



University College Dublin

Review Group Report

Periodic Quality Review

UCD School of Earth Sciences

May 2019

Accepted by the UCD Governing Authority at its meeting of 24 June 2021

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Appendix 1: Summary of Commendations and Recommendations

Appendix 2: UCD School of Earth Sciences Response to the Review Group Report

Appendix 3: Schedule for Review Site Visit to UCD School of Earth Sciences

Key Findings of the Review Group

The Review Group has identified a number of key findings in relation to areas of good practice operating within the School of Earth Science (SES), including areas requiring future improvement. The main section of this Report sets out all observations, commendations and recommendations of the Review Group in more detail. A list of all commendations and recommendations is set out in Appendix 1.

Examples of Good Practice

- The School has maintained its collegiality and mutual support during a period of significant change and expansion.
- The School has managed to do this while absorbing the major iCrag research centre without losing its focus or established sense of itself.
- The academic, research, administrative and technical staff are hard-working and dedicated, demonstrating an exceptional commitment to both teaching and research.
- The School is producing high quality research, exceeding that of comparable sized national and international institutions: i.e. 'punching above its weight'.
- The School has strong external links, particularly in terms of research, and, up to the time of this review, has increased its international profile in master's teaching.
- Undergraduate and postgraduate taught course students were unanimously complimentary of the School and the care and attention given by staff to their academic and pastoral development.

Recommendations for Future Improvement

The full list of recommendations is set out in Appendix 1, however, the Review Group would suggest that the following be prioritised:

- The School, College and University need collectively and urgently to resolve the issue of refurbishment of Science West through an open dialogue, to provide an acceptable and fit-for-purpose environment for teaching and research, which should improve the student learning experience and, potentially, support increased recruitment of future students and staff to join SES. It is presently not fit-for-purpose and runs a high risk of damaging the School's international standing at a critical time of growth.
- The financial responsibility for the refurbishment has been extensively debated within UCD over several years and urgently needs to be resolved, once-and-for-all.

- Although iCrag workspace is clean and modern, it is not fit-for-purpose. As part of the refurbishment plans for Science West, space allocation should include the co-location of SES and iCrag in order to maximise both the quality and effectiveness of the research work and to improve the working environment for all concerned. This co-relocation would mitigate any evolving separation of iCrag from SES (e.g. as the number of staff in iCrag grows), and thus avoid reducing UCD's longer-term earth science research and teaching effectiveness.
- Providing suitable accommodation for the newly appointed SFI Professor and his research group (12-15 PhD students) is an urgent issue that needs to be resolved in the immediate-term.
- While the current informal approach to organisation and management has been effective to date, the Review Group recommends that the School review its network of formal structures and meetings. This should clearly address those entitled/expected to be present at the various meetings, which is a growing issue in the light of the changed School profile arising from the establishment of iCrag.

1. Introduction and Overview of UCD School of Earth Sciences

Introduction

- 1.1 This Report presents the findings of a quality review of the School of Earth Sciences, University College Dublin, which was undertaken on 23-26 April 2018. The School response to the Review Group Report is attached as Appendix 2.

The Review Framework

- 1.2 Irish Universities have collectively agreed a framework for their quality review and quality improvement systems, which is consistent with both the legislative requirements of the Qualifications and Quality Assurance (Education and Training) Act 2012, and international good practice (e.g. Standards and Guidelines for Quality Assurance in the European Higher Education Area, 2015). Quality reviews are carried out in academic, administrative and support service units.

- 1.3 The purpose of periodic review is to assist the University to assure itself of the quality of each of its constituent units, and to utilise learning from this developmental process in order to effect improvement, including:

- To monitor the quality of the student experience, and of teaching and learning.
- To monitor research activity, including: management of research activity; assessing the research performance with regard to: research productivity, research income, and recruiting and supporting doctoral students.
- To identify, encourage and disseminate good practice, and to identify challenges and how to address these.
- To provide an opportunity for units to test the effectiveness of their systems and procedures for monitoring and enhancing quality and standards.
- To encourage the development and enhancement of these systems, in the context of current and emerging provision.
- To inform the University's strategic planning process.
- The output report provides robust evidence for external accreditation bodies.
- The process provides an external benchmark on practice and curriculum.
- To provide public information on the University's capacity to assure the quality and standards of its awards. The University's implementation of its quality procedures enables it to demonstrate how it discharges its responsibilities for assuring the quality

and standards of its awards, as required by the Universities Act 1997 and the Qualifications and Quality Assurance (Education and Training) Act 2012.

The Review Process

1.4 Typically, the review model comprises four major elements:

- Preparation of a self-assessment report (SAR)
- A visit by a review group (RG) that includes UCD staff and external experts, both national and international. The site visit normally will take place over a two or three day period
- Preparation of a review group report that is made public
- Agreement of an action plan for improvement (quality improvement plan) based on the RG report's recommendations. The University will also monitor progress against the improvement plan

Full details of the review process can be found on the UCD Quality Office website: www.ucd.ie/quality.

