

QUALITY ENHANCEMENT UNIT



*QUALITY REVIEW
PEER REVIEW PANEL REPORT
SCHOOL OF MATHEMATICAL SCIENCES*

Dates: 4-12 November 2020

“By embedding a strong quality-enhancement ethos, we will use our quality processes to ensure a culture and experience of best practice in the delivery of our academic mission, demonstrating our commitment to continuous evolution and improvement”

(UCC’s Strategic Plan 2017 – 2022, p.23)

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List of Panel Members

Refer to Appendix A for detailed panel profiles.

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Part 1 - Overall Analysis

1.1 Context

The School of Mathematical Sciences (SoMS) is a long-established and research-active academic unit with an internationalisation focus. It is located within the College of Science, Engineering and Food Science at University College Cork (UCC) and based in the *Western Gateway Building*, close to the main UCC campus. It includes the Departments of Mathematics, Applied Mathematics and Statistics, which were first brought together within a school structure in 1996. However, Mathematics was taught at the then Queen's College Cork since 1849. The appointment of new Head of School in September 2019 has coincided with the process of quality review, as well as with the unit's engagement with the application for Athena Swan (bronze award).

The School offers a total of nineteen programmes between undergraduate (8) and postgraduate (11) options; among these, two are run in collaboration with the School of Computer Science and one is a joint programme with Beijing Business and Technology University. It has strong relationships also with cognate disciplines such as the Department of Physics and with the School of Engineering.

Additionally, it contributes 166 modules to 83 programmes offered by other Schools in the University, such as three Arts programmes within the College of Arts Celtic Studies and Social Sciences. One in five University students takes at least a module in Mathematical Sciences (SER, p.21). In 2019/20 the SoMS had 792 FTEs (681 UG and 111 PG) and a total student headcount greater than three thousand students. The unit has a long tradition of community engagement with local schools: since 1987 it has provided free mathematics classes to primary and secondary school children through the Maths Circles and Enrichment programmes and hosted Transition Year Week initiatives to promote passion for Mathematical Sciences and enhance mathematical reasoning skills among the Cork youth. It has established research collaborations with research centres and institutes. These include Insight Centre for Data Analytics, MAREI and Tyndall at UCC, externally the Central Statistics Office and international researchers, as well as partnerships with industry stakeholders.

The School has a total of 44.5 FTE staff members, including 7 post-doctoral researchers and 1 Adjunct Professor (SER, p.116). Of these, 30.5 are academics, while the remaining are listed under administrative/technical and research categories. The first category comprises of a head of school, three professors, 4.5 senior lecturers and twenty-two college lecturers. In addition, there are also eight Emeriti Professors. Among the administrative/professional services there are two school managers, an executive assistant, two senior executive assistants and a technical officer. While the School scores high in terms of national and ethnic diversity of its staff - 56% of the SoMS staff is international originating from twelve countries (SER, p.31), there is a considerable gender unbalance (71% are male vs 29% female - rounded figures).

1.2 Review Methodology and Site Visit (Covid19-emergency adaptation)

Due to the onset of the Covid-19 pandemic, the original Review site visit, which had been scheduled to take place in March 2020, had to be deferred. To enable completion of the Quality Review under the prevailing public health restrictions a model for conducting site visits virtually was developed, to ensure continuity in the operation and delivery of quality review and enhancement activities. Development of the revised model was informed by emerging practices for quality review nationally and internationally under Covid-19 arrangements. Core principles which guided the redesign were the need to:

- Achieve completion of the Review process whilst recognising the significant impact of Covid-19 adaptations for teaching, learning and assessment for academic units;
- Uphold the overall integrity of the Review process and maintain comparability by ensuring that the objectives for Review could be achieved under adapted circumstances;
- Coordinate the sequence of the site visit to ensure coherence and retain all the relevant meetings with staff, students and stakeholders;
- Manage the process of Review Team establishment and working ethos.

The Self-Evaluation Report and Case Study of Good Practice submitted for the Quality Review process was supplemented by a short Covid-19 SER Addendum. The purpose of the Addendum was to outline and reflect on the unit's response to the Covid-19 pandemic, including challenges, learnings and unforeseen opportunities faced by the School, as a result of the sudden adaptation to remote Teaching, Learning and Assessment. This addition served to make the context of the unit as current as possible for the Review Panel.

In place of the usual physical site visit at the University over a 2.5-day period, the virtual visit was configured to take place over a two-week period in November 2020. Microsoft Teams was used as the virtual platform to enable meetings of the Peer Review Panel with the School. The longer timeframe of the site visit provided for increased flexibility, whilst retaining all the relevant meetings with staff, students and stakeholders and so ensuring that the objectives of quality review would be fulfilled. The

sequencing of meetings was organised so as to ensure coherence and progression in the conduct of the site visit, from the strategic orientation meetings through to the detailed discussions with staff, students, internal and external stakeholders.

The timetable was comprehensive and enabled consultation with key stakeholders, including the Head of College, senior management of the University and other key internal stakeholders (Careers Office staff and Programme stakeholders outside of the School), students and local, national and international external stakeholders. There was engagement with the Head of School, the School Manager, the Deputy-Head, Programme Directors and other staff from the School. The timetable for the site visit is included in Appendix B.

To support the establishment of the Review Panel and facilitate effective engagement throughout the site visit, additional guidance and support was provided by staff of the Quality Enhancement Unit. This included technical support, as well as briefing and advisory support prior to and throughout the site visit. On the rare occasion when, due to prior commitment a Panel member was unable to attend a scheduled meeting, the online meeting was recorded to ensure that all Panel members had access to the full proceedings of the review. When this occurred, permission for recording was sought from all involved and the recording was deleted thereafter once the Review Panel had formulated its conclusions.

The Panel brought together national and international peer reviewers. Internal reviewers provided knowledge of institutional and organisational structures within UCC, with the external Panel members contributing their peer expertise in the area of Mathematical Sciences. All review panels at UCC also include a student representative as a full Panel member, who brought valuable insights and perspectives on student issues. Despite the remote modalities of the site visit, the Panel reached positive synergy and engaged constructively with the School staff and participants in the site visit meetings throughout. At the end of the site visit, the Panel presented its initial findings, both commendations and recommendations, to the School.

Review coordination was provided throughout by a Quality Enhancement Advisor from the Quality Enhancement Unit (QEU) to facilitate the review process and to support the Peer Review Panel in formulating and agreeing the final Panel Report. The Report was compiled collaboratively and the entire Panel contributed to the production of the final Report.

