



University College Dublin

REVIEW GROUP REPORT

Periodic Quality Review

UCD School of Biosystems and Food Engineering

July 2017

Accepted by the UCD Governing Authority at its meeting on 30 April 2018

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Key Findings of the Review Group

The Review Group (RG) has identified a number of key findings in relation to areas of good practice operating within the School of Biosystems and Food Engineering, and also areas that the RG highlight as requiring improvement. The main section of this Report sets out all observations, commendations and recommendations of the RG in more detail. An aggregated list of all commendations and recommendations is set out in Appendix 1.

Examples of Good Practice

The RG identified a number of commendations, in particular:

1. It is clear that the Head of School (HOS) provides effective and creative leadership, and has created conditions to prime the School for further development (Commendation 2.8).
2. Universally, the employers and programme graduates interviewed were very positive regarding the quality and skill sets of SBFE graduates indicating the students possessed the right blend of science and engineering skills and further that students “hit the ground running” when starting their positions (Commendation 4.8).
3. SBFE is now located within the College of Engineering and Architecture and is well recognised for its significant research scholarship. This recognition is an important factor when it comes to recruiting students to the taught Masters programmes (ME, MEngSc, and MSc) (Commendation 5.3).
4. In terms of research productivity, faculty and staff are excellent in all measures of key performance indicators, which is to be highly commended (Commendation 6.10).
5. Very strong relations with Industry, Teagasc and International Universities is evident and is to be commended (Commendation 9.4).

Prioritised Recommendations for Improvement

The full list of recommendations is set out in Appendix 1; however, the RG suggests that the following be prioritised:

1. After a number of organisational changes over the past 12 years, the RG strongly recommend that SBFE remain in the current structure, allowing time and space to maximise its educational and research impact within the College of Engineering and Architecture, but with strong interdisciplinary links across the University, (for example with the School of Computer Science, School of Agriculture and Food Science, Health Sciences) (Recommendation 2.12).

2. In the long term, SBFE should develop a staffing plan to backfill open positions as a result of retirements as alluded to in the SAR. The scope of the staffing plan should be seven years (Recommendation 3.18).
3. It is recommended that the planned Industry Advisory Group be routinely consulted on curricular content and desired learning outcomes for all SBFE degree programmes (Recommendation 4.14).
4. Enhanced visibility of SBFE's taught ME programme will be essential to ensure a supply of domestic students. SBFE should consider developing Stage 1, 2 or 3 modules of interest to existing College of Engineering and Architecture students. (SBFE's Design Challenge is an excellent example of such a module with broad appeal). A few well-placed modules could serve as a bridge between existing BE programmes in the College, and the SBFE ME programme. Potential new modules identified by industry partners include data science, project management and innovation/entrepreneurship. SBFE should consider developing additional Discovery modules and/or structured electives for greater exposure to undergraduates across UCD (Recommendation 5.7).
5. The strategic campus development plan envisages that SBFE be co-located with the other Engineering Schools, and this would significantly enhance SBFE's ability to collaborate with engineering colleagues. However in the interim the School should be supported in its plans to remodel the space it occupies on the 3rd Floor of the Agriculture Building (Recommendation 8.7).

1. Introduction and Overview of UCD School of Biosystems and Food Engineering

Introduction

- 1.1 This report presents the findings of a quality review of the School of Biosystems and Food Engineering (hereinafter referred to as SBFE), University College Dublin, which was undertaken from 24-27 April 2017. The School's response to the Review Group Report is attached as Appendix 2.

The Review Framework

- 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 Qualifications and Quality Assurance (Education and Training) Act 2012, and international good practice (e.g. Standards and Guidelines for Quality Assurance in the European Higher Education Area, 2015). 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 developmental process in order to effect improvement, including:
- To monitor the quality of the student experience, and of teaching and learning.
 - 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 identify, encourage and disseminate good practice, and to identify challenges and how to address these.
 - To provide an opportunity for units to test the effectiveness of their systems and procedures for monitoring and enhancing quality and standards.
 - To encourage the development and enhancement of these systems, in the context of current and emerging provision.
 - To inform the University's strategic planning process.
 - The output report provides robust evidence for external accreditation bodies.
 - The process provides an external benchmark on practice and curriculum.

- 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 procedures enables it to demonstrate how it discharges its responsibilities for assuring the quality and standards of its awards, as required by the Qualifications and Quality Assurance (Education and Training) Act 2012.

The Review Process

1.4 Typically, the review model comprises four major elements:

- Preparation of a self-assessment report (SAR)
- A visit by a 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.

The Review Group

1.5 The composition of the RG for the UCD School of Biosystems and Food Engineering was as follows:

- Professor Grace Mulcahy, UCD School of Veterinary Medicine (Chair)
- Associate Professor Sara O'Sullivan, Associate Dean of Social Science (Deputy Chair)
- Professor Vijaya Raghavan, McGill University, Canada (Extern)
- Professor Scott A. Shearer, The Ohio State University, USA (Extern)

1.6 The RG visited the School from 25-27 April 2017 and held meetings with School faculty and staff; undergraduate and postgraduate students; graduates, employers, the SAR Co-ordinating Committee; other University staff, including the Principal of the College of Engineering & Architecture/Dean of Engineering. The site visit schedule is included as Appendix 3. All members of the Review Group participated in all discussions and meetings.

1.7 In addition to the SAR, the RG considered documentation provided by the School and the University during the site visit.

1.8 This Report has been read and approved by all members of the Review Group.

Preparation of the Self-assessment Report (SAR)

1.9 Following a briefing from the UCD Quality Office, a SAR Coordinating Committee (SARCC) was established representing a cross section of staff within the School, and including a postgraduate student representative.

1.10 The SAR was prepared in the period January 2016 –March 2017. Staff were consulted during the process and invited to contribute to the drafting of sections of the report. All staff were invited to discuss and comment on a draft of the SAR. The SAR was submitted to the UCD Quality Office on 30 March 2017.

1.11 The RG commends the School on the preparation of a clear and comprehensive report, accompanied by extensive data in appendices.

