Faculty of Engineering, Mathematics and Science Quality Report 2014

Submitted to Quality Committee

1 Executive Summary

1.1 Overview of the Faculty of Engineering, Mathematics and Science (FEMS)

The Faculty of Engineering, Mathematics and Science (FEMS) is comprised of eight Schools, with 18 undergraduate programmes (with an additional 16 moderatorships from TR071), 29 postgraduate taught programmes (at diploma and masters levels) and a total of 892 teaching modules. Across the Faculty, including three Trinity Research Institutes and numerous research centres, 911 staff members including 276 academics, 378 researchers, 132 technical staff and 125 administrative and librarian staff. The Faculty is located across a multitude of sites including main campus, the Trinity Biomedical Sciences Institute (TBSI), Westland Row, Pearse Street and TTEC.

The FEMS Quality Report 2014 was compiled using submissions from each of the Faculty's eight Schools, External Examiner Reports, the ISSE Report and retention data extracted from the Senior Lecturer Report 13-14. The results of this process were discussed at a special meeting of the Faculty Executive on Monday, 26th Jan 2015, with the Quality Office represented by Elizabeth Donnellan.

Each School has a thorough evaluation process for its undergraduate and postgraduate taught programmes, with a diverse range of methods employed across the various programmes, including surveys (online and paper), one-to-one interviews or group feedback sessions, feedback from Class Reps and feedback from Course Directors. All schools in the Faculty have robust mechanisms for disseminating student feedback to the appropriate staff and committees within the school.

The Faculty has robust quality processes in place, with 97% undergraduate modules being evaluated in 2013-14. The small number of modules not evaluated fell into distinct categories:
- field trips,
- multiple-led modules (where there was confusion over who was responsible for the evaluation),
- taught by retired staff (and the paperwork could not be located), or
- accidentally overlooked (only occurred in two cases).

In each case, the procedure has now been tightened to ensure all modules are evaluated in 14-15.

Overall, 227 postgraduate taught (PGT) modules were evaluated, representing 94% evaluation rate the Faculty. The methods of evaluation at postgraduate level matched those used at UG.

Two of the programmes in FEMS are subject to evaluations by accrediting bodies; this is in addition to the Quality Review cycle and the annual Quality Report.

A gap in the quality process was identified by the Faculty, as there is currently no formal evaluation of postgraduate research courses. This will be one of the key quality projects for FEMS for 2014-15.

Schools place an emphasis on closing the feedback loop by conveying outcomes to the student body and to the external examiners. There are processes in place at School level for the dissemination of information from student evaluations and external examiner reports, including through the School Executive Committees, DUTLs and DPTLs, Student Liaison Committees, and Curriculum Development Committees. Some members of the Faculty expressed concern that the External Examiners reports

were not disseminated to all relevant members of staff – another key project for the Faculty will be engagement with the Quality Office on the new External Examiners process, to bridge any gaps identified in this area.

Undergraduate and postgraduate programmes across all four schools are under continual development in light of these robust quality review processes, and this development is related back to students in order to encourage continual engagement in the quality process.

As a Faculty Executive, members are generally very happy with the quality assurance procedures in place across FEMS.

However, the Faculty identified a set of concerns that need to be escalated to College level. These included registration delays experienced by some students, that budgets for Schools have been cut year-on-year for a number of years impacting on the School's ability to maintain high quality course delivery and the cost to schools of maintaining buildings (especially older stock buildings).

1.2 FEMS ISSE Report

The Irish Survey of Student Engagement (ISSE) measures student engagement with higher education, beyond that ascertained through student satisfaction surveys. A summary of the ISSE findings, as they pertain to FEMS, was discussed by the Faculty.

Some key findings:
- 356 students from FEMS, across JF/SS/PGT years, responded to the survey;
- Overall satisfaction is on par with the other faculties in TCD;
- General development outcomes (individual and social development) were lower across FEMS when compared with the same cohorts in the other two faculties;
- A wide variation was seen in scores across FEMS cohorts on the following indices: student-staff interaction, work integrated learning and career readiness;
- Overall, the general satisfaction of students in FEMS improves from first to final year.

Of particular interest to the Faculty were the open comments from the UG and PGT cohorts, and included issues such as space for socialising, more independent learning, smaller classes, provision of internships and more practical experience.

