FACULTY OF ENGINEERING, MATHEMATICS AND SCIENCE

QUALITY REPORT 2018-19

FACULTY OF ENGINEERING, MATHEMATICS AND SCIENCE - EXECUTIVE SUMMARY

Prof Sylvia Draper was appointed as the new Dean of the Faculty of Engineering, Mathematics and Science (FEMS) in July 2019. As the first female to hold this post in the 400 year history of the university, her election marks a new era, one that can be characterized as 'doing things differently'. It also reflects the rising seniority, role and profile of women in the Faculty and the active commitment of the previous Dean (in establishing the post of Faculty Athena SWAN project officer) and its 8 constituent schools, to actions that further gender equality, diversity and inclusion (e.g. Chemistry and Natural Science successfully retained their Athena SWAN bronze awards in 2019).

Implementation of the Trinity Education Project within FEMS

The Faculty and all its affiliated staff (academic, administrative, technical, support and research) have continued to implement ambitious reforms within the new curriculum architecture of the Trinity Education Project (TEP). The direct entry streams have dramatically affected course structures, class sizes and time-tabled offerings. There is evidence that staff have adapted their teaching to the changed profiles of the students on admission as well as the new norms in the distribution of student FTSEs and staff:student ratios across many Schools in the Faculty. Some schools (e.g. Chemistry) have introduced student self-assessment surveys in an attempt to better understand the learning needs of their freshmen classes.

In 2019, the first TEP entrants entered their Senior Freshman year and Schools finalized preparations for the progression of these students into the Sophister years. The implementation of change has created new opportunities (the advent of joint honours courses e.g. between Geography and Computer Science) and challenges (end-of-semester assessments, alternative open-book and stepwise modes of continual assessment) in freshman and final year classes. As a result the nature and extent of staff:student engagement has undergone a subtle change in emphasis from formal mechanisms (e.g. on-line modular student surveys and feedback) to more open dialogues (e.g. in-class activities) and in greater levels of student representation and participation in course committees (e.g. Theoretical Physics (joint between Maths and Physics)) and teaching committees (Chaired by Directors of Undergraduate Teaching and Learning in the Schools).

Faculty-wide Quality Responses

The StudentSurvey.ie had a national response rate of 29% in 2018/19 overall, with Trinity achieving a 22% participation rate. To alleviate the even lower response rates when Schools extract results the Faculty Executive Committee (FEC) agreed to share the Faculty-wide Irish Survey of Student Engagement (ISSE) (also known as the National Student Survey) and the International Student Barometer (IBS) data to all schools jointly. This allowed it to discuss commonalities in the findings and to act in a concerted fashion. Two issues were raised over the year.

The first, were requests for career guidance and greater levels of transferrable skills instruction by students. Many schools have responded by introducing guest lectures, research seminars (e.g. Chemistry, Biochemistry and Immunology, Genetics and Microbiology, Physics), industry speakers (e.g. Engineering and Computer Science), alumni mentorship (e.g. Chemistry and Physics) and career office lecture slots into their undergraduate course structures. 5/8 Schools are providing career networking events for UG and PG students e.g. Trinity Biosciences Institute careers event.

The second, was the timeliness and quality of the feedback given to students. The majority of in-course continual assessment work within FEMS courses occurs within experimental laboratories and write-ups that are supervised and evaluated via PG teaching assistants. Most schools have introduced mandatory PG demonstration and teaching courses (e.g. Zoology, Chemistry and Physics). Evidence of the quality of this training can be seen in the number of FEMS PG students gaining College teaching awards (e.g. 50% of the College PG teaching awards in 2019 were to FEMS participants (Chemistry and Natural Science)). Evidence of increased PG engagement in the Faculty's teaching mission is also demonstrated by the active participation of the PG student body in its outreach activities e.g. 2019 Inaugural Lectures of Chair Appointees, Open Day (all school stalls had >40% PG attendants), and Science Gallery collaborations.

Faculty-wide Teaching Innovations

Several Faculty-based teaching initiatives have served to further embed the College's newly articulated Graduate Attributes.

The bringing together of the undergraduate (UG) and postgraduate research experience is probably best exemplified in the Faculty's continued promotion and support of a peer-reviewed undergraduate science journal, the Trinity Student Scientific Review (TSSR). Now in its 6th year this publication is edited by students for students and celebrates scientific reviews written by UG sophister science students on research topics that were inspired by their capstone projects or summer research experiences in research laboratories across FEMS.

Innovative teaching methodologies are shared by the FEMS Teaching Support Group which was initiated by a FEMS Teach-Meet, in early March 2018. This group (comprising PDR, teaching fellows, junior and senior academics) has met approximately monthly throughout 2019. It is organised by the TEP Pedagogy working group, chaired by Lucy Hederman (Computer Science) and Nicola Marples (Zoology, National Forum Student Hero award winner 2016). It is built around an informal discussion and presentation format and promotes best practice in teaching innovation in the Faculty. A demonstration of its impact can be seen in the evidence of reflective teaching practices in FEMS applications for Junior Academic Promotion (e.g. Blackboard commentaries, chat boards and 24 hour email services provide by staff) and the quality of some of the captured student responses therein. Across the Faculty there are examples of successful externally funded projects for teaching innovation e.g. BioLabPrep 2019, a project funded by the National Forum for the enhancement of teaching and learning in higher education, which aims to maximise learning in the laboratory environment. In addition, a significant number of Schools within FEMS have delivered or are developing Trinity Elective Modules for 2018/19 and 2019/20 e.g. Genetics and Microbiology launched two electives in 2018/19.

A number of strategies have been introduced to ensure the consolidation of information and its effective projection upstream at Faculty level. As an example in 2019 the Course Office enabled a cross-school survey and face-to-face discussion forum with UG science course representatives. This provided valuable information (e.g. on the suitability of teaching spaces (Goldsmith Hall) and the exam experience (RDS)) for transmission through the Associate Dean of Undergraduates Science Education (ADUSE) to the Dean of FEMS and members of the College Executive Committee (Bursar, Chief Operating Officer).

At PG level additional processes for quality review and pastoral care have been introduced to provide further assurance of a quality PG research experience. All 1st year Ph.D. students are now assigned a Ph.D. panel comprising two staff members to act in a supervisory capacity outside the formally assigned and direct supervisor. This serves to enable a higher level of pastoral care, additional discipline-based expertise and intermediary services if required and to act as a source of internal examiners at confirmation viva and final Ph.D. viva stages. In addition to excellent Ph.D. completion rates across the Faculty, 6/8 schools are undertaking PG exit surveys as part of their Athena SWAN initiatives.

Student recruitment and business planning

Strategic and financial planning continues to be a point of focus for the Faculty with each school reflecting on its quarterly reporting at individual meetings with the Dean and Faculty Finance Partner. Student recruitment forms a large part of these reviews and facilitates opportunities to forecast future STEM-based skills needs and the consequent pedagogical changes needed to address them.

The impact of this thinking is epitomized by the Engineering, Environment and Emerging Technologies (E3) Initiative which was launched in 2018 as a single strategic development to expand the teaching and research activities across FEMS (and in Engineering, Natural Science and Computer Science and Statistics in particular). The aim of this forward-thinking initiative is to imbibe students with inter- and trans- disciplinary knowledge via a challenge-based learning approach. It seeks to increase the number of STEM-based UG students by one third (1,550 sFTES) over the next 10 year period. The consequences of this new teaching pedagogy is anticipated to be far-reaching and deep, and multi-disciplinary design strategies are already seeping into many of the existing and new UG and PGT courses within the Faculty.

Connected to the above are introductions of new taught programmes at UG and PG level in 2019. Many of these are promoted through the work of the Global Officers (GO) in Chemistry, Engineering, Maths, Natural Science and Physics and the appointment in 2018/19 of International Global Directors in the Schools whose role is to support a dedicated response to the needs of international students at registration and during the course of their studies e.g. additional English language supports, review of entrance requirements. The GOs and newly appointed E3 student Recruitment and Admissions Officers have also assisted the Schools in reviewing the small number of ISB responses from students in Science and Engineering programmes. Many of the responses highlight broader campus-wide issues in terms of accessing information about facilities, course and student societies and sourcing affordable accommodation.

New courses include those with Columbia University (2+2 courses in Geosciences and Neurosciences) and the furthering of existing partnerships e.g. with Thapar University (Engineering and Computer Science and Statistics). April 11th 2019 also saw the launch of a new and timely M.Sc. in ImmunoTherapeutics in the School of Biochemistry and Immunology with its first intake of students in September, a new joint M.Sc. in Energy Science, as a joint venture between the schools of Physics, Chemistry and Natural Science, and a new M.Sc. in Genomic Medicine with its first intake of students scheduled for September 2020.

Research outputs

As part of the annual research review process, the RSS-generated School reports are reviewed by the Dean against the agreed ABC Research Productive Metrics criteria. This annual exercise forms a part of the Baseline Budgetary Model reporting to College. In 2019 all the schools in the Faculty retained or exceeded the percentage of research productive staff reported in the previous year. 2018/19 saw an increased number of new ERC

award holders in the Faculty particularly at starter and consolidator levels. Such recognition of our academic staff is a mark of quality in our recruitment strategies. It is also a welcome boost to research productivity at a time when PI-dedicated funding through Science Foundation Ireland was at a minimum.

The Faculty's research institutes and centres continue to go from strength-to-strength e.g. CONNECT and AMBER were successful in their national bids for continued funding for further periods of 6 and 5 years respectively. Addressing the infrastructural and financial supports needed to maintain the international profile of these units, remains a challenge for the cognate schools. Through their sizeable PG Training and Network funding the centres are gaining in importance as significant players in PG training across the Faculty as well as in delivering cutting-edge research. In terms of the 2019 QS world-rankings, the University's top 50 subjects include Mineral and Mining Engineering which was in 39th place. Additionally, Trinity was ranked in the QS top 100 in the world in 13 subjects of which 5 were in FEMS (Computer Science & Information Systems, Biological Sciences, Chemistry, Geography and Materials Science). In combination the above QS rankings are for subjects representing 6 of the 8 Schools in the Faculty and mark a consolidated performance on the Faculty's QS world-rankings during a period of continued financial restraint and at a time when Trinity's overall position in the rankings declined (moving from 120 to 164 in the 2020 Times Higher Education World University Rankings (THE, WUR) and from 88 to 108 in the 2019 QS World University Rankings).

Athena SWAN

7 out of 8 Schools in FEMS have reported an active Self-Assessment Teams (SAT) in 2019, compared to 4 in the previous year. School SATs promote best practice e.g. in the acquisition of gendered disaggregated data and their analysis across the Faculty. Student feedback and engagement has increased in relation to PG and PDR representation and it is clear that Athena SWAN-promoted activities are resulting in alternative platforms for gendered learnings and progression-tracking of Male:Female cohorts so as to provide a deeper and more nuanced understanding at School level of student and staff induction, training, progression and retention.

4 schools submitted Athena SWAN applications in 2019 with a 50% success rate. Under the expert guidance of the FEMS Athena SWAN Project Officer, the Schools of Physics, and Biochemistry and Immunology, are currently reviewing the feedback they obtained to improve their resubmissions over the next 12 months. Many of the Athena SWAN activities across college have been piloted in FEMS schools e.g. revisions of the PDR nomination form. Staff mentors for all newly appointed staff are now assigned and matched by the Faculty Deans, with a very high % of new college tutors arising from FEMS schools. Indeed many schools in the faculty have a long history of academic staff holding tutorial positions (> 20 years service).

Website

Across the Faculty, School websites have undergone a facelift in 2019. They now universally follow a revised University template for ease of access and migration between sites and provide a trusted source of current information e.g. course handbooks, School Safety statements etc. This year the Faculty website has also improved, and its content is maintained, updated and current. Further work is planned to promote FEMS-based achievements in the coming year using twitter e.g. the following information was not promoted or captured on the Faculty website for the Provost's Teaching Award Winners in 2019: Lifetime Achievement Award, Professor Celia Holland (School of Natural Sciences), Prof. Conor McGinn (School of Engineering)

one of only two recipients of an Early Career Award.

Space

The Faculty is working to fully optimize the space available within its on and off-campus footprint. It has taken steps to quantify, evaluate, consolidate and refurbish its existing spaces and to plan for current and future eventualities. Opportunities to occupy new dedicated and trans-disciplinary shared space will open-up in Sept 2023 with the E3 learning Foundry new build.

The Dean of FEMS is working closely with the Schools and the Space Planning Officer to create an accurate FEMS-based space atlas. This data is key to unlocking the strategic connection of cognate disciplines through shared research and teaching spaces e.g. providing access to equipment and facilities. In particular, the unsuitability of Goldsmith Hall has become a ubiquitous feature in School/Programme reviews and student feedback. Plans to fund the renovation and repurposing of this space continue within the Faculty and feature prominently in the College's Estate Strategy.

Looking Ahead

A re-balancing of priorities is required as the Faculty strives to sustain the areas in which it excels and to deliver on the College's Strategic Goals in teaching and research.

The era of 'doing things differently' has been precipitated by the COVID-19 pandemic. The many challenges that have arisen have been tackled collectively and imaginatively. The 8 Heads of School, administrative and student representatives and 3 directors of the Research Institutes have been unified, cooperative and collaborative in their constructive and solution-oriented actions to address the fallout of this cataclysmic event. The Schools have demonstrated their ability to share ideas and to purposely identify their strengths and vulnerabilities. Armed with a new and fit-for-purpose Faculty risk register there is a determination to continue to find ways to capitalize on emerging opportunities, to stride boldly and wide-eyed into the future, and to realize the potential of the Faculty's long-term capital projects such as the E3 Building and Foundry projects.

