Faculty of STEM Quality Retrospective Report 2022/3

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FACULTY OF SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS (STEM) EXECUTIVE SUMMARY

In our 2022 Quality report we described how we were re-adapting to in-person and hybrid practices in the aftermath of COVID-19.

In 2023, the theme for the Faculty was 'looking ahead'. All eight schools across the faculty refreshed their Strategic Plans using a new STEM strategic plan template and in 2023/24 the new College wide BPA budget model was implemented. 2023 also saw the Schools of Biochemistry and Immunology, and Genetics and Microbiology engage in informative and constructive, quality external school reviews.

Athena SWAN and Gender equality

In August 2023, two schools in the STEM faculty (Natural Science and Chemistry) were awarded Athena SWAN silver awards. These schools have been at the forefront of the Faculty's EDI efforts. Their ambitions, hard work and implementation plans have led the Faculty charge. Under the new Athena Swan Ireland Framework, they continue to shape our attitudes to equality of opportunity and attainment in STEM. Across the faculty, seven of the eight schools hold bronze or silver school awards. Each has developed an action plan for identifying and reducing obstacles to equality and inclusion and made structural, cultural and curricula changes.

To further promote gender equality the Faculty of STEM supported two UG initiatives. These, developed in collaboration with Three Ireland and Johnson and Johnson, are providing financial and mentoring support to 10 worthy undergraduates across all the STEM disciplines, but with a particular focus on numerical and biological sciences (respectively).

Student experience

The cost of living and housing crisis continue to impact staff and students. The retention and replacement of staff and the recruitment of PhD students is proving challenging in the face of accommodation shortages and high inflation. Our commitment to quality induction processes is vital, as is our vocal support for changes to scholarship funding to support research students throughout their studies. The lack of resources to maintain and replace equipment in a timely manner is impacting postgraduate research and UG teaching in many areas of STEM. Equipment downtimes are compounded by the age of the equipment, unsupported operating systems, and terminated warranties/maintenance contracts.

Liaising with students/ student feedback

We value student input and are delighted to acknowledge the contributions of our undergraduate student representative (Ruaidhrí Saulnier) to the Faculty executive committee in STEM. In 2023, and currently, we await formal postgraduate (PG) representation on the STEM Faculty executive committee. It is notable that the PG voice on 7/8 of the STEM School Executive Committees has been garnered from local PG volunteers.

Throughout this report it is clear that Schools are effectively using external examiners' reports to inform their curricula and assessment practices. In response to low survey response rates, Schools are actively seeking alternative ways to both hear and address student concerns. Other electronic avenues for quantifying student feedback would be valuable. The short turnaround times for examination and marking arising from the new academic year structure continue to pose significant challenges and are giving rise to local workarounds.

Points of note that are common to many of the School submissions include

- Concerns around the cost of laboratory science/field trips as they affect UG capstone projects and research projects more broadly.
- The need to consider distributed workload models and teaching timetables, to alleviate the burden on students working outside of College or commuting long distances.

Some highlights around emerging practices are the development and adoption of new processes and systems at school level

- to garner student evaluation on modules and programmes (SCSS, G&M, Physics)
- to determine the implications of generative AI in the classroom (formation of a working group in SCSS; new plagiarism protocols (Eng.); adapted module assessments (Natural Sc.))
- to allocate demonstrators and teacher assistants (DAS system) (SCSS).
- to provide new online resources for service modules (Maths, funded by Trinity Inclusive Curriculum)

Retention Rates

UG student retention rates are in line with those across College with the highest number of students lost to Trinity STEM in JF years (81 of 1018 students = 8%) and falling to 3%, 2%, 1% and 0% across the 4 (BA) or 5 (MAI) years of the UG degree programmes. Within the streamed science course structure the retention rates vary from 97.7% to 92.2%, with the Physical Sciences stream having the lowest retention rate closely followed by Mathematics at 94%. There is no significant change notable from previous years.

Space

A recurrent theme is the impact of inadequate and unsuitable teaching and research spaces. Space on campus is a limited commodity and the competition for space is heightened by the growth in staff and student numbers across College and in STEM. Data shown in Table 1.

Table 1: FSTEM headcount data

Headcount	2022	2023
Staff	1049	1120
UG Students	3922	3967
UG Students visiting	126	144
PG Students	1429	1428

Source: SITS and AR Liaison (Student numbers); Electoral register (Staff numbers) includes academic, research and professional staff

The completion of the E3 Learning Foundry (delayed from Sept 2022 to Sept 2024) will mitigate against some of the effects of over-crowding, however as student numbers have grown, the Goldsmith hall has become too small to accommodate certain modules in-person.

Hybrid, recorded and repeat lectures in smaller groups have been a necessity particularly in the biological sciences, but are a resource-intensive mode of delivery. On a positive note, in 2023 two schools were able to highlight the provision of disability access to existing teaching spaces.

Research outputs

The Faculty of STEM, uses the ABC Research Productive Metrics criteria for the annual research review process. In 2023 all the Schools in the Faculty retained or exceeded the percentage of research productive staff reported in the previous year. The Schools in the Faculty are contributing to the top 100 QS world-rankings in Biological Sciences, Chemistry, Computer Science, Geography and Materials Science as outlined in Table 2 and the majority of disciplines have maintained or improved their international rankings.

Table 2: QS world-ranking

Subject	2022	2023	Change
Geography	101-150	50-100	↑
Chemistry	87	88	↓
Computer Science	104	91	↑
Biological Sciences	71	93	↓
Materials Science	87	77	↑
Physics and Astronomy	151-200	122	↑
Electrical and Electronic Eng.	150	144	↑
Mechanical Eng.	138	145	↓
Geology	201-220	151-200	↑
Earth and Marine Sciences	151-200	151-200	=
Engineering and Technology	165	183	↓
Engineering Civil and Structural Eng.	151-200	151-200	=
Natural Sciences	201	197	↑
Geophysics	N/A	201-230	
Environmental Sciences	201-250	201-250	=
Mathematics	251-300	201-250	↑

Source: https://www.topuniversities.com/universities/trinity-college-dublin-university-dublin

Within STEM we note the dependency of our research programmes on continued research-centre funding. In this context the amalgamation of SFI and IRC funding bodies into 'Research Ireland' represents a very considerable 'future unknown' in the national funding landscape.

Professor Sylvia Draper
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Acknowledgment: This quality report was written by Prof Sylvia Draper and Dr Katie O'Connor in collaboration with Heads of School, Directors, Professors, School managers and with input from the Faculty Executive Committee and Mrs Hyunju Knowles in the FSTEM office.

SECTION 1: UNDERGRADUATE TEACHING

Quantitative Data to inform Faculty Performance on key metrics for Annual Faculty Quality Report.
[Ensure numbers reported are verified via sources above prior to submission]

Table 1a: Quantitative data on UG student module evaluation

School	Number of Undergraduate Modules taught	Number of Undergraduate Modules Evaluated	Percentage of Undergraduate Modules Evaluated	Average response rate to UG module evaluations (%)
Biochemistry & Immunology	57 (6 are directly audited by the Biology Teaching Centre)	57)	100%	40%
Chemistry	39	39	100	N/A due to feedback mechanism
Computer Science and Statistics	81	81	100%	37%
Engineering	106 (Yrs 1-4)	106	100%	100% response rate in the Freshman and Sophister years due to method of evaluation.
Genetics and Microbiology	48	48	100%	N/A due to feedback mechanism
Mathematics	56	56	100%	41%
Natural Sciences	113	49	43%	47%
Physics	41	17(in 2022/23)	41%	34-60% (This is a single year anomaly associated with the fact that the school manager was out for a period..)

Table 1b: Qualitative data on UG student module evaluation

School	Comments/Actions arising Evaluations	Summary of actions taken to respond to the outcome of student UG module evaluations
Biochemistry & Immunology	The DUTL sent out student surveys to all JS and SS students which gave them the opportunity to comment on all modules (44 modules). The feedback was collated and discussed at Curriculum Committee meetings in order to define actions required. Other modules such as those taught in Health Sciences were evaluated similarly.	Some of the actions taken as a result of student feedback: - Some of the students mentioned that the BIU33150 Biochemistry for Biosciences module was only online and they'd like some face-to-face engagement. Derek organised in-person tutorials this year. - The literature review (part of BIU33160, BIU33260, BIU33360 & BIU33485) was deemed highly useful but suggestions were made to re-structure the preparation and assessment of it. This led us to fully integrate the exercise into our small group tutorials in order to better prepare and better engage with the students on it. - enjoyable, although I think we should have been allowed to pick our topics. I think more presentation work would be beneficial. - Assessments from lab practicals corrected in a more timely manner to give students feedback prior to exams. - Communication around morning lectures and capstone lab projects in Semester 1 for SS students improved, so that lab supervisors of SS students are aware of their time constraints (in response to students noting stress around managing morning lectures and capstone project work). - For BIU44010, students requested access to past exam papers for the quantitative problems and assistance in writing essays. It was agreed that the group tutorials are the most appropriate means of addressing these issues.
Chemistry	We have revised our syllabus and our assessment structure (exams and continuous assessment) to address most of the student comments.	We have revised some of our Junior and Senior Sophister syllabi and our assessment structure (exams and continuous assessment) to address some of the JS and SS student comments. For the JS year, we restructured the interdisciplinary laboratory providing a new type of CA, which will contribute directly to the skillset required for the experimental labs.

	We have not surveyed each individual module until recently but hold regular liaison committee meetings with class reps, have a standing item on UG issues on the School Committee and have held all-class meetings with each year group. In addition we have held all-class meetings with each SS moderatorship. We have reinstated module surveys in the academic year 2023-2024	For the SS, we have amended the assessment of the short-problems module (SS CHU44123). This used to be 20% CA in Sem 1 and 80% in-person exam in semester 2 annual exams. The 80% exam in semester 2 annual examinations was converted to an 80% in-class assessment in semester 2. This will now be a mid-term in-class (closed-books) problem assessment that the students will take just after study week in the second semester in the Chemistry Science Lecture Theatre. The examination element, format and learning outcome would be the same (based on material from core modules from years 1-3). This is meant to take the pressure off the exam period as the students will have one fewer exam to prepare for (and it is an exam they struggle with as it encompasses material from previous years). It will also be a good opportunity to revise and prepare for the forthcoming core 4th year annual exams.
Computer Science and Statistics	Survey reports were returned to module coordinators, showing each module's performance compared to the average per cohort. DUTL & ADUTL collected additional qualitative feedback from a meeting with Class Reps & School Convenor.	The School run anonymous student feedback surveys, and held a meeting between student representatives and DUTL, ADUTL, course directors to discuss any wider concerns of students. An Associate Director UG Teaching and Learning has the dedicated role of collecting quality assessments (e.g., student feedback surveys) and disseminating aggregated results to the module coordinators and School executives (e.g., Head of School, DUTL), as well as organising the meetings with student representatives. Individual lecturers undertook module adjustments where appropriate based on feedback received. Example refinements would include the scheduling of assignments to reflect student workload across a given semester, or provision of additional learning resources for learning components that students were finding particularly challenging. After the meeting with student representatives, difficulties with studying abroad surfaced. These were already in the process of being improved by staff responsible. Concerns about a small number of modules that had introduced significant changes were followed up by the DUTL.