The Faculty felt that further breakdown of the some responses, particularly relating to 'better admin support' and 'better notes from certain lecturers and more hands on help with exam papers' would be required before these issues can be addressed.

The Faculty felt very strongly that the comment relating to 'interaction with academic staff being limited for first two years' is a result of the large cohort in freshman years, and can be resolved by putting procedures in place to manage expectations (such as responses to emails).

1.3 Student Retention

Student retention figures within the Faculty were discussed at the Faculty Executive. The Strategic Plan 2014-2019 contains a target of increasing course retention rates from 84% to 90%. In 2012/13

FEMS had a non-retention rate of 10.45%.

In the 'not retained' category ranges of 0-35% were recorded, with the average across the Faculty being 10.3%. (Please note: courses with the highest percentages 'not retained' tended to be lower quota courses, and in most cases the actual numbers leaving are small).

Overall, the Faculty was pleased with the figures shown for FEMS, stating that the retention seemed to have improved compared to previous years. However, the Faculty also noted that direct comparison of year-on-year data is not possible due to the transition from Admin 5 to SITS (the 13-14 data being for JF to SF progression only, and not all four years of UG study as previous).

The Faculty would like to be in a position to compare retention over a number of years, with the aim of establishing trends and pin-pointing practices that improve retention. The Faculty Office will liaise with the Quality Office to see if comparable data can be sourced for previous years. However, it is anticipated that this will be possible in SITS starting with the 2012/13 cohort onwards.

Faculty members also commented that comparison with direct competitors and international peer institutes would be invaluable – the diverse range of courses taught in the Faculty mean comparison on a School to School (or course to course) basis is crude and unhelpful. Again, the Faculty Office will liaise with the Quality Office to find determine if appropriate international benchmarks for each School can be sourced.

1.4 Dean's Awards (Teaching and Innovation)

The Faculty felt that the introduction of the Dean's Awards, in the area of teaching and innovation, was an important step in the quality process in 2013-14.

- In the inaugural Call 13-14, the Dean made nine teaching innovation awards (€45k investment) to a broad spectrum of projects across the Faculty.
- The fund supported projects to train SF as learning assistants to deliver JF tutorials, to record podcasts on core elements of a course, to develop problem-based teaching methods etc.

The fund also supported the introduction of Clickers across JF Science and Engineering programmes.

- 540 clickers distributed JF to science and engineering students (and some FHS students, who share common modules with FEMS students);
- Additional investment of €15k for the clickers project;
- 22 academic members of staff are signed up to the programme;
- The technology has been piloted in some Sophister courses;
- Initial feedback has been extremely positive, with over 80% of respondents stating that it increase engagement, promoted discussion or made you question yourself. Less than 10% of respondents felt it had no impact.

Although not funded by the Dean's Awards (but also relevant to teaching innovation) over 60 staff members across the Faculty have signed up to the new STEM-ERC group, coordinated by Colette Murphy in the School of Education (aim is to enhance research, communication and teaching in STEM subjects at all levels, with a special emphasis in higher education)

A copy of the brochure created for the launch of the 14-15 Call for proposals is appended, which

showcases the projects that were funded in 13-14 in more detail.

2. Summary of best practice across the Faculty

Examples of good practice from Schools within the Faculty include, but are not limited to the following:

2.1 Increased emphasis on innovative and dynamic methods of engagement with students. Of special note was the introduction of clickers across JF science and engineering.

2.2 Most schools highlighted the use of Blackboard, as an enhancement to teaching and learning.

2.3 Feedback from the Faculty suggests the vast majority of lecturers use Blackboard as a matter of course.

2.4 Introduction of a Peer Mentoring programme in which students from a higher year support students from a lower year within a particular course. Of special note was the learning assistants in Biochemistry and Immunology, funded under the Dean's Awards 2014, where Junior Sophisters are Learning Assistants (LAs) to the current Senior Freshman students taking Module BY2203 (Metabolism).

2.5 Managing expectations of students: Having a School-wide policy of responding to emails from students, setting out target response times.

2.6 Including specific evaluation questions on student support services during evaluations has been trialled.

2.7 External Examiners informed about changes made as a result of their (or previous external examiner's) recommendations.

2.8 It is clear that utilising a variety of evaluation and feedback methods is proving successful across the Faculty and so a continued emphasis on this model will be encouraged.