In the coming year, the legacy impacts of the COVID-19 pandemic will become manifest as will the outcomes of our responses, which saw the schools in the Faculty fast-track, rethink and innovate their on-line course content and implement new delivery mechanisms and assessment procedures.

2020 will see a greater focus on remote and on-line teaching paradigms and the anchoring of new financial realities within the Faculty. It will witness the development of new concepts (such as micro-credentialing and blended-learning in the construction of its programmes) and the metamorphoric re-emergence of staff and students after lockdown, as they seek out new ways to operate effectively and safely under new social distancing norms.

Professor Sylvia Draper
Dean of Faculty of Engineering, Mathematics and Science

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SECTION 1: UNDERGRADUATE TEACHING

All Head of Schools (pictured), school and Faculty Administrative staff contributed greatly to the content in this report.








SECTION 1 UNDERGRADUATE TEACHING

Outline your School's experience with regard to the introduction of the new Academic Year Structure (AYS), semesterised exams, and new progression and award regulations.

1.1 Collective Summary

The introduction of the new Academic Year Structure (AYS) has brought both opportunities and challenges for Schools across FEMS. Many comments on the significant increase in workloads arising from the volume and accumulation of multiple assessments and the short-turnaround times for publishing end-of-semester and supplemental results. They also report the perception of chronic stress on students to perform continuously and on staff to cater for exceptional circumstances and repeat students under severe time constraints. The School of Maths in particular has concerns about the timetabling and decoupling of modules that were previously taught biennially and jointly to differing student cohorts. The Dean of FEMS has worked with the School to help communicate and address its concerns directly with the Senior Lecturer. The ADUSE as a permanent member of the FEC has also worked to organize constructive dialogue around the pillaring options within the structured timetable. The opportunities that are emerging are in the creation of new possibilities e.g. to contribute to new joint honour combinations. The first of these is Computer Science and Geography with its first intake in September 2020. All schools report either filling their UG student quotas or exceeding them and there is evidence in some courses of growing demand e.g. UG Engineering, Integrated Computer Science, Theoretical Physics and Bioscience streams.

5/8 of the Schools do not use a standard mechanism for student feedback as in-house class assessments (e.g. clickers, chat boards) and student liaison workshops and increased levels of student representation within the formal school governance committees are becoming more wide-spread modes of interactive feedback. This sees the Faculty adopting a more student/staff partnership model in the learning process.

The responses to the External Examiners reports (100% return rate) are also universally prompt and constructive. The number of EE is on average one per discipline in multi-disciplinary schools. Attendance at the internal Court of Examiner Committee meetings is compulsory in the majority of Schools. They are used as opportunities to benchmark courses against international standards and to discuss individual student and class progressions, average module marks and any gendered-differences in exam performance which are recorded and analyzed. Consideration is also given to the M:F ratio of the EE in each school. EE are appointed every 3 years by the HoD and HoS and approved at Council. All the course handbooks are available electronically for access by both students and EE.

Each of the Schools across the Faculty have provided feedback on matters crucial to providing quality teaching and learning; and world renowned research being conducted. The proceeding pages captures the comments from the Heads of Schools. The first topic they address is the new Academic Year Structure (AYS).

School of Biochemistry and Immunology (commonly referred to as B&I)

The new academic year structure has been largely successful for us but there have been challenges. Our main difficulty is encountered when trying to meet the very tight turnaround time between the completion of exam week and publishing of results. This is particularly problematic for the supplemental period which is even shorter. We second mark our SS exam scripts and in addition to organizing viva's for borderline students, we were extremely pressurized for time during the last exam session. We are concerned that this will lead to errors in the recording of exam results. We are also extremely disappointed that we can no longer offer on-campus exams for our SS students. While we understand that marks were not affected last year by the move to the RDS, the student experience has no doubt been affected. We have no issues regarding the new progression and award regulations.

School of Chemistry (commonly referred to as Chem)

Overall the experience of the School with the new structures has been positive, however the timeframe for return of grades following annual exams is very tight and does not allow for any delays with grading, this could be a particular problem if a member of staff was unable to correct their scripts for health or other reasons. The timeframe for supplementals is extremely tight and should be extended if possible. The timing for School exams is very problematic in the context of the new year structures and we are pleased that alternatives are being discussed at USC level. Progression and award regulations appear to be working well, we would not like to see any further changes to these in the near term.

School of Computer Science and Statistics (commonly referred to as CSS)

Very significant effort on the part of professional and academic staff in the School has resulted in successful implementation of all TEP features to date. Returning and processing examination and assessment results within the available Marking/Results window remains a significant challenge.

School of Engineering (commonly referred to as Engin)

There are some concerns in the School that the new academic year structure is not working well for our staff or students. In particular, the School is concerned with the time allowed for correcting scripts and with the late publication of supplemental results. Some possible solutions are to allow for a longer annual (semester 2) session and to have the supplemental exam session earlier (so that we have supplemental exam results available earlier, latest by the Wednesday of the week before semester 1 start). It is worth mentioning that nearly all of the Engineering external examiners in 2018-19 made the same comment about the exam session being unnecessarily compressed; this was also mentioned in our final exam board meeting.

School of Genetics and Microbiology (commonly referred to as G&M)

Implementation of these academic structure changes has been extremely time-consuming and laborious. One concern is that with the new academic year structure, teaching is being compressed into even fewer weeks of term-time. Also, we feel that the new structure leads to students being almost continuously assessed, which may increase levels of stress and anxiety and might hamper instead of improve student learning.

School of Mathematics (commonly referred to as Maths)

Regarding the new Academic Year Structure (AYS), semesterised exams, and new progression and award regulations, we have been generally able to cope with the new regulations, although we were faced with extremely tight deadlines for processing our exam results. Our main concerns involve the effect of TEP on our sophister modules that heavily rely on cross-year teaching and modules in Statistics (which have not been incorporated in any pillar). Due to our limited resources, a large number of sophister modules can only be offered every other year, so these modules are only available during either a student's JS year or during their SS year (but not both). Since the JS year will count for 30% of a student's result and the SS year will count for 70%, our cross-year teaching is likely to cause some issues.

Another TEP-related concern that we have is the inclusion of Statistics modules in the fixed timetable. STU12501/STU12502 are introductory modules that should be taken by several cohorts of students including Joint Honours students in Maths & Economics, Maths & Music and Maths & Russian, for instance. We are not sure how these modules will be timetabled, as they involve all 4 of the pillars.

These concerns have been raised since last year, but we have not received any response, guidance or reassurance. In particular, we are not entirely sure that our cross-year teaching in sophister years will be permitted and that our sophister students will have access to a sufficient number of modules. This will be especially difficult for the Joint Honours students, given the restrictions imposed by TEP

School of Natural Sciences

The schools experience was generally good. Informal feedback from staff indicated a heightened level of pressure/anxiety on the part of students adjusting to the semester assessment structure.

School of Physics

The response to the new academic year structure, and semesterized exams has not been positive. It has been challenging in implementing these changes and the student experience has not improved.

1.1.1 Undergraduate feedback to students on academic performance

Feedback is returned by almost all schools, although there is not always a standard format for this as in the case of the School of Natural Science this academic feedback is done at the discipline/programme level. Multi-disciplinary programees have not adopted a standard format due to the nature of School and multi-disciplinary programmes.

Feedback to students on academic performance	B&I	Chem	CSS	Engineering	G&M	Maths	Natural Sciences	Physics
Is School Meeting requirements for feedback back within 20 days?	Y	Y	N	Y The School meets this requirement for most modules	Y	Y	Y The School meets this requirement for most modules	Y
Has the School adopted a standard format for the return of feedback?	Y	Y	N	N Responsibility lies with module coordinators	N	Y	N There is a wide range of module types in the school. While a modifiable template is provided for the evaluations, no template is provided for feedback. This is left to the module coordinator.	N

Table 1: Overview of undergraduate feedback to students on academic performance for each FEMS School

At both an undergraduate and post graduate level the mechanism used to gather and evaluate student feedback is similar (as shown in Tables 1 and 2).

Postgraduate Feedback to students on academic performance	B&I	Chem	CSS	Engineering	G&M	Maths	Natural Sciences	Physics
Is School Meeting requirements for feedback back within 30 days?	Y	Y	Y	Y (With the exception of a small number of modules on the Electronic Information Engineering course)	Y	Y	Y	Y

Table 2: Postgraduate Feedback to students on academic performance

1.1.2 Conduct of Courts of Examiners

Appropriately monitoring and recording the manner in which Examiners participate in the examination process is essential. Overall, the Schools are consistent regarding the conduct of the court of examiners. Examiners tend not to engage with blackboard and attending the CoE remotely, these issues suggest that additional IT support should be offered to examiners in order for them to easily avail of the systems that they should be able to access so that they may best evaluate the examination process. For the most part, these IT issues are not considered challenges as they are dealt with locally and the required information is provided.

Conduct of Courts of Examiners (CoE)	B&I	Chem	CSS	Engin	G&M	Maths	Natural Sciences	Physics
Does the school record key quality issues discussed at CoE?	Y	Y	Y	Y	Y	Y	N it is addressed at a programme / discipline level.	Y
Has the School responded in writing to EE recommendations arising in 18/19 EE reports?	Y	Y	Y	Y	Y	Y	Y	Y
Did any of your EEs attend CoE remotely?	N	Y	N	N	N	N	N	N
Has the School taken action to implement GDPR regulations with EEs?	Y	Y	Y	Y	Y We use OneDrive to share information with externs, which is GDPR compliant.	Y	Y	Y
Did the EE have access to Blackboard?	N	N	N	N	N	N	Y It varies, some do.	N

Table 3 depicts the current operations in each School in respect to the conduct of court examiners.

1.1.3 Undergraduate Grades Journey

On reviewing the comments from Schools in respect to the uploading of student marks from Blackboard to SITs, it is evident that this is not common practise for an array of reasons such as joint programmes, and in some cases other alternative established practises are being used instead. This is also relevant for the Conduct of Courts of Examiners (CoE) as examiners may not request to access Blackboard if it does not hold the marking information for students. All schools are utilising the platform as a repository for students to have access to handbook policies. The level of engagement with the Grades Journey is similar for both undergraduate and postgraduate programmes.

Comment on the School's experience with implementation of the **Grades Journey** i.e. the upload of student marks from Blackboard to SITS:

School of Biochemistry and Immunology: No major issues encountered.

School of Chemistry: Given that our PGR students are part of the joint TCD/UCD DubChem programme, Blackboard and Grades Journey cannot be used for module/grades management.

School of Computer Science and Statistics: SCSS was offered this facility and requested it for certain modules but, to our knowledge, the facility has not been implemented where requested.

School of Engineering: No negative feedback from staff who have used it.

School of Genetics and Microbiology: We currently do not transfer any marks from Blackboard to SITS.

School of Mathematics: We did not have any issues reported.

School of Physics: Used in 1 module, but training requirement precludes wide use.

Programme/Year/Subject Handbooks	B&I	Chem	CSS	Engin	G&M	Maths	Natural Sciences	Physics
Did the School implement the new Programme Handbook Policy in 2018/19?	Y	Y	Y	Y	Y	Y	Y	Y
Were programme handbooks published and available to students before the start of the new Academic Year?	Y	Y	Y	Y	Y	Y	Y	Y

Table 4: Undergraduate Handbook policy

1.1.4 CAO entry points

CAO Entry Points: Insert trends in demand for School Programmes, in particular any new programmes introduced in 2018/19.

School of Chemistry All places in Chemical Sciences were filled in 2018/2019

School of Computer Science and Statistics There was significant increase in 1st preference applications for Integrated Computer Science (76.15%) and Computer Science and Language (121.43%) in 2019, with smaller increases (18% to 23%) in MSISS and Computer Science & Business.

School of Engineering: The quota has increased for Engineering and Engineering with Management and the CAO points have also increased which points to a strong demand for our programmes and higher quality students.

	2017	**2018**
Engineering	466 (quota: 175)	487 (quota: 185)
Engineering with Management	499 (quota: 20)	509 (quota: 21)

School of Genetics and Microbiology We are part of TR060, which has seen an increase in Entry Points over the past two years.

School of Natural Sciences Demand is steady. Of note is the strength of applications for the new (year 2) TR062, Geography and Geoscience programme.

School of Physics TR063 Physical Sciences saw its first intake in 2018/19. The School was happy with no. of 1st preferences in CAO (2018: 100 and 2019: 99 and accepted student over quota while keeping points at an acceptable level (~500). For TR035 Theoretical Physics the demand remained high with a 1st preference : quota ratio of >2 and points ~540.

1.2 Technology Enhanced Learning Initiatives

Each of the Schools in the Faculty provided the following comment on the use of the 'clickers' or 'apps' or any other Technology Enhanced Learning initiatives.

School of Computer Science and Statistics

Technology Enhanced Learning initiatives are being used where deemed appropriate by module lecturers. The School does not maintain data on this.

School of Genetics and Microbiology

We are using clickers as well as other technology (Blackboard collaborate, Panopto and Turnitin, assignments, blogs, forums through blackboard) for our teaching.