Engineering	Evaluations with the student representatives in each semester before assessments across the Freshman and Sophister years. Feedback discussed with the module coordinators and actions taken. Head of Disciplines discuss feedback with their module coordinators of the Sophister modules, whilst Director of Undergraduate Teaching & Learning discussing evaluation feedback with the Freshman module coordinators, including those coordinators in service teaching schools. Following feedback this year from the JF year and their concerns with the math's modules, more math's tutorials were timetabled for the 23/24 academic year to reduce the number of students in tutorial classes. We aim to add further tutorials again next year in the hope reduce tutorial class sizes even further for a better experience for students. In response to feedback that the workload on an MAI Electronic module was too high, the module was increased to a 10 ECTS module spread over two semesters. Students have requested that CA workload be balanced across the semester. This is something the Disciplines are working to rectify by improving communication between module coordinators. There was feedback from some Mechanical Engineering students that there were limited computing resources to complete their work. In response, the Discipline has posted lab timetables	Same as the comment

	on Computer Room doors to help with scheduling but acknowledge that improved facilities are required.	
Genetics and Microbiology	N/A	To date we have circulated questionnaires to our students. However, in order to increase evaluation response rates and quality of responses, we have introduced a new process whereby the DUTL meets with class reps and other representatives in a focus group format. The class reps will have previously collated feedback from their peers. This method has proved to give more in-depth feedback from a greater number of students.
Mathematics	N/A	The student module evaluations are typically distributed around reading week and provide crucial and valuable feedback for our lectures. The nature of our modules in mathematics and theoretical physics makes it possible to respond promptly to the student feedback. We respond to the module evaluations in various ways: 1. The lecturers adapt their lecturing style. For example, they reduce or increase the pace, and change the number of explicit examples. 2. The lecturers adapt the lecture content, for example by having more or less abstract material. 3. The students often ask for more or smaller tutorial groups. Within the available resources we aim to facilitate these requests. Besides the student evaluations, the School also communicates closely with class representatives and School conveners to know of the student perspective.
Natural Science	Based on the consistent and low module evaluation return data, the DUTL will discuss with the T&L committee the process of centralizing solicitation of module feedback to increase module review data quality and access.	• It is recommended to adhere to a single assignment rather than two, and to include the assessment of practicals and exercises conducted in class. • Deadline for CA earlier in module, reduction in number of National Standards covered in lectures. • Assessment reviewed and will be updated to reduce load. In person classes to replace webinar.

		• No major changes but importance of student engagement in classes will be emphasized following extremely low attendance this year. • Aligned content with 2nd year stats module and removed some of the overlap. • Rescheduled lectures to 1 hour blocks, increased cohesion between lectures & field course, re-examined scheduling of field activities. • Added summary slides and more structure to tutorials. • Improved direction as to what to focus on learning in the mammal practicals where the quantity of information in terms of diversity of mammals can be overwhelming. • Removal of assessment components (presentation and peer review), re-weighting of assessments • Spread assessments out more evenly across term.
Physics		**Feedback from the School on administration of UG surveys** Attaining student feedback from module surveys has been a challenge. Online module surveys were attempted during the COVID-19 pandemic but had an extremely poor response rate. As a result, the School has returned to in-person surveys (carried out by the School's administrative team). However, the return on administrative time remains to be quite poor (low response rates, incomplete surveys etc). For this reason, the School now is considering the adoption of a survey schedule, where different cohorts of students will be surveyed at varying times across the year e.g. JF and JS in Semester 1, SF and SS in semester 2. This would ensure that all students are provided with the opportunity to provide feedback on module content. Modules outside of this rota could also be surveyed upon individual academic's request. **Student Feedback on UG modules** Analysis of the student surveys have highlighted some minor administrative issues that are currently being addressed. These include coordination of continuous assessment deadlines across JS modules, and better signposting to previous exam questions (Senior Freshman). Several issues were also raised which are outside the School's control e.g. timetable slots for lectures and length of lab slots (fixed).

		Overall, the students responded positively to the module material covered, the choice of problems and the range of potential applications of the material to the real world. Students also commentated favorably on the choice of demonstrations and visuals. The motivation and preparedness of the lecturers, as well as their overall openness to questions was also highlighted.

Table 2 Open Module Evaluation – Science, Technology, Engineering and Mathematics (STEM)

At Departmental/Discipline level, Schools are asked to conduct evaluations of their Open Modules and report back through the Annual Faculty Quality Report (AFQR). If Departments/Disciplines in your School offer modules as Open Modules, please answer the question below:

School	**Schools that provide open modules are asked to comment on the experience of the evaluation of open modules (year 2).**
Biochemistry & Immunology	BIU33150 Biochemistry for Biosciences, total number of students registered: 79 Following feedback from students 21/22, an in-person prep exam tutorial was held in which students submitted queries to staff prior to this session. These questions were addressed by the various member of the teaching staff in the session. There was also an open Q&A session followed by a 20 min presentation by the module co-ordinator on exam preparation and on how to answer essay type questions. A total of 70 students completed the module in sem 1, all students passed and the mean grade was 62.6% with highest mark being 80% and lowest being 40.0. Feedback from the students highlight the following issues. 1. Workload. While most students were happy with the course and could see that it was at an appropriate level for an open module, some students felt that there was too much content. In reply, the module co-ordinator pointed out that the content of the course, the material covered, was what the school of biochemistry was asked to cover by the various non biochemistry degree programmes, (for a 5 credit open module) and it was the same material in 20/21 and now in 22/23, it is a selection of Biochemistry topics for non-biochemistry students. This matter will be reviewed at the end of 23/24 as part of a 4 year module content review. The students were also assured that examiners were aware that this was an open module and that biochemistry was not the primary interest of students taking this module and that they would have a different expectation of answer content. 2. Student happy with the in-course assessments but felt that the MCQ time could be longer. As the MCQs are online and open book, it was felt that the time limit of 2 min per MCQ was appropriate. The alternative would be a supervised MCQ sessions, but students were not too enthusiastic about this suggestion. 3. Students also asked about the possibility of a practical element. We are considering this request and are looking into the possibility of a real time online practical on transport across membranes that would link to lecture in this section of the course. 4. This is currently an online module and some students, but not many, have raised the possibility of having lectures in person. The online nature of the module arose because of Covid and the problem of time tabling across

	multiple cohorts of JS students, and the difficulty of finding a free time for all students. We are looking into converting this module into in-person module. This is not an issue for teaching staff but a timetable matter. We are in discussions with our colleagues in other schools as part of the attempt to create a timetable that will make this possible across schools
Chemistry	We have only one open module (Trinity Elective) "The Chemistry of Periodic Elements", which received positive feedback. A full review of the module will be conducted next year.
Computer Science and Statistics	SCSS has no dedicated Open Modules. Students taking SCSS modules as Open Modules are included in the general surveys above.
Engineering	N/A
Genetics and Microbiology	Most students taking our open modules are from our own school and so feedback is included in the evaluation above. However, we looking at ways to best receive feedback from students in other schools and visiting students. There is both a survey and a poll function within Blackboard but survey response rates do not tend to be high. We welcome any suggestions on best practice.
Mathematics	N/A
Natural Sciences	N/A
Physics	1 X Trinity Elective module (From Planets to Cosmos). All Trinity Electives are surveyed independently of the School. Informal feedback is also received by the lecturer who has been happy to receive and implement/facilitate where possible.

Table 3a: Quantitative data on Undergraduate External Examiner Reports

School	No of External Examiner Reports Expected (UG)	No of External Examiner Reports Returned (UG)	% of External Examiner Reports Returned (UG)	Did the School respond in writing to EE recommendations?	Did the External Examiner(s) have or request access to Blackboard?
Biochemistry & Immunology	4	4	100%	Yes X No☒	Yes ☐No☒
Chemistry	5	4	80%	Yes ☒No☒	Yes ☐ No☒
Computer Science and Statistics	5	5	100%	Yes ☒ No☐	Yes ☒ No☐
Engineering	6 – EE report for each of the Engineering Disciplines including MAI	5 – Engineering with Management report still to be submitted	83%	Yes ☒No☒	Yes ☒ No☐
Genetics and Microbiology	3	3	100%	Yes ☒No☐	Yes ☒No☐
Mathematics	2	2	100%	Yes ☐No☒	Yes ☒No☐
Natural Sciences	6	5	83	Yes ☒No☐	Yes ☒No☐
Physics	3	3	100%	Yes ☒ No☐	Yes ☐ No☒

Table 3b: Qualitative data on Undergraduate External Examiner Reports

School	Comment/Actions arising from EE Reports	Summary of actions taken to respond to UG external examiner recommendations:
Biochemistry & Immunology	Comments were very positive. For one SS poster session only 1 of the markers was present- this is not fair to students. Feedback and annotations on assignments a little variable. SS capstone projects still too long for a 10 week project after some reduction this year.	We ensured that both markers are present for the poster and oral presentation for SS students. We will encourage all lecturers to give written feedback on assignments. We further reduced the allowed word count of the capstone project thesis for 23/24.
Chemistry	We have fully responded to external examiners reports and provided all necessary feedback via the Quality Office. We also took action to address all issues raised by the EEs (see below).	• We have undertaken a thorough review of our 4-year Inorganic Chemistry curriculum. The outcome of that review has been assessed and commensurate planning has initiated. We anticipate a revised curriculum that will address most of the external examiner's points starting from next year, although these revisions will take 3-4 years to percolate through to 4th year. We anticipate the final-year Inorganic 'options' module will provide a platform for independent book-based research by the students through continuous assessment reports, essays and posters. • To try to make the JS Bioinorganic chemistry module a core module rather than an open module. • Revise Inorganic Chemistry curriculum within academic year 2023/24 • Introduction of an Interdisciplinary laboratory in JS year, providing a new type of CA, which will contribute directly to the skillset required for the labs. • The handbook was updated in revision year 2023-2024 • We have implemented a special project-report-writing training session for the SS year. • To provide more opportunities to practice and learn how to approach problem-solving questions. Tutorials are in place in semester 2.

		• For the SS year, we have amended the assessment of the short-problems module (SS CHU44123). This used to be 20% CA in Sem 1 and 80% in-person exam in semester 2 annual exams. The 80% exam in semester 2 annual examinations was converted to an 80% in-class assessment in semester 2. This will now be a mid-term in-class (closed-books) problem assessment, that the students will do just after study week in the second semester in the Chemistry Science Lecture Theatre. The examination element, format and learning outcome remain the same (based on material from core modules from years 1-3). This will take the pressure off the exam period as the student will have one fewer exam to prepare for (and it is an exam they struggle with). It will also be a good opportunity to revise and prepare for the forthcoming core 4th year modules annual exams.
Computer Science and Statistics	N/A	The input of the external examiners is very helpful and greatly appreciated. Overall, they confirm the quality of our teaching and examination procedures. Most of the comments that require actions were on the review process, rather the quality of teaching: - Some examiners mentioned that they initially had technical issues (e.g., accessing Blackboard). They all reported that the problems were resolved. Nevertheless, we will offer dedicated sessions to each examiner to ensure that in the future the process is as seamless as possible for them. - For other items, it seems that providing additional information would be useful (e.g., particular statistics on academic achievements of students, information on resourcing of programmes/modules). We will explore whether we can provide such additional information in the next round of the review cycle. - We will ensure that all examiners get the opportunity to talk to students.