The Review Group

1.5 The composition of the Review Group for the UCD School of Earth Sciences was as follows:

- Emeritus Professor Muiris O'Sullivan, UCD School of Archaeology (Chair)
- Professor Patricia Fitzpatrick, UCD School of Public Health, Physiotherapy and Sports Science (Deputy Chair)
- Professor Howard Johnson, Imperial College London (External)
- Professor Mike Lovell, University of Leicester (External)

1.6 The Review Group visited the School from 23-26 April 2018 and held meetings with School staff; undergraduate and postgraduate students; postdoctoral researchers; external stakeholders; and other University staff, including the College Principal. The site visit schedule is included as Appendix 3.

1.7 In addition to the Self-assessment Report, the Review Group considered documentation provided by the School and the University during the site visit.

Preparation of the Self-assessment Report (SAR)

1.8 Following a briefing from the UCD Quality Office representatives, a Self-assessment Report Coordinating Committee (SARCC) was established. Members of the Committee, in

consultation with staff members and student representatives, drafted sections of the Self-assessment Report. Committee membership was as follows:

SAR Co-ordinating Committee	SAR Drafting Committee
Dr John Conneally (Research Staff)	Assoc. Prof. Lawrence Amy
Dr Jennifer Craig (iCrag Staff)	Dr Conrad Childs
Ms Julia Gustafsson (Administrative Staff)	Dr Laia Comas Bru
Prof. Frank McDermott (Head of School / SARCC Deputy Chair)	Dr Jennifer Craig
Mr Michael Murphy (Technical Staff)	Prof. J Stephen Daly
Assoc. Prof. Patrick Orr (SARCC Chair / Academic Staff)	Dr Aggeliki Georgiopoulou
Ms Sarah Proctor (Administrative Staff)	Ms Julia Gustafsson
Ms Deirdre Walsh (PhD and MSc representative)	Prof. Peter Haughton
	Assoc. Prof. Eoghan Holohan
	Assoc. Prof. Ivan Lokmer
	Assoc. Prof. Tom Manzocchi
	Assoc. Prof. Julian Menuge
	Prof. Frank McDermott
	Assoc. Prof. Patrick Orr
	Ms Sarah Procter
	Prof. John Walsh

- 1.9 The composition of the Co-ordinating Committee ensured each stakeholder group within the School had input to the self-assessment exercise. Members were points of contact for their stakeholder group and the Report was produced by the Self-assessment Report Committee and reviewed by all members of the School. The Self-assessment Report Committee met on six occasions between October 2017 and March 2018 and iterations of each draft chapter was circulated in advance of meetings for discussion and feedback. The final draft of the Report was circulated to the College Principal, all School staff and the UCDQO for comment in March 2018, and the final version submitted to the UCDQO by the end of March 2018.
- 1.10 UCD Teaching & Learning facilitated focus group meetings with student and academic staff to review the effectiveness of delivery of the School's teaching programmes in December 2018. The College HR Partner facilitated additional focus group meetings with PhD and MSc students, research staff, School support staff and academic staff to consider organisational effectiveness between the School and the University. The Science Programme Office facilitated a focus group with 3rd year undergraduate students. Online surveys were circulated to postgraduate students and research staff inviting feedback on various aspects of their UCO experience.

The University

- 1.11 University College Dublin (UCD) is a large and diverse university whose origins date back to 1854. The University is situated on a large modern campus about 4 km to the south of the centre of Dublin.

- 1.12 The University Strategic Plan (to 2020) states that the University’s mission is: “to contribute to the flourishing of Dublin, Ireland, Europe and the world through the excellence and impact of our research and scholarship, the quality of our graduates and our global engagement; providing a supportive community in which every member of the University is enabled to achieve their full potential”.

The University is currently organised into six colleges and 37 schools:

- UCD College of Arts and Humanities
- UCD College of Business
- UCD College of Engineering and Architecture
- UCD College of Health and Agricultural Sciences
- UCD College of Social Sciences and Law
- UCD College of Science

- 1.13 As one of the largest universities on the island of Ireland, UCD supports a broad, deep and rich academic community in Science, Business, Engineering, Health Sciences, Agriculture, Veterinary Medicine, Arts, Law, Celtic Studies and Human Sciences. There are currently more than 26,000 students in our UCD campus (approximately 16,300 undergraduates, 7,800 postgraduates and 2,200 Occasional and Adult Education students) registered on over 70 University degree programmes, including over 6,300 international students from more than 121 countries. The University also has over 5,400 students studying UCD degree programmes on campuses overseas.