The University

1.12 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.

1.13 The University Strategic Plan (to 2020) states that the University’s mission is: “to contribute to the flourishing of Dublin, Ireland, Europe and the world through the excellence and impact of our research and scholarship, the quality of our graduates and our global engagement; providing a supportive community in which every member of the University is enabled to achieve their full potential.”

The University is currently organised into six colleges and 37 schools:

- UCD College of Arts and Humanities
- UCD College of Business
- UCD College of Engineering and Architecture
- UCD College of Health and Agricultural Sciences
- UCD College of Social Sciences and Law
- UCD College of Science

- 1.14 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 Medicine, Arts, Law, Celtic Studies and Human Sciences. There are currently more than 26,000 students in our UCD campus (approximately 16,300 undergraduates, 7,800 postgraduates and 2,200 Occasional and Adult Education students) registered on over 70 University degree programmes, including over 6,300 international students from more than 121 countries. The University also has over 5,400 students studying UCD degree programmes on campuses overseas.

UCD School of Biosystems and Food Engineering

- 1.15 SBFE is situated in the Agriculture Building on the Belfield campus, with some additional facilities in the O'Brien Centre for Science (South).
- 1.16 SBFE is one of six schools in the College of Engineering and Architecture. This arrangement dates from September 2011 following a restructuring of academic units in the University. Prior to that, the School (2005-2011) had been part of a School of Agriculture, Food Science and Veterinary Medicine, but had its origins in UCD as a Department within the then Faculty of Engineering and Architecture.
- 1.17 SBFE is relatively small, with 12 faculty (10.1 FTE faculty). Taught student FTEs are also low, which led to the discontinuation of the BE option in Biosystems and Food Engineering. SBFE is recognised as being among the most productive, in terms of research outputs, across the University.
- 1.18 SBFE has a current Strategic Plan, although this is implicitly, rather than explicitly, linked to the University Strategic plan.
- 1.19 Biosystems Engineering is a field of engineering that integrates engineering science and design with applied biological, environmental, and agricultural sciences. It represents an evolution of the Agricultural and Food Engineering discipline applied to all living organisms but generally does not include biomedical applications.¹

2. Organisation and Management

General Comments and Context

- 2.1 The Head of SBFE has overall responsibility for management and strategic planning, and sits on the Executive of the College of Engineering and Architecture. There is a SBFE Executive which meets infrequently. The SBFE Committee, consisting of all faculty, technical and

¹ "Providing the necessities of life. Innovators, collaborators, stewards. ASABE members are leaders in the production, transport, storage, and use of renewable resources. They put science to work to meet humanity's most fundamental needs: safe and abundant food; clean water; fiber, timber, and renewable sources of fuel; and life-enhancing and life-saving products from bio-based materials. And they do this with a constant eye toward the improved protection of the people, livestock, wildlife, and natural resources involved." *American Society of Agricultural and Biological Engineers*

administrative staff plus a representative of the research staff, meets monthly where routine and strategic business is discussed and agreed. Although there is a Teaching and Learning Committee, it does not hold separate meetings. Instead, Teaching and Learning is an agenda item chaired by the School Head of Teaching & Learning at monthly School committee meetings.

- 2.2 There is a separate SBFE Research Committee, which also deals with matters related to graduate research students. A Staff-Student Liaison Committee has recently been convened, and met twice during 2016-17. A new Laboratory Committee deals with research and teaching-related laboratory requirements and with laboratory health and safety.
- 2.3 SBFE has representation on both the Engineering and Agriculture & Food Science Programme Boards, although representation on the latter is not as strong.
- 2.4 The RG considered opinions on structures and organisation from a variety of viewpoints during the site visit. It was clear that a majority opinion within the School favoured retention of the current organisational structure, in order to consolidate the advances in research and in staffing that have been made within the last few years.
- 2.5 The small size of SBFE means that some processes, for example, induction of staff and graduate students, and workload allocation, have evolved informally.
- 2.6 The School has recently decided to form an Industry Advisory Board, although this had not yet met at the time of the review.

Commendations

- 2.7 SBFE is to be commended for providing unfettered access to students, faculty, support staff, university officials and industry representatives. Supporting materials were made available via appended materials, and printed and electronic materials provided upon request.
- 2.8 It is clear that the Head of School (HOS) provides effective and creative leadership, and has created conditions to prime the School for further development.
- 2.9 SBFE recognises the opportunities for strategic development presented in the current organisational structures.
- 2.10 The SBFE Administrator and HOS maintain an Open Door policy, which is welcomed by research staff and by taught graduate students, in particular.
- 2.11 The RG commends the recent decision to form an Industry Advisory Group, and encourages the School to ensure this group meets and sets out its priorities, as soon as possible.

Recommendations

- 2.12 After a number of organisational changes over the past 12 years, the RG strongly recommend that SBFE remain in the current structure, allowing time and space to maximise its educational and research impact within the College of Engineering and Architecture, but with strong interdisciplinary linkages across the University, (for example with the School of Computer Science, School of Agriculture and Food Science, Health Sciences).

- 2.13 Formalised procedures for induction and mentoring of staff should be introduced as soon as possible. The RG recognises that within a small School, these often happen informally. However, a more rigorous and consistent approach, ensuring all staff have an equivalent experience, is recommended.
- 2.14 SBFE should formalise its workload management model.
- 2.15 Student induction and orientation, as well as workload allocation, should also be undertaken in a systematic way.
- 2.16 All staff should be made aware of, and the HOS monitor, the need to ensure that the opinions, views and contributions of more recently appointed faculty are equally valued.
- 2.17 The Institutional Athena Swan Bronze Award presents an opportunity for SBFE to emphasise its commitment to advancing the careers of women in science, technology and engineering. SBFE should consider developing an application for a school-level Award.
- 2.18 SBFE is encouraged to strengthen its links with undergraduate students, for example through organising events in collaboration with the UCD Engineering Society, and also by offering summer research placements to undergraduate students from engineering, agriculture, and science disciplines.
- 2.19 The RG recommends that SBFE business should be carried out according to formalised protocols, to ensure continuity and consistency over time.
- 2.20 Responsibility for Health and Safety across the School should be formally delegated by the HOS to a specific individual staff member.
- 2.21 The SBFE strategic plan should be revised and further mapped to University strategic planning activity. Sections on risk analysis and management, and succession planning should be added to the plan.