School of Mathematics

We have made all content available online, but we are not using clickers or apps. A small number of our modules use the Wiley system which assigns homework problems to each student separately.

School of Physics

There is an appropriate level of use of TEL among lecturers. Most have tried clickers, with some continuing and some deciding it is not helpful. Blackboard is used in most cases although some prefer websites or other means, which have some advantages in terms of accessibility (e.g. trivial access for off-books students and staff not timetabled for the module). Panopto is starting to be used to create video/audio/screen recordings of lectures for students to review later. This seems to have some cons (reduced attendance in lectures!) as well as the more obvious pros.

School of Biochemistry and Immunology:

(a) Use of clickers in Flipped classroom:

We have utilised clickers to enable staff taking practical classes to pose questions and assess experimental outcomes simultaneously from each student and immediately collect and display the responses of the entire class. This technology allows real-time feedback from students taking the practical class and the incorporation and display of this feedback, e.g. experimental outcomes and other responses, into the progress of the practical class creates an active learning environment. For example, clicker polls are used to check that everybody has completed step 1 and is ready to move to the next step. This has the effect of directing students' attention to a particular task and alerting the instructor when they are moving too fast (or too slowly). Depending on the results, the instructor can choose to pause, give more explanation, or direct demonstrators to 'help out more'. Questions can be posed to test comprehension and enable 'teaching by questioning' in a non-threatening environment (responses are anonymous). These questions are designed with the objective of directing students' attention, stimulating discussion, communicating feedback and measuring learning outcomes in achieving competence in practical skills.

(b) Use of clickers in Flipped classroom:

In our Flipped Classroom, SF students are provided with a video covering the lecture material which they watch in their own time **before** the allocated class-time. Online assessments are provided for the students to help them with learning and revision. Class time is then devoted to activities such as multiple-choice questionnaires (MCQs) (with clickers), group work, peer-to-peer learning, demonstrations *etc.* Lecture material is recorded on video and hosted on Blackboard approximately 1 week prior to the in-class session. The video is accompanied by a 10 question Multiple Choice Questionnaire for which students are awarded 1% of the module mark. Lecturers review the results of the online quizzes and address concepts that students struggled with during their subsequent in-class sessions. Further MCQs, using clickers, are used during class to assess whether these

difficulties were overcome. Other activities used by the lecturers include demonstrations, peer-to-peer teaching and problem solving. Feedback from students has been overwhelmingly positive: 65% prefer the flipped classroom to the traditional classroom and 80 % report that the flipped classroom gave them a better understanding of the topic than traditional methods.

(c) Use of clickers in SF practical classes:

The constraint of the student-staff ratio poses a challenge. We have utilised clickers to enable staff taking practical classes to pose questions and assess experimental outcomes simultaneously from each student and immediately collect and display the responses of the entire class. This technology allows real-time feedback from students taking the practical class and the incorporation and display of this feedback, e.g. experimental outcomes and other responses, into the progress of the practical class creates an active learning environment. For example, clicker polls are used to check that everybody has completed step 1 and is ready to move to the next step. This has the effect of directing students' attention to a particular task and alerting the instructor when they are moving too fast (or too slowly). Depending on the results, the instructor can choose to pause, give more explanation, or direct demonstrators to 'help out more'. Questions can be posed to test comprehension and enable 'teaching by questioning' in a non- threatening environment (responses are anonymous). These questions are designed with the objective of directing students' attention, stimulating discussion, communicating feedback and measuring learning outcomes in achieving competence in practical skills.

(d) Virtual learning for practical classes:

The School has developed a virtual learning resource for SF practicals. In brief, this consists of audio-visual demonstrations of practical techniques that are both formative and summative in nature, as they are designed to help students learn in novel and innovative ways that interface with more classical examination and assessment structures. The emphasis is on pre-practical preparation for large science, pharmacy and medical classes and involves multiple choice quizzes with feedback, glossary of Biochemistry terms and PowerPoint lecture presentations. Audio-visual demonstrations and a biochemistry glossary are provided in a format that can be downloaded and are designed to facilitate a student's understanding of experimentation before they physically undertake the practical exercise.

(e) ImmunoView

ImmunoView is an online teaching tool that was developed by staff in B&I to help students to integrate their knowledge of immunology. The tool is run via blackboard and students can click into various aspects of immunology which leads to an animated, narrated explanation of the topic.

1.3 Director of Teaching and Learning (Undergraduate)

The Director of Undergraduate Teaching and Learning in the respective Schools provided their feedback on the year.

School of Biochemistry and Immunology:

Course content is updated approx. every 2-3 years to include relevant subject matter and utilize new expertise in the school if new academics are recruited. For example, in the last year, the School has introduced new lectures in Immunometabolism to JS students and state of the art technology lectures to SS students (e.g. Seahorse analysis) to reflect our research expertise in this area. A number of additional course changes have been planned (particularly for the JS year) as part of TEP. These changes will be implemented in 2020/2021. The innovative teaching tools we have developed have been particularly successful and have streamlined our teaching practices making them more interactive when one on one interaction is not possible. We have fallen short when obtaining student feedback questionnaires as not all staff avail of this opportunity however, we have recently formalized this process and will make questionnaires available online e.g. via Blackboard, rather than putting the onus of individual academics to organize feedback for their individual lectures.

The School of Biochemistry and Immunology (with support from the School of Medicine) was one of the first to deliver a Trinity Elective, 'Vaccines – Friend or Foe' in 2018/19. Given the resurgent problems associated with poor vaccine uptake, understanding vaccines and how they work, and understanding the complexities of choice associated with different societal roles, is a topical and important issue for our time. The elective was designed to have a number of different innovative components and to use a variety of teaching and learning approaches to address these.

To complement a series of traditional lectures, students had access to two newly designed and produced animations (VaccineView), that explained the specific immunology concepts this cohort of students needed in order to understand how vaccines work. There were also two interactive workshops which presented different ethical dilemmas. Students had to address these individually in advance and subsequently as a group. They had to reflect on how their opinion changed in response to interactions with other students and other groups. Communications skills were improved, particularly as they had to make an oral presentation as part of this activity. Smaller groups had to prepare and present a public message on vaccination with a medium of their choice and finally, there was a series of guest lectures showcasing current vaccine research in Trinity College.

School of Chemistry

The School is committed to the delivery of a world class education using modern best practice. It listens to comments and suggestions made by student stakeholders and external examiners and acts on these if possible. The School has diversified its academic offerings in that a new strand in TR061, Chemistry with Bioscience, will be offered to incoming students in the 2020/2021 academic year. Furthermore, discussion is ongoing with the School of Education to engage with them in a Science Education Degree. The School continues to invest significant resources in the UG teaching laboratories. This academic year we have invested some 50k€ in the Physical Chemistry Teaching Laboratories. Despite the major changes associated with roll out of TEP. We are pleased to note that there has not been a significant impact in the grades achieved by students in the first two years of Chemical Sciences (compared to general science data). Indeed, the move to a dedicated Chemical Sciences stream has resulted in student cohort with a keen interest in Chemistry that appear to be highly engaged with teaching and practical aspects of the course. It is noteworthy that the highest increase in demand for Science course in TCD (based on 2020 CAO applications data), is for the Chemical Sciences (5% year on year increase).

School of Computer Science and Statistics

The School is undergoing a period of significant growth in student numbers, in line with the E3 Business Plan. With a high proportion of lab-based modules, the School relies heavily on PhD students engaging in teaching activities as Demonstrators and Teaching Assistants. A decline in PhD student numbers has resulted in less support for the delivery of some modules and the School has continued to seek innovative ways to accommodate this. Moves by College to reduce the rate of pay for Demonstrators and Teaching Assistants are unhelpful and improved consultation with Schools is necessary.

The School has made significant enhancements to the structures and procedures that support undergraduate teaching. The School's Undergraduate Teaching and Learning Committee meets five times each academic year. Each programme committee meets twice per year. The School has introduced a comprehensive system for conducting module level feedback surveys for all modules delivered by the School. The results of these surveys inform discussion at a new SCSS Student Representative Forum, which includes all Class Representatives, the SU Convenor for SCSS, Course Directors and the Director and Associate Director of Teaching and Learning (Undergraduate). The forum meets at the end of each Semester. Re-accreditation of the Integrated Computer Science programme is scheduled for October 2020.

It is worth noting that the quality report template does not provide a meaningful way to capture all of the information requested. For example, while the School is aware of a small number of instances of modules failing to meet to 20-day deadline for "return of coursework", this represents a very small proportion of the modules delivered each year. It is suggested that the template be modified to capture such information as a compliance rate, rather than a binary response.

School of Engineering

2018/19 saw the introduction of TEP which the School saw as both a challenge and an opportunity. The School worked closely with the Senior Lecturer and the TEP team to ensure the successful implementation of all aspects of TEP including assessment, modules sizes, progression rules, calculation of award and programme architecture. The School also developed two Trinity Elective modules which were chosen by the TE Implementation Group to be offered in 2019/20.

The School developed new processes to ensure the smooth implementation of semesterised exams, most notably the introduction of paperless Courts of Examiners through the use of Microsoft Teams. However, as noted above, staff, students and all external examiners expressed concern that the timing of semesterised exams is unnecessarily compressed.

Work continued in 2018/19 on the delivery of the E3 project. Student numbers increased and preparations began on the development of the new UG course proposal for Environmental Engineering and Science. The first intake of students is planned for September 2021.

School of Genetics and Microbiology

The school continues to publish at a high level. E.g. Over a quarter of the publications from TCD in Nature or Science in the last 5 years come from our School. One Department, Genetics, has had eight ERC grants awarded.

School of Mathematics

I am deeply concerned about the implementation of TEP in sophister years, especially when it comes to (a) cross-year teaching, (b) timetabling of statistics modules and (c) reduction in the number of optional modules. All sophister modules, except for the final year dissertation, are currently optional and this is likely to change in the near future. Sophister modules that will be available to Joint Honours students must be timetabled within a 10-hour time frame and that is quite restrictive. In particular, students will have either compulsory modules only or else a small number of optional modules (which will inevitably clash and thus reduce the available options for the Single Honours students). Our primary worry for the future is the timetabling of modules and the constraints this and other TEP-related changes may impose on student choice.

School of Natural Sciences

The school will continue to review the impact of the TEP reforms on the nature and quality of undergraduate education in the school. The school continues to innovate. A new course proposal for a Dual Columbia/TCD degree in Geoscience was approved by USC and Council in 2019/20. Major work towards an integrated Bachelors/Masters programme in Environmental Engineering was carried out: this was approved in 2020. The school continues with wide-ranging work to align its curricula and pedagogy with the aims and principles of the E3 teaching and research philosophy. The school has successfully developed two Trinity Elective modules.

School of Physics

The introduction of the new academic year structure, and semesterized exams, has been a negative experience for the majority of staff and, judging from the many complaints we received, many of the students too. The marking periods and timescales are too short and placed academic and administrative staff under unreasonable pressure. The new progression rules, in particular the removal of 'pass-by-aggregation', have led to an increase in the number of exam sittings, and we now have significant numbers of JS and SS students supplementing who would, under the previous regulations, have passed at the first attempt. Overall, we view this as a negative. On the student side, we received many complaints to the effect that the short revision periods and exam periods would not allow them to perform at their best; while this did not appear to be the case in aggregate (results were similar), it certainly caused bad feeling and stress. The increase in supplementals may also be an effect of students being unable to revise effectively for all their modules in such a short period, and so electing to focus on some rather than others. We have also received many complaints about the RDS being unsuitable, or at least less suitable than our previous practice of hosting sophister exams in SNIAM. The issues with the centralized approach appear to be continuing, judging from our most recent staff-student meetings.

1.4 Staff Student Ratios 2018/19 Report (1:X)

In 2018, the staff:student ratio for the Faculty of engineering, mathematics and science stands was 1:16; this is consistent with the previous year (1:16 in 2016-17 and shows a decrease from the 2015-16 ratio of 1:18). Each of the Schools offered insight on their current staffing, all Schools were in agreements that the current HR systems is very slow and often overly complex. There are concerns that the issues with the HR process may negatively impact the Faculty's ability to the recruit staff and researchers in a timely manner.

School of Chemistry

There are 78 demonstrators that act as Graduate Teaching Assistants in the School of Physics, making the ratio of TAs to students 8 – 12. All 33 first-year PGs have enrolled on the GTA online module but details on non-first years taking the module are not available. For the School of Chemistry, the Staff Student Ratio in 2018/19 was 16 (same level as in 2010/11 and 2011/12). In previous years the SSR was slowly improving from a high of 21 in 2014/15 (2017/18: 18; 2016/17: 14; 2015/16: 19 and 2014/15: 21). This indicator compares well with Oxford University Chemistry (16.7) Imperial College London (16.2) and QUB (15.9) but is still higher than Durham (14.6), Bristol (13.9) and Manchester (13.8). We would like to achieve the SSR in Liverpool Chemistry (11.1) as a long-term aspiration.

School of Computer Science and Statistics

The official School student staff ratio for 2018/19 is 17:1 (Computer Science 15:1 and Statistics 29:1). As a comparator, the top six UK Universities for Computer Science have the following SSRs: Cambridge 10.2, St Andrews 12.3, Oxford 7.3, Imperial College 15, Warwick 16.4 and Edinburgh 11.3.

