

Quality Assurance / Quality Improvement
Internal Quality Review Programme



School of Mathematical Sciences
Quality Improvement Plan

November 2018

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1 Introduction

The Head of School (Chair of the Quality Review Committee) drafted the Area Quality Improvement Plan. This was reviewed by the Quality Review Committee on 8th June 2018 and by a whole School meeting on Friday 15th June. The agreed School Quality Improvement Plan was circulated to the School for final comments on August 17th and submitted to the Quality Promotions Office on August 27th.

2 Responses to the Recommendations in the Peer Review Group Report

The following notation is used in the recommendations for improvement.

P1: A recommendation that is important *and* requires urgent action.

P2: A recommendation that is important, but can (or perhaps must) be addressed on a more extended time scale.

P3: A recommendation which merits serious consideration but which is not considered to be critical to the quality of the ongoing activities in the Area.

Additionally, the PRG indicate the level(s) of the University where action is required: A: Area under review U: University Senior Management

Recommendation Number	Priority	Addressee	PRG Recommendation	Response	Schedule for Implementation	University Response
1	P2	A	The PRG recommends the School to consider having internal administrative roles rotated on a periodic basis to gain new perspectives and broaden the experience base of the School.	Area response and action plan: The School will formalise rotation of a number of administrative roles within a new workload allocation guidelines document to be developed and implemented for Semester One, 2018-19.	Within 1 year; rotation has been implemented for Semester One, 2018-19.	The University welcomes progress to date on this recommendation. The University further welcomes feedback, through the Faculty Executive Dean, on the progress in relation to the effectiveness of this approach
2	P2	U	The PRG can see much potential in increasing student numbers on the Financial and Actuarial Mathematics degrees. The PRG recommends the University to clarify the SCR resource provision to incentivise the School to expand the existing and develop new degree programmes.	Area response: The absence of clarity in relation to financing of taught programmes creates significant difficulties for Schools in relation to planning around student numbers and new/restructured degree programmes. It is imperative that the additional short, medium and long-term workload implications are appropriately resourced, and that successful programmes generate income for Schools to invest in research. In the case of the School of Mathematical	Before end 2018	The University notes that budget model operates on a devolved basis to faculties. As such the allocation from the total Faculty budget to individual academic Schools within the Faculty is managed by the Executive Dean. The University therefore recommends the School works closely with the Faculty Dean regarding the budget allocation to the School.

				<p>Sciences, the weighting applied to HEA block grant income for students in Mathematical Sciences must be revisited in light of the significant increase in computer-based teaching, learning and assessment mandated by the IFoA, required for taught postgraduate graduate programmes, and necessitated by the needs of competitive programmes in financial mathematics. The School considers this to be a P1 issue.</p>		<p>The HEA undertook a review of the Higher Education model for allocating grant funding to universities, institutes of technology and colleges. The recommendations include a recommendation that consideration should be given to the appropriateness of weightings for specific disciplines. The work on the implementation of the review is ongoing and the University is part of the HEA working group in that regard.</p> <p>The University notes that as part of its 2017-2022 strategic plan, the University shall develop initiatives for incentivising new income generation within the University. It is anticipated that that review will be completed in the current financial year.</p>
3	P1	A/U	<p>The PRG recommends that the new IFoA program specifications are fulfilled by the School, in particular by ensuring that dedicated computing resources, the adequate software and the required technical support are available for a group of up to 80 students.</p>	<p>Area response and action plan: The School has submitted documentation to the IFoA for reaccreditation of the BSc in Actuarial Mathematics and the partial exemption agreement in relation to the BSc in Financial Mathematics (11th June 2018). The issue of provision of adequate computing resources (with appropriate technical support) for teaching, learning and assessment is of the utmost importance to the School. Discussions are</p>	<p>Underway. Computing resources for roll-in period must be in place by the academic year 2019-20, with substantial, permanent resources in</p>	<p>The University notes the crucial importance of continued IFoA accreditation for the BSc in Actuarial Mathematics, and commends the School's active engagement in development a plan for reaccreditation. The University suggests that the School continue to actively engage with both the Faculty, and the University, through the SPAMG and Estates</p>