UCD School of Earth Sciences

- 1.14 The School was established in 2015, having formerly been UCD School of Geological Sciences and before that the Department of Geology. It is one of the seven schools in the UCD College of Science and offers two taught programmes: BSc(Hons) (Geology) and MSc Petroleum Geoscience and contributes modules to the BSc in Civil Engineering, the ME in Energy Systems, and MSc programmes in Environmental Science and Environmental Sustainability.
- 1.15 The School's main research activities are in the areas of Fault Analysis; Geochronology, Petrology & Isotope Geochemistry; Geophysics; Marine & Petroleum Geology; Palaeoclimatology and Palaeobiology. School staff currently contribute to two UCD Research Institutes (UCD Earth Institute and UCD Energy Institute) and the School hosts the National Centre for Isotope Geochemistry. The School also hosts the Science Foundation Ireland (SFI) funded Irish Centre for Research in Applied Geosciences (iCRAG).
- 1.16 The School comprises 13 academic staff, 2 emeritus staff and 8 visiting and adjunct academic staff. Its activities are currently supported by 5 technical staff and 2 administrative staff.

iCrag activities are supported by 5 staff with 27 research staff and 29 postgraduate researchers.

2. Organisation and Management

- 2.1 There is a strong collegial ethos in the School, which helps to maintain cohesion, facilitates informal communication, contributes to a spirit of unity and is reflected in a consensual approach to decision-making.
- 2.2 The School Executive Committee comprises the academic staff of the Unit and the School Administrator, with a rotating representative of staff (i.e. Professional Technical and Support Staff). The School Executive committee meets regularly on a monthly basis and is the most formal in its structure and, as a result, it assumes overwhelming importance within the School.
- 2.3 Formal plenary meetings extending beyond this core group were less evident to the Review Group, although the approachability of School staff as individuals mitigates the effect of this. Other committees that meet regularly include Safety, and Curriculum Review. Recommendations from such committees are passed to the School Executive Committee for further discussion and a final decision, hence the lack of minutes from such committees. While this informal approach has been effective to date, the expansion of the School with the development of iCrag, means that an informal approach is no longer fit-for-purpose.
- 2.4 The current spatial separation of iCrag from the School presents a significant challenge to the management structure and collegial nature of the School of Earth Sciences. The non-representation of iCrag staff on the School Executive adds to the challenge.
- 2.5 While the School Executive is satisfied that an informal approach to management and communication works well, interviews with various cohorts not represented on the School Executive revealed gaps that tend not to occur in circumstances involving a more formal network of meetings.

Commendations

- 2.6 The School has maintained its collegiality and mutual support during a period of significant change and expansion.
- 2.7 The School has managed to do this while absorbing the major iCrag research centre without losing its focus or established sense of itself
- 2.8 The approachability of all staff as individuals is a significant and commendable strength.
- 2.9 The School exudes a general sense of common purpose and appears to run quite smoothly.
- 2.10 Well-prepared SAR and efficient provision of additional information to the Review Group as required.

Recommendations

- 2.11 While the current informal approach to organisation and management has been effective to date, the Review Group recommends that the School review its network of formal structures and meetings. This should clearly address those entitled/expected to be present at the various meetings, which is a growing issue in the light of the changed School profile arising from the establishment of iCrag.
- 2.12 Consideration should be given to developing a smaller School Executive that is not effectively a meeting of the full academic staff but is representative of the School as a whole, including research staff and students as appropriate.
- 2.13 The School should formalise the recording of all School committee meetings.

3. Staff and Facilities

Staff

- 3.1 As stated in 1.16 above, the School comprises 13 academic staff, 2 emeritus staff, 8 visiting and adjunct academic staff, 5 technical staff and 2 administrative staff. The establishment of iCrag has resulted in a much larger cohort of staff in the School and a change in the ratio of academic staff to PhD and Post-Doctoral researchers. The iCrag staff complement includes 5 support staff, 27 research staff and 29 postgraduate researchers.
- 3.2 The total number of academic staff is small (13), comprising full-time (9) and fixed-term (4) members. This is supplemented by eight visiting and adjunct academics and two emeritus academics. There is a bimodal distribution in staff demographics, with one half in the 50-65 age group and the other in the 30-45 group. The 13 academic staff undertake the bulk of a large teaching workload and all members are research active. The total number of staff is small considering the breadth and depth of the teaching and research programmes. Potential risks to continuity stemming from future retirements, the increased appointment of staff on fixed-term contracts and the use of industry funding for posts were noted by the Review Group.
- 3.3 With some academic staff in the later stages of their UCD careers, the School will be faced with strategic staffing decisions in the coming years. Uncertainty around the introduction at National level of changes to the mandatory retirement age for civil servants from 65-70 years of age complicates these decisions. Under the new measure, people can work up until 70, if they so choose, and legislation around this is currently being drafted by the Irish Government. The current lack of clarity may have implications for the School's staff planning in the medium-term. The School has identified key areas in which it wishes to make appointments and is already on a path to appointing a Quaternary geologist in 2018.