School of Mathematics

The School of Mathematics student: staff ratio is 1:22 counting part-time lecturers and teaching fellows. The ratio is 1:24 counting only full-time academic staff. The College average is approximately 1:18. An extreme comparison is with Princeton University ranked #1 in Mathematics (QS) which has 78 faculty. 68 graduate students and 80 undergraduate majors. A reasonable international benchmark is a staff: student ratio of (approx.) 1:16. Assuming student numbers remain static this would require a staff FTE of 32 (it is currently 21 counting full-time academic staff). The staff: student ratio is a significant issue for the School – compromising the breadth of mathematical topics we can cover as well as the number of UG students and PGT programmes we can run.

School of Physics

There is financial pressure to increase the UG student numbers and also the pressure to increase PG numbers to increase research productivity. We have been able to maintain Student: Staff ratio of approx. 13:1. through opportunistic recruitment of academic staff who have brought large research grants (often covering their own salaries). Because the numbers of PGR students reduced in the period 2015-2018 (this decrease offset the increase in UG numbers. Note, however, that the numbers of PGR student have now recovered to >100 and we expect an increasing trend in the SSR in 2019/20.

In the School of Physics, there are 60 Teaching Assistants (TA) in the School which makes the composition of the Ratio of TAs to students as follows:

- Average 15 Students: TA
- Experimental labs Average 13 Students:TA
- Computational labs Average 18 Students:TA

School of Biochemistry and Immunology

The constraint of the student-staff ratio poses a challenge to ensure that all students within a large practical class are actively and successfully participating and are achieving the learning outcomes of a particular practical.

School of Engineering

There are 112 TAS in the School of Engineering, the student: staff ratio for labs is approx. 1:5 and Approx. 1:40 for tutorials. Currently 1 TA is enrolled on the GTA online module.

School of Genetics and Microbiology

There has been a large amount of flux in our teaching commitments in early years. I prefer to defer comment on this until figures are available that reflect these changes (an increase in FTSE is anticipated).

1.5 Rankings

The overview of FEMS 2019 subject ranking are as follows:

Biological Sciences	51-100
Natural Science	152
Physics	101 - 150
Computer Science	51 - 100
Engineering	88
Chemistry	51-100
Maths	251-300

Heads of School commented on trends in rankings over the years.

School of Chemistry

The School is ranked in the band 51-100 in 2019 QS University rankings for Chemistry. This compares very favourably with UCD, which is placed in the band 151-200, the University of York (also ranked 151-200) and QUB (ranked in band 201-250). Our aspiration is to re-enter the band 1-50.

School of Computer Science and Statistics

The School was ranked in top 100 Schools for “Computer Science & Information Systems” in the 2018/19, 2019/20 and 2020/21 QS Subject Rankings.

School of Engineering:

Engineering and technology have been rated as 88 by QS rankings and all subjects are top rated nationally.

School of Genetics and Microbiology

Note we are due to have a school review in the autumn which will address this.

School of Mathematics

The School of Mathematics is one of the smallest Mathematics Schools/departments in Ireland (for comparison UCD has ~50 faculty). In addition, the Schools research profile is unusual – including pure mathematics (no applied mathematics or statistics) and theoretical physics (more usually found in Physics departments).

For QS ranking purposes all papers published by theoretical physics staff in the school are counted for Physics rankings. This leaves only 9 pure mathematics whose work is included for rankings. Publishing and citation norms in mathematics also mean that pure mathematics only is at a disadvantage compared to applied mathematics.

School of Physics

Note that the ranking of the School is heavily skewed because the research is counted between two categories (physics and materials). This dilutes the ranking of the School.

1.6 Teaching & Learning Environment-Space/utilization

School of Chemistry

Teaching lecture theatres and laboratories are being fully utilized during teaching term. In the summer months the labs are being used for significant outreach activities. There are plans to develop an international summer school in organic chemistry to cater for the very significant North American market. Planning for new multipurpose laboratory space should be initiated over the next few years to allow expansion and development of student numbers.

School of Computer Science and Statistics

There is a lack of large lecture theatres to accommodate some classes, otherwise space is adequate although spread across too many locations. A new replacement undergraduate PC Lab has been opened in Trinity Central (yet another location) to replace the ICT Huts (which were temporary since 1996). Additional space will be needed in the short term for more academics (E3 Strategic Plan) and research staff (e.g. ADAPT). The School's move into the TR&I space has been delayed. The Bursar is exploring alternative arrangements. The planning for the E3 Learning Foundry, scheduled for completion for the 2022/23 academic year, is progressing well. This will be a significant boost in the quality of the School's teaching space.

School of Engineering

School space is currently over 15 locations. The School is actively engaged with the Planning Officer. Major quality refurbishments are expected in Aras an Phiarsaigh as part of the ramp up phase for the E3 Learning Foundry. We are also reviewing accommodation for lectures for Engineering which has suffered from a lack of cohesive timetabling planning.

School of Mathematics

School space is at a premium. Seminar/tutorial space was converted to offices to accommodate increasing staff, PG and postdoc numbers. The maths help room is now sharing space as a seminar room and lecture room meaning hours cannot be expanded. Ongoing lack of clarity around the Salmon and Synge lecture theaters mean the AV facilities there are not up to spec. The MSc in HPC space is limited to ~15 students, limiting numbers on that programme.

School of Physics

Our teaching labs are now at capacity and we have had to reduce the number of lab sessions (e.g. for JS Physics) in order to accommodate all students (in subgroups).

SECTION 2: POSTGRADUATE TEACHING

SECTION 2 POSTGRADUATE TEACHING SUMMARY

2.1 Collective Summary

All schools in the Faculty have a healthy number of PGR students although this number has been dropping in recent years. This poses a quality issue is terms of the provision of PG experimental laboratory teaching for courses that are dependent on a high-level of practical laboratory supervision.

Within each School, the mechanism for annual registration ensures that all students comply with the new PGR progression/confirmation requirements. In addition, all new PhD students (from 2018 onwards) across the Faculty are enrolled in the 'Research Integrity and Impact in an Open Scholarship Era' module (Epigeum training). Mandatory Annual Progress Reports are submitted (signed-off and agreed by both student and supervisor) and the majority of Schools have assigned supervisory research panels to each PGR which provide an additional line of support to the student's progression.

PGR completion rates are high, with most completing their studies within 4 years (FT) and 6 years (PT). The period of Dean's grace and additional extension periods are accessed readily by students in need of a delayed thesis submission for personal or other reasons and the Directors of PG Teaching and Learning provide an excellent service in support of this.

In many of the schools a number of credit-bearing mandatory and elected modules form part of a structured-PhD programme offering. In several Athena SWAN action plans, Schools have undertaken to complete PGR exit surveys which are invaluable in terms of a feedback mechanism as a source of additional information (e.g. first career destinations) to aid the tailoring of the Ph.D. experience to fit the varied careers, and future needs, of students as they enter academia or the workforce. Many completed PDR (alumni) return to their respect schools to provide alumni:student mentoring and industry-focussed/ career workshops or research seminars. This supplements data coming back to the DPGTL through the HEA Graduate Outcomes Survey.

The numbers of PGT students in the Faculty remains high with a number of schools reporting new M.Sc. taught programmes and providing PG diploma and PG certificate programmes. In the main these cohorts have a high proportion of non-EU students and the needs of these students can be very culturally different, requiring a higher-level of staff:student interaction and supports. The College's PG Advisory Service is a very valuable resource for addressing the volume of enquiries from international students and the Schools provide a considerable degree of on-site and local interventions. Many schools have PGT module coordinators and dedicated administrative officers to coordinate the progression of students in their M.Sc. programmes.

2.2 Completion Rates for PGR students

Completion Rates for PGR students: Please comment on trends in Doctoral students completing their studies within 4 years (FT) and 6 years (PT) of commencement of their PhD programme. Has the School noted any issues with non-completion/ withdrawal or late completion (>6years), PhD fails or awards of lower degrees?

School of Biochemistry and Immunology

Almost all of our students complete their studies within the 4 years (>95%). The school has a very small number of cases in which the completion of PhDs have been delayed. However in all of these cases there were mitigating circumstances e.g. medical or personal issues

School of Chemistry

In 2018/19 there were 51 registered 4th year students listed on SITS (note SITS does not increment beyond 4th year). 35 submitted in 2018/19. 14 students went on to submit in 2019/20. 1 student has yet to submit but is within extension. 1 student left with a MSc. While there are sometimes delays for a range of reasons (lab issues, student personal & health issues etc.), the School has a good record of assisting students complete their degree programme. There are no concerning trends at the moment but clearly there is a need to maintain flexibility regarding the provision of Dean's Grace and we should prepare to be more vigilant with the increased number of start dates. Progress reports and assignment of thesis committee should mitigate the risk.

School of Engineering

Almost all the Doctoral students are completing their studies within 4 years (FT) and 6 years (PT) of commencement of their PhD programme. Issues with non-completion/ withdrawal or late completion (>6years), PhD fails, or awards of lower degrees are rare.

School of Genetics and Microbiology

All students in our school are enrolled in full time courses and the general trend is that students will complete their PhD within 4 years. There have been no cases this year of students requiring more than 6 years to complete their studies. There have been no PhD fails or awarding of lower degrees.

School of Physics

- Vast majority of PhD students complete the programme within 4 years
- Occasional extensions of extra 6 months are granted (6 out 115 current students in the past 3 years)
- Extensions of 1 year or less are rare (3 in the past 3 years)
- Late completion is rare (1 case in the last 3 years)
- Withdrawals are low (3 in the past 3 years)
- Awards of lower degree (2 in the past 4 years)*

  * Appeals were granted in these 2 cases and students were successful after reassessment

PGR Students	B&I	Chem	CSS	Engin	G&M	Maths	Natural Sciences	Physics
Did the School comply with the **new PGR progression/confirmation requirements** prior to annual registration for continuing PGR students?	Y	Y	Y	Y	Y	Y	Y	Y
Are School PhD students being informed of the need to enrol in the 'Research Integrity and Impact in an Open Scholarship Era' module?	Y This is now mandatory for all first year PhD students	Y	Y	Y	Y	Y	Y	Y Yes in 2019/20. We note that the administration and communication of the marks relating to this centrally run module has been inadequate. The School is still waiting for results
Has the School implemented the **EU-GDPR regulations** with externs as per the Advisory Guidelines on EU-GDPR, the Procedure for transfer of students assessed work to EEs and the Thesis Submission Guidelines for Doctoral Students?	Y	Y	Y	Y	Y	Y	Y	Y

Table 5: Postgraduate students registration

2.3 New Postgraduate programmes

Please comment on the implementation of any new PGT programmes that commenced in 2018/19, in particular cross-School or cross-Faculty PGT programmes. Have these programmmes met their student recruitment targets?

School of Biochemistry and Immunology:

A new MSc in Immunotherapeutics commenced in September 2019. We welcomed 9 EU and 5 non-EU students onto this course. This exceeded the total number of students in our initial recruit strategy which targeted a total of 10 students.

School of Chemistry

The cross-School MSc in Energy Science was introduced this year in partnership with the School of Physics with a total of 7 registrants. The 2018/19 target was 8 students.

School of Engineering

MSc in Mechanical Engineering: 6 registered students (target was 10 students)
MSc in Electronic Information Systems: 4 registered students (target was 10 students)

School of Genetics and Microbiology

A new Masters in Genomic Medicine was approved in 2018/2019 and the first intake of students is scheduled for September 2020.

School of Physics

MSc In Energy Science was introduced. (Managed by Physics but run jointly with School of Chemistry and Dept. of Geology). It did not succeed in meeting its target recruitment for a number of reasons (Late starting in recruitment and lack of engagement of some staff.

Table 6: Postgraduate Blackboard engagement

Blackboard	B&I	Chem	CSS	Engin	G&M	Maths	Natural Sciences	Physics
Is module content and information available for all modules on Blackboard, as per the VLE Policy?	Y	Y	Y	Y	Y	N	Y	Y
Did EEs have/or request access to Blackboard?	N	Y	Y	Y Access requested and granted to external examiner of Music and Media Technologies. No other requests received.	N	N	Y	N
Has the School adopted the use of Turnitin in Blackboard?	Y	Y	Y	Y It is not a School policy, but many staff have adopted it.	N	N	Y	Y

2.4 Postgraduate Grades Journey

Comment on the School's experience with implementation of the Grades Journey i.e. the upload of student marks from Blackboard to SITS:

In the School of Genetics and Microbiology, all students are now aware of the regulations regarding yearly progress reports and the 18 month continuation report. We have also implemented a thesis committee for each student in the school.

Programme/Year/Subject Handbooks	B&I	Chem	CSS	Engin	G&M	Maths	Natural Sciences	Physics
Did the School implement the new Programme Handbook Policy in 2018/19?	Y	Y	Y	Y	Y	Y	Y	Y
Were programme handbooks published and available to students before the start of the new Academic Year?	Y	Y	Y	Y	Y	Y	Y	Y
Is the School promoting the new Postgraduate Research Student Handbook to Doctoral Students?	Y	Y	N	Y	Y	Y	Y	Y

Table 7: Handbook policy for undergraduate teaching

2.5 Director of Postgraduate Teaching & Learning comments

School of Biochemistry and Immunology

This was a very successful year in our school from a post graduate perspective. We launched our new MSc in Immunotherapeutics. We welcomed 9 EU and 5 non-EU students onto this course, exceeding our targeting recruitment by 4 students. These students will have the unique opportunity to complete their research projects in collaboration with industry. 11 of these students are poised to begin their research projects completely within industrial settings in the coming weeks (pending any impact of the COVID19 situation). On our MSc in Immunology we welcomed 9 EU and 14 non-EU students. This is the 12th year of this course and it continues to attract significant numbers of high calibre students many of whom go on to pursue PhDs.