3. Staff and Facilities

General Comments and Context

- 3.1 There are 12 faculty members, amounting to 10.1 FTE (including a 0.2 post-retirement contract, and a 0.4 appointment shared with the School of Agriculture and Food Science. One of the faculty members is on a short term contract arising from teaching buyout. In addition, there are two adjunct faculty.
- 3.2 There are 11 postdoctoral/research staff, one technical and one administrative member of staff.
- 3.3 A good balance exists between research and teaching activities. This balance is achieved through the major contribution of the post-docs who are funded from external research grants, and who also make some contribution to teaching activity. Whereas the School is

noted across the University, particularly for its research productivity, three faculty members have recently won teaching awards.

- 3.4 SBFE facilities are located in two buildings: 1) Agriculture and Food Science Centre and 2) Science South. The facilities in Science South provide an excellent environment, with state of the art analytical/research equipment. The facilities in the Agriculture and Food Science Centre are basic, and some of the areas require upgrading. Some offices are accessed through laboratories, creating a safety concern. There is little in the way of purpose-built teaching laboratory space, and therefore research labs are used for teaching.
- 3.5 There are sufficient write-up rooms for accommodating graduate students. There has also been some re-organisation of the space, which is positively welcomed by students.
- 3.6 Staff in the College Office are helpful in a number of aspects, including marketing and student recruitment.
- 3.7 SBFE has made significant progress recently in enhancing both gender balance and age profile, with two recent appointments at Assistant Professor and Associate Professor grades.
- 3.8 Some student groups, particularly undergraduate students on the BAgrSc programme, and some PhD students, did not feel the SBFE and its staff made strong efforts to include them as part of the SBFE community.

Commendations

- 3.9 Overall, the staff have a very positive outlook on SBFE and the new organisational structure.
- 3.10 The Science South facility contains high quality laboratory space; and SBFE is to be commended for its pro-active approach in terms of acquiring high quality research equipment.
- 3.11 The input of the College in areas such as marketing, internships, student advising, finance, etc. is beneficial.
- 3.12 A number of SBFE faculty have won teaching awards, which reflects very well on their commitment to education, in addition to SBFE's very strong research profile.

Recommendations

- 3.13 It is highly desirable to replace current temporary faculty appointments with permanent positions, whenever possible.
- 3.14 The numbers of support staff available to assist with practical teaching and research are inadequate. Support staffing should reflect the module offerings and enrolment.
- 3.15 We recommend SBFE place an emphasis on formalising staff development, consistent with the new UCD HR system "Performance for Growth," as it is rolled out.

- 3.16 SBFE needs to prioritise career development plans for its post-doctoral staff, having regard to the discipline, consistent with university-wide initiatives.
- 3.17 SBFE needs to improve communications among and between faculty, staff, and students.
- 3.18 In the long term, SBFE should develop a staffing plan to backfill open positions as a result of retirements as alluded to in the SAR. The scope of the staffing plan should be seven years.
- 3.19 SBFE should continue to fully utilise staff at College level to enhance marketing and student recruitment.
- 3.20 SBFE should continue its efforts to enhance diversity (gender and other aspects).
- 3.21 Research and common areas within the Agriculture and Food Science Centre should be renovated to support an expanding research base.

4. Teaching, Learning and Assessment

General Comments and Context

- 4.1 The School is responsible for 38 taught modules, with registered student numbers of 1,054 over two teaching semesters, mainly from the Colleges of Engineering and Architecture, Health and Agricultural Sciences, and Science (2015/16). Module enhancement and programme review is carried out routinely by the School. Assessment is a mixture of continuous assessment and end of semester examinations.
- 4.2 The RG recognises the specific context of the transition of the SBFE between the then College of Life Sciences and the College of Engineering and Architecture. Further, that the School bridges two Colleges and two Programme Boards in the development and delivery of its degree programmes.
- 4.3 Given the recent termination of the BE programme, creation of the new ME programme and restructuring of the BAgSc programme; the School is moving along a novel path of programme implementation. The RG recognises the full effect of this programme restructuring will not be fully realised for several years, and that many of the assessment materials provided were collected from students enrolled under the previous structure.
- 4.4 A number of School faculty have undertaken qualifications in Teaching and Learning.
- 4.5 Links with graduates/alumni and industry contacts are maintained through a LinkedIn group administered locally in the School. Numbers in the group are relatively small.

- 4.6 Undergraduate and postgraduate students met with the RG during the site visit. They were positive overall about the School in their discussions. Many of the PhD students indicated that their programmes of study, while administered through SBFE, seemed somewhat disconnected from SBFE. In some cases the students were unaware of research being carried out within the school by academic staff not immediately connected with their own topic.

Commendations

- 4.7 SBFE graduate students expressed appreciation for the opportunity to study under the direction of motivated and highly regarded faculty who are world leaders in the biological and agricultural engineering discipline. They were complimentary of the formal SBFE Research Review conducted on an annual basis.
- 4.8 Universally, the employers and programme graduates interviewed were very positive regarding the quality and skill sets of SBFE graduates, indicating that the students possessed the right blend of science and engineering skills and “hit the ground running” when starting their positions.
- 4.9 The faculty are highly motivated and focused on providing high-quality instruction to meet the needs of their students.
- 4.10 Students enrolling in SBFE taught Masters programmes were complimentary of their educational experience and the overall value of these programmes. Many of these students chose to continue their education by enrolling in a SBFE Research Masters or PhD programmes, lending further support to the positive opinions expressed by these students.
- 4.11 SBFE provides opportunities for student input regarding the quality and content of modules. While some students choose not to provide this input, the overall response rate for SBFE is similar to that of other Schools within the College of Engineering and Architecture.