				underway within the Faculty to plan for provision of appropriate computing facilities. Given space considerations within the Faculty, University input will be essential.	place by 2020-21.	Office to plan for the provision of appropriate computer-based teaching facilities, and other supports required to progress reaccreditation.
4	P1	A/U	The PRG recommends an increase in student numbers via better marketing and visibility of the existing FIM and MFM programmes, and via development of new programmes, to generate extra operational budget that can be used by the School for research travel and PhD Studentships.	Area response and action plan: It is essential for the School that an increase in student numbers at undergraduate and postgraduate level is supported by adequate resource provision (including a revised weighting of HEA block-grant income for students in Mathematical Sciences), and that the income generated is available to the School to support its research. Work is underway in relation to increasing numbers on the BSc in Financial Mathematics through promotion efforts. A strategy to recruit international students onto the MSc in Financial Mathematics is underway. The School will also develop a postgraduate programme in Actuarial Mathematics, and explore opportunities in international actuarial education provision at undergraduate and postgraduate level. The School is also working with the School of Physical Sciences to develop an MSc degree in Relativity and Astrophysics. See also Recommendation 2. The School will also dedicate a portion of the QuIP budget to market research to investigate the market capacity for new undergraduate programmes in (i)	Underway; different elements to be completed within one and three years. HEA Mobility funding in place for elements of this action plan.	The University welcomes progress made to date on this recommendation. The work of the School in developing plans for increased student intake is complementary to the development of a structured student growth plan for the university as part of the DCU Strategic Plan. The University welcome input from the School, through Faculty structures in the development and execution of this growth plan.

				statistics and applied mathematics and (ii) theoretical physics. The former would require additional staff in the relevant area(s).		
5	P2	A	The PRG recommends that the School considers revising the content and delivery of 1st year service modules to adapt to the changes in the Leaving Certificate Mathematics and bridge the widening gap between Leaving Certificate mathematics and the required University-level mathematics for non-mathematics students, with the focus on improving the failure rates in mathematics modules for Computer Science.	<p>Area response and action plan: Working with the Maths Learning Centre, the School will target a number of first year undergraduate service modules that are of particular importance to the University to pilot interventions that seek to address the widening gap between second and third level mathematics. This work will be done in cooperation with relevant service teaching client schools.</p> <p>The School would welcome an opportunity to explore with the University appropriate models for assessing and determining mathematical competence for students completing foundation modules in Mathematics</p>	Different elements will have one and three-year target dates.	<p>The University welcomes an opportunity to support the School further in relation to mathematics attainment in 1st year service teaching modules.</p> <p>The University suggests the School explore models for determining mathematical competence as part of broader developments in University Marks and Standards around assurance of competency achievement being considered as part of the implementation of online MOOC delivery through the FutureLearn platform</p>
6	P2	U	The PRG recommends that the University support the School with suitable resources to help redesign 1st year service teaching.	<p>Area response: See Recommendation Number 5. Resources must be made available to the School in order to undertake the pilot reforms envisaged. These will ultimately lead to delivery modes that will be sustainable with the School's operational budget. This support will not be solely financial: it will be essential that cooperation from (e.g.) the Registry and from Academic Affairs is forthcoming as the School implements research-led efforts to increase the level of engagement and attainment by</p>	Within 1 year.	<p>The University supports the proposed approach by the School on this recommendation.</p> <p>The University recommends that the School work closely with relevant support units, e.g. Teaching Enhancement Unit, Offices of the Vice-President Academic Affairs as part of any reforms suggested.</p>