One of the major recommendations received from the external examiner of our MSc Immunology was the urgent need for a designated PG administrator. School requested approval for a 100% FT administrator, faculty approved a 50% PGT administrator who is currently being recruited.
We welcomed 18 new PhD students and 2 MSc by research students to the school in September 2019, bringing the total number of PhD students registered in our school to 76. All of our newly registered PhD students completed a bespoke 10ECTs taught module in Core Biomedical Research Skills developed in-house and also completed the college mandated online course in Research Integrity and impact in an open scholarship era. In January 2020 we ran an exciting event for our second year PhD students who had completed their confirmation process. 29 students presented their research findings at a poster event which was followed by a wine reception. The event was well attended by students and staff. Prizes sponsored by the school were awarded to the best presentation along with 2 runner-up prizes.

School of Chemistry

The School has restructured the taught elements of the structured PhD into 3 parts. (i) Mandatory courses - including CA7000, Demonstration module, Research communication, LEAD and Health and Safety Training; (ii) Research-relevant courses and (iii) Translational Skills courses. The new structure has been well received by students. DubChem courses delivered by UCD contribute research-relevant modules, and scheduling and grading issues have now been resolved.

The PG website has been updated and a revised handbook provided to all students. The processing of PGR applications has been streamlined to facilitate recruitment of overseas and scholarship students. Systems are in place to monitor the progression of each student through timely transfer vivas and completion of progress reports.

School of Computer Science and Statistics

The MSc in Computer Science, comprising fours strands, remains our flagship offering and is attracting a significant number of applications which is yielding a high-quality cohort of students. There have been some issues with regards to the timely closing of applications and this seems to be a result of the number of people needed to make this decision. In 2019/20 this has resulted in 134 students accepting offers onto the programme, with is over 10% more than the target of 120. This has led to a significant strain on supervision capacity within the School. This has a potential impact on the quality of the supervision offered.

Regarding the School's structured PhD programme, it is functioning well, and students are mostly progressing as anticipated. The tightening of the tracking of progression has resulted in more timely confirmations and completion of annual reports. We have seen a drop in the relative proportion of students requesting a continuation year, meaning most are completing with in the 4-year (FT) or 6-year (PT) timeline.

PhD numbers are declining overall, despite new funding mechanisms, such as the SFI Centres for Research Training (CRTs). The decline is mostly attributable to a very strong employment market for Computer Science (and related) graduates. With a large proportion of the School's students being funded by SFI we are having increasing difficulty finding the resources to cover the difference between what the funding agency with support with respect to fees and the College's non-EU fee. This will likely result in us not being able to offer funded PhD opportunities to the best candidate if they are not eligible for EU fees. This will have an impact on the quality of our PhD graduates.
The new Postgraduate Research Student Handbook will be promoted in out 2020/21 School Handbook.

School of Engineering

The PGT programmes in the School are continuously modified and upgraded to appropriately incorporate new relevant elements targeted to cater for the academic, industrial and market needs. Also, strong industry links though already exist are also the focus. We are also exploring joint programmes across some of the relevant Schools (Engineering, Natural Sciences and Computer Science) in the context of E3 developments which are expected to start from 2020-21.

We already have healthy numbers in our MSc programmes, particularly in Civil and Mechanical Engineering, where we have experienced a significant growth with interests from non-EU candidates. We are limited by administrative, laboratory and supervisory capacity to further increase our student numbers in the MSc programmes. The School plans to start an MSc on 'Computational Engineering' as a new strand in the MSc on 'Electronic Information Engineering' from 2021-2022 to address growing industry needs and relevance in this area.

The individual Doctoral committee for PhD researchers have been a key development. This is working well. The School will also consider developing some level 10 doctoral level modules in 2020-21.

The School has very active engagement from colleagues with curriculum planning. We have innovated successfully in the MAI programme which has been expanded to include internships and study abroad options. Participation in study abroad/internship options has vastly improved in recent years. The School is improving its diversification of international partnerships. Teaching methods are diverging to include more cross disciplinary elements as a precursor to the E3 Initiative. Research grant income is stable and is diversifying.

School of Genetics and Microbiology

Our School provides excellent PG student supervision is reflected and has a high research output as we continue to publish many papers in international journals of very high calibre and impact. A large proportion of PG students registered with the School who are Irish Research Council (IRC) PhD student program. PG students continue to contribute to teaching undergraduate students in their capacity as demonstrators during practical classes. Additionally, PG students are essential for the day-to-day activities of final year "capstone" research projects. These projects receive no financial contribution from College and students receive no remuneration for their time which is often extensive. The time committed by PG students also takes away from time spent on their own projects. This will need to be addressed going forward as it is a chronic complaint and the situation is not sustainable in its current form. As these projects are a fundamental feature of TEP, at the very least, funds should be provided for these 10-week projects. The School is in the process of establishing a taught Masters course in Genomic Medicine and this is due to launch in 2019/2020. It is a joint initiative with the School of Medicine. The School is currently meeting the requirements for all credit bearing courses that need to be completed by PG students.

School of Physics

The School was very proactive in most directions related to teaching, research, student recruitment and engagement with UG and PG students. We followed the best international examples of practice in these areas and were not shy to pioneer in some areas ourselves. We could mention Walton Club, a shining example of engagement with Secondary School students for the benefit of raising the profile of the College, the School and also as a recruitment effort.

One issue that is having a very negative impact on PGR students is the stipend & fees situation at the moment. Vast majority of students are paid from research grants from different sources (SFI, IRC, ERC, etc.). Stipends have been static for many years while rents in Dublin continue to grow. Students are struggling financially, and this will inevitably impact on their research and on their PhD. In addition, tuition fees charged by TCD are higher than the amount permitted by funding agencies. Instead of transferring this difference to the student, the School of Physics covers this shortfall at a significant cost for the entire School. If the TCD fees were in line with the amount permitted by research councils, the School could provide some extra financial support to students, which would have a major impact on the quality of their postgraduate experience.

School of Mathematics

The School was negatively impacted by the recent reorganization of the Science degree – TR071 into 3 streams, losing a significant portion of its FTEs through reduction in overall mathematics teaching to Science students AND in the requirement that we deliver the same teaching in two semesters to what was previously a single JF cohort. The school participated in good faith in the curriculum reform discussions, being assured that any negative consequences would be addressed. The very real negative effect on the School's budget has not been addressed. The School continues to be extremely worried by the looming negative consequence s for our programmes – most especially Mathematics in TSM (Joint Honors). Concerns have been described in detail in the previous quality report as well as in various meetings and email exchanges with the Senior Lecturer, VP and others. No mitigating strategies have been discussed or agreed.

Finally, I would like to commend my colleagues for their exceptional dedication to teaching and learning in what has been a very difficult year. In 2019 two active members of the School died – one while still in service and the other although retired was still teaching and supervising UG projects. A senior member of the School faculty also left to take up a more senior post

School of Natural Sciences

Some aspects of TEP have been incorporated and will continue to be implemented. This is not undertaken at School level, but through individual supervisors. Too few participants in the ISSE report to be meaningful in any real sense. Individual disiplines have taken on board specific actionable comments and find the survey has offered some insight into how we can improve our program.

Several students have identified cost of living relative to the stipend as a problem – informally we have also experienced students not taking up places due to cost of living worries. This is a critical problem. One student cites research infrastructure as a problem. We are working on upgrading our research infrastructure. Several students cite administrative burden as a key problem – particularly understanding how to register, communication with central administration and payment of stipend in a timely manner. We could do better as a College in effectively managing PhD student registrations and at the Discipline level in communicating expectations and processes better to students. The School is meeting the requirement for return of coursework within 30 days.

SECTION 3 External Accreditation

School of Physics

The following are the name of programmes that had an accreditation visit in 2018/19:

- BA Physics TR063
- BA Nanoscience TR063
- BA Theoretical Physics TR035
- BA Physics and Astrophysics TR063

The name of the accreditation body: Institute of Physics

The outcome achieved/period of accreditation granted: The degrees listed below were accredited with immediate effect and were set a review date of **30 March 2021**.

School of Biochemistry and Immunology: Reported as n/a

School of Chemistry Reported as n/a

School of Computer Science and Statistics Reported as n/a

School of Engineering: Reported as n/a

School of Genetics and Microbiology Reported as n/a

School of Mathematics Reported as n/a

School of Natural Sciences Reported as n/a

SECTION 4: INTERNATIONAL STUDENT EXPERIENCE

SECTION 4 International student experience

We can learn much about international student experiences in Trinity by considering the feedback from staff and consulting the International Student Barometer (ISB). This barometer is a particularly useful tooling for quality improvement purposes as ISM is a global benchmarking survey. The Trinity ISM survey was conducted in November – December 2018, all 4500 international students were invited to participate in the survey. The response rate was 31% for the Trinity ISM survey compared to the 26% national response rate. The survey takes a holistic approach to the student experience from living accommodation to the quality of teaching.

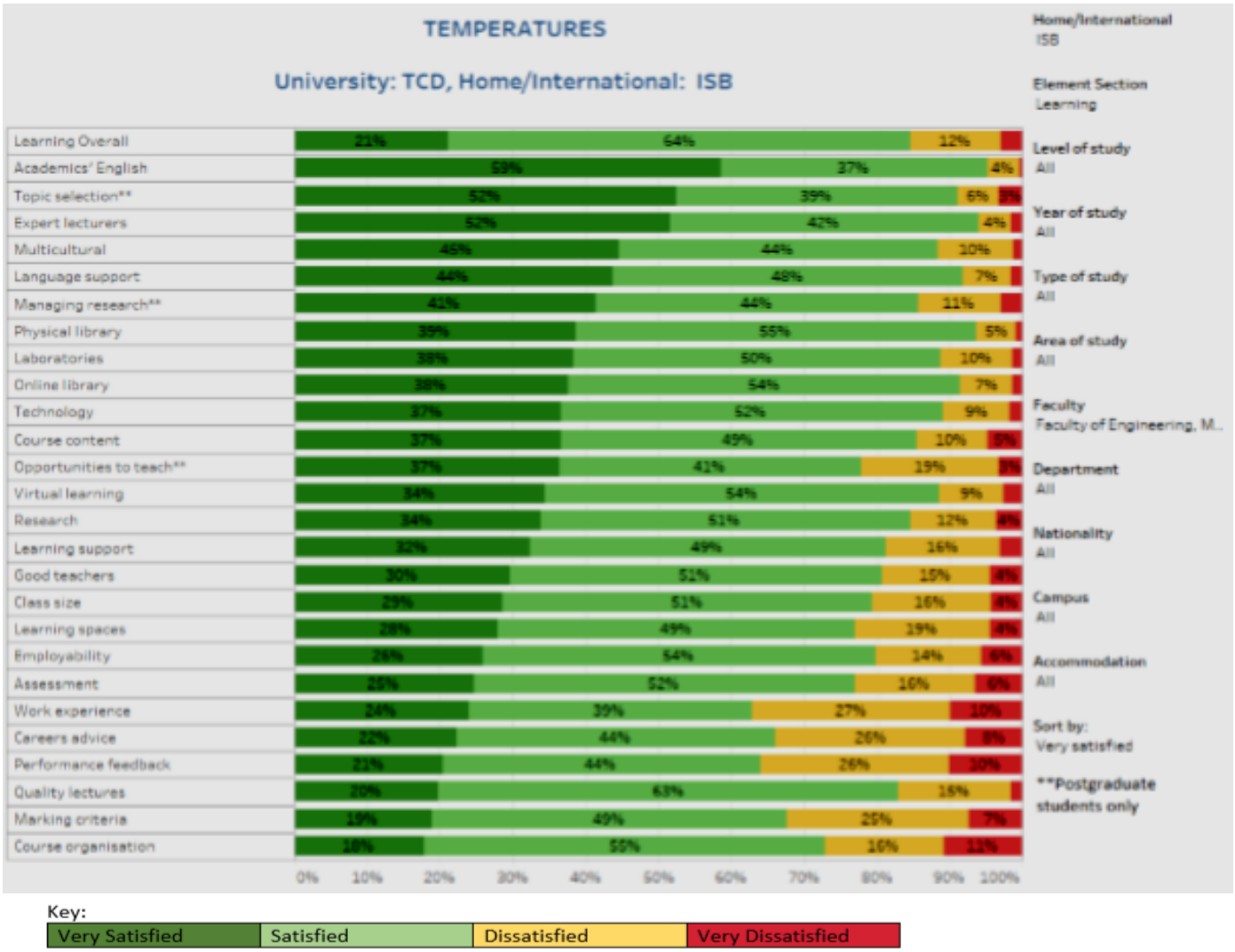

Figure 1: Learning Experience survey findings for the Faculty of engineering, mathematics and science

On reviewing the findings from the ISM survey, our Faculty were particularly interested in international students' overall learning experience. Figure 1 summarises the different elements which contribute to the student experience; students rated their level of satisfaction accordingly in each of these areas (from very satisfied, satisfied, dissatisfied to very dissatisfied). This feedback better informed the Faculty on areas in which we intend on focus on in the coming year such as providing additional work experience and career advice; providing continuous formative feedback as necessary and reviewing course organisation and marking rubrics. Many of the issues highlighted by the survey results had also been raised by FEMS staff (as indicated in the section below).