Recommendations

- 4.12 SBFE should consider implementing a Graduate Seminar to enhance the exchange of ideas between and among SBFE faculty and graduate students.
- 4.13 SBFE should formalise the on-boarding process for all graduate students. Historically, on-boarding has been handled by the academic staff and support staff, and given the relatively small size of the academic unit, this informal approach was acceptable. However, as student numbers grow it will be increasingly important to formalise the on-boarding process so that students understand degree requirements and timelines, laboratory hygiene and safety practices, support staff resources, computer and software access, building access, etc.
- 4.14 It is recommended that the planned Industry Advisory Group be routinely consulted on curricular content and desired learning outcomes for all SBFE degree programmes.

- 4.15 The overall efforts by the School to track SBFE graduates were not obvious, apart from the LinkedIn group. Information regarding post-graduate employment rates was presented. However, starting salaries and a listing of employers were not available to the RG. If the latter items are not routinely tracked, it is important for SBFE to begin collecting this data.

5. Curriculum Development and Review

General Comments and Context

- 5.1 The School has recently participated in the University led Curriculum Review and Enhancement Process (CREP), which has resulted in Curriculum changes. The School has proactively engaged in this process through its Programme Directors and Head of Teaching and Learning.
- 5.2 Updated Vision/Values Statements and associated programme outcomes for the taught programmes of ME (Biosystems and Food Engineering), MEngSc (Food Engineering), MSc (Sustainable Energy & Green Technologies), MSc (Environmental Technology), and BAgrSc (Agricultural Systems Technology) have been put in place. This has involved changes to the programme structure, teaching and learning strategies, assessment and feedback mechanisms.

Commendations

- 5.3 SBFE is now located within the College of Engineering and Architecture and is well recognised for its significant research scholarship. This recognition is a significant factor when it comes to recruiting students to the taught Masters programmes (ME, MEngSc, and MSc).
- 5.4 The revised BAgrSc undergraduate programme with a focus on computer systems, networks, data management and sensors is novel.
- 5.5 SBFE has been very quick to avail of opportunities to advertise the taught ME programme to students matriculating from within Ireland, the EU and outside of the EU. SBFE taught Masters programmes are beginning to realize the benefits of international recruiting efforts by the College of Engineering and Architecture.
- 5.6 Internships are offered in the taught ME programme with 2-3 students taking advantage of this opportunity per year. SBFE is planning to expand these opportunities to the remaining taught Masters programmes.

Recommendations

- 5.7 Enhanced visibility of SBFE's taught ME programme will be essential to ensure a supply of domestic students. SBFE should consider developing Stage 1, 2 or 3 modules of interest to existing College of Engineering and Architecture students. (SBFE's Design Challenge is an

excellent example of such a module with broad appeal). A few well-placed modules could serve as a bridge between existing BE programmes in the College, and the SBFE ME programme. Potential new modules identified by industry partners include data science, project management and innovation/entrepreneurship. SBFE should consider developing additional Discovery modules and/or structured electives for greater exposure to undergraduates across UCD.

- 5.8 Summer Research Studentships for undergraduate students of Engineering, Science and Agriculture would also be a useful recruitment tool.
- 5.9 A journal club and/or seminar programme should be developed to accommodate the required taught credits for graduate research and taught graduate students, and also to help communications between prospective undergraduates, graduate students and faculty.
- 5.10 Students enrolled in the MSc programmes (Sustainable Energy & Green Technologies and Environmental Technology) were complimentary of SBFE for offering these options, and in general were positive about their educational experiences. The same students expressed concern about module content indicating the desire for modules with more depth in the respective programme areas and less content in areas such as food processing.
- 5.11 SBFE should redouble their efforts to ensure that BAgSc students are more fully integrated into the School, as per suggestions below.
- 5.12 SBFE should work to close the loop on student advising and support by ensuring staff tasked with these responsibilities are sensitive to student needs, and that the students are aware of the support staff who are available to enhance their educational experience.
- 5.13 Questions concerning BAgSc graduates' eligibility for Qualified Farmer (Green Cert) status should be resolved as soon as possible.
- 5.14 SBFE should stay the course with the current educational programme restructuring to allow adequate time to develop recruitment strategies to fill the degree programme pipelines and to establish baseline enrolment numbers. After three years SFBE should commit to a critical review of the degree programmes to ensure these programmes are meeting student needs and are attracting sufficient student numbers to warrant their continuation. Of concern to the RG was the proliferation of taught Masters programmes and discontinuation of the undergraduate engineering programme.
- 5.15 SBFE should consider creative and novel options to attract increased numbers of Engineering students interested in the broad biological applications of engineering (courses with broad appeal in Stages 1, 2 and 3 of the BE, partnering with others in Biomedical Engineering etc.).

6. Research Activity

General Comments and Context

- 6.1 Research conducted within SBFE addresses diverse issues concerning Biosystems and Food Engineering. It encompasses agriculture, food, energy and environment of local and global interests viz., Food and Process Engineering, Energy and the Environment, and Bioenvironmental Engineering.
- 6.2 A great number of research-active faculty and staff are generating high-quality research output, which has high impact internationally. The volume of research activity generated through externally funded research has been consistently high over the years.
- 6.3 The School has great success in attracting research funds from various sources, nationally and internationally, which facilitates funding of research staff, students and post-doctoral fellows.
- 6.4 SBFE research facilities located in the Agriculture and Food Science Centre are marginally acceptable for serving the research activity of staff and students.
- 6.5 The strong research culture of SBFE facilitates connectivity within industry for establishing research internships, and industry driven projects for Masters' students.
- 6.6 The research excellence of SBFE is recognisable through its strong key performance indicators of the faculty and students. This will be helpful in accomplishing the goal of the strategic plan set out by the School.
- 6.7 The collaboration profile of the School internationally is very strong and it is reflected in the number of co-authored publications.
- 6.8 The recruitment plan for international students, orchestrated by the College marketing team, is working well. However, the visibility of SBFE to undergraduate students within the College is minimal; this aspect needs to be improved for recruiting students internally to taught and research masters programmes in SBFE.
- 6.9 SBFE compares very well with the top ranked US and Canadian university programmes when evaluated in terms of numbers of PhD students and peer-reviewed publications per faculty.