Engineering	Externs had access to module material through shared folders in SharePoint as well as BB. Comments/actions taken detailed below for each stream.	<u>Biomedical Engineering</u> The external examiner was satisfied with the curriculum and noted the following: • Students in the MAI year would welcome more hands-on coursework. The Stream Coordinator responded that this was pandemic related and that the amount of hands-on coursework has in fact increased. • The extern recommended connecting with the students by having a meeting at the beginning of the year outlining upcoming coursework, the study abroad process, thesis projects, etc. The Stream Coordinator noted that all of this information was available to students but took on board the fact that it could be communicated more effectively and has set up an induction session for incoming JS, SS and MAI students. • The external examiner recommended bringing together theoretical knowledge with hands-on application. The Stream Coordinator hopes that the opening of the Learning Foundry will allow them to improve the hands-on coursework element of the stream. • The Stream Coordinator will ask the School MAI Project Coordinator to include an item in the assessment form to account for additional supervision/support from lab members or clinical collaborators following a comment from the External Examiner that there may be variability in faculty advising the student. • The External Examiner noted that the Biomedical Engineering stream awarded less distinctions than other streams. The Stream Coordinator acknowledged this and will monitor performance closely going forward, particularly in relation to the MAI project. • The Stream Coordinator, with the Discipline Management Group, is reviewing an MAI module which had a particularly high failure rate for Biomedical Engineering students. <u>Civil, Structural and Environmental Engineering</u> The External Examiner was happy with the overall curriculum but suggested the Discipline introduce students to more real-world examples and to the BIM concept and

		its application. The Discipline has a new appointment in this area who will add software like this and use more real-world examples. The External Examiner supported the Discipline in rejecting the pass/fail grading system for internships as he feels it fails to reward excellence and could potentially disincentivize others. The External Examiner also recommended that the best project prize be awarded to a Civil Engineering student. The Head of Discipline agreed and will speak with the Director of Undergraduate Teaching and Learning about the issue. <u>Computer Engineering</u> The External Examiner was happy with the course overall, commenting that the curriculum demonstrates good design and organization and noted in particular how valuable it was to see research led topics like Urban Computing in the curriculum. The external examiner was satisfied with the mixture of assessment methods and combination of individual and group work. The projects were found to be of an appropriate standard and there were appropriate mechanisms in place to review and moderate project marks where needed. The level of achievement by the students was found to be broadly in line with comparable universities but concern was noted at the high number of failed modules at BAI level which should be reviewed. <u>Electronic Engineering</u> The External Examiner noted that some students ended up doing two capstone projects (one in year 4 and one in year 5). The Extern also noted that there are relatively few emerging electrical areas being covered, for e.g. power. The Discipline is in the process of redesigning the curriculum jointly with the School of Computer Science with the aim of having this complete by the end of this semester. AP recruitment has also begun in these emerging areas. <u>Mechanical and Manufacturing Engineering</u> The External Examiner was satisfied with the course and did not recommend any specific actions to be taken but noted the following points:

		• The External Examiner noted that there seemed to be a relatively high number of exam failures in the MAI year but, in response, the Stream Coordinator commented that the failure rate was in line with other streams. • The External Examiner was of the opinion that overall the standard of UG projects was good. • The External Examiner requested that model answers come with a breakdown of marks to ensure the exam paper is auditable. In response, the Stream Coordinator has asked that module coordinators indicate marks in their draft solutions. • Following a meeting with the students, the External Examiner noted that the main concern was the amount and timings of assessments. The Stream Coordinator responded that students can often underestimate the workload involved with a certain amount of ECTS but that the Discipline does provide a spreadsheet to students indicating the timing of assessment deadlines in order for them to plan their workload over the semesters. • With regards to the MAI projects, students overall had a positive experience with good resources/software but there was some variability in experiences when it came to supervision. The External Examiner recommended maintaining a consistency and a minimum frequency of meetings/feedback between student and supervisor. The Stream Coordinator noted that supervisors are asked to set up regular meetings with MAI students but that ultimately the student should take responsibility to arrange meetings if they are in need of more guidance. At a School level, the Director of Undergraduate Teaching and Learning is drafting a supervision policy document which will apply to BAI, MAI and MSc project supervision.

Genetics and Microbiology	N/A	Consider increasing the weighting for the presentation of the Capstone Project. Consider the possibility of external examiners dialling into the presentations. Consider oral assessment element be incorporated into the literature review assessment. Consider further adapting assessments considering the new reality of Artificial Intelligence (AI). All three external examiners commented that overall they were very impressed with the learning opportunities of the three undergraduate degrees provided by the School - Genetics, Human Genetics and Microbiology.
Mathematics	We were unable to access the EE reports via college systems as our school is on a different network and instead had the externals email their reports directly to us.	• The Module MAU34802 on Linear Programming will be re-designed in 2024/25 to incorporate more advanced material, to reflect recent developments and become more in-line with corresponding modules at peer institutions. • The importance of clear and concise marking of scripts will be emphasized to the lecturers.
Natural Sciences	N/A	• Management of staff workloads especially where research but out has occurred, oversight of this is managed at school level by the HoS. Resourcing around some critical areas of teaching will be alleviated through integration with E3. • Engagement with student representatives on the courses to get broader insight into wider feedback on programmes. • Revision to how students can choose pathways and access content within a degree programme structure. • Review of workloads and class time and assessment s associated with 5 and 10 ECTS modules. • Development of industry connections and links for students. • Retention of field-based teaching in SNS degree programmes.

Physics		The 22/23 undergraduate external examiner reports were predominantly positive. Changes that were requested included a slight amendment to the module assessment rubrics, a further breakdown of exam question marks and a request for follow-up clarification (whether problems had previously been attempted as coursework or were unseen). These amendments/clarifications were addressed and implemented. In 22/23, the external examiners praised how problems had been designed to highlight real-world issues, encouraging students to make connections to the world around them. Overall, the examiners appreciated the structure of the problems that required students to demonstrate both conceptual understanding of the material and application of their knowledge from the module. • More feedback to continuous assessment has been requested of all academic staff members. • More administrative supports: There will be enhanced communication of existing College wide supports e.g. improved signposting to previous exam papers, signposting to Student Learning Development etc. • Increased opportunities for questions relating to modules: Some lecturers are experimenting with office hours. • More tutorials: Previously the School offered smaller tutorial groups to Senior Freshman students (groups of 20). However, poor student attendance at these tutorials has led the School to change to a larger group tutorial format in these modules. Student attendance at tutorials is being monitored.

SECTION 2: POSTGRADUATE TEACHING

Table 4a: Quantitative data on Postgraduate Module Evaluation

School	No. of PGT Programmes	No. of PGT Programmes Evaluated	% of PGT Programmes Evaluated	Average response rate to PGT programme evaluations (%)
Biochemistry & Immunology	2	2	100%	20%
Chemistry	1	1	100%	20%
Computer Science and Statistics	3	3	100%	N/A
Engineering	11 (6 Diplomas and 5 MSc/MPhil) Note: Dip in Sustainable Energy and the Environment did not run in 2022/23	11	100%	N/A
Genetics and Microbiology	1	1	100%	N/A
Mathematics	2	0	0	N/A
Natural Sciences	4	4	100%	Unknown (~80% for BioCon)
Physics	2	2	100%	50%

Table 4b: Qualitative data on Postgraduate Module Evaluation

School	Comment/Actions arising from EE Reports	Summary of actions taken to respond to the outcome of postgraduate module evaluations
Biochemistry & Immunology	Faster turnaround of assessment results, earlier notice of timetable changes Students requested more feedback on assignments. All slides to be available on Blackboard	We will endeavour to return assessments in a more timely manner and notify timetable changes promptly. We will ask all lecturers to provide feedback on assignments. We will ask all lecturers to upload their lectures to Blackboard.
Chemistry	Only 2 students have provided their comments on "Circular Economy and Recycling Technologies" postgraduate diploma course. Please see our responses to the comments and corresponding actions below.	The students who participated in the review of postgraduate diploma course "Circular Economy and Recycling Technologies" have emphasized "Live tutorials & workshops work " and "Social media coverage" as the best aspects of the course. We are restarting this course in September 2024 and plan to continue these positive practices. Most of our students (80%) to date have been working full time and some of them did not live in Dublin, so could not physically attend any events during the day. As the course is targeted at this type of student, it will be relaunched for 2024/25 as a fully online course allowing students to take it from anywhere in the world. It will include recorded lectures to allow the students to study the materials at any time combined with live tutorials, question boards etc. through Blackboard.
Computer Science and Statistics	SCSS offers 3 PGT Programmes which are disparate in size. Written programme/module surveys were conducted for the online Postgraduate Certificate in Statistics & Data Science, and Interactive Digital Media courses. Computer Science MSc consists of 4 strands, and each strand lead meets the strand student cohort several times during the semester for a detailed feedback session.	The Course Director of Postgraduate Certificate in Statistics and Data Science course (online) ensured greater resources were put into the live sessions each week: 1. Increased the number of demonstrators and tried to ensure that they are more experienced (late stage PhD and/or Post-doc). 2. Added extra live sessions each week so that students have a greater chance to be able to attend one;

Engineering	Feedback discussed with the module coordinators and actions taken.	
Genetics and Microbiology	N/A	As this is a small class, feedback is given via a focus group to which all students are invited. Written feedback can also be submitted. This has proved to be a good way to engage with students and the discussion allows for greater feedback. Overall, very positive feedback received re topics covered and teaching. There were some suggestions re timing of assessments so as to avoid significant workload pressures at particular periods.
Mathematics	Due to the small size of the courses, student feedback is given through exit interviews and meetings with class representatives.	In response to student feedback, the teaching of modules in the QFSG MSc was re-organised to spread the workload more evenly over the semesters and to improve the ordering of material. This included restructuring modules and re-organising the timetabling of lectures.
Natural Sciences	N/A	Modules are evaluated on a module basis, e.g. by the module coordinator. The obtained student satisfaction or evaluation is used by the module coordinator to improve individual module quality. No course directors have indicated that module evaluations were fed back to the course directors. ACTION: We will put in place a system where course module coordinators share module evaluation with the course director, who in turn will share this information with the School Director for PGT&L, for future Annual Quality Review.
Physics	Following the survey of both programmes, conflicting assessment deadlines and student workload were highlighted. Both of these issues have been addressed below.	**MSc in Energy Science** In 2022/23, the MSc Energy Science programme has made the following changes: • Following feedback from both students and staff, the assessment strategy in one of the modules (GL7001) has been reimagined. It has switched to 100% Continuous Assessment in

		2022/23 from 60% Written Exams + 40% Continuous Assessment in previous years. • Feedback has also been received from the students regarding the overall exam timetable for the remaining modules, specifically around the scheduling of exams. These changes have been implemented for the 2023/24 exam timetable. Student feedback will be sought on both changes. **MSc in Quantum Science and Technology** In 21/22, student survey feedback suggested that the workload in the second semester was too heavy. In response, PYP11Q30 was moved from Semester 2 to Semester 1 in an attempt to rebalance the student workload. Consequently, the 22/23 cohort of students had some issues with conflicting assessment deadlines, brought on by the newly increased workload in Semester 1. This was communicated through the 22/23 module survey. For 23/24, some assessments in Semester 1 were also redesigned. An oral exam has now been introduced to allow for individual assessment of student competencies. The frequency of assessments has also been examined by the course team and amended to minimize overlapping assessment deadlines. Analysis of the impact of these changes are ongoing. The module survey also suggested that the introductory module PYP11Q10 wasn't quite challenging enough for the students who had completed their undergraduate studies in the School of Physics. Therefore, additional tasks were introduced into the module's continuous assessment which is completed through problem sheets. This has resulted in a more uniform distribution of grades for this module.