- 3.4 There are eight, highly experienced and well-qualified technical staff, who work in three, overlapping areas: (1) SES, (2) iCRAG, and (3) NCIG. There have been recent and planned future retirements, which have been accompanied by effective succession planning and new appointments.
- 3.5 In respect of gender balance in the academic staff cohort in the School, the situation has improved since the last quality review in 2011 with the appointment of two female staff. The School is conscious of this skewed distribution, which is largely a consequence of the broader, historic gender imbalance within the geological community. This has been changing over recent decades and the School is encouraged to continue its efforts to increase its staff diversity when future academic appointments are considered. This is particularly important given that the University achieved the Athena Swan Bronze level in 2017 and the University has committed, in its related Gender Equality Action Plan, to ensuring that all UCD STEM schools will apply for Bronze Awards by 2021.
- 3.6 The geographical profile of School Faculty is diverse comprising seven Irish nationals and others from the UK (3), Spain (1), Greece (1) and Croatia (1). This contributes to the international culture of the School's teaching programme, its research projects and researchers, and the graduate and postgraduate student populations.

Facilities

- 3.7 Teaching and research is undertaken in two separate locations: (1) SES (Science West), and (2) iCRAG (Science East). The Science West teaching areas are old, inflexible and are, overall, not fit-for-purpose. Criticism of the Science West area, especially the teaching laboratories, has been repeatedly stated, both in previous reviews (e.g. 2011) and in the 2018 SAR. Other facilities in Science West are highly variable, ranging from outdated rock cutting to advanced isotope geochemistry. The Core Cutting/Storage laboratory is a state-of-the-art facility. The School research laboratories (e.g. NCIG) are generally clean and of a decent standard, however equipment is tightly packed. Working conditions in the rock cutting and rock sample preparation area may be sub-marginal from a health and safety perspective and this should be independently assessed at the earliest opportunity (e.g. risk of inhalation of dust and harmful mineral particles, among other things).
- 3.8 The iCRAG research area is a modern, bright and mainly open-plan area, which is used by PhD students and Post-doctoral Research Assistants (PDRAs). However, this space lacks suitable storage space for geoscience researchers and feedback from researchers highlights frequent disturbance from noise due to the tightly packed nature of the staff and students. The meeting area 'pods' also lack sufficient noise insulation.
- 3.9 The School is aware of the inadequate condition of its core space, which is located in a part of the Science building (Science West) that has not been renovated since it was built in the 1960s. Previous review documents confirm that the SES has been pressing strongly for improvements over several years. There have been numerous discussions between the School, College and University in relation to resolving the issues around Science West and an upgrade of the wing is seen as a priority, however, there is no budget and no clear time-line in place. The issues

around the iCrag space appear to have attracted less attention but, from visiting the space and interviewing those working there, the Review Group has formed an opinion that the space is unsuitable for its current purpose. Addressing the issue of space could yield significant income through better student recruitment (Undergraduate and MSc) and further research investment, particularly involving industry.

Commendations

- 3.10 The School has a strong and inclusive work ethic that permeates throughout all parts of Earth Science teaching, research and administration, including staff and students alike.
- 3.11 The academic, research, administrative and technical staff is hard-working and dedicated, demonstrating an exceptional commitment to both teaching and research.
- 3.12 Academic staff members are highly approachable, resulting in a strong collegiate atmosphere.
- 3.13 The incorporation of iCrag into SES has been remarkably successful.
- 3.14 The ongoing replacement of technical staff, supporting SES, NCIG and iCrag, has been excellent with an uplift in overall capabilities.
- 3.15 Continuity of academic and technical staff numbers despite the withdrawal of industry funding.
- 3.16 The successful award and recruitment of an SFI Professor.

Recommendations

- 3.17 The School should strategically plan to engage with University plans to appoint 100 additional academics across the institution in the next year (and up to 500 over the next 5 years); these appointments will be allocated to strategic areas of growth and opportunity.
- 3.18 The School, College and University need collectively and urgently to resolve the issue of refurbishment of Science West through an open dialogue, to provide an acceptable and fit-for-purpose environment for teaching and research, which should improve the student learning experience and, potentially, support increased recruitment of future students and staff to join SES. It is presently not fit-for-purpose and runs a high risk of damaging the School's international standing at a critical time of growth.
- 3.19 The Review Group urges that an appropriate group of senior UCD staff, including the Vice-President for Campus Development, the Director of Estates, and the College Principal meet with the newly reconstituted SES executive to find a solution that enables the University's refurbishment plans with regard to Science West to be implemented at the earliest opportunity.