Commendations

- 6.10 In terms of research productivity, faculty and staff are excellent in all measures of key performance indicators, which is to be highly commended.
- 6.11 The success of staff in obtaining research funding from various national and international sources is outstanding.
- 6.12 The research output in multi-disciplinary areas of food, energy and environment is significant.

6.13 The faculty takes a keen interest in bringing industry connections to student projects, which is to be commended.

Recommendations

6.14 The RG encourages appropriate recognition of all research active areas within SFBE.

6.15 The School should consider providing for additional research support in its staffing plan.

6.16 Establish a regular seminar series in the School, which needs to be well-advertised in the University to attract student participation from different colleges.

6.17 There is a need to leverage marketing and communications expertise across both Engineering and Agriculture in recruiting masters' students.

6.18 The communication channels between incoming students and faculty/staff need to be improved.

6.19 A plan for short, medium and long-term strategic investment in research laboratory space needs to be put in place and communicated to the College, University and Alumni/Industry.

7. Management of Quality and Enhancement

General Comments and Context

7.1 The School actively engages with a variety of tools and processes at University, College and School level in assuring and managing the quality of its activity and in promoting its enhancement. These were clearly outlined in the School's SAR.

7.2 SBFE has worked hard to identify its strengths, as well as opportunities and challenges in the College of Engineering and Architecture and within the UCD budgetary model.

7.3 External Examiner reports were made available to the RG, and were generally complimentary of the educational offerings, as well as providing suggestions to attract additional students. Engagement with the recent university-wide project was evident, although on-going processes for curriculum review and refinement were not explicitly described.

Commendations

7.4 The ambition, vision and commitment of the Head of School was very evident to the Review Group.

7.5 This was the first formal quality review process for the School and the sustained engagement with this opportunity was welcome.

- 7.6 As part of its routine quality enhancement activities the School has a robust external examiner system in place to assure the academic standards of its modules and awards. The School also engages very successfully in external peer review of research funding proposals and publications.
- 7.7 The recent rationalisation of undergraduate teaching and review of the BAgrSc offering has led to the introduction of the exciting new Agricultural Systems Technology pathway combining basic science, agricultural sciences, engineering technologies and data science.

Recommendations

- 7.8 It would be useful for the School to engage with its students and other stakeholders to communicate how it closes the feedback loop.
- 7.9 A method for evaluating the success of the new BAgrSc pathway should be developed to capture its impact on a range of measures including enhancing student numbers, strengthening the quality of the student experience, employer feedback and take-up of SBFE Masters programmes.
- 7.10 Ongoing attention to formal curriculum review and refinement needs to be placed across all programmes.

8. Support Services

General Comments and Context

- 8.1 SBFE engages with a wide variety of supports and services provided by other UCD units, including the College of Engineering and Architecture, IT Services, the Library, UCD Estate Services, UCD Alumni Relations and UCD Research. Feedback from SBFE indicated that, for the most part, SBFE has a positive relationship with these University units. Colleagues from both UCD Research and the College of Engineering and Architecture reported that schools use the supports they provide effectively and were very supportive of the achievements, strategic plan and mission of the School.
- 8.2 Alumni contacts and follow-up are made through a School operated LinkedIn group rather than through the Alumni Relations Office. The College has new Alumni and Marketing support persons who will be able to help with this. The input of the College Liaison Librarian to undergraduate and graduate teaching and learning was clearly important. Given the importance of the School's research income to the University as a whole, concern over the level of post-award research support available was expressed, and this is recognised as an issue across the University by UCD Research and Innovation.
- 8.3 In the long-term, co-location of SFBE with other Engineering Schools, as per the Campus Development Plan, will enhance the research and teaching mission of the School. In the short/medium term, some refurbishment/repurposing of existing space is required. Graduate Research students expressed frustration over the lack of a swipe card system for after-hours access to the Agriculture and Food Science Centre. Not all of the software packages required by taught graduate students and faculty are available through UCD IT Services.

Commendations

- 8.4 SBFE's good working relations with key staff in the College of Engineering and Architecture is to be commended, particularly given their location in another building.
- 8.5 The effective use of the College Liaison Librarian role to provide support to students for skills training (for example on plagiarism, Endnote and library services), is a very effective use of this central support.
- 8.6 Support from UCD Research Office pre-award, for particular programmes and *via* targeted seminars to School on key topics, is strong.

Recommendations

- 8.7 The strategic campus development plan envisages that the SBFE be co-located with the other Engineering Schools, and this would significantly enhance SBFE's ability to collaborate with colleagues in the other Engineering Schools. However, in the interim the School should be supported in its plans to remodel the space it occupies on the 3rd floor of the Agriculture and Food Science Centre.
- 8.8 SBFE should work with UCD Estate Services to ensure that a swipe card system for out-of-hours access to the building is available for all graduate research students and staff.
- 8.9 SBFE has considerable software and hardware needs, not all of which are currently being met by UCD IT Services provision. Given the considerable research strengths in data science and new Agriculture Systems and Technology pathway in the BAgrSc programme, it is recommended that SBFE should carry out a needs assessment of their requirements, in conjunction with UCD IT Services, to identify whether any additional supports, for example campus-wide availability of relevant software licenses, could be made available and/or to identify items for SBFE's budget planning over the coming years.
- 8.10 SBFE should work with UCD Research and Innovation in its review of post-award services. In such a research active School this is an essential support, particularly for faculty winning larger grants.

9. External Relations

General Comments and Context

- 9.1 Overall very strong external relations were evident in the research, professional and teaching and learning domains. The RG were extremely impressed by the high esteem in which SBFE was held by representatives from Irish industry. The RG praised the high quality and relevance of faculty's research, and commented very positively on their collaborative orientation, and their accessibility and availability to industry.
- 9.2 The RG was very positive about the excellent skill set and competencies of graduates from both the taught and graduate research programmes, emphasising problem solving skills as having particular value.
- 9.3 Key features of a strong undergraduate programme identified by the RG, namely modules in data science and precision agriculture, were very much aligned with the curriculum of the

new Agricultural Systems Technology pathway in the BAgrSc programme. The RG suggested that additional course content on innovation and entrepreneurship would be useful in providing industry-ready graduates. Unless they are involved in research collaborations, alumni do not seem to be prioritised in the outreach activities of SBFE.