1.3 Objectives of the Quality Review

The overarching objectives of academic quality review at UCC are to enable Schools, through evidence-based self-evaluation, to:

1. Reflect on and promote the strategic enhancement of their academic activities to ensure an outstanding learning experience for all students (enhancement dimension);
2. Evaluate the effectiveness of their processes for assuring academic standards and provision, in line with the University's academic mission and strategy (assurance dimension).

Thus, peer review goes beyond quality assurance to also embrace continuous quality enhancement. The Peer Review Panel report reflects these objectives in the recommendations and commendations outlined to support the School of Mathematical Sciences in further refining its priorities and optimising its activities, in the pursuit of its ambitious drive for securing central-stage position within the University and raising its profile and reputation of excellence within the national and international arena of higher education.

1.4 Overall Analysis of Self-Evaluation Process

1.4.1 Self-Evaluation Report (SER)

The appointment of a new Head of School occurred during the course of the self-evaluation process and created opportunity for a constructive change momentum, which was reflected in many of the priorities identified in the School's SER. It was evident to the Panel that the School undertook an honest, open and inclusive self-evaluation exercise and embraced a quality enhancement ethos throughout. A cross-disciplinary coordinating committee was established in the School to facilitate the self-evaluation process and to coordinate the drafting of the Self-Evaluation Report (SER). The School used the opportunity for self-evaluation to engage in a review of its activities through consultation with staff, students and benchmarking exercises. The School evaluated its current position and identified eight key recommendations for review and change in core areas. These related to its governance and communication structures and processes and to its committee composition, structures and processes. They also addressed School's identity and culture and aspects concerning its programme portfolio. Student feedback loop, staff support and professional development and scholarship awarding criteria were also considered. The self-evaluation will contribute, where appropriate, to the School's Athena SWAN application.

Notwithstanding the SER's honesty, openness and explicit commitment to the completion of the schoolification process, the inclusion of a more comprehensive outline and systematic analysis of the issues faced by the unit would have been informative. This could have been accompanied by a strategic vision underpinning the envisaged review of the School's programme portfolio and the accomplishment of the identified priorities through the development of a new strategic plan. Similarly, the identification of concrete and actionable details for implementing the SER's recommendations would have been useful.

Consideration of the substantial implications for the SoMS of the forthcoming changes in the global market for international students would have been contextually relevant, especially with regards to the joint programme BSc (Risk and Actuarial Science) with Beijing Technology and Business University.

1.4.2 SWOT

The SWOT consultation, which was facilitated by Dr Anne Gannon (UCC HR), was attended by three quarters of the School's staff. The outcomes of the workshop identified the School's main strengths as its broad range of programme offerings and adaptability to market needs. It also regarded positively the high CAO entry points for student enrolment in the School, the employability and high market demand of School's graduates. Other identified points of force were its constructive connections with alumni, external stakeholders in the industry and research centres and its outreach activities in the local primary and secondary schools.

On the other hand, the SWOT revealed key areas for development including: strategic direction and planning; governance, communication and committee structures; a shared School identity and culture; levels of representation and wider interactions within the University and beyond, as well as improving overall staff morale.

The opportunities highlighted by the SWOT largely focused on strengthening strategic collaborations with other schools, research centres/institutes and industry partners, embracing emerging fields of study and supporting staff's professional development and research applications for key funding streams.

Finally, the School also identified a number of threats, the most significant being the limited academic promotion opportunities for staff, the retention of programme accreditation with the Institute and Faculty of Actuaries and future developments of the joint UG programme with Beijing Technology and Business University.

1.4.3 Benchmarking

The School carried out targeted and aspirational benchmarking against two higher education institutions located on the island of Ireland and, thus, at a reachable distance from UCC: Queen's University Belfast (UK-based) and University College Dublin. These offer comparable programmes and are ranked among the top two hundred on the QS World Ranking (UCC's SoMS is instead ranked as 310th). The School found the exercise very valuable for the planned revision of its management, governance and committee structures and processes. It was also of interest for the adoption of a fair and comprehensive staff workload distribution model, as well as many other good practices (e.g. research incentives). The much higher SSR of UCC's SoMS, as well as the lack of professional development and career support vis-à-vis the benchmarked institutions, emerged as key differentiating factors. These were regarded as affecting the reduced opportunity for the SoMS to reach its full potential and raise its position in world rankings. The Panel suggested that the lessons learnt through this benchmarking exercise would be used for the review of the School's governance and committee structure with the functional needs of the unit as a whole in mind.

1.4.4 *Developments since last review*

The last periodic quality review took place in the academic year 2011/12. The Panel was concerned that most of the recommendations made by the previous Quality Peer Review Panel (2012) remain to be addressed and are identified as challenges in the current self-evaluation report. These include very high SSR and teaching/administrative loads for academics; limited opportunities and support for research and conference attendance; collaboration with the Careers Service to support work placement offerings and transferable professional skills acquisition within the taught programmes).

However, the Panel was satisfied that, under the new Head of School's leadership, some quality enhancement changes had already begun to take place. For instance, at the time of the review visit, a draft of the School's Rules was under discussion within the School. The Graduate Studies Committee had undertaken a review process and had strengthened its key functions, including the completion of annual PhD performance reviews.

1.5 **Good Practice Case Study**

The case study of good practice, 'Transitioning to E-Assessment in Mathematics Education', which was included in the SER and then presented during the Panel's remote site visit of the School, was commended by the Panel as a successful example of innovative online learning and assessment method. It demonstrated significant positive impact on the experience of students registered for core Mathematics modules, either included within the School-offered programmes or in other Schools' programmes with compulsory Mathematics modules, typically but not exclusively in first year.

It covers the adoption of *Numbas* – a free, flexible e-assessment platform developed and maintained by the University of Newcastle (UK), which facilitates the construction of localised topic/module/lecturer/student cohort-specific formative-assessment. It was pioneering by two SoMS academics at UCC, as part of a collaborative project with CIT, having been awarded funding by the National Forum for Teaching and Learning (Building Digital Capacity) in 2014. Since then, other SoMS academics have incorporated *Numbas* within their modules' learning and assessment practices, recognising its success in strengthening students' understanding, mathematical competencies and examination performance and results.

Other inspiring examples of enhancing the student learning experience were also presented to the Panel during the site visit:

- *VisNetSci*, a project developed by an academic, with the collaborative involvement of two student assistants, aimed at enhancing the understanding of Network Science through the realisation of visualisations of complex theories and data sets and their storage in online collections of visualisations. These visual representations relate to mathematical methods,

mechanics, quantum mechanics, electrodynamics, statistical physics, special relativity and nonlinear dynamics.

