching and Learning)
17.15-17.35	Individual Staff Meetings
17.35 - 18.30	Review Group private meeting – review key observations/findings and/or begin preparing draft RG Report
18.30	Review Group depart

Day 3: 28th November 2013
Venue: Room 206, UCD Engineering and Materials Science Centre, Belfield

08.45 - 09.15	Private meeting of Review Group, with tea, coffee and refreshments
09.15-09.55	Review Group meet with representatives of **School Management Team**
10.00 - 10.15	Break

10.15-10.45	Review Group meet **UCD HR Officer** (Research Funded Recruitment) and **UCD HR Head of Recruitment Services**
10.45-11.00	Break with tea, coffee and refreshments
11.00 - 12.30	Review Group prepare first draft Review Group Report and exit presentation
12.30 - 13.15	Lunch
13.15 - 14.30	Review Group finalise first draft of Review Group Report and feedback commendations/recommendations
14.30 - 14.45	Break with tea, coffee and refreshments
14.45 - 15.00	Review Group meet with **Head of School** to feedback initial outline commendations and recommendations
15.00	**Exit presentation** to all available staff of the unit summarising the principal commendations/recommendations of the Review Group
15.30	Review Group depart