Commendations

- 9.4 Very strong relations with Industry, Teagasc and International Universities is evident and is to be commended.
- 9.5 A co-authorship rate of 50%, with a wide range of international collaborators, is evidence of excellent practice.
- 9.6 Positions on a wide range of professional bodies and international editorial boards is indicative of leadership roles in the discipline.
- 9.7 The LinkedIn SBFE group an interesting way of maintaining contact with alumni and industry.

Recommendations

- 9.8 Modules on innovation and entrepreneurship would be useful additions to the taught programmes, introducing students to fundamentals of concept and market. The RG recommends that modules offered by the UCD Innovation Academy be reviewed by the Teaching and Learning Committee with particular attention to explicit project management skills.
- 9.10 Outreach activities did not come across as a priority. Additional student outreach activities could be a useful way of enhancing UG enrolments.
- 9.11 It appeared the strong relationship with industry was not being fully leveraged to assist with challenges experienced with student enrolment. Representatives from industry were eager to do more and become more involved in the taught programmes in a range of different ways. It is recommended that these are explored via the planned Industry Advisory Group.
- 9.12 SBFE should carefully review its approach to social media, refining as necessary to more fully engage with prospective students and to enhance the publicity and interest surrounding the educational and research programmes.

UCD School of Biosystems and Food Engineering - Full List of Commendations and Recommendations

This Appendix contains a full list of commendations and recommendations made by the Review Group for the UCD School of Biosystems and Food Engineering and should be read in conjunction with the specific chapters above. *(Please note that the paragraph references below refer to the relevant paragraphs in the report text)*

2. Organisation and Management

Commendations

- 2.7 SBFE is to be commended for providing unfettered access to students, faculty, support staff, university officials and industry representatives. Supporting materials were made available via appended materials, and printed and electronic materials provided upon request.
- 2.8 It is clear that the Head of School (HOS) provides effective and creative leadership, and has created conditions to prime the School for further development.
- 2.9 SBFE recognises the opportunities for strategic development presented in the current organisational structures.
- 2.10 The SBFE Administrator and HOS maintain an Open Door policy, which is welcomed by research staff and by taught graduate students, in particular.
- 2.11 The RG commends the recent decision to form an Industry Advisory Group, and encourages the School to ensure this group meets and sets out its priorities, as soon as possible.

Recommendations

- 2.12 After a number of organisational changes over the past 12 years, the RG strongly recommend that SBFE remain in the current structure, allowing time and space to maximise its educational and research impact within the College of Engineering and Architecture, but with strong interdisciplinary links across the University, (for example with the School of Computer Science, School of Agriculture and Food Science, Health Sciences).
- 2.13 Formalised procedures for induction and mentoring of staff should be introduced as soon as possible. The RG recognises that within a small School, these often happen informally. However, a more rigorous and consistent approach, ensuring all staff have an equivalent experience, is recommended.
- 2.14 SBFE should formalise its workload management model.
- 2.15 Student induction and orientation, as well as workload allocation, should also be undertaken in a systematic way.

- 2.16 All staff should be made aware of, and the HOS monitor, the need to ensure that the opinions, views and contributions of more recently appointed faculty are equally valued.
- 2.17 The Institutional Athena Swan Bronze Award presents an opportunity for SBFE to emphasise its commitment to advancing the careers of women in science, technology and engineering. SBFE should consider developing an application for a school-level Award.
- 2.18 SBFE is encouraged to strengthen its links with undergraduate students, for example through organizing events in collaboration with the UCD Engineering Society, and also by offering summer research placements to undergraduate students from engineering, agriculture, and science disciplines.
- 2.19 The RG recommends that SBFE business should be carried out according to formalised protocols, to ensure continuity and consistency over time.
- 2.20 Responsibility for Health and Safety across the School should be formally delegated by the HOS to a specific individual staff member.
- 2.21 The SBFE strategic plan should be revised and mapped to University strategic planning activity. Sections on risk analysis and management, and succession planning should be added to the plan.

3. Staff and Facilities

Commendations

- 3.9 Overall, the staff have a very positive outlook on SBFE and the new organisational structure.
- 3.10 The Science South facility contains high quality laboratory space; and SBFE is to be commended for its pro-active approach in terms of acquiring high quality research equipment.
- 3.11 The input of the College in areas such as marketing, internships, student advising, finance etc. is beneficial.
- 3.12 A number of SBFE faculty have won teaching awards, which reflects very well on their commitment to education, in addition to SBFE's very strong research profile.

Recommendations

- 3.13 It is highly desirable to replace current temporary faculty appointments with permanent positions, whenever possible.
- 3.14 The numbers of support staff available to assist with practical teaching and research are inadequate. Support staffing should reflect the module offerings and enrolment.
- 3.15 We recommend SBFE place an emphasis on formalising staff development, consistent with the new UCD HR system "Performance for Growth," as it is rolled out.

- 3.16 SBFE needs to prioritise career development plans for its post-doctoral staff, having regard to the discipline, consistent with university-wide initiatives.
- 3.17 SBFE needs to improve communications among and between faculty, staff and students.
- 3.18 In the long term, SBFE should develop a staffing plan to backfill open positions as a result of retirements as alluded to in the SAR. The scope of the staffing plan should be seven years.
- 3.19 SBFE should continue to fully utilize staff at College level to enhance marketing and student recruitment.
- 3.20 SBFE should continue its efforts to enhance diversity (gender and other aspects).
- 3.21 Research and common areas within the Agriculture and Food Science Centre should be renovated to support an expanding research base.