- 3.20 The financial responsibility for the refurbishment has been extensively debated within UCD over several years and urgently needs to be resolved, once-and-for-all.
- 3.21 The teaching rooms should be refurbished in a way that maximises their versatility, including moveable tables, retractable computer screens and suitable storage facilities for earth science equipment and samples; this may require designation as a shared space with the versatility to enable both earth science and non-earth science teaching to be undertaken.
- 3.22 Although iCRAG workspace is clean and modern, it is not fit-for-purpose. As part of the refurbishment plans for Science West, space allocation should include the co-location of SES and iCRAG in order to maximise both the quality and effectiveness of the research work and to improve the working environment for all concerned. This co-relocation would mitigate any evolving separation of iCRAG from SES (e.g. as the number of staff in iCRAG grows), and thus avoid reducing UCD's longer-term earth science research and teaching effectiveness.
- 3.23 Providing suitable accommodation for the newly appointed SFI Professor and his research group (12-15 PhD students) is an urgent issue that needs to be resolved in the immediate-term.
- 3.24 The rock cutting and rock sample preparation area needs immediate attention, with an independent health and safety review recommended; the expectation should be more than the minimum health and safety requirement and a total refurbishment is probably necessary.
- 3.25 Older non-teaching laboratories and public spaces within SES would also benefit in the interim from a 'spring clean' and redecorating to improve the quality of the working environment for its users.
- 3.26 The large cohort of post-doctoral research staff is an underutilised resource that could be used more effectively in supporting the School's large teaching workload.
- 3.27 The large and relatively rapid increase in the research staff population, mainly in iCRAG, requires the introduction of more formal procedures to maintain both good communication and the School's renowned collegiality.
- 3.28 The School should introduce a more formal induction procedure for new academic staff, support staff, research staff and research students.
- 3.29 A mentoring programme should be introduced for early-career staff.
- 3.30 The Review Group supports the School's ambition to diversify into other subject areas, especially Quaternary Geology and Geophysics/Remote Sensing.
- 3.31 The efforts to improve gender diversity must continue, including strong engagement with Athena SWAN. The School should engage with UCDHR in terms of maximising applications and recruitment from a diverse range of applicants.

4. Teaching, Learning, Assessment and Curriculum Review: BSc (Hons) Geology

- 4.1 The UCD School of Earth Sciences offers an excellent teaching programme that includes elective modules taken by large cohorts of students through to a well-respected and much valued 4-year BSc (Hons) programme in Geology. This is a Level 8 programme in the National Framework of Qualifications and is respected and valued by employers; graduates are seen as excellent candidates for professional careers in geoscience.
- 4.2 Students are recruited primarily from Ireland with a small number of visiting students from overseas. Entry to the BSc degree programme is through common entry to Science (DN200) and the School delivers elective modules in Level 1 and Level 2 with students progressing into the full geology programme in years 3 and 4.
- 4.3 The entry-level points for this common entry scheme are high (>500) and consequently is much stronger than normally required for entry to similar programmes at competitor institutions, where often direct entry is available. This effectively reduces the marketplace for UCD in terms of recruiting students to geology. Additionally, the internal market created by the common entry system sets UCD Schools against each other in terms of recruitment of students and does not encourage collaborative ventures.
- 4.4 The number of students that enrol in years 3 and 4 is currently relatively small compared with the large numbers taking (four) elective modules in years 1 (modules GEOL10040 & GEOL10050) and 2 (modules GEOL20110 & GEOL20180)) so that the School's main income stream centres around elective modules which are not central to the Geology degree programme.
- 4.5 A question arises as to why so few students continue with geology into years 3 and 4 and what may be done to improve recruitment to the full degree programme while respecting the common entry system at UCD. Conversations with students during the site visit suggest that the complexity and interlocking requirements for the various degree streams on offer through common entry are difficult to navigate, especially to anyone unfamiliar with the system.
- 4.6 Geology is grouped as "mathematics, physical and geological sciences" and while students do not necessarily have to opt for this grouping to study geology there is a perception that this is so, and that mathematics and physics play a much greater role in geology than the curriculum reflects. Students who met with the Review Group reported that this appears to be a deterrent to students in choosing to study geology.
- 4.7 Anecdotal evidence suggested that some of the elective modules taken by large numbers of students, who did not go on to study geology, were considered easy options where students could pass, and that the modules were not sufficiently dynamic to encourage students to pursue a degree in geology.
- 4.8 The small number of School staff teach a broad wide-ranging programme in addition to delivering very high-quality research. There seems to be an excessive quantity of teaching (both delivery and assessment) delivered by such a small group. The School states that

academic teaching is supplemented by the involvement of PhD students, research staff and external/industrial specialists. While PhD student demonstrators are involved in the delivery of a range of campus-based and field-based teaching activities, it is also apparent that research staff are much less involved in teaching and may be discouraged by supervisors, or by funding rules, from becoming more involved.