School of Biochemistry and Immunology

One (minor) difficulty was our timetable and practicals. Unlike some other schools, our timetable is different each week, and practical classes have limits on space and resources, which limits the numbers of international students we can accept. One solution is to accept the first '10' students to the whole course / modules and any more than 10 to lectures only.

School of Chemistry

One problem that is recurrent for international students is finding accommodation. It is very difficult for them to find affordable places of reasonable quality for short periods of time (4-6 months to 1 year).

School of Computer Science and Statistics

The Thapar Student Integration Sub-Committee was established last year. Academics from Computer science, along with academics from Engineering, Global officers, the International Student Experience office, Trinity Halls, the Careers Advisory Service and Academic Registry sit on this committee whose aim is to aid in supporting Thapar students' issues.

School of Engineering:

The two areas of development for the School of Engineering based on the feedback from the 2019 ISB are 1) welcome/orientation and 2) work opportunities.

<u>Welcome/Orientation-</u>

Provide regular communications, both email and webinars, in August for incoming students to provide important information prior to starting at Trinity to establish the sense of community, as well as ease anxieties of starting at a new school and in a new country. To address the feedback on improving the welcome and orientation for international students, we will livestream the regular School of Engineering international student orientation for students who have not yet arrived. It can also be posted online and can be viewed later by students to receive relevant and necessary information. This will allow for more students being able to participate in orientation. The Global Officer will also host a follow up orientation/welcome event in September, after Freshers week, and once classes have started to address any issues that have come up and to create a line of communication between students and the School.

<u>Work Opportunities-</u>

International students sometimes need support to understand their working eligibility within a new country, as well as the workplace culture of finding employment. The Global Officer will an information session in late September to advise international students on their work eligibility, as well as tips on finding meaningful employment, as students and as they prepare for their careers.

SECTION 5 Partnership agreements

One partnership of note is between Trinity College Dublin, Ireland and Columbia University, New York joined forces to offer a dual degree program to provide students with an international educational experience at renowned universities on both sides of the Atlantic. This partnership offered opportunities for students across the
Faculty.

Columbia University's David Madigan with TCD's Patrick Prendergast on the occasion of the signing.

What Partnership/Articulation is your School engaged in?

School of Biochemistry and Immunology

Starting in 2020, there will be a Columbia partnership which will be 20 students per year. The School of B&I has existing partnerships with University of Zaragosa, University of Aix Marseille, University of Grenoble, Jagellonian University Crakow, Johannes Gutenberg University of Mainz, University of Florence, and University of Siena for the 3rd year Erasmus program. The School also has partnerships with University of Massachusetts (UMass) Boston, Harvard Medical School, Boston, The Hudson Institute at University of Melbourne, the Lowry Cancer Research Center in University of New South Wales, Australia. The School has initiated a joint degree program in Neuroscience with Columbia University, USA.

A number of students enter the School of Biochemistry and Immunology under partnership arrangements. In 2018-19 (all cohorts), this includes the following intake:

- Harvard: 1-2 students per year, UMass: 2 students per year
- Lowry Cancer Center: 2-6 per year
- UNSW: 3-6 per year
- Tapar: 0 in 2018-19
- Erasmus: 0 in 2018-19

School of Chemistry

We are now finalizing the details for a new Partnership with Villanoba University (USA) that will be integrated within a summer school in Chemistry serving as an entry for future studies.
Additionally, initial contacts are in progress with Syracuse University (USA) for a partnership in the degrees of Chemistry and Medicinal Chemistry. Additionally, we continue strongly engaged with the

Erasmus agreements program and Erasmus+ internships program. Since our partnerships have not yet been finalized, we have not received any student within a partnership arrangement in 2018-19. Regarding Erasmus and Erasmus+ students, we have received 15 students in 2018-19 and sent 7 (4 Erasmus, 3 interinstitutional agreements) within the same period.

School of Computer Science and Statistics

In 2018-19, 20 students entered the School of Computer Science and Statistics via the Thapar partnership.
To date, the total number of students in our School who entered under this formal partnership arrangement are as follows:
Thapar in 2018/19: 48 students which comprises of

Year 3: 20 Students
Year 4: 27 students
Year 5: 1 student

Thapar cumulative since 2015/16: 95 students.

School of Engineering

In 2018-19, the School of Engineering engaged in both the INSA Lyon and the Thapar partnerships respectively. Under the Thapar partnership, 33 students entered our School and via the INSA Lyon partnership 3 students enrolled on our programmes. These two partnerships are well established with 102 students entering under Thapar since 2015. From 2004 to 2019, 44 students commenced in our School via the INSA Lyon partnership.

School of Genetics and Microbiology

Currently the School is not engaged in a Partnership/Articulation Arrangement.

School of Mathematics

No students in your School in 2018-19 entered under a formal partnership arrangement.

School of Natural Sciences

In 2018-19, the School was not engaged in a Partnership/Articulation Arrangement.

School of Physics

Students can enter programmes in the School of Physics via the Columbia or the Thapar partnerships, in 2018/2019 no students enter the School through these partnerships.

SECTION 6: STRATEGIC STAFFING PLAN- RECRUITMENT/ VACANCIES

SECTION 6 Strategic Staffing Plan-Recruitment/Vacancies

School of Chemistry

There will be a number of retirements both of technical and academic staff as anticipated in the School staffing plan within the next 2-3 years. Hence it will be important to replace key technical staff in order to ensure maintained quality in UG lab teaching. Action is being taken in administrative staff recruitment. Vacancies arising from retirement of academic staff will hopefully be filled.

School of Computer Science and Statistics

The School is working through its E3 Strategic Staffing plan. Currently it has 12 new and replacement academic appointments, including a Head of School, in progress or planned for completion by the end of the 2019/20 academic year. The hiring process is very slow (this process needs to be streamlined). Some academic posts may be hard to fill in the current circumstances.

School of Engineering:

In 2018/19 the Chairs of Mechanical Engineering and Electronic Engineering were vacant. The LM Thapar Chair was also vacant. The general staffing level in Electronic and Electrical Engineering is too low to allow adequate coverage of the subjects even at introductory levels.

School of Genetics and Microbiology

The School has challenges in filling a vital teaching post, arising from a resignation. A Teaching Fellow appointment will be needed in the interim. Other challenges are filling the newly vacant School administrator post, negotiating a fixed term Ass. Prof contract, filling a vital EO post.

School of Mathematics

The Erasmus Smith Chair in Mathematics remains vacant (last 11 years) significantly damaging international reputation as well the strategic development of the discipline. The recent award of a SALI chair in Mathematics was welcome and is now advertised. However, this must not be seen as a replacement for the Erasmus Chair. As already noted, faculty numbers are very low in the school by all national and international norms.

School of Physics

The School did not have issues with filling its academic positions with high caliber staff. We are seen as a high-profile research organization and remain highly competitive on the academic labour market. Yet, there is massive pressure on space to accommodate research groups of the incoming academics and support the growth of successful current academics. The College needs to have uniform and transparent policy for allocation of space to Schools to reduce inefficient use of space. The main risks are associated with the reduced autonomy of the School to secure its support staff within the allocated budget. We are struggling to fill in the support staff vacancies at the level that is appropriate to the task. The decisions on this are taken at the centre of the College and the responsibility for these decisions are allocated to the School. The problem is that with inadequate numbers of support staff, additional workload is placed on academics to fill the gaps and this reduces efficiency of the organization.

SECTION 7 Notable awards received

7.1 Provosts' Teaching Awards

On 30th May 2019, Prof Celia Holland, School of Natural Sciences received the Lifetime Achievement Award at the Provosts' Teaching Awards 2019 ceremony.

Prof Conor McGinn from the School of Engineering received the Early Career Award at the 2019 TCD Provosts Teaching Awards. Conor is a lead developer from the School of Engineering, in the 2019 he featured on the Time Magazine Top 100 Inventions of the Year for Stevie the Robot. Conor was also on the list of 35 Innovators Under 35 Europe in 2019.

Prof Conor McGinn, Prof Helen Sheridan, Prof Celia Holland, Prof Tara Mitchell & The Provost (Left to Right)

7.2 Trinity Teaching Award for Postgraduate Student

Congratulations to Maedhbh Nic Lochlainn from the School of Natural Sciences and Shelley Stafford, from the School of Chemistry who won the Postgraduate Teaching Awards for 2018. These awards recognise the substantial contribution that Trinity's postgraduate students make to undergraduate teaching & learning through their roles as teaching assistants and demonstrators.

Declan Cahill, Samantha Fazekas, Shelley Stafford and Maedbh Nic Lochlainn *(Left to Right)*

7.3 Provost's Professional Staff Awards

The Provost's Professional Staff Awards acknowledges the contribution of exceptional professional staff, including all Trinity College Dublin administrative, technical and support staff. We wish acknowledge staff from the Faculty of Engineering, Mathematics and Science who received one of the Provost's Professional Staff Awards. Outstanding Colleague Award was presented to Mr. David Sullivan, Dept of Genetics - FEMS who delivers outstanding service to the Trinity Community.

SECTION 8 ATHENA SWAN

In 2019, the Faculty of Engineering, Mathematics and Science (FEMS) has 7 out of 8 Schools with an active Self-Assessment Teams (SAT). Compared to the previous years, this indicates that the number of Schools in FEMS with active SATS has almost doubled in the past 2 years. In the following pages we provide a summary of the progress regarding Athena SWAN in each of the Schools.

School of Biochemistry and Immunology:

Our Athena swan committee (led by Dr Noirin Nic a Bhaird, Dr Darren Fayne, Prof Cliona O'Farrelly, Dr Aisling Dunne, Dr Tomas Ryan, Dr Lydia Lynch and Prof Ed Lavelle) have worked hard on this and submitted an Athena Swan bronze application in 2019. We were unfortunately unsuccessful, so the committee are working towards a resubmission in late 2020. As part of this there have been specific meetings with all school cohorts, and this has been a rewarding process in terms of identifying issues of concern within the school. We see this as an ongoing process that should help build stronger connections across the school from undergraduate students to Professors and our technical and administrative staff.

School of Chemistry

The School has been in receipt of an Athena Swan Bronze Award over the period 2015-2018. School retained its Athena Swan Bronze award in 2019. It is one of two Schools in FEMS that has a current Bronze award, the other being Natural Science. The Athena Swan Self-Assessment Team (ASSAT) has been replaced by the Equality, Diversity and Inclusion (EDI) Committee chaired by Prof. Graeme Watson with a remit both to submit an AS Silver application in November 2021, and to progress Equality and Diversity best practice throughout the School of Chemistry. This is a core committee of the School, whose terms of reference and membership have been approved by the School Executive. The AS champions in the School for the period 2019-2022 are Profs. Graeme Watson & Larissa Florea.

To date our Athena Swan actions have resulted in the creation of a permanent and formal role for the ASSAT in the School's management structure; a 50% increase in female academics on decision making committees; more transparent communication and enhanced consultation through the re-introduction of monthly School Committee meetings; improved staff induction and mentoring procedures; enhanced visibility of our female staff (24% of our research seminars are presented by female academics compared with 16% over the period 2012/2015) and new targeted career supports for our PG (40% female) and PDRF (32% female) cohorts.

We are now actively track our online and recruitment materials and the progression of our UG students (2018 intake 55% female). This gender disaggregated data (GDD) is used to underpin changes in our procedures, policies and teaching practices with a view to achieving greater gender parity. The culture of the School has changed irrevocably. It has been transformed by implementing living; equality and diversity training (LEAD) for all staff (71% in 2018 versus 48% in 2015) and raising implicit bias awareness (49% staff).

School of Genetics and Microbiology

A bronze award application is in the final stages of completion and will be submitted soon. The Athena Swan Bronze award application process involved a considerable exercise in data gathering. Professor Aoife McLysaght has agreed to act as champion for this application within the School and is assembling a self-assessment team from different layers of the School's members.

School of Computer Science and Statistics

We have appointed an Athena Swan champion. We have a planning team in place and Prof. Tangney is actively involved in planning at the Faculty level. The School plans to submit an Athena Swan Bronze application in 2019/20. A self-assessment team (SAT), led by Prof Brendan Tangney, has been formed. It has met regularly, surveyed all staff and made presentations to the Executive and at Staff meetings. A draft submission has been prepared. The COVID-19 pandemic has delayed its discussion and review at a Staff Meeting and consequently its submission. With delayed deadlines it may still be possible to submit in May-20 rather than delay until Nov-20.

School of Engineering

Athena Swan application for Bronze Award progressed in 2018/19. Active Committee established with Sarah McCormack as lead and reports regularly to School Executive Committee. SALI Chair application was proposed but wasn't successfully shortlisted at College level.

The School is fully engaged in the Athena Swan process, with a new Athena Swan Champion appointed, Dr Sarah McCormack, who is the School's key liaison with the Faculty's Athena Swan planning group. A presentation from Dr Eileen Drew to the School Executive Committee is being planned for Semester 2.