4. Teaching, Learning and Assessment

Commendations

- 4.7 SBFE graduate students expressed appreciation for the opportunity to study under the direction of motivated and highly regarded faculty who are world leaders in the biological and agricultural engineering discipline. They were complimentary of the formal SBFE Research Review conducted on an annual basis.
- 4.8 Universally, the employers and programme graduates interviewed were very positive regarding the quality and skill sets of SBFE graduates, indicating that the students possessed the right blend of science and engineering skills and “hit the ground running” when starting their positions.
- 4.9 The faculty are highly motivated and focused on providing high-quality instruction to meet the needs of their students.
- 4.10 Students enrolling in SBFE taught Masters programmes were complimentary of their educational experience and the overall value of these programmes. Many of these students chose to continue their education by enrolling in a SBFE Research Masters or PhD programmes, lending further support to the positive opinions expressed by these students.
- 4.11 SBFE provides opportunities for student input regarding the quality and content of modules. While some students choose not to provide this input, the overall response rate for SBFE is similar to that of other Schools within the College of Engineering and Architecture.

Recommendations

- 4.12 SBFE should consider implementing a Graduate Seminar to enhance the exchange of ideas between and among SBFE faculty and graduate students.

- 4.13 SBFE should formalise the on-boarding process for all graduate students. Historically, on-boarding has been handled by the academic staff and support staff, and given the relatively small size of the academic unit, this informal approach was acceptable. However, as student numbers grow it will be increasingly important to formalise the on-boarding process so that students understand degree requirements and timelines, laboratory hygiene and safety practices, support staff resources, computer and software access, building access, etc.
- 4.14 It is recommended that the planned Industry Advisory Group be routinely consulted on curricular content and desired learning outcomes for all SBFE degree programmes.
- 4.15 The overall efforts by the School to track SBFE graduates were not obvious, apart from the LinkedIn group. Information regarding post-graduate employment rates was presented. However, starting salaries and a listing of employers were not available to the RG. If the latter items are not routinely tracked, it is important for SBFE to begin collecting this data.

5. Curriculum Development and Review

Commendations

- 5.3 SBFE is now located within the College of Engineering and Architecture and is well recognised for its significant research scholarship. This recognition is a significant factor when it comes to recruiting students to the taught Masters programmes (ME, MEngSc, and MSc).
- 5.4 The revised BAgSc undergraduate programme with a focus on computer systems, networks, data management and sensors is novel.
- 5.5 SBFE has been very quick to avail of opportunities to advertise the taught ME programme to students matriculating from within Ireland, the EU and outside of the EU. SBFE taught Masters programmes are beginning to realise the benefits of international recruiting efforts by the College of Engineering and Architecture.
- 5.6 Internships are offered in the taught ME programme with 2-3 students taking advantage of this opportunity per year. SBFE is planning to expand these opportunities to the remaining taught Masters programmes.

Recommendations

- 5.7 Enhanced visibility of SBFE's taught ME programme will be essential to ensure a supply of domestic students. SBFE should consider developing Stage 1, 2 or 3 modules of interest to existing College of Engineering and Architecture students. (SBFE's Design Challenge is an excellent example of such a module with broad appeal). A few well-placed modules could serve as a bridge between existing BE programmes in the College, and the SBFE ME programme. Potential new modules identified by industry partners include data science, project management and innovation/entrepreneurship. SBFE should consider developing

additional Discovery modules and/or structured electives for greater exposure to undergraduates across UCD.

- 5.8 Summer Research Studentships for undergraduate students of Engineering, Science and Agriculture would also be a useful recruitment tool.
- 5.9 A journal club and/or seminar programme should be developed to accommodate the required taught credits for graduate research and taught graduate students, and also to help communications between prospective undergraduates, graduate students and faculty.
- 5.10 Students enrolled in the MSc programmes (Sustainable Energy & Green Technologies and Environmental Technology) were complimentary of SBFE for offering these options, and in general were positive about their educational experiences. The same students expressed concern about module content indicating the desire for modules with more depth in the respective programme areas and less content in areas such as food processing.
- 5.11 SBFE should redouble their efforts to ensure that BAgrSc students are more fully integrated into the School, as per suggestions below.
- 5.12 SBFE should work to close the loop on student advising and support by ensuring staff tasked with these responsibilities are sensitive to student needs, and that the students are aware of the support staff who are available to enhance their educational experience.
- 5.13 Questions concerning BAgrSc graduates' eligibility for Qualified Farmer (Green Cert) status should be resolved as soon as possible.
- 5.14 SBFE should stay the course with the current educational programme restructuring to allow adequate time to develop recruitment strategies to fill the degree programme pipelines and to establish baseline enrolment numbers. After three years, SBFE should commit to a critical review of the degree programmes to ensure these programmes are meeting student needs and are attracting sufficient student numbers to warrant their continuation. Of concern to the RG was the proliferation of taught Masters programmes and discontinuation of the undergraduate engineering programme.
- 5.15 SBFE should consider creative and novel options to attract increased numbers of engineering students interested in the broad biological applications of engineering (courses with broad appeal in Stages 1, 2 and 3 of the BE, partnering with others in biomedical engineering etc.).

6. Research Activity

Commendations

- 6.10 In terms of research productivity, faculty and staff are excellent in all measures of key performance indicators, which is to be highly commended.

- 6.11 The success of staff in obtaining research funding from various national and international sources is outstanding.
- 6.12 The research output in multi-disciplinary areas of food, energy and environment is significant.
- 6.13 The faculty takes a keen interest in bringing industry connections to student projects, which is to be commended.

Recommendations

- 6.14 The RG encourages appropriate recognition of all research active areas within SFBE.
- 6.15 The School should consider in its staffing plan providing for additional research support.
- 6.16 Establish a regular seminar series in the School, which needs to be well-advertised in the University to attract student participation from different colleges.
- 6.17 There is a need to leverage marketing and communications expertise across both Engineering and Agriculture in recruiting masters' students.
- 6.18 The communication channels between incoming students and faculty/staff need to be improved.
- 6.19 A plan for short, medium and long-term strategic investment in research laboratory space needs to be put in place and communicated to the College, University and Alumni/Industry.