Table 5a: Quantitative data on Postgraduate External Examiner Reports - Science, Technology, Engineering and Mathematics (STEM)

School	No of External Examiner Reports Expected (PG)	No of External Examiner Reports Returned (PG)	% of External Examiner Reports Returned (PG)
Biochemistry & Immunology	2	2	100%
Chemistry	0	0	0
Computer Science and Statistics	3	3	100%
Engineering	11 (6 Diploma and 5 MSc/MPhil)	10 (Report on Dip in Applied Building Repair and Conservation is still to be submitted)	91%
Genetics and Microbiology	1	1	100%
Mathematics	2	2	N/A
Natural Sciences	4	4	100%
Physics	0	0	0 (Quantum has nominated an extern. Energy sciences is aiming to find an extern)

Table 5b: Qualitative data on Postgraduate External Examiner Reports - Science, Technology, Engineering and Mathematics (STEM)

School	Comment/Actions arising from EE Reports	Summary of actions taken to respond to PG external examiner recommendations
Biochemistry & Immunology	We agree that a case presentation should be included in IM7107	The external examiner for the MSc in Immunology suggested that we include a case presentation assessment in our Clinical Immunology IM7107 module. We have included that this year in response.
Chemistry	N/A	N/A
Computer Science and Statistics	All 3 external examiners have been examiners for the previous 3 years, so their recommendations have already been implemented. No further actions are noted as needed at this point.	N/A
Engineering	<u>Dip in Project Management</u> Yes, the external examiner returned a report and was overall very happy with the course. He did suggest we try include more BIM and this is being addressed. <u>Dip in Health and Safety in Construction</u> The External examiner deemed all aspects of the course to be satisfactory. Although the assessment strategies were very good, I observed that assignments and papers are burdensome workloads for students; the programme director may consider combining assignments to reduce students workload but students still can achieve the module/programme learning outcomes. · Hybrid classroom might be an option that the programme director could consider reducing students commuting to TCD on Friday evenings	

	· In the next academic year, I would like to speak to students or to review feedback provided by students on the programme. Feedback from students always has a positive impact for students, lecturers and the programme. Due to the course being suspended no action has been taken on these suggestions , but these can be considered if necessary at a future date. <u>Dip in Fire Safety Practice</u> The External examiner deemed all aspects of the course to be satisfactory and had no major recommendations During my meeting with the external examiner when he visited the campus, he pointed out that the time that elapses between the date of lectures early in semester 1, and the date of exams at the end of semester 2 may cause problems for some students. He suggested that some consideration should be given to exams at the end of semester 1. While this may be considered in the medium or long term, it is not possible due to the current lecture and module set-up. <u>Dip in Construction Law and Contract Administration</u> The External examiner deemed all aspects of the course to be satisfactory and had no major recommendations <u>Dip in Engineering for Climate Action</u> The external examiner noted the suggested amendments to the previous years programme based on their recommendations, and was happy with the programme delivery that year.	

	<u>MSc in Engineering [Environmental, Structural & Geotechnical/Transport/ Sustainable Energy/3 Micro-credentials in Transport Modelling & Planning; Advanced Geo-spatial Analysis using GIS; Solar Energy Conversion & Application]</u> The external examiner did return a report. We have taken particular action with the recommendation to attain two external examiners for the course to focus on separate areas in which they are experts. We have four streams hence it is hard for one external examiner to be fully familiar with each area of civil engineering. Hence for 2023/24 we have appointed Prof Bassam Izzudin from Imperial College London to focus on structural engineering and geotechnical engineering. Prof. Eoghan Clifford from the University of Galway has been appointed to focus on environmental engineering and transport. <u>MSc in Electrical Information Engineering/Micro-credential in XR; Applications and Technologies</u> The external examiner noted the suggested amendments to the previous years programme based on their recommendations, and was happy with the programme delivery that year. James Hopgood noted that the students were satisfied with the course but also pointed out that we could provide more interim feedback on the research project deliverables at the end of semester 2. We have started to improve this feedback as of 2023/24 by communicating better with our staff.	

	<u>MSc in Biomedical Engineering</u> Yes, the report was for both the MAI and MSc in Biomedical Engineering. It primarily focused on the MAI), with no specific issues or recommendations raised about the MSc. It should be noted that the external did only meet with 1 MSc student during his visit who was happy with the course. <u>MPhil Music and Media Technologies</u> The overall feedback from the external examiner was very strong and positive, although they did express some concerns about the workload placed on staff with supervising so many student projects all the way though the summer, with marking only being completed one week before the start of the new academic year. One action we have taken to try to alleviate this issue is to move the annual grad show from early August and before the thesis submission, to September and after the thesis has been submitted. This will be the approach taken this year, i.e. in 2023/24. It was noted by the external examiner that the marks for one module for which the lecturer in question had since left TCD were exceptionally high across the board, something which we had flagged ourselves. In response to the extern's recommendation we therefore scaled these marks to bring them more in line with the marks for the other modules.	

	<u>MSc in Mechanical Engineering / Zero-Carbon Technology / Micro-credential in Low Carbon Power Technology</u> The MAI Mechanical and Manufacturing Engineering stream and the MSC in Mechanical Engineering share an External Examiner. In addition to the points above in Table 5, the External Examiner noted the following in relation to the MSc programme: - The overall standards are very high and seem to be in line with the very strongest Universities in the UK. - The project list and allocation process works well for MAI students but poorly for the MSc students as the latter group only had one week to make choices. In response, the MSc Course Director has implemented project selection changes this year. A detailed list of projects was circulated earlier to the MSc students before arrival, the students were given an extra week to make project selections and the majority of students were allocated their first project choice.	
Genetics and Microbiology	N/A	The external examiner was very happy overall. As in previous years, there were a few issues with plagiarism. These were discussed with the external examiner and all agreed that although it continues to be a concern with some international students, it is neither unique to our course nor to Trinity. She was satisfied with our handling of any issues of this nature. The external examiner considered our course commensurate with similar offerings in major UK universities.
Mathematics	We were unable to access the EE report for either MSc. For the QFSG MSc we directly contacted the external who emailed their report to us. The comments from the HPC EE were taken during meetings with the course director.	For the QFSG MSc there were no specific recommendations, except those from previous years which had been already implemented. For the HPC MSc, the EE commented that the range of topics covered by research projects could be broadened to topics beyond

		parallelization and GPU implementations while remaining within the scope of HPC. This has been implemented in the current academic year.
Natural Sciences	N/A	**MSc in Environmental Sciences:** The feedback from the External Examiner for the EnvSci MSc was highly positive. Students expressed satisfaction with the content and variety of topics covered in the program. However, a few areas for improvement have been identified: 1. Students have requested a quicker turnaround for the release of module results. ACTION: While efforts have been made to address this, the thorough evaluation required for continuous assessment poses a challenge in expediting the process. Module coordinators and teaching staff have been urged to finalize assessment sooner. 2. Students have expressed a desire for more comprehensive and timely information regarding field trip fees. ACTION: To address this concern, a dedicated session was conducted this year, in the first week of the first term, to elucidate all payment details and the structure of field trips. Additionally, students are provided with a booklet containing this information. Dedicated information was also included in the Course handbook. Furthermore, dedicated information will also be included on the course website, visible to prospective students. 3. Some students have noted overlaps with their undergraduate studies and expressed a preference for additional elective opportunities. ACTION: This issue is currently being addressed, and we are planning new and updated modules to this MSc program. Also, a new timetable structure is expected to be implemented by the academic year 2025-26.

		MSc in Development Practice: The external examiner's report for the masters in development practice was broadly positive. A few areas/issues for improvement were identified. 1. Grading (issues with the grading scale used): ACTION: The report was circulated to all module coordinators so they could identify any issues that need to be thought about/rectified such as more generous marking at the lower end of the scale. 2. The external examiner identifies a reluctance to fail students: ACTION: We did refer a dissertation to her to read which was failed and which the student is now repeating. 3. The examiner identified potential synergy between the Economics and Engineering modules. ACTION: This has been highlighted to the respective coordinators. **MSc in Biodiversity and Conservation:** The EE report was overall very positive. A few points highlighted and associated actions we'll undertake: 1. expedite return of marks/feedback. New Director (NP) will discuss directly with module coordinators and be more active in chasing up. 2. Too many assessments for one module. Next year the number of assessments will be approximately halved for that module. 3. Data handling module identified as necessarily challenging. To help we'll try to use more demonstrators to help with practical classes.

Physics	N/A	The School of Physics is actively trying to secure external examiners for both PGT programmes: • MSc in Energy Science: The multidisciplinary nature of the MSc in Energy Science has made it challenging to find an external examiner confident to successfully examine the programme as a whole. A candidate was previously put forward but was deemed unsuitable. Attempts to identify a willing alternative candidate are currently ongoing. • MSc in Quantum Science and Technology: A suitable candidate has been identified and is expected to be nominated to the Dean of Graduate Studies nomination process shortly. If the candidate is accepted, it is hoped that this candidate would be in place for the 24/25 academic year.

SECTION 3: Student survey

The national student survey takes a holistic approach to the student experience from living accommodation to the quality of teaching.