2.9 The utilisation of the Class Representatives for gathering and disseminating information has been highlighted across all Schools.

2.10 Podcasts were developed for courses, as a direct result of student requests in one module.

3. Issues to be escalated to College Level

3.1 The Faculty raised the issue of the year-on-year cuts to non-pay budgets as the biggest risk to the quality of programmes delivered in FEMS. The Faculty would like to see College acknowledge the cost of running STEM programmes, and have that reflected in non-pay allocations.

3.2 A ubiquitous problem across the Faculty is a lack of space for both students and staff. Most Schools reported ongoing complaints from students with regards to appropriate teaching and learning spaces. There is also need for more small-group teaching rooms.

3.3 The cost of maintaining buildings, especially older stock, was raised by the Faculty. The ability to ask external suppliers for quotes may make it more competitive to get repairs/ upgrades completed.

3.4 The Faculty raised concerns regarding the English skills of some students, especially those entering the Faculty from foundation courses.

3.5 Several external examiners and surveys raised the issue of the full use of marking grades. A College-wide marking scale, that makes full use of marks, should be agreed.

3.6   Promotions and probations among staff should also be addressed. In 13-14 it was felt that many high-achieving, outstanding members of staff did not get promoted, which will lead to low morale and unexpected leavers.

3.7   Numerous problems associated with SITS have been raised by Faculty members at several fora. The Faculty would like to see these issues resolved, so SITS can function efficiently and effectively, to restore faith in the system at all levels. Faculty members also highlighted the increased administrative burden placed on academic staff members, which impacts on their other duties.

3.8   The delay in making offers to students who applied for PGT courses was highlighted as a particular concern in 2014. It is to be hoped that the new Academic Registry project will address this as a matter of urgency.

3.9   There is often too much of a time lag in receiving External Examiners reports. Greater streamlining of the provision of reports is necessary. Also further clarification of who External Examiners reports should be circulated to from central college – one suggestion is that all reports should be copied to School Administrators who are best placed to know who they should be forwarded to within their own school.

4.   Faculty Projects 14-15

4.1   The Faculty agreed that Postgraduate Research students should be included in this process in the future, with Schools being asked to report on their quality procedures around this category of student. The Faculty Office will liaise with the appropriate DPTL and course coordinators to institute this in the most efficient manner possible. The issues to be resolved include:
- Cohort: Research Masters and Doctoral students;
- Modular or yearly review;
- Best method to capture feedback;
- Closing the loop, with feedback to students and contributors.

4.2   Schools should be asked to report on how they capture feedback from external examiners during the Courts of Examiners.
- This will be added to the data template as a new item for 14-15.

4.3   The Faculty has agreed to set up a SITS working group, which will feed into the Academic Registry Project recently announced by the COO.
- Representatives of each School will be asked to join;
- The reps will reflect the wide range of users (administrative, technical and academic staff requirements);
- The working group will focus strategic issues common across the faculty;
- The group will proactively engage with the project by suggest solutions to strategic faculty issues, rather than a list of issues to be resolved.

4.4   Continuation of the Dean's Awards (Innovation in Teaching and Learning) for the 2014-15
- The Call for proposals has been issued, with deadline of 10th Feb 2015.

4.5   The Faculty Office will liaise with the Quality Office and the other faculty administrators to collate the 'best practice' ideas from across the college, and make these available in a user- friendly

format to all faculty members.

4.6 Expansion of Clickers into SF modules

- The Clicker project champion, supported by the Faculty Office, will work on recruiting SF academics to the technology

5.   FEMS at a glance

5.1 Undergraduate summary

Number of UG modules running in FEMS in 2013-14	665
Number of UG modules evaluated	655
Are procedures in place to ensure all modules are evaluated in 2014-15?	Procedures are in place to ensure all modules are evaluated in 2014-15.
Types of data gathering used	Methods include: • online surveys (several Schools reported low responses rates to online surveys. Anecdotal evidence suggests this is due to the high volume of surveys students are being asked to complete) • classroom-based paper surveys • distribution of Assessment Sheets at the conclusion of a lecture series by a particular lecturer with students leaving the completed sheets in an envelope for review at end of year. • Some Schools are considering using the clickers for instant feedback, though none have implemented this to date • Some field trips were not evaluated in 13-14, though procedures have been tightened to ensure this is done in 14-15
Where are results discussed?	Results are discussed in a wide variety of forums within different Schools (School Executive Committees, DUTLs and DPTLs, Student Liaison Committees, Science Course Management Committee, Student Liaison Committees and Curriculum Development Committees.)