				undergraduate students in mathematics across the University.		
7	P1	A/U	The PRG understands that the University is willing to provide ongoing support for the MLC, and recommend that the School seek a more concrete commitment from the University in this regard.	Area response and action plan: The School will seek a formal undertaking from the University (in particular Office of the VP for Academic Affairs) that such financial support will be available on an ongoing basis.	Before end of the current academic year.	The University notes that central funding for the ongoing delivery of maths supports services through the MLA has been secured for the 2017/18 and 2018/19 academic year. The University acknowledges the importance of the MLC as an academic support service for DCU Students. The University suggests that the School work closely with the Executive Dean and the Director of Finance on proposals and a business case that will facilitate long term central funding of the MLC
8	P1	A	The PRG recommends that, in addition to the existing grant efforts, the School explores EU opportunities such as Marie Sklodowska-Curie Innovative Training Networks (ITNs) and Research and Innovation Staff Exchange (RISE), with the aim to attract highly qualified PhD students and funds that can be used for conference travel, networking with the EU partners, and organising workshops.	Area response and action plan: The School will continue to proactively seek suitable applicants for all such funding programmes. We will work with RIS to identify relevant funding opportunities. We will use existing structures (e.g. the School website, CfAR, the MSc in Financial Mathematics) to maximise visibility of research opportunities in the School.	Underway.	The University welcomes this recommendation, and notes the development of a new University level Research and Innovation, completed since the Peer Review Visit. The University look forward to working with the School, and encourage the School to continue active engagement with the Research and Innovation Support, where appropriate to support the Schools Research's ambitions.
9	P1	U	The PRG recommends that the University supports the efforts of the School to increase its UG and PG student	Area response: While this recommendation is addressed to the University, we note that the School will	Within 1 year.	The University recommends that the School work with the Executive Dean and Faculty manager in

			<p>numbers and attract external EU funding with:</p> <ul style="list-style-type: none"> a) internal funds for PhD studentships that cover the maintenance costs, the fees, computer equipment and modest travel allowance in line with the IRC and SFI studentships (i.e. €25k per year per studentship), b) internal funds to support conference travel to at least one international meeting a year for each member of staff that is research active. <p>The internal funds could be partially generated by student fees and grant overheads, or by new mechanisms that award publications in top international journals and additional efforts associated with the preparation of grant proposals.</p>	<p>ring-fence the portion of our operational budget derived from the Central Research Allocation to part-fund research travel, and will structure payment for tutorial work to part-fund PhD scholarships. We note the need to provide internal funds for staff whose research plans require this, as well as for those who are ‘research active’ by the University’s definition. This funding will allow the School to promote its research, to establish new contacts and to generate new research funding opportunities. The successful NEP funding provided a successful model of this. Likewise, the availability of scholarships within the School will increase the potential for the School to recruit externally funded research students eg through the IRC scheme.</p>		<p>relation to the identification of potential funding streams to support the Schools research ambitions.</p>
10	P2	U	<p>The PRG recommends that the University:</p> <ul style="list-style-type: none"> a) Continues the excellent and effective support for the MLC, possibly with a long-term commitment; see Recommendation 7, and b) Provides resource support for sustained engagement with local community schools. 	<p>Area response: Again we note that this recommendation is addressed to the University. In relation to the MLC, see Recommendation 7. Contingent on the provision of appropriate resources to sustain community engagement projects, the School will create a Community Engagement administrative position that creates capacity for such efforts (e.g. building on maths support for second level students in local and/or DEIS schools; rebooting the Mathscircles after-school maths club structure; deeper</p>	<p>Within 1 year.</p>	<p>The University suggests this part a) of this recommendation will be most effectively progress in alignment with Recommendation 7 of the PRG report.</p> <p>In relation to all additional posts, the university notes that additional requests for resources to support the Office should be proposed to the University Budget Committee, for approval by the University Executive. In making proposals on</p>