Table 6a: Results of the National Student Survey.ie 2022/23 – issues identified

School	*Based on the results of the National Student Survey.ie, identify a maximum of 3 issues that the school will address*	*Identify barriers to addressing/improving any issue:*
Biochemistry & Immunology	Several students requested tutorials and/or peer to peer learning. Students requested more feedback on assignments and requested rubrics for assignments before they were submitted. Students requested more diverse assessment methods and practice tests e.g. MCQs that are not assessed for credit. Online lectures: some students request all lectures to be online to avoid long commutes. Some students requested lecture slides and notes be provided before the lecture.	Timetabling is an issue for scheduling peer to peer tutorials as all students have busy timetables. Individual feedback to students is very time-consuming and we do it as much as possible.
Chemistry	More continuous assessment (4th Year)	Resources, especially academic staff time
Computer Science and Statistics	The feedback received by the National Student Survey (NSS) gives a useful signal in the overall feedback practices of the School, which include semi-annual Anonymous Student Feedback surveys (with more than double the participation of the NSS) and Student Representative meetings (which solicits more qualitative feedback). Arising from the NSS and the School feedback activities the following issues will be addressed: • Student workload; • Learning in smaller groups; • Individual module concerns;	Some of the issues raised in both the School feedback activities and the NSS are not entirely within the School's control. These include: • Large class sizes and high student-to-staff ratio; • Tight and inconvenient scheduling of lectures and exams. A number of multi-cohort modules had to reduce the number of lectures per week due to central scheduling constraints. Several students were late to class due to distance between scheduled rooms. Moreover tight Exams scheduling with cases of students sitting 3-4 exams in 2-3 days increases student dissatisfaction;

	Based on the PGR survey, the School plans to increase the number of events and/or seminars open to PGR/PhD students in the School.	• Limited availability of rooms for interactive/small group learning techniques. A need exists for a larger number of small meeting rooms for interactive group work, breakout sessions, and similar activities.
Engineering	1. Better labs and facilities 2. Timetabling 3. Stipends - too low for cost of living in Dublin	1. Sub-par facilities (as acknowledge by college). 2. Structure of semester and mismatch between hours expected of students and reality of what the students are expected to deliver. 3. College has increased new stipends and are in the process of bringing all College stipends to the same level but this is a staggered process and is taking time to implement.
Genetics and Microbiology	1. Consider providing more time for capstone project to complete project write-up. 2. Consider including more extensive opportunities for more coding and statistical analysis. 3. Providing clear guidance on formal requirements for PGR students and any inductions/training programmes available.	1. The format of semesterisation makes the work schedule very tight and providing additional time for project write-ups may be challenging. 2. Teaching resources may represent a barrier to addressing the issue. 3. No barrier.
Mathematics	1. The quality and number of tutorials 2. Timetabling, sufficient choice and availability of modules 3. Communication between departments and lecturers.	1. The numbers of pure & applied mathematics teaching staff and PhD students are small. This fundamentally limits the number of modules and tutorials we can offer. 2. Timetabling is a complicated problem. The range of modules, the nature of mathematics & theoretical physics teaching and constraints of the common architecture make it difficult to accommodate all student preferences.

Natural Sciences	At UG level, the National Student Survey data response rates varied for low to medium across the courses, hence the information should be noted with same – in summary, the School's TR060 and TR062 programmes track close to STEM averages while TR064 tracks a little above STEM averages based on the indicator feedback. Recurring issues include; • Class sizes and resources (i.e. infrastructures) • Access to fieldwork and costs ACTION: To address some of the challenges, the School are in the process of renovating/upgrading several locally maintained teaching spaces. Renovated AV systems will be in place for the 24/25 AY. ACTION: The School have remained committed to fieldtrips, given the importance across our programmes and are exploring ways to better control costs for students going forward. For Taught Msc programmes within the School: • Environmental Sciences • Development Practice • Smart & Sustainable Cities • Biodiversity & Conservation Students in the School's taught programs have responded in fairly low numbers to the National Student Survey (1–7 depending on the program). However, based on the respondents, indicator indices from the Survey show that the School's taught programs generally score well-above TCD-overall (average score: 30/60), or STEM (average score: 29/60) indices metrics, with MSc Biodiversity &	1. Identifying sufficient external partners for student placements or dissertation research projects. 2. Costs arising with residential fieldtrips cannot be adequately mapped back to student fees and annual budgets. As such, the School has no clear mechanism in place to cover student costs associated with mandatory fieldtrips. Obtaining consistent student financial information (i.e. clear budget breakdowns) and support from College would alleviate the challenge. 3. Most of the modules in the School's MSc programs are currently running as short three-week blocks, in which students intensively participate only in the one module. At the same time, much of the assessment is in-course assessment. However, due to the high level of scheduled student-staff contact hours, very little time remains for staff to go over student course work and provide feedback throughout the module.

	Conservation score: 34/60; MSc Development Practice: 40/60; MSc Environmental Sciences: 36/60; MSc Smart & Sustainable Cities: 46/60. Due to the low student response rate in some programs (e.g. 1 respondent from MSc in Environmental Sciences) it is hard to identify (based on the National Student Survey) issues that impact the student cohort at large. 1. Over 50% of the School's respondents indicated that they have no access to blended academic learning with workplace experience. Students do however indicate that they see this as a miss and that they would prefer to have a possibility of e.g. placements, or Capstone projects in collaboration with external partners. ACTION: The MSc in Smart and Sustainable Cities and MSc in Development Practice actively stimulate students to obtain outside experience, with approximately half of the students availing of such opportunities. No such opportunities exist yet for the 2. Cost of residential fieldtrips. Some students have indicated significant difficulties with bearing the financial costs of mandatory residential fieldtrips. 3. The School MSc programs underperform, relative to TCD-overall, and STEM, on feedback on course work or assessments, therefore possibly compromising the students insight on their performance during a course.	
Physics	The following themes emerged from the National Student Survey data. Physical Sciences Stream	**Timetable feedback** The National Student Survey included feedback specific to the physical sciences timetable, specifically referring to issues that

	• More feedback to Continuous Assessment • More administrative supports • Increased opportunities for questions relating to modules. • Increase in UG tutorials	commuting students have with early morning/late evening lecture times. These are issues outside of the School's control as the School is bound by the lecture times available across the science course timetables. **Staff time/resourcing** Resourcing is an ongoing issue. The issues raised above require more staff time which will be difficult to do without compromising other activities (research etc).

Table 6b: Results of the National Student Survey.ie 2022/23 –response to issues

School	Outline how each issue will be addressed
Biochemistry & Immunology	Tutorials: Before Covid we ran very successful peer to peer learning tutorials for SF students. We will look at introducing this again as it was popular and effective. Feedback: Students requested more frequent and more comprehensive feedback on assignments and exams. We will ask our lecturers to provide this if possible. Diversity of assignments: We strive to provide a variety of assessment methods in B&I and will continue to diversify the assessment methods used. Online lectures: The school believes that in person lectures are an essential part of the educational experience and do not plan to provide all lectures online. Lecture slides and notes: we will request that lecturers upload the material to Blackboard before the lecture so that students can access them.
Chemistry	Modified the 4th problem-solving module as noted previously.
Computer Science and Statistics	Taking all feedback signals into account the School will seek to continue returning feedback from both NSS and School Feedback activities to lecturers, encouraging improvements in highlighted areas. The School will also follow up with lecturers on specific issues raised by students in some modules. It will also seek to map and improve student workload per course. The expected availability of the facilities in the new E3 building in will contribute to addressing some of the issues (facilities for learning activities in small groups).
Engineering	1. Opening of Learning Foundry will provide higher quality and quantum of space suitable to modern learning needs. 2. Working group considering academic year structure. 3. College is working with the IUA and HEA to improve stipends from SFI/IRC/EPA, etc. PIs are encouraged to apply for higher stipends (€25k) where funding bodies allow.

Genetics and Microbiology	1. Despite current semesterisation format, we will try to find a potential solution to allow more time for project write-ups. 2. We are currently in the process of some new academic hires in the school and it is hoped that this might alleviate the current teaching resource. 3. We have recently completed an overall of our school website, including an updated comprehensive 'Postgraduate Research Student Handbook'.
Mathematics	An important school goal is to increase the number of staff and PhD students, particularly within the discipline of pure mathematics and thus to offer more modules yearly. This will increase student module choice, increase the number of tutorials we can provide and allow academics to devote more time to module development. We are working on resolving timetabling issues by re-organizing our course offerings and curricula to better fit within the common architecture. Increased staff numbers, and increased module offerings, will help address the issues of alternate-year and cross-year teaching, which will further help with timetabling. We have appointed new administrative staff in the School Office to assist staff and students. This will help with the flow of information between students, course directors and staff in other schools.
Natural Sciences	1. The MSc in Env. Sciences and the MSc in Biodiversity and Conservation are actively exploring ways to enable students to obtain outside experience, through placements or collaborative dissertation research projects with outside partners. First, a mechanism will be discussed and put in place to formally enable such activities. Secondly, student will be stimulated to engage in such activities, by personally seeking out potential placement or dissertation partners. Thirdly, the School is considering to permanently task a staff member with identifying external partners for placements and dissertation research projects. 2. The School and MSc programs consider field teaching as essential of the educational program and experience. The programs cannot provide and financial support themselves to students in general, and not even to students in financial difficulties. However, the School and programs will strive and to ensure that students are aware of all costs associated with residential fieldtrips, not only from the annual start of the program, but even on the School's/programs' websites, so that also prospective students are aware that additional costs should be expected, in addition to standard College fees. 3. The School is currently exploring to switch the teaching model, from short and intense 3-week teaching blocks/module (short & fat), to teaching for each module scheduled throughout the term (long & thin). Such change will significantly reduce weekly contact hours and therefore provide more opportunities for staff to provide meaningful feedback. This change in teaching model is currently explored for Semester 1 of the MSc in Biodiversity and Conservation and the MSc in Env. Sciences.

Physics	•More feedback to continuous assessments has been requested of all academic staff members. •More administrative supports: There will be enhanced communication of existing College wide supports e.g. improved signposting to previous exam papers, signposting to Student Learning Development etc. •Increased opportunities for questions relating to modules: Some lecturers are experimenting with office hours. •More tutorials: Previously the School offered smaller tutorial groups to Senior Freshman students (groups of 20). However, poor student attendance at these tutorials has led the School to change to a larger group tutorial format in these modules. Student attendance at tutorials is being monitored.

SECTION 4: Professional Accreditation

Table 7: Professional Accreditation – Science, Technology, Engineering and Mathematics (STEM)

SCHOOL	ACCREDITED PROGRAMME	PROFESSIONAL OR STATUTORY BODY	YEAR OF MOST RECENT ACCREDITATION	IF ACCREDITATION TOOK PLACE IN 2022/23, SPECIFY WHETHER IT WAS IN PERSON OR VIRTUALLY	Comment if any conditions resulted from Accreditation Report outcomes e.g. reduced period of accreditation	Actions taken in response to accreditation outcomes
School of Chemistry	**B.A. Mod Chemistry** **B.A. Mod Chemistry with Molecular Modelling** **B.A. Mod Medicinal Chemistry** **B.A. Mod Chemistry with Biosciences**	Royal Society of Chemistry	To Apply for accreditation in 2024/25			
School of Computer Science and Statistics	**B.A.I./M.A.I. - Computer Engineering** **BA/MCS Integrated Computer Science**	Engineers Ireland	March 2022 5 years Re-accreditation in 2025/2026	In-person		

SCHOOL	ACCREDITED PROGRAMME	PROFESSIONAL OR STATUTORY BODY	YEAR OF MOST RECENT ACCREDITATION	IF ACCREDITATION TOOK PLACE IN 2022/23, SPECIFY WHETHER IT WAS IN PERSON OR VIRTUALLY	Comment if any conditions resulted from Accreditation Report outcomes e.g. reduced period of accreditation	Actions taken in response to accreditation outcomes
School of Engineering	**B.A.I/M.A.I. - Civil, Structural & Environmental Engineering**	Engineers Ireland	March 2022 5 years Re-accreditation in 2025/2026			
	B.A.I./M.A.I. - Computer Engineering					
	B.A.I./M.A.I. - Electronic Engineering					
	B.A.I./M.A.I. - Electronic & Computer Engineering					
	B.A.I./M.A.I. - Mechanical & Manufacturing Engineering					
	B.A.I./M.A.I. Biomedical Engineering					
	B.Sc. (Ing) / M.A.I. (optional) Engineering with Management					