Feedback methods to students	Methods include:
	• Meetings between the Student Representatives and members of the Teaching and Learning Committee.
	• Individual lecturers may discuss their feedback and/or resulting changes with future classes.
	• email was commonly used
	• Blackboard and webpages were also used.
	• The Dean met with all UG student reps in February 2014, where student feedback was discussed.
	• The Dean held a meeting with all four student reps from the Theoretical Physics course in Mar 2014 Due to the changes made to the course, the Dean was anxious for additional feedback on this specific programme. The outcomes of the meeting were then passed to the TP Management Committee.

5.2 Postgraduate Taught summary

Number of PG modules running in FEMS in 2013-14	227
Number of PG modules evaluated	214 (94%)
Are procedures in place to ensure all modules are evaluated in 2014-15?	Procedures are in place to ensure all modules are evaluated in 2014-15.
Types of data gathering used	The same types of data gathering were used as for undergraduate students.
Where are results discussed?	Results are discussed in the same way as for the UG students.
Feedback methods to students	Feedback methods are the same as for UG students.

5.3 External Examiners Summary

Number of External Examinations conducted	2012-13: 31 2013-14: 31
Number of external examiners reports returned	2012-13: 80% 2013-14: 60%
Summary of how external examiners are appointed	External examiners are nominated at School level. All are approved by Senior Lecturer/Dean of Graduate Studies. The Faculty will engage with the new External Examiners procedure
Summary of how feedback is given to stakeholders	Feedback varies between Schools. The Faculty would welcome a consistent approach from College as to how feedback is given provided and to whom it is provided.

5.4 Professional Accreditation Summary

School of Physics	Date of visit	2010-11
	Accrediting Body	Institute of Physics (IOP)
	Duration of accreditation cycle	5 Years
School of Engineering	Date of visit	2012-13
	Accrediting Body	Engineers Ireland
	Duration of accreditation cycle	The BAI and BSc programmes (years 1 to 4) went through the accreditation process in 2012-13. Engineering with Management and all streams of Engineering (apart from Biomedical which had no graduates at the time) are fully accredited with Engineers Ireland until 2017. It is planned to apply for accreditation again in 2016. This will include all BAI streams, Engineering with Management, the MAI and the MSc programmes of the School.

5.5 Quality review cycle

List of Schools/Programmes subject to Quality Review in 2013/14	School of Mathematics (Review date 24-26 March 2014)
List of Review Reports presented to Quality Committee in 2013/14	School of Engineering (Review date 25 - 27 March 2013) presented to QC on the 10 December 2013
List of Implementation Plans presented to Quality Committee in 2013/14	School of Engineering (Review date 25 – 27 March 2013) presented to the QC on the 20 March 2014
List of Progress Reports presented to Quality Committee in 2013/14	School of Biochemistry & Immunology (Review date 12 – 14 December 2011) presented to QC on the 10 October 2013 School of Physics (Review date 20 – 21 March 2012) presented to QC on the 12 December 2013
List of Schools/Programmes scheduled for a Quality Review in 2014/15	TR071 (2-4 December 2014)

College-wide issues identified in FEMS Quality Review Reports in 2013/14:

School of Engineering (Review date 25-27 March 2013)

HR/staffing
- Staff retention including retirements and succession planning;
- Staff promotion
- Recognition of Heads of School & Discipline
- Induction processes
- Support for development of early career academics

PhD/Postdoc students/Research
- Improved orientation/support/training for PhD students
- Lack of career mentoring & training for postdocs
- Strengthening the sense of community amongst postdocs
- Support & training for PhD students
- Application of regulations to PhD students including progression
- Support for research grant proposals and IP issues

Teaching & Learning
-Better technician support
-More regular feedback to students

Organisation/structures
-Cohesion of the school – cross-fertilization

School of Biochemistry & Immunology (Review date 12-14 December 2011)

Space
-Transparency around decisions on space allocation
-Better planning re needs assessment for users of facilities

HR/staffing
-Progression/promotion opportunities for staff beyond their initial contract period

Research
-Support for EU grant applications

School of Physics (Review date 20-21 March 2012)

HR/Staffing
Retention of academic staff