				engagement in Mathsweek, Space Week, Science Week,...) by offering teaching remission equivalent to other administrative positions within the School.		Community Engagement resource requirements, the School should ensure alignment to the University's overall approach to Community engagement, and the overall mission and goals of the School.
11	P2	A	The PRG recommends that the School seeks to strengthen communications with other Schools and other Faculties in areas where there is a common interest either in research and teaching.	Area response and action plan: The School is contributing under three headings to the Faculty's 'Research Conversations' in order to explore new research links within the Faculty. We are also in discussions with the Faculty in relation to contributions to a faculty-wide MSc degree that uses a flexible platform to offer core and optional elements, with a variety of specialisms, including mathematics. The new Centre for Astrophysics and Relativity enhances cooperation with colleagues in Physical Sciences, and the proposed MSc in Relativity and Astrophysics is being developed in cooperation with that school.	Underway	The University welcomes the progress made to date in relation to this recommendation. The University notes the continuing CfAR Seminar Series led by the School, with invitation extended to staff from across the University and beyond.
12	P2	A/U	The PRG recommends improving the School's section of the University website, to enhance visibility of different programmes offered by the School and of interesting and excellent research activities.	Area response and action plan: Some progress has been made on this over the last months, and work will be completed by the end of the year. Ongoing input will be required from Communications and Marketing.	Underway	The University welcomes progress to date on this recommendation, and the drawing of support from the DCU Communications and Marketing department to maximise the impact of the School website.

3 Summary of the One Year Plan

Recommendation	Summary Title	Actions	Timeline	Responsible
R1	School admin group	New teaching allocation guidelines for rotation of admin roles	By end 2018	HoS; Teaching Convenor
R2	Funding models	Clarification over funding models for (new) programmes; revised allocation for students in Mathematical Sciences.	By end 2018	University
R3(a)	Curriculum 2019	Accreditation by IFoA	Submission by June 2018	Chair of ACM
R3(b)	Computing resources	Planning stages for new FSH computing lab	Resources for initial roll-out within one year; definite plan for permanent establishment of adequately supported lab (staff and equipment) in place by September 2019 with preparation of necessary tenders for procurement, budgetary approval etc	University, FSH
R4(a)	Student numbers	Continue student recruitment efforts in Financial Mathematics, in particular international	International: follow up to May 2018 visit to India in Nov 2018 & Feb 2019.	HoS; Chairs of BSc and MSc in Financial Mathematics; School marketing

		student recruitment. Market research on new programmes.	Domestic: orientation event for FIM in Semester One 2018-19; enhanced presence at Open Day and other events. Market research for new programmes: by end 2018.	coordinator; Faculty Manager; FSH marketing coordinator; DCU Comms & Marketing; International Office
R5(a), R6	Service teaching	Educational design research project to address attainment in first year service maths in two modules	Academic year 2018-19 (pilot stage)	University (funding); School; relevant lecturers; postdoctoral research assistant.
R7	MLC Funding	Agreement on MLC funding in perpetuity	By September 2018	HoS, MLC Director; University - OVPAA (Registrar, Academic Secretary)
R8	Research funding opportunities	Organise workshop with RIS on funding opportunities; continue to target IRC applicants; develop marketing around PG research recruitment (e.g. find a PhD website)	Semester One, 2018-19	Research convenor; ADR; RIS; school members
R9(a)	School research funding	Ring-fencing CRA in school budget	Summer 2018; allocation in 2018-19	University, RIS/VP for Research, Dean, HoS, Research Convenor
R9(b)	School research funding	Agree targeted allocation for School with University	Summer 2018; allocation in 2018-19	University, RIS, VP for Research, Dean, HoS,

				Research Convenor
R10	Community engagement	Agree budget with University; appointment to community engagement position within School; develop community engagement plan	Admin post holder and engagement plan in place for 2019-20	University (funding), HoS, Community Engagement Coordinator
R11	Faculty Links	Complete 'Research Conversations' work; continue dialogue with ADTL on MSc	Summer 2018 into academic year 2018-19	Relevant School staff members, HoS, Teaching Convenor; ADTL
R12	Website	Complete the revamp of the School website; develop maintenance plan	Semester One, 2018-19	School computing coordinator; school secretary; HoS; Comms & Marketing

4 Summary of the Three Year Plan

The three-year plan should contain actions and timelines in response to PRG findings and recommendations. It should also assign responsibility for the actions to named persons, or roles, or parts of the organisation.