SCHOOL	ACCREDITED PROGRAMME	PROFESSIONAL OR STATUTORY BODY	YEAR OF MOST RECENT ACCREDITATION	IF ACCREDITATION TOOK PLACE IN 2022/23, SPECIFY WHETHER IT WAS IN PERSON OR VIRTUALLY	Comment if any conditions resulted from Accreditation Report outcomes e.g. reduced period of accreditation	Actions taken in response to accreditation outcomes
	MSc in Engineering (Civil)					
	MSc in Mechanical Engineering					
	BSc in Environmental Science and Engineering					
	M.A.I. (optional year 5) - eligibility for Chartered Engineer status by Engineers Ireland for all seven programmes		BSc in Environmental Science and Engineering – N/A (new)			
	MSc in Electronic Information Engineering		March 2022 5 years Re-accreditation in 2025/2026			
	Additional: Diploma programmes already accredited by Engineers Ireland. One-off	Engineers Ireland	To apply for accreditation - potentially in 2025/2026	**N/A**		

SCHOOL	ACCREDITED PROGRAMME	PROFESSIONAL OR STATUTORY BODY	YEAR OF MOST RECENT ACCREDITATION	IF ACCREDITATION TOOK PLACE IN 2022/23, SPECIFY WHETHER IT WAS IN PERSON OR VIRTUALLY	Comment if any conditions resulted from Accreditation Report outcomes e.g. reduced period of accreditation	Actions taken in response to accreditation outcomes
	accreditation required only – accounts for 20 hours of annual 35-hour requirements for Chartered Membership: 1. Applied Building Repair and Conservation 2. Construction Law and Contract Admin 3. Environmental Monitoring, Assessment and Engineering 4. Fire Safety Practice 5. Health and Safety in Construction 6. Project Management 7. Sustainable Energy and Environment 8. Diploma in Engineering for Climate Action (New)					

SCHOOL	ACCREDITED PROGRAMME	PROFESSIONAL OR STATUTORY BODY	YEAR OF MOST RECENT ACCREDITATION	IF ACCREDITATION TOOK PLACE IN 2022/23, SPECIFY WHETHER IT WAS IN PERSON OR VIRTUALLY	Comment if any conditions resulted from Accreditation Report outcomes e.g. reduced period of accreditation	Actions taken in response to accreditation outcomes
School of Physics	**B.A. (Moderatorship) in Physics**	Institute of Physics (IoP)	Dec 2022. Conditional accreditation for 2 years (All UG programmes)	In person	Unrestricted reassessments were an issue, capping was required. The proportion of first and 2:1's in our degrees over previous 5 years was questioned in relation to sector norms in the Ireland and the UK. The TEP policy of uncapped re-sits was also questioned, both of which we have been asked to address.	
	B.A. (Moderatorship) in Physics & Astrophysics					Actions to address unrestricted uncapped re-sits through derogation are progressing through committees in consultation with the IOP and a formal response is in progress. Submission will occur at the end of February 2024 to the IOP and following that through USC and Quality Committee. This process is nearing completion
	B.A. (Moderatorship) in Theoretical Physics (joint programme with School o Math)	OP accreditation	Dec 2022. Conditional accreditation for 2 years (all UG physics programmes)			
	B.A. (Moderatorship) in Nanoscience (joint programme with School of Chemistry)		Dec 2022. Conditional accreditation for 2 years (all UG physics programmes)			
Genetics and Microbiology	**N/A**					

SECTION 5: Quality initiatives and issues

Table 8: Quality initiatives

School	Outline the three quality initiatives undertaken by the School in 2022/23 that you wish to showcase as good practice/enhancement activities.
Biochemistry & Immunology	We provided sample answers to previous exam questions to SS students to demonstrate first class answers. We provided bullet point summaries of expected answers to exam questions to external examiners. We held an away day for academic staff to discuss future planning for the school in terms of teaching and research. Each PI now to have the same JS students for tutorials and minireview for continuity.
Chemistry	N/A
Computer Science and Statistics	The School has established a Generative AI Workgroup to look at the implications for teaching, learning and assessment of Generative AI technologies such as ChatGPT. This initiative involved setting up a dedicated team tasked with conducting working sessions for faculty members. The focus is on providing guidelines and best practices for the School in relation to generative AI. Given the fast-paced advancements in this field, this is an ongoing endeavour that will need continuous engagement and updates. As part of the School's Industry Engagement strategy, the School responded to a call for funding from the HCI Enterprise Collaboration Activities Fund (€200,000) and secured an award of €30,000 to enable the School work with a consultant/agency to scope additional opportunities to engage with industry together with developing a media pack to support such engagement. Building on the success of the School's current industry engagement activities (the year 2 and 3 SWEng project, and year 4 internship programme), this funding will be used to develop a streamlined offering for those student groups (undergraduate and postgraduate) which currently may not have interactions with industry as part of their coursework. Providing all our students with the opportunity to engage with industry whether homegrown SME's or multinational technology corporations is a key School strategic objective and this funding will enable a media campaign and event launch to be held later in the year. The School has been developing a new bespoke web-based Demonstrator and Teaching Assistant Allocation () system to improve and greatly simplify the capture of all data required for: the annual demonstrator allocation process, process improvement, and more effective communication with all stakeholders (faculty, research and undergraduate students). The first iteration of the DAS system was rolled out in September 2023 and while some teething problems arose, these have been resolved. Further

	developments and programming are continuing and the systems are expected to be fully functional and embedded within the apparatus and procedures of the School for the next academic year.
Engineering	• Promotion of the School's activities both internally and externally through the development and implementation of a School Marketing and Communications strategy led by the School's new Marketing and Communications Officer. • Plagiarism: a new tracking process has been put in place for PG plagiarism cases and the DUTL implemented a new plagiarism protocol for undergraduate students which the Senior Lecturer is in the process of adopting for the College. • A review of the accreditation process was carried out and improvements to the process have been considered which should significantly improve and speed up the process for the next accreditation review.
Genetics and Microbiology	School website updated extensively, with dedicated sections for staff and student information; by way of example, we have a dedicated area for postgraduate research students with links to School, College and other resources. Improved disability access to School facilities, including conversion of a room to provide a new lecture theatre with wheelchair access. Many thanks to the DisAbility Office for their valuable engagement throughout this process. Upgraded audio-visual facilities in some areas of the School.
Mathematics	Online module material: The school has initiated a programme, initially funded through Trinity INC, of developing new online materials for service modules. This provides applications of mathematics to topics the students will see later in their other, particularly non-mathematics, modules. The goal is to provide motivation for the mathematical techniques being taught and to help the students have an improved recall of the mathematical concepts. In 2022/23 this was done for MAU11E01 and will be extended to other service modules in 2023/24. Disability venues for maths help-room: The maths help-room is run daily during term and is an opportunity for students in all maths modules to come and ask mathematics, statistics and theoretical physics questions. This provides important additional support for students who are struggling with their course materials or who need help with assignments. Due to the location of the room, there

	were significant access issues. In collaboration with the Disability service, we have now extended the help-room so that it takes place in a more accessible location (Printing house) once a week. One issue raised in previous years was the lack of opportunities for students to meet teaching staff in an informal atmosphere and generally a lack of student-faculty interactions. In 2022/23, we reintroduced several such events which had been cancelled due to the pandemic. We hosted meetings between incoming mathematics, TJH, and theoretical physics JF students and staff at the beginning of the academic year and a reception for graduating SS students.
Natural Sciences	1. While maintaining unique course identities, increasingly, MSc programs within the School are moving towards shared modules with other School or E3 MSc programs. This is to facilitate i) better use of staff resources, and ii) stimulate interaction between students from different programs and academic backgrounds, to tackle multi-disciplinary issues. 2. Despite issues raised above (e.g. financial costs to School and students, staff resource issues), all relevant School programs (UG & PG) have committed to maintaining residential field teaching as part of their programs, to ensure that Trinity students obtain the most relevant academic insight and remain competitive for employers. 3. The School are actively in the process of centralising several processes at both UG and PG level to normalize procedures and provide greater transparency and communication across all programmes and are adopting the new rules and guidance from the PG renewal programme. 4. Two of the School's MSc programs actively stimulate students to take placements or conduct dissertation projects with external partners (e.g. national/international governmental, non-governmental, industry etc). Although this puts significant burden on student and staff to identify projects and external partners, this practice is considered extremely valuable for the student experience and significantly aids in increasing student employability. 5. A significant risk to assessment is imposed by AI software (such as ChatGPT). This especially impacts on Essay style examinations, such as utilized by the Desk-study module in Env.Sc., and BioCon. To mitigate this risk we have decided to remove the desk-study modules from the curriculum and replace this with a dedicated module on Science Communication. Novel approaches are also being discussed at UG level.
Physics	Internal review of computational physics using python (from JF to SS) has been initiated with outcomes expected to apply in the next academic year (24/25). This process has involved extensive consultation (student and staff surveys, staff student liaison committees). From 22/23, all Junior Sophister students in all physics programmes obtained additional specific training in education, ethics in physics and research practices. This training included examples from the Irish Universities Association handbook. Implementation was in place during IOP accreditation in December 2022.

Table 9: Quality issues

School	Please outline any quality issues that fall outside the remit of the School for escalation to Faculty or College-level
Biochemistry & Immunology	Need for access to large venue spaces for lectures at sophister level that involve students from all 4 moderatorships. An ideal location exists in Trinity Central but these are currently restricted to a single school and not open for booking even though they are rarely used
Chemistry	Lecture Theatre Quality / size and availability makes timetabling and providing a quality experience difficult. Lack of sufficient classroom style workshop space of sufficient size Lack of computer rooms of sufficient size.
Computer Science and Statistics	The school has been unable to reach it's full faculty complement and reduce its rising student staff ratio for a number of years now. The problem is twofold: rising student FTEs aligned to the E3 initiative and falling faculty numbers, initially due to a recruitment freeze but thereafter due to staff resignations and retirements. While a significant recruitment drive has been undertaken resulting in the successful recruitment of eight new faculty members who took up employment during the 2022-23 academic year, however, notwithstanding the considerable resources associated with this volume of recruitment a further eight appointments will need to be made during the 2023-24 academic year (one commenced in January 2024). Maintaining this pace of recruitment is challenging for the School and exacerbated by current salaries and the cost of living in Dublin. This together with similar challenges, lack of promotional opportunities and delays in Professional staff appointments is hampering our ability to deliver existing and future programmes to the exacting standards that we constantly seek to deliver. Due to ongoing delays, access to adequate, contiguous space continued to pose serious difficulties for the School this year. The E3 Learning Foundry has encountered several delays with the current completion date now Q3 2004 with occupancy expected in early 2025. In addition, the refurbishment of the Trinity Research & Innovation (TR&I) space in Westland Row, made available to the School in 2022, was also delayed. The snag list is at last almost complete and occupancy of this space is expected to commence in February 2024, almost a year behind schedule. As a result of these delays, there have been consequential delays with two further smaller projects, namely the refurbishment of School space in Westland Row, on the far side of the TR&I space, and the O'Reilly