- 4.9 While a major University-led review of the curriculum took place in 2015 it is unclear that the School fully utilised the opportunity to address the underlying curriculum issues that contribute to staff teaching-overload. Addressing this may necessitate a reduction in both content and contact hours but the emphasis should be on ensuring the School maintains the high quality for which it is renowned at the expense of quantity.
- 4.10 The School has made significant efforts to include new developments, such as GIS, in the curriculum. However, accommodating these sometimes involved bolting them on to existing modules rather than fully integrating them into the curriculum. Feedback from industry representatives who met with the Review group indicated that GIS, for example, is so central to Earth Science/Geology that it should be introduced as a component early on in the programme and then used repeatedly in later years of the programme.
- 4.11 The School has identified an important gap in its Quaternary Geology programme and expects to recruit a member of staff to this subject area shortly. This is in agreement with the views of the employers' group, which met with the Review Group during the site visit.
- 4.12 A 6-week mapping project in summer of the 3rd year is a major and important component of the degree but adversely affects the students in terms of their workload (this is in addition to all the usual terms/semesters), their income from potential vacation work, and their opportunities to participate in internships and work experience. The last point, in particular, potentially has a negative impact on their employability prospects in a global market. At the moment, students are completing an additional 6 weeks of work compared to students of other disciplines and similar degree programmes at competitor institutes in Ireland.
- 4.13 Commentary from External Examiners is very positive and in recent years no significant issues have arisen from their detailed investigations and reports. When comments or suggestions have been made these have been adopted, where appropriate.
- 4.14 The School has developed initiatives with cognate subjects to deliver a minor degree in Geology as part of a 4-year degree in Social Sciences, a structured elective (Introduction to Earth Sciences and Global Change) and a Discovery elective (DSCY10060; Energy, Climate Change and Policy).
- 4.15 Undergraduate students reported that they appreciate the career support offered by UCD centrally but would like to see more detailed geoscience career advice from the School, particularly regarding career paths for geoscience professionals, identifying what they as students needed to do and to aspire to, throughout their degree to prepare for specific job entry requirements.

4.16 Communication between the School and the students is generally excellent; while there is no formal student-staff committee the small number of students combined with the informality and collegiality of the School means that 3rd/4th year students are able to meet regularly with staff.

Commendations

4.17 The geology programme at UCD is characterised by:

- Extremely high-quality teaching.
- Uniformly very enthusiastic and supportive staff.
- A strong sense of collegiality and teamwork.
- Very committed and hard-working staff.
- Excellent support staff.
- A highly intensive educational experience.
- Strong fieldwork component.
- A wide variety of assessment methods.
- An integrated and communal environment.

4.18 The School has taken the sensible initiative to explore new programmes with Geography.

4.19 Undergraduate and postgraduate taught course students were unanimously complimentary of the School and the care and attention given by staff to their academic and pastoral development.

Recommendations

4.20 The Undergraduate degree programme, from entry route to specialisation, is complex and difficult to follow for anyone who is not well-versed in UCD entry requirements – provision of additional information about how it works could address the issue of prospective geology students who find it off-putting and then select to apply to competitor institutions. It could be helpful to get present and recent former students to engage in discussions with prospective students.

4.21 An urgent review of the curriculum should be undertaken by the School. The focus should be on ensuring that the following aims are met:

- (i) first year modules (including the elective modules) should be sufficiently engaging and exciting to attract students to the geology degree stream. Students suggested further integration of a new flagship fieldwork component, if possible. A top-down approach engaging students with the major issues of the day could also be considered.
 - (ii) new concepts used by industry should be embedded into the curriculum at an early stage with opportunities at later years of the programme to further develop associated knowledge and skills.
 - (iii) the important components of delivery and assessment, and the integrity of the degree programme should be retained, while overall contact hours and workloads should be reduced, thus freeing up staff time for research.
- 4.22 As geology evolves as a subject it is impossible for an undergraduate degree to include everything and the degree should adapt to the changing needs of the world.
- 4.23 The School should create formal mechanisms whereby research staff can participate in teaching, providing career development opportunities for staff and easing the teaching workloads of academic staff.
- 4.24 The School needs to investigate how it can mitigate the impact of the 6-week mapping project on students while retaining its academic integrity. Absorption into the teaching terms, reduced duration or division over two summers are examples of solutions that might be considered.
- 4.25 The School, together with relevant UCD units, must find an urgent and satisfactory solution to the entry requirements issue that adversely affects recruitment of students to the School. This should address the need to provide alternative/additional entry routes that include not only mathematics/physical sciences, but also chemistry/biology. In addition students often become interested in geology through physical geography at pre-university level, so formal links with geography should be strengthened. The financial model is based on an internal market of student numbers but should not be a hindrance to these discussions, and compromise may be necessary.
- 4.26 Students entering through common entry need appropriate information to make decisions. For many students the subjects being offered at UCD (e.g. geology) are unknown quantities and current mechanisms for informing students on arrival prior to making selections seem to be ineffective for geology. The School should focus on how they can promote their discipline.
- 4.27 The School should continue to explore options with other Schools to develop programmes with geology components.
- 4.28 The School should develop a bespoke geoscience career support programme for students involving external speakers. Role models, drawn from successful career graduates, should form a central component taking into account the principles of equality and diversity, for example as expressed through the Athena SWAN charter.