Recommendation	Summary Title	Actions	Timeline	Responsible
R3(a)	Curriculum 2019	Roll-out of revised programme	September 2019	ACM chair; HoS; programme team
R3(b)	Computing resources	New computing lab open, technical support in place	September 2020	University, FSH
R4(b)	New programmes	New MSc programmes in Actuarial Mathematics and (with School of Physical Sciences) in Relativity & Astrophysics; new international undergraduate programme in Actuarial Mathematics	MSc in R&A: entry in 2020; MSc in Actuarial Science: entry in 2021; New undergraduate programmes: entry in 2021	Astro: HoS, Director of CfAR, Head of Physical Sciences; Actuarial: HoS, Chair of ACM, actuarial programme team.
R5(b)	Service teaching	Continuation of educational design research project to address attainment in first year service maths in two modules	Roll-out to other modules (implementation stage)	University (funding); School; relevant lecturers; postdoc
R9(a,b)	School research funding	Consolidate ongoing funding plan with Dean and VP for Research	Each summer (budget panning) and following academic year (expenditure)	University, RIS, VP for Research, HoS, Research Convenor

5 Appendices

5.1 Quality Committee (for the Self-Assessment Report)

- Dr Sinéad Breen – Survey data
- Prof Turlough Downes – Research
- Dr Brien Nolan (Chair) – School structures, management and resources; coordination of SAR
- Prof Eugene O’Riordan – Teaching and Learning
- Dr Niamh O’Sullivan – Engagement and Communication

5.2 Peer Review Group members

- Professor Carmen Molina-Paris, (Chair), Professor in Applied Mathematics, Applied Mathematics, University of Leeds.
- Mr. Kevin Begley, Senior Consultant, Willis Towers Watson.
- Professor Sebastian Wieczorek, Head of Department of Applied Mathematics, University College Cork.
- Dr Garrett McGuinness, Associate Professor of Biomedical Engineering, School of Mechanical and Manufacturing Engineering, Dublin City University.
- Dr Michael Gannon, Associate Professor of Marketing, DCU Business School, Dublin City University.

5.3 Quality Committee (for the Quality Improvement Plan)

- Dr Sinéad Breen
- Prof Turlough Downes
- Dr Brien Nolan (Chair)
- Prof Eugene O’Riordan
- Dr Niamh O’Sullivan

5.4 Prioritised Resource Requirements

Prioritised Resource Proposals

1 Summary Resource Proposals Table

Project #	Project Title	Cost Estimate (€)
1	New programmes in Mathematical Sciences	5,000
2	Seeding new research funding opportunities	7,000
3	Enhancing service teaching outcomes	28,000
4	Community Engagement	5,000
Total		45,000

2 Project Details

Project 1

Project 1	New Programmes in Mathematical Sciences
Ref PRG recommendation	Recommendation 4 (P1)
Aims of the Project	To undertake market research to assess the viability of (i) new undergraduate degree programmes in (a) statistics and applied mathematics and (b) theoretical and mathematical physics and (ii) new taught postgraduate degree programmes in (a) actuarial science and (b) relativity and astrophysics. With the support of the Faculty Marketing Coordinator and the DCU Communications and Marketing office, the School will commission external market research to assess market capacity for programmes in the areas indicated, and to inform marketing efforts on their inception.
Cost of the Project	€5,000 (advised by DCU Comms & Marketing)
Timeline for Delivery	December 2018
Project Leader/ Co-ordinator	Head of School, Teaching Convenor
Expected Impact on Quality	New programmes will increase student numbers and income in the School. Programmes in the areas indicated will not require significant increases in staffing, and thus will generate additional income to fund research and to enhance teaching and learning of Mathematics across the University. New postgraduate programmes have the potential to attract international students. This will benefit the whole university financially, the School and Faculty of Science and Health in particular.
Total Funding Requested	€5,000