	Institute Common Room. Functioning with insufficient and inappropriate space inhibits the ability of the School to recruit and retain staff, and deliver our programmes using state-of-the-art facilities. The recruitment of PhD students in the current environment is an ongoing challenge. The problems include fees (EU and NEU); the low level of stipends notwithstanding the increase in College and SFI awards, to which the School is aligning its awards; increasing cost of living, lack of (affordable) accommodation in Dublin together with an extremely buoyant jobs market. The falling PhD numbers is further creating a shortage of qualified demonstrators essential to support undergraduate teaching. As a first step to alleviate some of these difficulties College should address both EU and NEU fee issues and accelerating opportunities and relaxing constraints associated with PostDocs undertaking limited lecturing. The School would wish to see this as part of the mandatory, training aspects of such positions.
Engineering	• The current academic year structure puts pressure on academic and administration staff at the annual examination session. The timeline between the conclusion of exams and publication of results is too tight especially for the larger cohorts in the freshman years. This has been repeatedly raised as an issue at USC. • The School needs clear guidance from the University on how to deal with ChatGPT and OpenAI resources to ensure the integrity of the assessment processes. • The School is experiencing ongoing issues with office, lab and teaching space. It is a challenge to find suitable office space for incoming staff and PhD students, our capacity to cater to our growing student cohort and successfully run our new and expanding programmes is hampered by a lack of quality teaching space, e.g., Goldsmith Hall and our ability to take advantage of research opportunities is constrained by a lack of lab/research space.
Genetics and Microbiology	Senior Sophister Capstone projects: There remains a difficulty in financing wet laboratory SS Capstone Projects, which can cost a few thousand euro per student. Currently these projects tend to be paid for from our PIs' research funds, and budgets can be tight, so we would welcome some contribution from College funds.

	Infrastructure is an issue. Lecture theatres and laboratories need to be upgraded, and lack of space is especially problematic as our student numbers are rising year on year. To provide excellent student experience in STEM, and to be competitive with offerings from other national and international universities, investment in College infrastructure is urgently required.
Mathematics	The lack of sufficient resources to deliver our undergraduate programme remains a significant issue. Class sizes have grown and there are often not enough rooms or rooms of appropriate size to deliver tutorials. For example, this results in tutorial sessions with 60 or 70 students where a maximum should be closer to 20. Relatedly there is a shortage of tutors, particularly for advanced mathematics modules. This is in part due to a lack of funding for PhD students in mathematics. Timetabling within the common architecture continues to cause significant problems in delivering the undergraduate programme. It is difficult to provide students with sufficient module choices due to timetabling constraints. Students are often scheduled with excessively long blocks of lectures and lectures at late hours. The recruitment and retention of external examiners remains an issue. The role of external examiner has been increasing in difficulty, not least due to an increased number of exam sessions for which their input is needed. In addition, the administrative overhead they face, for example applying for a PPS number, is a disincentive given the small fee they receive. These issues resulted in the school not having an external examiner in mathematics in 2021/22. While an examiner for 2022/23 was found, the pool of candidates willing to do the job is small, and problems will likely continue in the future. There is an issue with the distribution and coordination of the external's reports. It was not possible to access all the reports via the shared online folder as our school is on a different network. The school had to contact the externals examiners directly to get access to the reports. In the future, it may be helpful if the externals send their reports directly to the school so they can be considered in a timely fashion.
Natural Sciences	• A significant risk to assessment is imposed by AI software (such as ChatGPT). This not only impacts on Essay style examinations, but even on exercises making power point presentations, film and posters. This is relevant to both UG and PG programmes. • Teaching facilities: Increased student numbers continue to put pressure on teaching quality and student experiences. This is relevant to both UG and PG programmes. • Costs of education: students have voiced concern about the rising additional costs of their education, for example because of residential fieldtrips. This is relevant to both UG and PG programmes. • Cost of living and associated need for students to have jobs on the side.

	• Sheer student numbers across all taught programs, which significantly impact on the number of undergraduate Capstone and PG dissertation projects staff are required to supervise, which in turn impacts on the quality of supervision and projects. • Research costs of undergraduate Capstone and PG dissertation projects, particularly when including field or lab-based research, which are not normally costed for by standard annual methods. This has potential knock-on impacts for the supervisors and students.
Physics	The issues raised through the IOP accreditation process (capping re-sits etc) has already been escalated through Quality Committee and Senior Lecturer.

Table 9b: Quality issues re: Equipment

School	Please outline any quality issues re: Equipment
Biochemistry & Immunology	equipment used in capstone projects and undergraduate teaching that was purchased with research funding and does not have a mechanisms to be upgraded of replaced: LiCor Odyssey System (run by B&I) Flow Cytometry Suite (shared service in TBSI, run by B&I) Confocal Microscopy Suite (shared service in TBSI, run by B&I).
Chemistry	We use equipment in chemistry in the labs UV vis IR and GC's in the fiscal labs are over 20 years old. We have to maintain computers running Windows XP to run them. They're always going down and breaking. We've got additional student numbers, so the student experience is poor in terms of getting through to using the equipment.
Computer Science and Statistics	New equipment required.
Engineering	- Trinity Widows update is making all of our lab computers obsolete - we don't have €20k+ to replace them - this will shut down a lot of MAI/MSc/PhD experiments as they run DAQ systems. - Our Quantronix DarwinDuo pulsed laser that we use in the Thermo lab for flow velocity measurements with particle image velocimetry (PIV) has broken down on several occasions. It was purchased in 2008 and is past end of life. The same applies to the high speed cameras (Photron Fastcam SA1) used in that system. The last time the laser broke down in Oct 2023, one of the laser diode power supplies failed. There was no budget available to replace it with a new one (8000 EUR). We eventually managed to find a local electronics shop to repair it, but it caused several weeks of downtime. This system is used by several PhD students, postdocs as well as MAI projects. But because of its problematic reliability, this is making it more difficult to plan for experimental MAI projects that would need this system. - 4 post RDP rig in test hall stopped working c. 18 months ago, 3rd year concrete beam experiment now has to be done downstairs so means a clash with 3rd year steel beam and subsequent stretch out of JS lab programme. - A new control system combined with data logging system would cost c. 70k. UCD have 2 of these systems… - 100Kn Zwick universal test machine in test hall is on its last legs, very dated and temperamental control system (we hoard old pc's that will still run it) often stops during testing of Sara Pavia's research samples. Also used for 1E12 and JS Bolt

	breaking lab. Truly the backbone of the lab. Michael is usually able to coax it back to life but really on a wing and a prayer and once it won't come back to life we are in big trouble. Have got quotes for either modernisation of it (sustainability !) or replacement of, both c.60k. - *PIV system;* - *Hotwire measurement system;* - *NI multichannel DAQ system;* - *High Performance Computing system (i.e. rack based multimode system).* -
Genetics and Microbiology	Here are a few examples of old equipment in our School that needs replacing and / or upgrading: **Microbiology:** It is of note, that as well as in-house teaching for the School of Genetics and Microbiology, the Discipline of Microbiology provides significant external teaching/lab preparation for various Schools/Disciplines/Student groups including Dental students, Dental nurses & hygienists, Pharmacy students, SF Medicine and SF Human Health & Disease. Plate Pourer (e.g. similar to https://www.integra-biosciences.com/ireland/en/media-preparation/mediajet) This is an essential piece of equipment in the prep room in Microbiology and is in near constant use. The current equipment/plate pourer is old and will have to be replaced soon. We cannot effectively function without this. Additionally, we have had the Biology Teaching Centre make use of this item of equipment. Sorvall Centrifuge Microbiology is down to the last centrifuge, which is used for many purposes including UG teaching. We really need to plan to replace this as it represents a very dangerous reliance on old equipment. Ice Machine Microbiology has one small ice machine that services all research groups in the Discipline. The technical team is currently looking at the possibility of service and repair of a second machine in the hope that we can may be able to be brought back into action. **Genetics:**

	<u>Autoclave</u> The waste autoclave in Genetics is almost 20 years old, the other smaller autoclaves are between 15 and 20 years old. We need at least one new autoclave to service the Discipline for both UG and PG teaching, and also research. <u>Safety cabinets</u> Safety cabinets need upgrading in multiple laboratories in Genetics to meet required specifications/policies. <u>Water system</u> This single water system in Genetics provides laboratory grade water for the whole Discipline – the water system in essential for all teaching and research. The system is extremely old and essentially on its last legs and therefore needs replacing soon. <u>Microtome/cryosectioning</u> The microtome is used by multiple laboratories in Genetics for UG final year projects and PG students, along with many other researchers in the Discipline. Unfortunately, it is old and therefore is rapidly becoming ineffective for sectioning tissues. - Maintenance of equipment is another enormous issue (currently not funded) that is essential for our School and more broadly TCD to remain competitive with respect to teaching and research. I have not touched on upgrading of laboratory benches etc, however clearly this, in the somewhat longer term, is another key issue for the School and the College.
Mathematics	Firstly, Mathematics has a projector in one of the lecture theatres. This lecture theatre was out of full action for four weeks in one semester and this had a huge impact. Secondly, for our capstone projects, we have an in-house computer system that the students use for doing a numerical work. These computers are decades old and this really impacts what the students can actually get done.
Natural Sciences	None reported.
Physics	In general, our research equipment is aging badly. This applies both to equipment within PI labs as well as shared facilities. This stems from the lack of a large scale infrastructure funding program such as PRTLI. The annual SFI equipment funding calls are simply too small to meet the needs of the national research community. This is particularly stark for shared facilities, such as those in CRANN. As an example, the Advanced Microscopy lab consists of a suite of microscopes which are nearly 20 years old. The vast majority of these tools are out of warranty, too old to be covered by service agreements or simply obsolete. A major problem is that because many of these microscopes were purchased together, they will come to end of life together. When they eventually fail, large swathes of our research will become impossible. This will make it extremely difficult for postgrad students to perform their research.