7. Management of Quality and Enhancement

Commendations

- 7.4 The ambition, vision and commitment of the Head of School was very evident to the Review Group.
- 7.5 This was the first formal quality review process for the School and the sustained engagement with this opportunity was welcome.
- 7.6 As part of its routine quality enhancement activities the School has a robust external examiner system in place to assure the academic standards of its modules and awards. The School also engages very successfully in external peer review of research funding proposals and publications.
- 7.7 The recent rationalisation of undergraduate teaching and review of the BAgrSc offering has led to the introduction of the exciting new Agricultural Systems Technology pathway combining basic science, agricultural sciences, engineering technologies and data science.

Recommendations

- 7.8 It would be useful for the School to engage with its students and other stakeholders to communicate how it closes the feedback loop.
- 7.9 A method for evaluating the success of the new BAgrSc pathway should be developed to capture its impact on a range of measures including enhancing student numbers, strengthening the quality of the student experience, employer feedback and take-up of SBFE Masters programmes.
- 7.10 Ongoing attention to formal curriculum review and refinement needs to be placed across all programmes.

8. Support Services

Commendations

- 8.4 SBFE's good working relations with key staff in the College of Engineering and Architecture is to be commended, particularly given their location in another building.
- 8.5 The effective use of the College Liaison Librarian role to provide support to students for skills training (for example on plagiarism, Endnote, and library services), is a very effective use of this central support.
- 8.6 Support from UCD Research Office pre-award, for particular programmes and *via* targeted seminars to School on key topics, is strong.

Recommendations

- 8.7 The strategic campus development plan envisages that the SBFE be co-located with the other Engineering Schools, and this would significantly enhance SBFE's ability to collaborate with colleagues in the other Engineering Schools. However, in the interim the School should be supported in its plans to remodel the space it occupies on the 3rd floor of the Agriculture and Food Science Centre.
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UCD School of Biosystems and Food Engineering Response to the Review Group Report

The UCD School of Biosystems and Food Engineering found the Quality Review exercise to be a very useful and constructive process. There was a high level of engagement from all staff categories and students in compiling the Self-Assessment Report and in interacting with the Review Group during the site visit. Preparation of the Self-assessment Report allowed us to identify areas of good practice and aspects of School activities requiring attention, and we feel that it is a document that is a true reflection of the School at this time.

The UCD School of Biosystems and Food Engineering is very grateful to the Review Group for their work in reviewing our Self-Assessment Report, visiting the School, and preparing a thorough and incisive Review Group Report. The amount of work involved was considerable, and is much appreciated by School faculty and staff. The School was impressed by the thoroughness of the Review Group members who were ably assisted by the staff of the UCD Quality Office.

We welcome the endorsement of the Review Group for our School's activities through commendations and agree with their recommendations for further development / improvement.

The School is now working to implement the recommendations as far as possible, in consultation with other relevant parties where appropriate. The School's Self-Assessment Report, the Review Group Report and the Quality Improvement Plan will be used to inform the School's academic and resource planning activities for the next 5 year strategic planning cycle.



UCD School of Biosystems and Food Engineering

Site Visit Timetable

24-27 April 2017

Pre-Visit Briefing Prior to Site Visit – Monday, April 24

- 17.00-19.00 RG meet to review preliminary issues and to confirm work schedule and assignment of tasks for the site visit – **RG and Deputy Director of Quality, Radisson Hotel**
- 19.30 Dinner hosted for the RG by the UCD Registrar and Deputy President – **RG, UCD Deputy President and UCD Quality Office only**

Day 1: Tuesday, April 25

Venue: Room 3.22, Agriculture Building

- 09.00-09.30 Private meeting of Review Group (RG)
- 09.30 – 10.00 Skype meeting between RG and Principal/Dean of Engineering, College of Engineering & Architecture
- 10.00 – 10.45 RG meet with Head of School
- 10.45 – 11.15 Tea/coffee break
- 11.15 – 12.15 RG meet with representative group of academic staff – primary focus on Teaching and Learning, and Curriculum issues
- 12.15-12.45 Break – RG review key observations and prepare for lunch time meeting
- 12.45-13.45 Working lunch – representative group of undergraduate students
- 13.45-14.15 RG review key observations
- 14.15-15.00 RG meet with representative group of postgraduate research students
- 15.00-15.30 RG meet with representative group of School research staff
- 15.30-15.45 RG tea/coffee break
- 15.45-16.30 RG meet with support staff representatives (e.g. administrative / technical etc.)

16.30-16.45	Break
16.45-17.45	Tour of School facilities
17.45	RG depart

Day 2: Wednesday, 26 April 2017
Venue: Room 3.22, Agriculture Building

08.45-09.15	Private meeting of the RG
09.15-10.00	RG meet relevant support service representatives – UCD Estates, UCD Research, IT Services, UCD College of Engineering and Architecture, UCD Library
10:00-10:20	Break
10.20-11.00	RG meet with a representative group of postgraduate taught students and recent graduates
11.00-11.15	RG tea/coffee break
11.15-12.15	RG meet with recently appointed members of staff
12.15-12.30	Break - RG review key observations
13.30-14.00	Break
14.00-14.15	RG private meeting - review key observations
14.15-15.00	RG meet with College Finance Manager and Head of School to outline School's financial situation
15.00-15.15	Break
15.15-16.15	RG meet with members of the School Research Committee/School Staff
16.15-17.15	RG available for private individual meetings with staff
17.15-18.00	RG private meeting – review key observations/findings
18.00	RG depart

Day 3: Thursday, 27 April 2017
Venue: Room 3.22, Agriculture Building

09.00-09.30	Private meeting of RG
09.30-10.30	RG begin preparing draft RG Report
10.30-10.45	Break

- 10.45-11.15 RG meet with College Principal (via Skype) and Head of School to provide feedback and initial outline commendations and recommendations
- 11.15-12.30 RG continue preparing draft RG Report
- 12.30-13.15 Lunch
- 15:00 Exit presentation in Room 118 Agriculture and Food Science Centre to all available staff of the School – summarising the principal commendations/recommendations of the Review Group.
- 16:00 Review Group depart