The School's female registration numbers are rising with females making up 27% of undergraduate students across the 5 years of BAI/MAI programme and 25% of all postgraduate students
The School continues to target girls' schools through outreach programmes run by Dr Kevin Kelly with support from the Consortium Linking Universities of Science and Technology for Education and Research, https://cluster.org/.

School of Mathematics

The School Athena Swan committee is in place, chaired by Prof. Stefan SInt, and we are working towards a submission for Bronze status in the November 2020 round.

School of Natural Sciences

The School of Natural Sciences currently holds a Bronze Award and applied for a Silver Award in November 2018.

School of Physics

The School applied for retention of its Bronze Award in 2018/19. However, the application was rejected, and the School was given an extension of one year in order to ally it re-apply (due April 2020). The School has addressed the points raised in the report, although we noticed significant inconsistency in such points (the same point was mentioned as a positive and as negative.) We have prepared for the resubmission of the application at the end of April 2020.

SECTION 9: Faculty Quality Actions at a Glance: Past, Present and Future

SECTION 9 Faculty Quality Actions at a Glance: Past, Present and Future

9.1 The Past: On-going actions from the previous 2018 Annual Faculty Quality Report

Space

Similar to previous years, space continues to be a common issue raised by students and staff in a number of Schools. In 2018 teaching spaces and common area are reported as sub-optimal for teaching and learning in the long term. The Goldsmith Hall lecture hall was reported in the previous Quality report as needing to be revamped. The Dean and Heads of School are actively engaging with the newly appointed College Space Office and Space Allocation Committee in order to improve Faculty teaching spaces to better satisfy the current and future needs of staff and students.

A number of projects were initiated in 2019.

- A FEMS space strategy report was commissioned as part of the E3 Learning Foundary New Build.
- The Faculty commissioned a review of Goldsmith Hall and obtained costings for repurposing and refurbishing this space. The quotes and architectural plans were used in a submission for external funding.
- A much-welcomed breastfeeding facility was provided within the Trinity Biosciences Institute.

Quality Data and Reporting Timelines

The file bank and resource depository developed by the Quality Office is welcomed however the timeframe for the collation and presentation of the Faculty Quality Report to the Quality Committee remains a challenge. The current process and the template do not allow for responses to be consistent across years and data acquisition and its analysis forms part of future actions.

Student Recruitment and Marketing

A number of learnings have been gleaned in 2019 from Faculty Office staff and the Dean working closely with the newly appointed E3 Marketing Manager and Student Admissions and Recruitment Officers. The Global Officers in Physics and Chemistry and in the Biological and Natural Science streams have worked hard to deliver some of the new dual degree, exchange and international partnerships that have emerged in the Faculty in 2019.

9.2 The Future: Looking forward in the short to medium term

Prioritised Actions within the Faculty will seek to address how to:

- Fully optimize and critically analyse the opportunities and risks that emerge from online and blending learning and teaching, and multimedia forms of assessment.
- Bolster the financial sustainability of the Faculty by leveraging the opportunities afforded though the philanthropic Campaign for Trinity, and recent Faculty-led submissions within the Human Capital Initiative.
- Embed the Athena SWAN objectives and progress actions for promoting gender, equality and inclusion across all 8 Schools
- Continue to drive forward the E3 project and to use the E3-dedicated marketing team to pilot and test effective marketing strategies to the benefit of the entire Faculty e.g. virtual Open Day materials and career webinars.
- Enhance data acquisition, analysis, testing and scenario planning at Faculty and School level.
- Improve communication with, and feedback from, Faculty representatives across the College

9.3 Present Realities and Risks

Quality is a difficult metric to measure but easily recognised. The challenge in the writing of this report was to support Schools to capture and report on the data in a timely manner and in a way that truly reflects the quality of the administrative, research and teaching support structures that are built into the fabric of the Faculty of Engineering, Maths and Science. There are many and varied examples of good practice that are so automatic (like double and anonymous marking, and one-to-one and face-to-face feedback on essay assignments) that they go unrecorded. Processes are being modified at School level to address issues like GDPR, plagiarism and safety in a manner that runs so smoothly that documenting it seems immaterial. Schools are recording and evaluating their processes continually but through a different lens e.g. for Athena SWAN applications (in addition to the 2 bronze award holders, 3 Schools have written final drafts of their submissions in 2019 which are currently undergoing internal review) or as part of External School Reviews (2 schools with documentation prepared for 2019), in fact the inception of the Trinity Education Project was born out of a review of the Science Course Office within the Faculty.

One focus of the Faculty in the next 12 month period therefore is to attempt to address this oversight, not by looking back but by reviewing the statistical and anecdotal data at regular intervals over the course of the next year and discussing it at the monthly Faculty Executive Committee. The intention also is to actively promote and highlight evidence of Quality via the Faculty website e.g. recognition via awards, prizes and honours to students and staff.

There have been significant and reflective changes in direction which do not form part of this 2019 report. Examples are

- The Faculty's consolidated risk registrar which represents a change in the identification, assessment, analysis and management of risk across all Schools.
- The creation and operation of a Faculty Ethics Committee as a new compliance structure supportive to researchers.
- The work of the Faculty Safety Committee, Comparative Medicine Unit and Faculty Executive Committees to make improvements in policies, procedures and operations that are not captured in this report but allowed the Faculty to respond to the challenges imposed by the COVID-19 pandemic.

The attainment of Quality is more assured in situations where resources are adequate and compromise is desired rather than essential. In the wake of the COVID-19 pandemic the College has had to rethink its Baseline Budgetary Model (which has been in operation in the College for the last 3 years). The immediate imperative is to work to mitigate against the effects of a global economic crisis that is about to descend on all sectors of society. The Schools in this Faculty that have worked so hard to gain insight into their financial stability and to deliver on their strategies for growth now have to plan for a very different future. Although every other framework within which we operate is about to change the Faculty will retain one constant – an unwavering commitment to Quality and all that that entails.

9.4 FACULTY AT A GLANCE QUANTITATIVE DATA

Tables 8 and 9 summarises the course and module evaluation for undergraduate and postgraduate modules.

Table 8: UG Student Module Evaluations

UG Student Module Evaluations	Bio	Chem	CSS	Engineer	Genetics	Maths	Natural Sciences	Physics
No. UG Modules taught	58	37	82	131	30	58	84	48
No. UG Modules evaluated	58	37	82	131	21	58	83	48
Proportion of UG Modules evaluated (%)	100%	100	100	100	100% in Microbiology 70% across School	100	98.8%	100%
Average response rate to module evaluations (%)	50%	n/a	44.38%	Good response rate due to method of evaluation	Varies. 93% in Microbiology	50% MT, 38% HT	n/a	50-60%

Table 9: PG Student Module Evaluations

PGT Student Evaluations	Bio	Chem	CSS	Engin	Genetics	Maths	Natural Sciences	Physics
No. PGT Programmes taught	2	1 shared programme currently administered by Physics	3+ 1 Year 5 of ICS	12	0	1	3	1
No. PGT Programmes evaluated	1	1	n/a	12	0	0	3	1
Proportion of PGT Modules evaluated (%)	50	100	n/a	100	n/a	0	-	100
Average response rate to module evaluations (%)	n/a	n/a		80	n/a	n/a	-	100

External Examiner Reports are depicted in Tables 10 and 11.

Table 10: Undergraduate Programmes Externally Examined by School

UG External Examiners	Bio	Chem	CSS	Engin	Genetics	Maths	Natural Sciences	Physics
No. of UG EE reports expected	4	6	5	6	3	2	8	3
No of UG EE reports received	4	6	5	6	3	2	8	3
Proportion of UG EE reports returned (%)	100%	100	100	100	100	100	100	100%

Table 11: Postgraduate Programmes Externally Examined by School

PGT External Examiners	Bio	Chem	CSS	Engin	Genetics	Maths	Natural Sciences	Physics
No. of PGT EE reports expected	1	0	5	12	0	1	3	0
No of PGT EE reports received	1	0	5	7	0	1	3	0
Proportion of PGT EE reports returned (%)	100%	0	100	58	n/a	100	3	n/a
Does school have a Staff/Student Liaison Committee?	N	n/a	Y	Y (Each course with the exception of Music and Media Technologies and Electronic Information Engineering has a staff/student liaison committee)	n/a	Y	Y	Y

APPENDICES

APPENDIX A: Action by action plan

School	Planned Action to be taken	Problem/ Opportunity action responds to	Trigger/ Source (e.g. EE report, module evaluation, ISSE PGR etc.)	Responsibility (e.g. DUTL, DTLPG, Programme Director etc.)	RAG Status Progress	Comment
1. Action(s) taken in response to **UG module evaluations**						
NATURAL SCIENCE	BOU44107 – on basis of student feedback on apparent inequity in time requirements for written assessments associated with this module, we will modify the assessment requirements for the third practical (reducing the number of case-study species), and will more clearly inform students of expected time input to each practical.		Evaluation	Module Coordinator	BOU44107 – on basis of student feedback on apparent inequity in time requirements for written assessments associated with this module, we will modify the assessment requirements for the third practical (reducing the	
GENETICS	Reorganise final year research projects in Microbiology so that they are split evenly between semesters 1 and 2.	Microbiology SS students requested this change so that they could reflect on their results and start to write them up before planning the second phase of the project.	Feedback from SS students	Microbiology course director	Completed	
ENGINEERING	School proposing to make it a requirement for PhD students to teach	Decline in number of Teaching Assistants and impact on lab/tut teaching	Staff/student liaison meeting	DUTL	Amber	
Maths	Discussion of content for analysis	Opportunity to improve of analysis procedures	UG Maths committee	DUTL, UG Maths Committee	ongoing	
FEMS	Increase module choice at JS level	Perceived lack of choice in 5 ECTS modules at JS level	Staff-Student Liaison Meeting	HoD; DUTL	ongoing	
CHEMISTRY	Work with other Schools in FEMS to ensure that CA assignment deadlines are more evenly spread out across the semester.	Students have raised concerns that a significant number of CA deadlines occur in the final week before exams, both in S1 and S2, resulting in considerable pressure. A pan-FEMS approach, using an online spreadsheet, is being considered to manage this.	Student feedback	DUTL		
CHEMISTRY		This item has already been addressed through communication with TR060. Chemical Sciences students will have same timetable as TR060 students next year.	Student feedback	DUTL		
CHEMISTRY	Timetabling of labs in BYU22201 for Chemical Sciences students caused significant difficulties.		Student feedback	DUTL		
FEMS	Review of assessment deadlines and weightings	Bunching of deadlines and opportunity to rebalance assessment weightings in context of an increase of assessed coursework components (in response to TEP)	Staff-Student Liaison Committees	DUTL, HoDs	ongoing	
FEMS	Spreading deadlines, where possible.	The "bunching" of assessments for coursework now that we are using this as an alternative/supplement to exams at the end of the semester.	Feedback from student reps, e.g. in undergraduate studies committee	DUTL / Module Coordinators		
FEMS	As part of future proofing our assessment methods, we must have plans in place if another COVID19 situation occurred. We must be prepared if necessary, to change assessment format	Student perception of difficulty and length of assignment was noted by students being examined during COVID19 campus closure	Range of student responses regarding different aspects of assessment	Module coordinator	ongoing	

School	Planned Action to be taken	Problem/ Opportunity action responds to	Trigger/ Source (e.g. EE report, module evaluation, ISSE PGR etc.)	Responsibility (e.g. DUTL, DTLPG, Programme Director etc.)	RAG Status Progress	Comment
2. Action (s) taken in response to **ISSE Survey (UG)**						
MATHS	Discussion of format of final year projects	Forward planning		DUTL		
CHEMISTRY	JS labs will be looked at in detail. Need to improve overall student experience.	JS Organic labs will be thoroughly reviewed. Reproducibility of experiments will be addressed. Some sample characterization data will be provided. Further guidance on writing and grading of reports will be provided (early in S1). Training for new demonstrators will be revised.	ISSE survey	DUTL/JS Coordinator/JS Lab Coordinator		
FEMS	Increase mindfulness and wellbeing activities in the School	To reduce the number of students presenting with anxiety, particularly at examination sessions	Students reaching out to Tutors and to Student counselling services	DUTL, Tutors		
ENGINEERING	More frequent interaction with class reps to flag issues/concerns	1st year student experience	ISSE	DUTL	Amber	
GENETICS	Encourage student participation	Low student response rate	Survey report	DUTL	Pending	

School	Planned Action to be taken	Problem/ Opportunity action responds to	Trigger/ Source (e.g. EE report, module evaluation, ISSE PGR etc.)	Responsibility (e.g. DUTL, DTLPG, Programme Director etc.)	RAG Status Progress	Comment
3. Action (s) taken in response to **UG External Examiner reports**						
MATHS	Adjustment of marking schemes and solution	Forward planning	Extern and student feedback	DUTL		
ENGINEERING	Reporting problems with compressed exam session to Senior Lecturer	New academic year structure and timing of exam sessions	External examiner reports	DUTL	Red	
CHEMISTRY	Negative feedback in relation to RDS as a venue for SS exams.	Issue has been raised with SL but no alternative venue can be provided at the moment.	External examiner report	DUTL/Course coordinators		Negative feedback in relation to RDS as a venue for SS exams.
CHEMISTRY	Low marks in synoptic problem paper need to be addressed.	Additional tutorials will be provided to assist students in preparing for problem paper. Staff will be asked to go through past problems in detail. Weighting of CA component will be increased.	External examiner report	DUTL/Heads of discipline		Low marks in synoptic problem paper need to be addressed.
FEMS	Adopt a standard format for return of feedback on academic work	Inconsistent feedback across programmes	EE feedback	Directors		
FEMS	Increase in use of technology for submission of assessment and student feedback	Dependence on a hard-copy system	EE report and Staff-Student Liaison	HoD; DUTL; administrators	In process	
NATURAL SCIENCES	Feedback on dissertations	1.Dissertation reports retained for the external examiners. Consideration to be given to making reports available without grades.				
NATURAL SCIENCES	Compulsory fieldwork in Geography	2. Although there are field courses in Geography, they are no longer compulsory for the whole class at any point. This policy, that has only been in place for a few years (and for good reasons) will be reversed. A compulsory JS field course will be put in place.				
GENETICS	Reduction of word count for SS project reports in Genetics/Human Genetics.	EE found the reports too lengthy.	Court of Examiners meeting	Genetics/Human Genetics course coordinator	Implemented	