Appendix A: Faculty Retention Data

Table 3: Retention by Standing & faculty

Standing & Retention	STEM	%
1	**1018**	**26.74%**
PROGRESSED SAME COURSE	870	22.85%
REPEAT SAME COURSE	30	0.79%
TRANSFERRED OTHER COURSE	37	0.97%
NOT RETAINED	81	2.13%
2	**929**	**24.40%**
PROGRESSED SAME COURSE	836	21.96%
REPEAT SAME COURSE	27	0.71%
TRANSFERRED OTHER COURSE	38	1.00%
NOT RETAINED	28	0.74%
3	**854**	**22.43%**
COURSE COMPLETED		0.00%
PROGRESSED SAME COURSE	795	20.88%
REPEAT SAME COURSE	30	0.79%
TRANSFERRED OTHER COURSE	13	0.34%
NOT RETAINED	16	0.42%
4	**802**	**21.07%**
COURSE COMPLETED	448	11.77%
COURSE COMPLETED - EXIT	141	3.70%
PROGRESSED SAME COURSE	190	4.99%
REPEAT SAME COURSE	11	0.29%
TRANSFERRED OTHER COURSE	1	0.03%
NOT RETAINED	11	0.29%
5	**204**	**5.36%**
COURSE COMPLETED	204	5.36%
NOT RETAINED		0.00%
Grand Total	**3807**	**100.00%**

Table 4. Retention by Standing & Gender & Faculty	STEM			STEM Total
Standing & Retention	Female	Male	Prefer not to say	
1	**480**	**533**	**5**	**1018**
PROGRESSED SAME COURSE	403	463	4	870
REPEAT SAME COURSE	8	21	1	30
TRANSFERRED OTHER COURSE	23	14		37
NOT RETAINED	46	35		81
2	**423**	**502**	**4**	**929**
PROGRESSED SAME COURSE	390	442	4	836
REPEAT SAME COURSE	9	18		27
TRANSFERRED OTHER COURSE	13	25		38
NOT RETAINED	11	17		28
3	**386**	**464**	**4**	**854**
COURSE COMPLETED				
PROGRESSED SAME COURSE	370	421	4	795
REPEAT SAME COURSE	8	22		30
TRANSFERRED OTHER COURSE	4	9		13
NOT RETAINED	4	12		16
4	**332**	**470**		**802**
COURSE COMPLETED	232	216		448
COURSE COMPLETED - EXIT	48	93		141
PROGRESSED SAME COURSE	45	145		190
REPEAT SAME COURSE	4	7		11
TRANSFERRED OTHER COURSE		1		1
NOT RETAINED	3	8		11
5	**47**	**157**		**204**
COURSE COMPLETED	47	157		204
NOT RETAINED				
Grand Total	**1668**	**2126**	**13**	**3807**

Table 5. Retention by Standing & Gender & Faculty	STEM			STEM Total
Standing & Retention	Female	Male	Prefer not to say	
1	**28.78%**	**25.07%**	**38.46%**	**26.74%**
PROGRESSED SAME COURSE	24.16%	21.78%	30.77%	22.85%
REPEAT SAME COURSE	0.48%	0.99%	7.69%	0.79%
TRANSFERRED OTHER COURSE	1.38%	0.66%	0.00%	0.97%
NOT RETAINED	2.76%	1.65%	0.00%	2.13%
2	**25.36%**	**23.61%**	**30.77%**	**24.40%**
PROGRESSED SAME COURSE	23.38%	20.79%	30.77%	21.96%
REPEAT SAME COURSE	0.54%	0.85%	0.00%	0.71%
TRANSFERRED OTHER COURSE	0.78%	1.18%	0.00%	1.00%
NOT RETAINED	0.66%	0.80%	0.00%	0.74%
3	**23.14%**	**21.83%**	**30.77%**	**22.43%**
COURSE COMPLETED	0.00%	0.00%	0.00%	0.00%
PROGRESSED SAME COURSE	22.18%	19.80%	30.77%	20.88%
REPEAT SAME COURSE	0.48%	1.03%	0.00%	0.79%
TRANSFERRED OTHER COURSE	0.24%	0.42%	0.00%	0.34%
NOT RETAINED	0.24%	0.56%	0.00%	0.42%
4	**19.90%**	**22.11%**	**0.00%**	**21.07%**
COURSE COMPLETED	13.91%	10.16%	0.00%	11.77%
COURSE COMPLETED - EXIT	2.88%	4.37%	0.00%	3.70%
PROGRESSED SAME COURSE	2.70%	6.82%	0.00%	4.99%
REPEAT SAME COURSE	0.24%	0.33%	0.00%	0.29%
TRANSFERRED OTHER COURSE	0.00%	0.05%	0.00%	0.03%
NOT RETAINED	0.18%	0.38%	0.00%	0.29%
5	**2.82%**	**7.38%**	**0.00%**	**5.36%**
COURSE COMPLETED	2.82%	7.38%	0.00%	5.36%
NOT RETAINED	0.00%	0.00%	0.00%	0.00%
Grand Total	100.00%	100.00%	100.00%	100.00%

Table 6. Retention by Standing & Fee Status & Faculty	STEM		STEM Total
Standing & Retention	**EU**	**NEU**	
1	**868**	**150**	**1018**
PROGRESSED SAME COURSE	742	128	870
REPEAT SAME COURSE	24	6	30
TRANSFERRED OTHER COURSE	35	2	37
NOT RETAINED	67	14	81
2	**819**	**110**	**929**
PROGRESSED SAME COURSE	735	101	836
REPEAT SAME COURSE	23	4	27
TRANSFERRED OTHER COURSE	38		38
NOT RETAINED	23	5	28
3	**763**	**91**	**854**
COURSE COMPLETED			
PROGRESSED SAME COURSE	709	86	795
REPEAT SAME COURSE	28	2	30
TRANSFERRED OTHER COURSE	11	2	13
NOT RETAINED	15	1	16
4	**706**	**96**	**802**
COURSE COMPLETED	426	22	448
COURSE COMPLETED - EXIT	91	50	141
PROGRESSED SAME COURSE	169	21	190
REPEAT SAME COURSE	11		11
TRANSFERRED OTHER COURSE	1		1
NOT RETAINED	8	3	11
5	**197**	**7**	**204**
COURSE COMPLETED	197	7	204
NOT RETAINED			
Grand Total	**3353**	**454**	**3807**

Table 7. Retention by Standing & Fee Status & Faculty	STEM		STEM Total
Standing & Retention	**EU**	**NEU**	
1	**25.89%**	**33.04%**	**26.74%**
PROGRESSED SAME COURSE	22.13%	28.19%	22.85%
REPEAT SAME COURSE	0.72%	1.32%	0.79%
TRANSFERRED OTHER COURSE	1.04%	0.44%	0.97%
NOT RETAINED	2.00%	3.08%	2.13%
2	**24.43%**	**24.23%**	**24.40%**
PROGRESSED SAME COURSE	21.92%	22.25%	21.96%
REPEAT SAME COURSE	0.69%	0.88%	0.71%
TRANSFERRED OTHER COURSE	1.13%	0.00%	1.00%
NOT RETAINED	0.69%	1.10%	0.74%
3	**22.76%**	**20.04%**	**22.43%**
COURSE COMPLETED	0.00%	0.00%	0.00%
PROGRESSED SAME COURSE	21.15%	18.94%	20.88%
REPEAT SAME COURSE	0.84%	0.44%	0.79%
TRANSFERRED OTHER COURSE	0.33%	0.44%	0.34%
NOT RETAINED	0.45%	0.22%	0.42%
4	**21.06%**	**21.15%**	**21.07%**
COURSE COMPLETED	12.71%	4.85%	11.77%
COURSE COMPLETED - EXIT	2.71%	11.01%	3.70%
PROGRESSED SAME COURSE	5.04%	4.63%	4.99%
REPEAT SAME COURSE	0.33%	0.00%	0.29%
TRANSFERRED OTHER COURSE	0.03%	0.00%	0.03%
NOT RETAINED	0.24%	0.66%	0.29%
5	**5.88%**	**1.54%**	**5.36%**
COURSE COMPLETED	5.88%	1.54%	5.36%
NOT RETAINED	0.00%	0.00%	0.00%
Grand Total	**100.00%**	**100.00%**	**100.00%**

Table 8: Faculty STEM by programme

Programme	Retained	Grand Total
Biological and Biomedical Sciences	COURSE COMPLETED	202
	PROGRESSED SAME COURSE	695
	REPEAT SAME COURSE	11
	TRANSFERRED OTHER COURSE	18
	NOT RETAINED	45
Chemical Sciences	COURSE COMPLETED	49
	PROGRESSED SAME COURSE	163
	REPEAT SAME COURSE	14
	TRANSFERRED OTHER COURSE	3
	NOT RETAINED	13
Computer Science	COURSE COMPLETED	35
	COURSE COMPLETED - EXIT	47
	PROGRESSED SAME COURSE	375
	REPEAT SAME COURSE	12
	NOT RETAINED	11
Computer Science and Language	COURSE COMPLETED	16
	PROGRESSED SAME COURSE	12
	REPEAT SAME COURSE	1
	TRANSFERRED OTHER COURSE	9
	NOT RETAINED	1

Computer Science, Linguistics and a Language	PROGRESSED SAME COURSE	30
	REPEAT SAME COURSE	1
	NOT RETAINED	2
Engineering	COURSE COMPLETED	146
	COURSE COMPLETED - EXIT	90
	PROGRESSED SAME COURSE	683
	REPEAT SAME COURSE	26
	TRANSFERRED OTHER COURSE	6
	NOT RETAINED	22
Engineering with Management	COURSE COMPLETED	23
	COURSE COMPLETED - EXIT	4
	PROGRESSED SAME COURSE	93
	REPEAT SAME COURSE	3
	TRANSFERRED OTHER COURSE	6
	NOT RETAINED	4
Environmental Science and Engineering	PROGRESSED SAME COURSE	38
	REPEAT SAME COURSE	2
	NOT RETAINED	1
Geography and Geoscience	COURSE COMPLETED	47
	PROGRESSED SAME COURSE	163
	TRANSFERRED OTHER COURSE	8
	NOT RETAINED	2

Management Science and Information Systems Studies	COURSE COMPLETED	33
	PROGRESSED SAME COURSE	91
	TRANSFERRED OTHER COURSE	1
Mathematics	COURSE COMPLETED	30
	PROGRESSED SAME COURSE	112
	REPEAT SAME COURSE	7
	TRANSFERRED OTHER COURSE	6
	NOT RETAINED	10
Physical Sciences	COURSE COMPLETED	47
	PROGRESSED SAME COURSE	128
	REPEAT SAME COURSE	15
	TRANSFERRED OTHER COURSE	22
	NOT RETAINED	18
Theoretical Physics	COURSE COMPLETED	24
	PROGRESSED SAME COURSE	108
	REPEAT SAME COURSE	6
	TRANSFERRED OTHER COURSE	10
	NOT RETAINED	7
Grand Total		**3807**

Appendix B: Faculty Risk register 2022 (2023 risk register due after Quality report so is unavailable at the time this submission)

Risk Title
This should be short risk title that outline's the risk in a clear and concise way, for example, "GDPR Risk", "Staff and Student wellness Risk" or "Space capacity Risk"
1: Large-scale equipment failures
2: Inadequate or unsuitable space for teaching and research
3: Over-dependence on key staff/posts that are difficult/costly to replace
4: Financial uncertainty
5: Significant and imbalanced resource issues on the implementation of TEP
6: Serious accident/event/disclosure arising from legislative non-compliance. Need to dispose of equipment and material that is hazardous.
7: Loss of key personnel
8: Diminishing institutional research profile
9: Inability to respond effectively to external events and evolving student markets
10: Decline in PGR numbers across FSTEM
11. Risk of increasing and escalating costs of doing STEM-based research due to Brexit, Ukraine War and disruptions to supply chains
12. Reduced ability to retain and recruit UG students
13. Risk of staff and student burnout
14. Human capital initiative (HCI) - logistics and operational challenges
15. Inadequate IT infrastructure
16. Goldsmith Hall - Health and safety concerns
17. Goldsmith Hall - reputational damage and teaching space Inadequacies/ negative learning experience
18. Capstone projects are a key feature of STEM courses but are financially and resource intensive.
19. Change to the BPA and the implications of this
20. Continuation of research is dependent on infrastructure, finances, staff, PhDs and resources
21. Recruiting and maintaining PhD numbers
22. Cost of living in Dublin risk and housing crisis plus inflation