- 4.29 While communication was generally excellent, the School should discuss with current students where communication appears to have broken down, for example, fieldwork dates and accessing coursework component marks.
- 4.30 The inclusion of Quaternary Geology in the curriculum offers an opportunity to develop a holistic approach to geoscience and should include applied aspects such as geotechnical engineering, hydrogeology and aggregates.
- 4.31 The School should develop a focussed student recruitment programme directed at second-level schools to better explain the nature of the subject plus the entry and progression requirements. This could initially be based on data held by UCD as to where previous graduates have been drawn from. The use of successful career graduates through short videos could be particularly aspirational, whether on the web or through school visits.
- 4.32 External experts could be used more to the advantage of the School and, especially, to inspire students and researchers in their career development (see 4.28 above).
- 4.33 Involvement of non-academic staff (e.g. PhD students, research staff and external contributors) should be formalised and, particularly where they are involved in assessment, appropriate training and monitoring should be a mandatory requirement.
- 4.34 The development of new modules and/or minor degrees with cognate disciplines is most welcome but the School should be cautious that these and further developments yield significant (financial) returns so as to benefit the School as a whole and do not simply stretch the staff further.
- 4.35 If undergraduate recruitment improves significantly the introduction of a student/staff forum may be something that requires more formal consideration.

5. Teaching, Learning, Assessment and Curriculum Review: MSc Petroleum Geoscience

- 5.1 The UCD SES offers an intensive but well received MSc in Petroleum Geoscience now in its fifth year. This is the sole petroleum geoscience programme in Ireland and represents a critical development in terms of training both home students but also international students. The links and support provided by partnership with industry acted as a catalyst and while this support is currently not available, the programme remains a success. The withdrawal of industry funding due to current sectoral issues has significantly impacted continuous staff employment and, while the School stepped in to ensure continuity, it has impacted the School finances.
- 5.2 Students are currently recruited primarily from overseas with the downturn in the oil price hindering home student applications. Students commented that 80% of them had arrived on the course more by accident than intent; they considered the course was not well advertised,

but that the personal response of the course director had influenced them in selecting UCD over other competitors.

- 5.3 A small number of staff teach an intensive programme in addition to delivering very high-quality research. The excellent teaching programme is highly regarded by both students and employers. The fieldwork (three 7 to 10 day residential field courses) is recognised as a major asset to the programme. The inclusion of fieldwork costs in the fee is supportive of students. The MSc students who met with the Review Group described the programme as ‘fantastic’, from both a technical and a developmental perspective. The students commented very positively on the approachability of all MSc teaching staff. Academic instruction is supplemented by industry experts as appropriate, often through professional short courses.
- 5.4 Petroleum geoscience remains an important subject and UCD offers the only such course in Ireland, so it is important as a national resource base. The perception of many students, however, is that a more environmentally sustainable world beckons. Much of the fundamental subject matter of the MSc is equally relevant to sustainable subsurface exploration and to management of the subsurface environment, whether for resources (petroleum, minerals, energy or water), or for the management of the subsurface (waste/pollution) or related to various geohazards. Given the continuing downturn in the oil price and the weak financial state of the oil industry, it would be prudent to explore whether a parallel MSc can be run without the major petroleum component or title to attract a different group of students simultaneously. The two MSc courses could have a considerable overlap but with, for example, a very different emphasis through the research project and independent coursework (e.g. literature reviews/dissertations). This could be an interim solution but with significant longer-term benefits, providing clear separation between UCD and other institutes offering MSc courses.
- 5.5 As with the Undergraduate programme, commentary from external examiners is very positive and in recent years, no significant issues arise from their detailed investigations and reports. Where comment or suggestions have been made these have been adopted where appropriate.

Commendations

- 5.6 As is the case for the undergraduate programme, the MSc programme at UCD is characterised by:
- Extremely high-quality teaching
 - Uniformly very enthusiastic and supportive staff.
 - A strong sense of collegiality and teamwork.
 - Very committed and hard-working staff.
 - Excellent support staff.

- A highly intensive educational experience.
- Strong fieldwork components.
- A wide variety of assessment methods.
- An integrated and communal environment.

Recommendations

- 5.7 An urgent review of the curriculum and the market would be timely to explore whether a parallel MSc focussed on sustainable subsurface exploration and management could be introduced without the major petroleum component or title to attract a different group of students simultaneously.
- 5.8 The School should create formal mechanisms whereby research staff can participate in teaching of MSc students, providing career development opportunities for staff and easing the teaching workloads of academic staff. This should be formally established to provide equal opportunities for all, while also controlling the amount of time that individuals contribute so it is not to the detriment of their research.
- 5.9 The School should invest in advertising the MSc course(s), particularly through a visible presence at international petroleum conferences (e.g. AAPG) and also through a better web presence, including the use of successful graduates (video clips). The School is in a very strong position in terms of the quality of its teaching and research and should present its success to the world in a much more assertive manner.
- 5.10 The School should explore options for MSc programmes, using existing geology modules with minimal additional work, with other Schools.
- 5.11 The School should develop a bespoke geoscience career support programme for students involving external speakers, with role models drawn from successful career graduates.
- 5.12 While the inclusion of fieldwork costs in the fee is attractive to students, there are hidden costs such as visas for overseas students. While the School cannot take responsibility for these unknown costs, it would help students if they were given clear forewarning that they could incur such costs.

6. Research Activity

- 6.1 The quality and quantity of research output has increased considerably since the last review, with all key metrics showing rising trajectories in all research areas. A substantial part of this improving research profile has been the successful introduction of iCrag, which has been

achieved through the integrated efforts of academic staff, researchers, PhD students, administrative and operations support staff.