- *CHEST – Coherent Harmonious Effective Student Teams*, a team-building pilot project developed by staff from SoMS, Applied Psychology, Computer Science and Medicine, targeting final year SoMS students, registered for a statistical Consulting module. This exercise represented a very successful example of staff's interdisciplinary collaboration to develop and enhance teamwork skills among students using positive psychology and a supporting smartphone application. Plans are being made to mainstream and incorporate aspects of this pilot project into a broader range of programme offerings for students.
- *Going all online – Teaching practice, learning design and assessment*, a SoMS-organised two-day workshop seminar series, aimed at promoting professional dialogue, development and best practices in online Teaching, Learning and Assessment practices and tools. Having been awarded funding by the National Forum for the Enhancement of Learning and Teaching, this national workshop and seminar series will take place in Spring 2021. It will comprise of three keynote speakers' contributions and twelve presentations from UCC based speakers from Mathematical Sciences, Computer Science, Cork University Business School and CIRTL.

The Panel was very impressed by the quality of these initiatives and commended the School staff on pursuing their development, which is even more laudable in light of their extremely high workload demands. Finally, the Panel highly recommended planning for their future development and mainstreaming within the School, as well as their dissemination and celebration within the University (and beyond). QEU will work with the School of Mathematical Sciences to develop the publication of these innovative Teaching, Learning and Assessment initiatives as the School's Study of Good Practice.

1.4 Collaborative partnerships (e.g. joint programmes)

The Panel welcomed the existing close interdisciplinary collaborations of the School of Mathematical Sciences with other schools across the University and international institutions, such as joint programmes and individual research specialisms (e.g. the joint programme BSc Risk and Actuarial Studies with Beijing Technology and Business University).

The School has a particularly important collaboration with colleagues in the College of Science, Engineering and Food Science (e.g. BSc and MSc in Data Science and Analytics with the School of Computer Science; BSc Physics and Mathematical Sciences with the Department of Physics). It also provides fundamental service teaching to academic units across the University by delivering core Maths modules for eighty-two programmes across the University, not only to cognate disciplines within the College of Science, Engineering and Food Science, but also to those within the College of Arts, Celtic Studies and Social Sciences and the College of Medicine and Health.

The Panel paid specific attention to the joint programme BSc (Risk and Actuarial Science) with Beijing Technology and Business University. This programme commenced operation in 2014 and is governed by a Collaborative Agreement signed by both institutions. The Panel urged the School of Mathematical Sciences to closely review and monitor the operation of the programme with particular attention on its sustainability into the future. Such a review will be vital to inform the future strategic development of its provision in light of recent developments in internationalisation trends and student mobility policy being developed by the Chinese government. The review would ensure that the particular features of the collaborative programme are part of the School's quality assurance arrangements.

1.5 Tour of the Facilities

The Panel did not have a chance to conduct a tour of the School's facilities at the Western Gateway Building, due to the remote format of the completed site visit. However, on the basis of its consideration of the submitted School's SER documentation, together with its consultation with the School's staff and students during the relevant meetings, the Panel was satisfied that the School is hosted in an excellent physical environment at the Western Gateway Building. The internal Review Panel members were able to provide further information on the quality and range of facilities housed in the Gateway building, one of the newest on campus and adjacent to the School of Computer Sciences.

Part 2 – Findings of the Panel

2.1 School Overview

The Panel was impressed by the genuine engagement with the quality review process demonstrated by the School's Head, in particular, and School staff, in general. Their commitment to leading the School into a new phase of further development and consolidation anchored on a shared identity, culture and synergy stood clearly out. The establishment of a Strategic Advisory Board for the School would greatly benefit strategic planning for its future and ensure that the Head of School and School's Executive Management Committee are strategically supported in achieving the aforementioned goals and leading the SoMS forward.

In fact, the Panel found that the School's current profile and reputation does not adequately reflect its many strengths, such as the high calibre and dedication of its staff and students, the broad and responsive range of its programmes and introduction of innovative approaches to Teaching, Learning and Assessment. These, together with its quality research outputs, genuine collegial contributions to the University community and long-established outreach activities in primary and secondary schools should be publicly celebrated.

Moreover, the Panel believes that the School's external collaborations with partners in industry and public and private research centres/institutes shows great potential for the future. In particular, the Panel was impressed with the external stakeholders' great esteem for the School's staff, students and graduates' outstanding abilities. Their great appetite for further strengthening their formal partnerships with regards to education, collaborative research, student internships and work placements would be a welcome development, which is in perfect alignment with the Connected Curriculum framework outlined in the [UCC Academic Strategy 2018-22](#). The establishment of a stable relationship with the University's Careers Service would provide the School and its students with additional support and expertise in realising some of the above targets.

The Panel is confident about School staff's acquired ability in securing external research grants, in light of its recent success in obtaining seven research grants in 2018/19 for a total value of over 800,000 Euro. Establishing strategic partnership with colleagues in cognate disciplines and internal/external research centres would allow the School to further expand the scope and reach of its research endeavour and ensure the awarding of national and international additional external funding.

Furthermore, while there seem to be high levels of informal collegiality between staff members of the School, the Panel noted that there is need for formally embedding staff support mechanisms and professional development opportunities within the School's structures and processes.

Overall, the Panel agreed that the unit has much untapped potential to establish itself as a highly reputed, strategically-oriented, internally cohesive and dynamic School. It could do so by building on

the legacy of George Boole, as well as on its own staff's strengths in teaching, research, innovation and other activities, on the outstanding quality of its students and on its comprehensive range of programme offerings.

2.2 Commendations to the School

In an ethos of quality enhancement, whereby good practice is identified, acknowledged and disseminated, the Peer Review Panel noted the following areas for commendation:

- Honest and open engagement with the self-evaluation process and commitment to quality enhancement in the activities of the School going forward;
- Excellent peer esteem of School staff and students by colleagues and professionals, both internally and externally to the University, and recognition of the critically important role of Mathematics within the University, within the industry and public and private sector;
- School's success in attracting applicants with very high CAO points, which secures highly achieving students' enrolment in its undergraduate programmes;
- Clear appetite for enhanced strategic engagement from external stakeholders;
- Excellent work ethic, University citizenship and extraordinary commitment to high quality and responsive teaching in their own programmes and underpinning other programmes across the institution;
- Agility in creating new programmes in response to University initiatives and societal needs;
- Effective and prompt adaptation of the School's Teaching, Learning and Assessment to a virtual environment in the aftermath of the Covid19 pandemic;
- Remarkable informal collegiality among staff members;
- Extraordinary level of innovative approaches to Teaching, Learning and Assessment, including interdisciplinary engagement with the development of soft skills in students, as presented in the session on 'Enhancing the Student Learning Experience';
- Clear evidence of research excellence within the School in specialist areas despite the high teaching and administrative workload, including evidence of the agility to exploit research opportunities opened up by the recent pandemic;
- Dedication and commitment to students (undergraduates and postgraduates) and their student experience at the School;
- It is clear that, under the leadership of the new Head of School, the unit has taken a series of quality enhancement initiatives, including the establishment of more effective communication with students and positively responding to their feedback on mapping Continuous Assessment activities;
- The Panel welcomes the Head of School and staff's commitment to eventually completing the unit's schoolification process, with the objective of continuing to enhance its activities and staff and student experiences.
- The Panel is impressed by the school's outreach activities carried out by the School's staff and students, in order to promote young people's passion for and education development in Mathematical Sciences through fun-based learning activities.
- The Panel is impressed by the School staff's recent success in securing an increasing amount of external research awards in the last few years (e.g. seven grants for a rounded value of Euro 827,000 in A.Y. 2018/19); this demonstrates an acquired ability in effectively targeting available research funding streams going forward.