Project 2	Seeding new research funding opportunities
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Ref PRG recommendation	Recommendations 8 & 9 (P1)
Aims of the Project	To provide research funding (in particular, travel funding) that will allow school members to develop collaborations that will lead to funding applications. In addition to providing research travel funding to all staff engaged in research via ring-fencing of the School's Central Research Allocation (see Area Response to Recommendation 9), the School will allocate the amount indicated here on a competitive basis to proposals which have as their aim the development or investigation of specific research funding applications or opportunities.
Cost of the Project	€7,000
Timeline for Delivery	December 2019
Project Leader/ Co-ordinator	Head of School, School Research Convenor
Expected Impact on Quality	This proposal will give School members the opportunity to build new partnerships for grant applications, and so ultimately, increase external research income in the School through direct grants and through externally funded PhD and Postdoctoral fellowships. This will enhance the research profile of the School (and consequently, the Faculty and University), and will generate research overheads for the University. It will contribute positively to the University's overall research mission.
Total Funding Requested	€7,000

Project 3	Enhancing service teaching outcomes
Ref PRG recommendation	Recommendations 5 & 6 (P2)
Aims of the Project	The School will undertake a research-informed project to enhance first year service teaching, where issues of retention of core learning as well as progression are a concern (as detailed in the SAR). Central to this will be assessment mechanisms that ensure mastery of core content as a pre-requisite for certification of students as competent. We anticipate a multi-faceted approach, relying on the experience of staff in the School supported by research-validated approaches. The MLC and Mathematics Education group in the School will have a particular role here, and key elements of the work will be undertaken by a post-doctoral researcher.
Cost of the Project	€28,000 (SFI salary scale; new postdoctoral researcher (Level 2A), including PRSI, on 8-month contract).
Timeline for Delivery	January – August 2019
Project Leader/ Co-ordinator	Head of School, MLC Director

Expected Impact on Quality	This project has the potential to have a significant and lasting impact on mathematics teaching across the University. By allocating the resources indicated to undertake a design research approach to reforming a small number of service mathematics modules, we will develop a new and sustainable template for this core aspect of our School's work. This will enhance the learning of mathematics by students across the University. This project will take a mastery learning approach (combining elements of online learning and guided inquiry approaches) to aim to improve retention of core mathematical knowledge and skills by first year students, and thereby contribute positively to rates of progression from first year and to the quality of learning in subsequent years.
Total Funding Requested	€28,000

Project 4	Community engagement
Ref PRG recommendation	Recommendation 10 (P2)
Aims of the Project	To enable the School to renew its efforts in community engagement activities, aimed at increasing engagement with mathematics by local school-goers. The School will develop and renew partnerships with local secondary schools to promote the enjoyment of mathematics and to communicate its importance in further study and in careers. This will be done through (among other things) establishing Maths Circles (after-school maths clubs), enhancing mathsweek activities (lectures, school visits, hands-on activities) and broadening the MLC's role in providing learning support in mathematics to local schools.
Cost of the Project	€5,000 (Materials, payment for tutors – undergraduate DCU students)
Timeline for Delivery	January – December 2019
Project Leader/ Co-ordinator	School Community Engagement Officer
Expected Impact on Quality	This will contribute to community engagement on the part of the School, the Faculty and the University. Local schools and their students will be the principal beneficiaries. Undergraduate students will benefit by gaining experience of working with secondary school students in school and community settings.
Total Funding Requested	€5,000