School	Planned Action to be taken	Problem/ Opportunity action responds to	Trigger/ Source (e.g. EE report, module evaluation, ISSE PGR etc.)	Responsibility (e.g. DUTL, DTLPG, Programme Director etc.)	RAG Status Progress	Comment
4. Action(s) taken in response to PG module evaluations						
ALL SCHOOLS	Refreshing of material on blackboard to ensure it up to date.	Some readings on blackboard are outdated, in one or two cases module coordinators did not have full access right for blackboard.	Feedback that arose when students moved to rely more heavily on blackboard.	Module Coordinators	Completed	
CHEMISTRY	Implementation of survey to better assess student experience	PG modules are delivered by both UCD and TCD. No data currently available. Survey will be instituted		DPGTL and DubChem committee		
ENGIN	In most cases there were no issues that needed actions. Generally, students are now given more timely feedback on the submitted coursework.	Determination of correct quality and quantity of feedback	Module evaluations	Course Directors	Green	
5. Action (s) taken in response to ISSE Survey (PG)						
ALL SCHOOLS	Ensuring all programme handbooks are available on the School webpages by the start of PG orientation week.	The ISSE PGT survey highlights the importance of early dissemination of key programme requirements and the high level of student dependence on programme handbooks.	ISSE Survey	Programme Directors		
CHEMISTRY	PG progression, & professional development	Expand PG communications via website and PG orientation and updated handbook. Increased visits from industry reps		DPGTL, Global/Industrial Liaison Officer/Dir Research		
ENGINEERING	Feedback on coursework is being provided more regularly and timely.	Timely feedback on CA	ISSE	Programme Director	Amber	

School	Planned Action to be taken	Problem/ Opportunity action responds to	Trigger/ Source (e.g. EE report, module evaluation, ISSE PGR etc.)	Responsibility (e.g. DUTL, DTLPG, Programme Director etc.)	RAG Status Progress	Comment
6. Action (s) taken in response to ISSE Survey (PGR)						
ENGINEERING	Individual Doctoral Committee for PhD researchers have been formed. This system is working well and it is expected that this will address some of the points raised in the ISSE survey.	Better early feedback to research students on their conversion process and more continuous engagement with internal examiners.	ISSE	DTLPG	Green	
CHEMISTRY	Lack support for teaching & demonstrating	Phased introduction of new mandatory demonstrator module with in-lab and online components		PPGTL and Lab co-ordinators		
7. Action (s) taken in response to PG External Examiner reports						
ENGINEERING	The external examiners' reports are not all available for the programmes yet. Based on the communication from the external examiner, choices have been eliminated from the exam paper for the MSc in Bioengineering.	To improve harmonization with peer Universities.	External examiner reports	Course Director	Green	
CHEMISTRY	There are no external examiner reports on PGR modules					
8. Actions (s) taken in response Accreditation reports						
CHEMISTRY	School does not have accreditation at the moment but is planning to seek RSC accreditation in 2021.			DUTL/HOS/School Manager/Freshman coordinator.		

School	Planned Action to be taken	Problem/ Opportunity action responds to	Trigger/ Source (e.g. EE report, module evaluation, ISSE PGR etc.)	Responsibility (e.g. DUTL, DTLPG, Programme Director etc.)	RAG Status Progress	Comment
9. Actions taken in response to ISB Survey report.						
ENGIN	Improved orientation for PGT courses	Non-uniform arrival experience	ISB	Prog Directors	Amber	
ENGIN	Coordinated scheduling of CA deadlines	UG Feedback and Assessment	ISB, Staff-student liaison	DUTL	Amber	
ENGIN	Improved recruitment info and scholarships	UG & PGT Decision-making	ISB, Staff-student liaison	GRO, E3	Amber	
CHEM	Aside from issues related to living costs, visas & additional work the biggest concern was opportunities to work abroad and career advice	Expand UG & PG communications via website, new student orientation and updated handbooks. Increased visits from industry representatives		DUTL/DPGTL, Global/Industrial Liaison Officer/Dir Research		
10. Actions taken in response to GDPR legislation.						
ALL SCHOOLS	Google docs is no longer used for storing marks.	GDPR implementation in May 2018	Legislative change	School Manager	Complete	Use of Office 365 (OneDrive/SharePoint) for internal document sharing and HEANet Filesender for external file sharing
CHEMISTRY	All files are encrypted and sent through HEANet					

Appendix B: Quality Review Cycle

School, Programme or Trinity Research Institute	Date of Quality Review	Type of Quality Review (S, P, R)*	Current Status (RR, IP, PR)**	Next review due
Chemistry	16-18 November 2015	S	Progress Report approved by Council in February 2018	2022/23
Computer Science and Statistics	15-17 February 2016	S	Progress Report approved by Council in June 2018	2022/23
Trinity College Institute of Neuroscience (TCIN)	25-27 April 2016	R	Progress report approved by Council in June 2018 (PR)	2022/23
CRANN	May 2018	R	Review Report approved by Council in June 2018 Implementation Plan approved by Council in October 2018	2024/25
Biochemistry and Immunology	March 2020	R	Deferred	TBC 2020
Genetics and Microbiology	March 2020	R	Deferred	TBC 2020

*__School (S); Programme (P); Research (R). ** Review Report (RR); Implementation Plan (IP); Progress Report (PR)__

Appendix C: Progression, Retention and Completion Statistics

Table 12: Retention by Standing & Gender & Fee status

Faculty of Engineering Math & Science 2018-19										
	Progression		Gender				Fee Status			
Standing & Retention	**EMS**	**%**	**Female**	**Female**	**Male**	**Male**	**EU**	**EU**	**NEU**	**NEU**
Year 1	**897**	**27.0%**	**361**	**28.0%**	**536**	**26.4%**	**852**	**27.2%**	**45**	**24.6%**
Progressed Same Course	805	89.7%	330	91.4%	475	88.6%	766	89.9%	39	86.7%
Repeat same course	18	2.0%	3	0.8%	15	2.8%	18	2.1%		0.0%
Transferred to another course	24	2.7%	11	3.0%	13	2.4%	23	2.7%	1	2.2%
Not Retained	50	5.6%	17	4.7%	33	6.2%	45	5.3%	5	11.1%
Year 2	**748**	**22.6%**	**307**	**23.9%**	**441**	**21.7%**	**714**	**22.8%**	**34**	**18.6%**
Progressed Same Course	704	94.1%	296	96.4%	408	92.5%	674	94.4%	30	88.2%
Repeat same course	10	1.3%	2	0.7%	8	1.8%	10	1.4%		0.0%
Transferred to another course	14	1.9%	3	1.0%	11	2.5%	12	1.7%	2	5.9%
Not Retained	20	2.7%	6	2.0%	14	3.2%	18	2.5%	2	5.9%
Year 3	**777**	**23.4%**	**307**	**23.9%**	**470**	**23.2%**	**729**	**23.3%**	**48**	**26.2%**
Course Completed		0.0%		0.0%		0.0%		0.0%		0.0%
Progressed Same Course	744	95.8%	299	97.4%	445	94.7%	702	96.3%	42	87.5%
Repeat same course	17	2.2%	5	1.6%	12	2.6%	14	1.9%	3	6.3%
Transferred to another course	3	0.4%	1	0.3%	2	0.4%	3	0.4%		0.0%
Not Retained	13	1.7%	2	0.7%	11	2.3%	10	1.4%	3	6.3%
Year 4	**747**	**22.5%**	**283**	**22.0%**	**464**	**22.9%**	**697**	**22.2%**	**50**	**27.3%**
Course Completed	468	62.7%	218	77.0%	250	53.9%	460	66.0%	8	16.0%
Course Completed-Exit Award	120	16.1%	23	8.1%	97	20.9%	94	13.5%	26	52.0%
Progressed Same Course	149	19.9%	42	14.8%	107	23.1%	135	19.4%	14	28.0%
Repeat same course	6	0.8%		0.0%	6	1.3%	4	0.6%	2	4.0%
Not Retained	4	0.5%		0.0%	4	0.9%	4	0.6%		0.0%
Year 5	**148**	**4.5%**	**29**	**2.3%**	**119**	**5.9%**	**142**	**4.5%**	**6**	**3.3%**
Course Completed	147	99.3%	29	100.0%	118	99.2%	141	99.3%	6	100.0%
Repeat same course	1	0.7%		0.0%	1	0.8%	1	0.7%		0.0%
Grand Total	**3,317**	**100.0%**	**1,287**	**100.0%**	**2,030**	**100.0%**	**3,134**	**100.0%**	**183**	**100.0%**

Table 13: New Entrant Data Year 1 by Faculty by gender and Fee status

Standing & Retention	EMS	%	Female	Male	EU	NEU
Year 1	**842**	**100.0%**	342	500	**800**	**42**
Progressed Same Course	763	90.6%	314	449	727	36
Repeat same course	17	2.0%	3	14	17	
Transferred to another course	21	2.5%	9	12	20	1
Not Retained	41	4.9%	16	25	36	5
Grand Total	**842**	**100.0%**	**342**	**500**	**800**	**42**

Appendix D: Faculty Risk register

Ref Number	Faculty/Department/School	Risk/Opportunity Owner	Risk Category	Risk Description
				Please ensure the words "Due to" are used in every risk - separate the symptom from the cause
1: Large-scale equipment failures	FEMS: Phys./Chem./B&I	HoS, DoR	Operational	**Large-scale equipment failures** due to (i) insufficient resources for replacement at local level (ii) dependency on expert knowledge (iii) effects of unforeseen events
2 : Inadequate or unsuitable space for teaching and research	FEMS: all schools	HoS, DoFEMS, Bursar	Strategic	**Inadequate or unsuitable space for teaching and research** due to (i) age and historic inheritance of buildings (ii) multiplicity and dispersion of sites occupied by single schools
3: Ill-conceived and costly staff recruitments	FEMS: Chem/Phys/SCSS	HoS, DoFEMS	Operational	**Ill-conceived and costly staff recruitments** due to (i) changes in implementation and HR policies (e.g. COID, retirement) (ii) poor senior management in school-led hiring e.g. opportunistic rather than strategic
4: Over-reliance on untested revenue streams	FEMS: all schools	CFO, DoFEMS, HoS	Financial	**Schools' over-reliance on untested revenue streams** due to (i) justification for school expenditure primarily based on income generation (ii) uncertainities around research funding (iii) increased expectations and ambitions of junior staff
5: Significant and imbalanced resource issues on the implementation of TEP	FEMS: all schools	DoF, HoS, CFO	Financial	**Significant and Imbalanced School-level resource issues** due to (i) E3 growth strategy (ii) variance in sFTSEs on the implementation of TEP (iii) time-lines for USSHER hires (iv) excessive expenditure against diminishing reserves
6: Serious accident/event/disclosure arising from legislative non-compliance	FEMS: all schools	HoS	Compliance/Reputational	**Serious accident/event/disclosure arising from legislative compliance failure** e.g. (i) Health and Safety (ii) Dignity & Respect (iii) HPRA (iv) QQI (v) external accreditation e.g. Professional bodies, Athena SWAN (vi) external recommendations, policies and procedures.
7: Loss of key personnel	FEMS: all schools	HoS, DoFEMS	Academic	**Loss of key personnel** due to (i) systemic underfunding of 3rd level education sector (ii) increased competition from Dublin-based and international institutions (iii) unattractive or insufficient retention opportunities
8: Diminishing institutional research profile	FEMS: all schools	DoR, HoS, DoR	Reputational/Academic R	**Falling institutional research profile** due to (i) dropping QS world-rankings (ii) polarised research eco-structure e.g. centres vs schools (iii) competitive research/administrative/teaching demands on academic units
9: Inability to respond to external events/ market forces	FEMS: all schools	DUGTK, DPGTL, HoS	Academic/T&L	**Inability to respond to external events/market forces due to** (i) inflexibility in course offerings e.g. over-dependence on 4 year UG degree model (ii) modes of delivery e.g. on-site student/lecture format (iii) reluctance of staff to engage in upskilling/new technologies/performance review
10: Decline in PGR numbers across FEMS	FEMS: all schools	HoS, DoR	Academic/Research	**Decline in PGR numbers across the Faculty** due to (i) rising PG fee gap (ii) unattractive stipend provision (iii) preferential PD recruitment by PIs (iv) increasing demands on academic time e.g. pastoral care, structured PhD couse provision, advertisement, training.

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