2.3 Recommendations to the School

The Panel identified the following areas, which should be addressed to further quality enhancement of the School's activities and to realise its full potential:

2.3.1 Strategy and Governance

- The Head of School and the School Executive Management Committee should prioritise the development of the School's new strategic plan, exploiting the opportunity of the current review of the University's Strategic Plan and Academic Strategy, in order to realise its vision of bringing Mathematical Sciences to its full potential. This might include consideration of:
 - appointment strategies, focusing on areas where they might collectively envision to develop in research, teaching directions, ensuring appropriate balance in the research expertise across the School, taking into account new research directions and interdisciplinary opportunities, especially with Computer Science and Physics;
 - sustainability of their current internationalization activities and planning for the future;
 - enhance its visibility within the University and externally, building on the current high regard and the Boole legacy;
 - strategic use of resources as seed funding for initiatives such as conference travel;
 - transparency in the management of School funds and application procedures for awarding of scholarships/conference travel funds and so on;
 - explicit articulation of the School's values such as integrity, commitment to students and excellence, together with the development of a new cohesive and enabling School's identity, animated by a spirit of collegiality and quality enhancement, as part of the completion of the initiated schoolification process;
 - leverage at a strategic level the outstanding work that has been carried out in relation to innovative approaches to Teaching, Learning and Assessment, which aligns fully and, in many instances, predates the University's Academic Strategy;
 - pursue the formation of a cluster within the School dedicated to the development, promotion and implementation of such innovative approaches broadly across the School with excellent outcomes for all the stakeholders (i.e. students, staff, University and society), building on their synergies and potential;
 - a critical assessment of workload management among staff members, adoption of a fair and transparent staff workload distribution model and continuation of the initiated work on rationalization of programmes and assessment;
- The Head of School and senior leadership should:
 - establish a Strategic Advisory Board, taking advantage of the extraordinary good will among valuable potentially strategic partners, both internally and externally, such as CSO, private sector employers, and research partners such as *Teagasc* and Head of School of cognate disciplines (Physics, Computer Science and Engineering) with whom they have already established promising informal partnerships.
 - work with the Head of College to identify appropriate structures and membership for the Strategic Advisory Board, building on prior experience in other areas within the College.

2.3.2 *Leadership and Management*

- Given the complex demands of academic leadership in the contemporary academic world, the Panel recommends that senior academics within the School should, with the support of the College, identify and avail of external and internal strategic leadership training and development opportunities, including team-work across the disciplines, in order to empower the team to optimize the opportunities to realise its strategic vision for the School.
- The Head of School and the leaders of the disciplines should take the opportunity offered by the adoption of the new School's rules and structures to build a strong cohesive executive team in order to realise together their vision for the School;
- The Head of School, School Executive Management Committee, in consultation with the Academic Programme and Curriculum Development Committee, should adopt formal programme governance arrangements across all its programmes, including boards of studies and regular programme reviews, in order to enhance their already successful programmes;

- The Head of School and the School Executive Management Committee should pursue the plans highlighted in the Self-Evaluation Report to review the School's committee composition, structures and processes in conjunction with the SEFS College to ensure it is fit for purpose in the current context.

2.3.3 *Reputation and Ranking*

- The Head of School and the School's Executive Management Committee, with the support of the Strategic Advisory Board, College and the University Ranking Unit, should focus on developing a strategy around leveraging the Boole legacy and the research and innovative strengths of the School to raise the School's profile nationally and internationally (e.g. conference-organisation and attendance, research grant applications, editorial membership and participation in disciplinary committees, ...).
- The Head of School should proactively encourage the Staff and ensure they have time to participate in activities which contribute to peer esteem (participation in grant evaluation panels; keynote lectures; disciplinary committee activities and others).

2.3.4 *Teaching, Learning, Assessment, Student Experience*

The Head of School, the Executive Management Committee and the Teaching, Learning and Student Experience Committee should:

- review the portfolio of programme curriculum and delivery, approaches to teaching, learning and assessment, in order to address the identified issues of over-teaching, overassessment, clustering of assessment deadlines and ensuring the proportionality between efforts and awards in Continuous Assessment;
- mainstream the innovative approaches to Teaching, Learning and Assessment, which have been introduced by individual lecturers and leverage the benefits across the School;
- Consider introducing a 'reading week' in Semester One, in order to give both students and staff time to reflect, prepare for and attend to other equally important duties and commitments.
- The Teaching and Learning and Student Experience Committee, in conjunction with programme directors, should:
 - make time for considering the overarching strategic intent of each programme and adjust its delivery, including considerations of sharing experiences, resources and approaches in teaching modules;
 - seriously consider in the context of the schoolification, joint delivery of modules across the individual disciplines.
 - Consider, as appropriate for any given module, the involvement of more than one member of academic staff in delivering a module to facilitate time, research and resources flexibility and agility and ensure students benefit from different perspectives on any one subject.
- The Head of School and the School's Executive Management Committee should prioritise developing a constructive and stable relationship with the Careers Service to underpin development of both work placement and, more generally, personal and professional development, as well as career orientation for students (e.g. a University example of this is the PX3001 module for UG students of programmes within the College of Arts, Celtic Studies and Social Sciences – this optional 5-credit module is awarded to students as a diploma supplement outside of their degree). In particular, the Panel recommends that:
 - The Head of School and the Executive Management Committee, in conjunction with the Programme Directors and the Career Service, should develop a work placement/professional work experience option within all or most the UG and PG programmes and ensure the students have access to the broad range of personal and professional development offered by the Careers Service;

- Undergraduate and postgraduate students should be proactively signposted to utilize university resources such as career development opportunities, skill development facilities by their Programme Directors, lecturers and supervisors, with coordination by the School Manager, to ensure all in the School are aware of the various opportunities on offer;
- Despite the staff's commitment in supporting research students, the evident level of dissatisfaction in relation to the IT infrastructure and funding for travel should be addressed;
- While there is strong evidence of academic staff members participating in programmes delivered in Certificate/Diploma/Master's in Teaching and Learning in Higher Education, the staff should be encouraged by the Head of School and by the Teaching, Learning and Student Experience Committee to engage systematically with the resources and guidance/advice provided by CIRTLL.
- Given the extraordinary individual initiatives in Teaching, Learning and Assessment, the Head of School and the Executive Management Committee, in consultation with the Research Committee and the Teaching, Learning and Student Experience Committee, should consider formation of a cluster to exploit the synergies and to enhance the impact and visibility of their innovative activities and leverage these strategically.

2.3.5 Staffing

- In consideration of the high SST, the Head of the School, in conjunction with the Executive Management Committee, should focus on the steps that can be taken internally to manage the workload, and, in parallel, articulate compelling cases and business plans for additional staff appointments (potentially in collaboration with other schools), targeted at specific research and teaching expansion/refocusing plans and engage with the senior leadership team of the University to ensure the opportunities/risks are appreciated. In particular, the School staff highlighted the impact of the delays in replacement of two members of staff on the workload of others.
- The Head of School, the Executive Management Committee and the Athena Swan Committee should take the opportunity to proactively engage with the Athena Swan process, in order to enhance its continued efforts to ensure Mathematical Sciences students and future second level mathematics teachers and professionals have female role models;
- Building on this, the Head of School and Executive Management Committee should consider submitting a strong proposal for a Strategic Academic Leadership Initiative post, potentially in partnership with a cognate school;
- The Head of School and Executive Management Committee should proactively seek opportunities to recognize the extraordinary contributions within the School in outreach activities and innovative approaches to teaching, learning and assessment and success in research, for example through nomination for staff awards (e.g. Impact, Leadership, Innovation and Outstanding Contributions; Early Career Researcher, Researcher of the Year and others);
- The School should prioritise professional career development of its staff and, in this context, the Head of School should ensure that the periodic Staff Performance Management and Development review is utilized effectively to ensure that staff are aware of the criteria and avail of guidance in developing their professional development and career.

2.3.6 Infrastructures and resources

- While the School is hosted in an excellent physical environment and adjacent to the School of Computer Science, access to high performance computing and other IT resources was raised as a challenge to be addressed by the School, potentially leveraging external resources such as ICHEC or in partnership with CSIT and Insight.

- Based on the success in attracting income through international partnerships and the generosity of the College in returning a significant proportion of this income to the School, the Head of School and the Executive Management Committee, in consultation with the Research Committee, should establish a mechanism for supporting conference attendance for staff and research students with clarity on process, transparency in allocation; while the funding has been historically committed to PhD studentships, a clear plan to adapt its usage, as the current commitment comes to an end, should form part of the strategic planning process;

2.3.7 *Communication and Marketing*

- The Head of the School, the Executive Management Team and the IT Officer, in conjunction with the Research Committee and Teaching and Learning and Student Experience Committee, should:
 - focus on improving the existing website to ensure it is an effective communication tool of the strengths and activities of the School, including learning, teaching and research and outstanding contributions to innovation, science and society;
 - ensure the visibility of the unit's high calibre activities at School, College and University level, as well as externally, through School's website, newsletters and other communication opportunities (e.g. by liaising with the relevant offices such as SEFS, the University's Media and Communications and the OVPRI).
- The Head of School, together with the relevant academic staff, should explore the potential of initiating a partnership with the Glucksman Gallery, in order to showcase their innovative initiatives in data/theory visualisation.

2.3.8 *Finance and sustainability*

- The anticipated changes in the global market for international students may impact substantively on the School over the coming years. In light of this, the Head of School and the School Executive Management Committee should embed mitigation strategies in the strategic planning process.

2.3.9 *Quality Monitoring for Collaborative Programmes*

- In accordance with national policy for transnational education, a review of the operation to date of the joint programme BSc (Risk and Actuarial Science) with BTBU should be undertaken to inform future strategic development of the provision and a process of Annual Reporting should be established for ongoing monitoring of the programme. This should be taken forward by the Programme Director, in conjunction with Academic Affairs and Governance, Academic Programmes and Regulations and the Quality Enhancement Unit.

Observations to College of Science, Engineering and Food Sciences

- The Head of College should continue to nurture interdisciplinary interactions in Research and Learning & Teaching across the schools and research centres.

Observations to the University

- While it is clear to the Panel that the University has a wide range of resources and services on offer (e.g. through CIRT, Careers Service, Media and Communications, OVPRI and others), consideration should be given, by the appropriate members of the University Management Team (UMT), to monitoring the extent to which individual academic schools engage with them and to any potential barriers to their engagement.

Appendix A – Panel Profiles

Panel Profiles – Quality Review of the School of Mathematical Sciences, UCC

<p>Professor Christian Beck</p>	<p>Christian Beck is a Professor of Applied Mathematics at Queen Mary, University of London. He obtained his PhD at the Technical University of Aachen (Germany) in 1988. After spending some time as a postdoc at Warwick University, University of Maryland, Copenhagen, Aachen and Budapest, he was appointed at Queen Mary in 1994, first as a Lecturer, then Reader, then Professor. His administrative roles included being Director of Applied Mathematics and being Director of the MSc Programme in Mathematical Finance. Since 2014 he is Head of the Dynamical Systems and Statistical Physics Group within the School of Mathematical Sciences at Queen Mary.</p> <p>His research is in the general area of mathematical modelling of complex systems, with applications to real-world problems. He has made important contributions to the understanding of equilibrium states and stationary nonequilibrium states of complex systems, using so-called super-statistical techniques. He is an expert on dynamical systems, stochastic processes, data-driven approaches to complex systems, spatio-temporal chaotic dynamics, stochastic modelling techniques, and interdisciplinary applications. He is author of 140 publications and 2 books.</p> <p>Christian Beck is a Fellow of the Institute of Mathematics and its Application (FIMA) and his early research was supported by a Royal Society Leverhulme Trust Senior Research Fellowship, as well as by an EPSRC springboard fellowship. He has held several EPSRC grants as a PI and his current research is supported by the Horizon 2020 programme. He has been a member of several EPSRC Mathematics panels (responsive mode and fellowships) in the recent past. He is also Chair of the Statistical and Nonlinear Physics Division of the European Physical Society (EPS). In 2019 he was the main organizer of the EPS conference 'Statistical Physics of Complex Systems' at Nordita/Stockholm. He was on the Scientific Committee of the Statphys conference in Buenos Aires (2019) and the Dynamics Days conference in Rostock (2019), and he is currently on the scientific committee for the Sigma-Phi conference on Statistical Physics (Chania, 2020) and the Supergen Energy networks conference (London, 2020). In 2019 he gave invited talks at conferences and workshops in Singapore, <i>Erice</i> and Vienna. He is currently Co-editor of EPL (Europhysics Letters), Associate Editor of <i>Physica A</i>, and Editor of <i>Chaos, Solitons and Fractals</i>.</p>
<p>Professor Anita Maguire (Chair)</p>	<p>Professor Anita Maguire is Vice-President for Research & Innovation at University College Cork since 2011. Following studies at UCC (BSc Chemistry 1985, PhD 1989), and postdoctoral research experience in Namur, Belgium then at the University of Exeter, UK, Professor Maguire returned to UCC in 1991 to establish an independent research team. In 2004 she was appointed as the first holder of the Chair of Pharmaceutical Chemistry at UCC. Professor Maguire leads a research team focusing on synthetic organic and medicinal chemistry, which interacts extensively with the pharmaceutical sector in Ireland and internationally. Her research interests include development of new synthetic methodology including the use of continuous flow, asymmetric synthesis including biocatalysis, and the design and synthesis of bioactive compounds. She is a Co-PI in the UL-led SSPC Centre supported by SFI.</p> <p>She is actively engaged in national policy development in research and innovation, especially in relation to PhD education and the university – industry interface. For example, she chaired the Advisory Science Council</p>

	<p>Task Force on <i>The Role of PhDs in the Smart Economy</i>, and she is the inaugural Chair of the National Forum on Research Integrity in Ireland established in 2015. She was elected as a Member of the Royal Irish Academy in 2014 and Vice President of the Royal Irish Academy in 2019. She was an Adjunct Professor in the University of Bergen, 2011-16. http://publish.ucc.ie/researchprofiles/V001/amaguire</p>
<p>Mr Andrew Brosnan</p>	<p>Mr Andrew Brosnan is a postgraduate student in the Cork University Business School. He is currently studying a Master's Degree in Information Systems for Business Performance. He completed his undergraduate studies in the College of Arts, studying History and Geography and is currently working towards the publication of his undergraduate dissertation in History, which explores the role of paramilitary forces during the Irish War of Independence.</p> <p>Mr Brosnan has also played an active role in UCC social life and served in various student representation and support functions. He was the academic class rep for both History and Geography from 2019-2020. He previously chaired the UCC Health Society from 2018-2019, having been a member of the Society Executive since 2017. Additionally, he served as Team Leader for the Student Community Support Group, run by the Students Union. This group ensures the safety of students during key periods of the academic year like Fresher's and Raise and Give Weeks. Thanks to these experiences with the University's Students Union, Societies and academic structures of student representation, Mr Brosnan has gained valuable insights into student needs, expectations and the operations of the University, which will assist him in performing the role of Student Reviewer for the Quality Review of the School of Mathematical Sciences.</p>
<p>Mr Paul O'Donovan</p>	<p>Paul O'Donovan is Academic Secretary & Assistant Registrar at UCC and leads the Office of Academic Affairs and Governance. He was appointed in 2012, reports to the Deputy President & Registrar and has a strategic focus on academic governance, institutional reform, inter-institutional relations and academic policy development.</p> <p>He is a member of the Academic Council (Senate) and responsible for its operation and the transaction of academic business across the University. He is also a member of each of the four College Councils and the University Management Team for Strategy. Mr O'Donovan joined UCC from the Welsh Government where he was Head of Strategic Policy at the Department for Business, Enterprise, Technology & Science. He has held a number of senior positions within the Welsh Government and the Welsh Development Agency (WDA), in the areas of economic development, enterprise, food and agriculture, European policy and funding, state aid, business support, skills and inward investment.</p> <p>Prior to the WDA, he worked for ADAS Consulting with a range of clients from small businesses to corporates and public bodies including the European Commission, the United Nations and the governments of the Czech Republic, Estonia, Poland, Slovakia, Slovenia and the UK. he has contributed to several Tempus/Erasmus+ projects. He has external roles as a Member of Senate of the National University of Ireland, and as Chairperson of Corcadorca Theatre Company. He is a former board member of the European Association for Regional Development Agencies (EURADA) and of the Wales Programme Monitoring Committee (PMC) responsible for monitoring implementation of EU structural funds in Wales.</p> <p>Mr O'Donovan holds a BSc from UCC, an MBA from Cardiff Business School, is an alumnus of the Leadership Foundation for Higher Education / Advance HE Top Management Programme and has taken executive education at Harvard University's Kennedy School of Government.</p>

<p>Professor Krasimira Tsaneva-Atanasova</p>	<p>Professor Krasimira Tsaneva-Atanasova is Professor of Mathematics for Healthcare in the Living Systems Institute and the Department of Mathematics at the University of Exeter (UoE), UK. She received her MSc (Mathematics) from the University of Plovdiv, Bulgaria and PhD (Applied Mathematics) from the University of Auckland, New Zealand. After completing her PhD in October 2004, she spent 18 months as a post-doctoral fellow at the Laboratory of Biological Modelling, National Institutes of Health, USA and another 15 months as a post-doctoral fellow at the Department of Mathematics and the Department of Biology at the <i>École normale supérieure</i> in Paris, France. She joined the Department of Engineering Mathematics at the University of Bristol in October 2007 as a lecturer and was promoted to a Reader in Applied Mathematics in 2012. She moved to the College of Engineering, Mathematics and Physical Sciences at the University of Exeter in July 2013. She currently serves as Associate Dean for Global and Development in the College of Engineering, Mathematics and Physical Sciences at the University of Exeter (2018-2021).</p> <p>Her research and professional activities aim to inform novel applications of mathematics to enable the development of quantitative methods for healthcare and healthcare technologies. In her research, she develops and analyses mathematical models for applications to personalised prediction and clinical decision support in prevention, diagnosis or treatment of health-related conditions. The models are developed in collaboration with experimentalists and are used to interpret data and to design new experimental tests of hypotheses. She has a long-standing interest in dynamical systems theory and applications; numerical continuation of solutions and bifurcations in non-linear systems of differential equations; data driven modelling including learning in the model space; scientific computing and finite element methods. She is very excited about applications of dynamical systems theory and in particular bifurcation analysis to hybrid systems such as dynamic clamp for electrophysiology experiments and human-virtual partner interaction for therapy and rehabilitation.</p> <p>Professor Tsaneva-Atanasova has published over 80 original pieces of research, 8 review, 7 peer-reviewed conference articles and 6 book chapters with a total of 2243 total citations, h-index - 27 (Google Scholar 01/2020). She has substantial experience of leading and managing large, multidisciplinary, research projects tackling biomedical and healthcare challenges, particularly in the field of (neuro)endocrinology. She is Deputy Director of CPMH (EP/N014391/1, 2016-2020), Co-director of the University of Exeter ISSF (a £4.8M initiative between UoE and the Wellcome Trust) and an Alan Turing Institute Fellow since October 2018. Since 2009 she has secured over £9M in research funding (as PI or CoI) and currently manages over £2M of funding from EPSRC, BBSRC and Wellcome Trust. Her international reputation is evidenced through regular invitations to meetings such as SIAM DS, ECMTB, Equadiff, ICIAM, and awards like the prestigious Technical University of Munich (TUM) Institute for Advanced Study (IAS) Hans Fischer Senior Fellowship, a 3-year programme of research on Transient Emergent Network Dynamics (since April 2019). She is a member of the EPSRC Peer Review College, the BBSRC Committee C core panel, NC3Rs Studentship Assessment Panel. She regularly assesses international research activity at the interface between mathematics and medicine.</p>
<p>Dr Silvia Brandi <i>(Review Coordinator)</i></p>	<p>Dr Silvia Brandi joined UCC's Quality Enhancement Unit in February 2019. Prior to this, in January 2018, she became a team member of the Student Records and Examinations Office, one of the University's core Professional</p>

	<p>Services, progressing from her previous post at the Boole Library (since December 2016).</p> <p>Having gained her Masters' Degree in Youth and Community Work (2006) and PhD Degree (2013) in Social Policy with UCC's School of Applied Social Studies, Dr Brandi worked as UCC university lecturer within the Higher Diploma in Social Policy programme for nearly four years.</p> <p>While pursuing her postgraduate studies at the UCC School of Applied Social Studies, she acquired other relevant public service experience by working for Cork's social services (HSE South/Tusla) for ten years, where she supported young people out of home and, later, assisted Tusla's Implementation Officer (Cork) with relevant research on contemporary issues in Irish social work.</p> <p>Her undergraduate (Honours) degree in Ancient Classics was awarded by Padua University (Italy) in 2000. During her undergraduate studies she also worked as a free-lance journalist.</p>
<p>Ms Marie O'Regan <i>(IT and Logistics Coordinator)</i></p>	<p>Ms Marie O'Regan is an Executive Assistant in the Quality Enhancement Unit. Marie worked in Health Insurance for several years and completed APA (Accredited Product Adviser) and CIP (Certified Insurance Practitioner) exams during this time. She studied at UCC, completing a BA, in Geography and Psychology. Her interests include environmental sustainability and she is the Secretary of the newly formed committee, 'Inchydoney Dunes Conservation Project', which aims to protect the dunes and preserve them as an amenity for the community and wider public.</p>

Appendix B – Peer Review Panel Remote Site Visit Timetable

QUALITY REVIEW OF THE SCHOOL OF MATHEMATICAL SCIENCES

PEER REVIEW PANEL REMOTE SITE VISIT TIMETABLE

In Summary

- In advance: The Peer Review Panel’s Chair is briefed by the Quality Review Coordinator, followed by a briefing from the Director of Quality Enhancement and the Review Co-ordinator to the whole Quality Peer Review Panel.
- Week 1: The Panel has online meetings with the Head of School, Senior Management, students and stakeholders.
- Week 2: The Panel has online meetings with School staff. The Panel commences drafting the report including recommendations and commendations.
The Panel has a final meeting with the Head of School followed by a closing presentation to all staff members of the School.

IN ADVANCE

Thursday 22nd October 2020	
11.00 – 12.00	Chair Briefing with Review Co-ordinator.
Friday 30th October 2020	
11.00 – 13.00	Briefing of the Panel with Director of Quality, and Review Co-ordinator.

WEEK 1

Wednesday 4th November 2020	
09.00 – 09.45	Convening of Panel Members – preparation for day ahead
09.45 – 10.00	Break for Panel Members

10.00 – 11.30	<p>Meeting with Head of School <i>(to be joined by School Manager at 11.00)</i></p> <p><i>Focus on:</i></p> <ul style="list-style-type: none"> - SER: how the School undertook its SER; what it learned from the process; what it hopes to gain from the review; Covid19 Addendum to the SER. - School developments to date, strategic priorities of the School and overview of educational provision.
11.30 – 12.00	Break for Panel Members
12.00 – 13.00	<p>Meeting with Head of College <i>(to be joined by the College Financial Analyst at 12.40)</i></p> <p><i>Panel discuss College strategy and priorities. The links between College/School financial resource allocations process, staffing resources and infrastructure.</i></p>
13.00 – 14.00	Break for Panel Members
14.00 – 14.30	<p>Meeting with Dean of Graduate Studies (deputising for Interim Deputy President & Registrar)</p> <p><i>Discussion of UCC's Strategic Plan (2017-2022) and Academic Strategy (2018-2022)</i></p>
14.30 – 15.00	Wrap-up Meeting

Thursday 5th November 2020	
09.30 – 10.00	Convening of the Panel – preparation for the day ahead
10.00 – 10.45	<p>Meeting with Senior Officers and Key Internal Stakeholders of the University</p> <p>Work Placement Manager, Career Services Vice President for Learning & Teaching Director of Research Support Services (deputising for Vice President for Research and Innovation) Senior Careers Advisor, Career Services</p>
10.45 – 11.00	Break for Panel Members
11.00 – 11.45	<p>Meeting with Undergraduate Students, representing:</p> <ul style="list-style-type: none"> BSc Financial Mathematics and Actuarial Science (2nd year) BSc Financial Mathematics and Actuarial Science (3rd year) BSc Financial Mathematics and Actuarial Science (4th year) BSc Mathematical Sciences (1st year) BSc Mathematical Sciences (3rd year) – 2 x students BSc Mathematical Sciences (4th year) – 2 x students
11.45 – 12.00	Break for Panel Members

12.00 – 12.45	<p>Meeting with Postgraduate Students, representing:</p> <p>PhD (Mathematics)</p> <p>MSc (Financial Maths and Computation)</p> <p>MSc (Mathematical Modelling and Self-Learning Systems)</p> <p>PhD (Statistics) – 2 students</p> <p>PhD (Applied Mathematics)</p>
12.45 – 14.00	Break for Panel Members
14.00 – 15.00	<p>Meeting with External Stakeholders</p> <p>Graduate, Founder and Data Analyst, Athena Analytics LTD, Kerry</p> <p>Researcher, Animal & Grassland Research and Innovation Centre, Teagasc, Cork</p> <p>Product Manager, Statsols, Cork</p> <p>MSc graduate, Senior Insights Analyst, Paddy Power</p> <p>Lead Data Scientist, McAfee, Cork</p> <p>Graduate, Teacher</p> <p>Statistician, Central Statistics Office</p>
15.00 – 15.30	Wrap-up Meeting

WEEK 2

Tuesday 10th November 2020	
10.00 – 10.30	Convening of the Panel – preparation for the day ahead
10.30 – 11.30	<p>Meetings with School Staff</p> <p><i>10.30 - 10.40 Chair's address and Panel's introduction to all staff</i></p> <p><i>10.40 - 11.30 Group discussion (in max of 3 break-out rooms in MS Teams):</i></p> <ul style="list-style-type: none"> - <i>What is working well in the School?</i> - <i>What has potential? What should be improving?</i> - <i>What is the one thing that needs to change?</i> <p><i>11.30 - 11.40 Conclusion and Close of School Staff Meeting by the Chair</i></p>
11.40 – 12.00	Break for Panel members
12.00 – 12.15	Brief Panel's discussion in advance of Meeting with Programme Directors
12.00 – 13.15	<p>Meeting with Programme Directors/Chairs of Boards of Studies</p> <p>Mathematical Sciences Coordinator, BSc and MSc Data Sciences and PG Dip Pharmaceutical Regulatory Science Chair, Financial Maths and Actuarial Science Chair, Research Committee Head, Department of Mathematics Chair, Graduate Studies Committee Chair, BSc Risk and Actuarial Studies Committee Coordinator, MSc in Financial Maths and Computation Coordinator, MSc Actuarial Science Chair, Teaching, Learning and Student Experience Committee Coordinator, MSc Mathematical Modelling and Self Learning Systems Chair, Mathematical Studies (CACSSS) Chair, Examination Boards Head, Applied Mathematics Chair, Academic Programmes and Curriculum Development Coordinator, MSc Data Science</p> <p><i>Discussion on monitoring and review of programmes to include indicatively, programme & module approval processes, student progression, External Examiner reports, external accreditation/recognition (where appropriate), supports for learners, placement (where appropriate) and, implementation of the Academic Strategy 2018-22.</i></p>
13.15 – 14.15	Break for Panel Members
14.15 – 15.00	Meeting with Programme Stakeholders (outside of the School)

	<p>Head, Department of Physics Programme Director (1st Years), School of Engineering Head, School of Computer Science and Information Technology Head, College of Arts, Celtic Studies and Social Sciences</p> <p><i>Discussion on service teaching and joint programmes with other Schools (e.g. programme & module approval processes, student progression, External Examiner reports, external accreditation/recognition -where appropriate-, supports for learners, placement - where appropriate)</i></p>
15.00 – 15.30	Wrap-up Meeting

Wednesday 11th November 2020

10.00 – 10.15	Convening of the Panel
10.15 – 11.30	<p>Enhancing the Student Learning Experience</p> <p><i>TEAME VisNetSci & Going All Online CHEST</i></p> <p><i>Opportunity for the School to showcase good practice and enhancements to the student learning experience.</i></p>
11.30 – 12.00	Break for Panel members
12.00 – 13.30	Panel Meeting to draft the report recommendations and commendations
13.30 – 14.00	Break for Panel Members
14.00 – 15.30	Panel Meeting to finalise the report recommendations and commendations

Thursday 12th November 2020

09.30 – 9.45	Convening of the Panel – preparation for day ahead
9.45 – 10.30	<p>Panel Meeting with the Head of School</p> <p><i>Clarification and discussions of main findings by Panel</i></p>
10.30 – 10.45	Break for Panel Members
10.45 – 11.45	Panel Meeting to formulate the closing presentation
11.45 – 12.00	Break for Panel Members
12.00 – 12.30	<p>Closing Presentation</p> <p><i>Closing presentation to all staff, to be made by the Chair or other member(s) of Panel as agreed, summarising the principal findings of the Panel. This presentation is <u>not</u> for discussion at this time.</i></p>

Appendix C – Taught Programmes in the School of Mathematical Sciences

Level 7 Programmes

Diploma in Statistical Studies

Level 8 Programmes

Bachelor of Science Applied Mathematics and Physics

BSc Financial Mathematics and Actuarial Science

BSc Mathematical Sciences and Physics

BSc Mathematical Sciences (Single Honours)

BSc Mathematical Sciences (Joint Honours)

BSc Data Science and Analytics

BSc Risk and Actuarial Studies (UCC-BTBU Joint Programme)

Bachelor of Arts (Honours) Applied Mathematics

BA (Hons) Mathematical Studies

BA (Hons) Mathematics

Level 9 Programmes

MSc Financial and Computational Mathematics

MSc Mathematical Modelling and Self-Learning Systems

MSc Mathematical Modelling and Scientific Computing

MSc Actuarial Science

MSc Data Science and Analytics

Higher Diploma in Statistics

Appendix D – Current Taught Programme Headcount Data

Qualification	UG/PG	EU/International	2019/20				
			Current Headcount				Total
			Year 1	Year 2	Year 3	Year 4	
CK407 BSc (Hons) Mathematical Sciences	UG	EU/ International	59				59
CK407 Mathematical Sciences (Joint Honours)	UG	EU		11	5	7	23
CK407 BSc (Hons) Mathematical Sciences - Financial Mathematics and Actuarial Science	UG	EU		39	32	42	113
CK407 BSc (Hons) Mathematical Sciences - Single Honours	UG	EU		9	21	12	42
CK407 BSc (Hons) Mathematical Sciences and Physics - Joint Honours	UG	EU		6	9	7	22
CK411 BSc (Hons) Data Science and Analytics **(collaboration with Computer Science)	UG	EU	36	16			52
BSc (Hons) Risk and Actuarial Studies (BTBU)	UG	International			34	33	67
Diploma in Statistical Studies	PG	International					0
CKO07 Higher Diploma in Statistics	PG	EU/ International	1				1
MSCASC MSc (Actuarial Science)	PG	EU/ International	11				11
CKR49 MSc (Data Science and Analytics) Science **(collaboration with Computer Science)	PG	EU/ International	32				32
CKR24 MSc (Financial and Computational Mathematics)	PG	EU/ International	6				6
CKR56 MSc (Mathematical Modelling and Self-learning Systems)	PG	EU/ International	10				10
CKR46 MSc (Mathematical Modelling and Scientific Computing) (previous AM Masters)	PG	EU/ International					

2019/20 School of Mathematical Sciences Current Programme Headcount Data (source: School of Mathematical Sciences, SER, January 2020)