- 6.2 iCrag is the single most significant development in terms of geoscience research in UCD since the last review. Its research development is far from complete, with exciting plans to integrate with other disciplines at both national and international levels. It offers a remarkable springboard for continued growth of earth science-related research in UCD, including spin-off benefits into teaching, especially at the masters-level.
- 6.3 iCrag also provides a vehicle for integrating earth science research across Ireland, which could include extending UCD's expertise from petroleum-related topics into other areas such as water, waste disposal, carbon capture and storage, environment and engineering geology. Links with other UCD schools, such as archaeology, geography and civil engineering provide scope for further research collaboration.
- 6.4 Future research expansion will be constrained by the small geoscience workforce, which is presently at capacity. Future decisions on new staff appointments and new research areas will need to take into account many facets, not least maintaining the cohesive nature of the SES and iCrag.
- 6.5 The Review Group considers the work space of research staff to be inferior to what is normally expected at this level (more typical of PhD students) and recommends consideration be given to improving this. The space occupied by iCrag has serious drawbacks for those working there. The Review Group notes in particular a critical storage problem both for the overall unit and for the individual researchers. Equally problematic is the open plan and close proximity of desks, which results in a lack of privacy for conversations and an ongoing noise difficulty. The separation of this space from laboratories and supervisors is a source of frustration to those working there.

Commendations

- 6.6 The School is producing high quality research, exceeding that of comparable sized national and international institutions: i.e. 'punching above its weight'.
- 6.7 The successful incorporation of iCrag into the SES during the present review period.
- 6.8 The high quality and high volume of research output, manifested by the rising trends for all research metrics.
- 6.9 The hard work and dedication of academic staff in maintaining their research active profiles, despite their large teaching workloads and increasing administrative demands.
- 6.10 The success in securing new research funds through a diverse array of funding opportunities, which is despite a reduction in national funding opportunities.

- 6.11 Maintaining the cohesion of earth science research in UCD, despite the physical separation between the SES and iCrag.
- 6.12 The strong outward-looking research culture, which has strengthened the depth and breadth of research output and provides a sound platform for sustained growth.
- 6.13 The successful appointment of a new SFI-sponsored chair, which will further extend the School's research profile.
- 6.14 The Review Group noted the inclusion of post-doctoral researchers to plenary and other School meetings, allowing them to participate in broader academic discussions and integrate with the School body.

Recommendations

- 6.14 The Review Group supports the aspiration for financially sustainable research growth, including increases in full-time academic staff, in order to fulfil its ambitious research targets.
- 6.15 The School should articulate a clearer research strategy that takes into account the significance of the iCrag development in UCD.
- 6.16 iCrag could be used as a vehicle for sharing UCD's expertise throughout the national earth science community.
- 6.17 The Review Group recommends that UCD review the proportion of overhead income that is returned to research groups, and consider providing a substantial increase on the present 10% figure to stimulate further research and development.
- 6.18 The School should explore ways to reduce teaching and administrative workloads for early career academics, especially those on fixed-term contracts, to assist them to maximise their early research development.
- 6.19 The rapid increase in staff in SES/iCrag requires a more formal approach to communication in order to maintain inclusivity and collegiality that has thus far been a proud hallmark of the School.
- 6.20 The collegiate nature of the SES and iCrag is being threatened by the two separate locations and the physical merging of the two entities is strongly recommended.
- 6.21 The Review Group notes that academic leadership is shared widely among all academic staff and recommends that a more focused approach is considered.
- 6.22 The Review Group recommends that the School consider ways to increase the amount of quality research time by, for example, reducing administrative workloads, possibly by appointing additional administrative staff.

- 6.23 The Review Group recommends greater attention be paid to personal career development planning for post-doctoral research staff, including how they might increase their contributions to teaching.

7. Management of Quality and Enhancement

- 7.1 The School has a good focus on quality and enhancement and engages with a number of quality mechanisms, for example, external examiners, student feedback, targeted training and development, and other mechanisms addressed in other sections of this Report. The School has actively engaged in curriculum review.
- 7.2 However, there is scope for the School to further develop its quality mechanisms in the area of career development for research staff and PhD students. In addition, PhD students who met with the Review Group seemed unsure of the role and function of the Doctoral Studies Panel (DSP) and there was some confusion with the stage transfer assessment. The spatial separation between the School and iCRAG, and the organisational structure in iCRAG which in itself could be viewed positively, may be a complicating factor to the students understanding of the process.

Commendations

- 7.3 The External Examiner reports in the past five years have been overall very positive about the undergraduate BSc in Geology and the MSc Petroleum Science.
- 7.4 Student feedback by module is very good with an overall upward trajectory over recent years.
- 7.5 Students feel academic and administrative staff are very approachable and helpful always.
- 7.6 Through iCRAG research staff receive media training and both research staff and PhDs can avail of public engagement opportunities.

Recommendations

- 7.7 The School should ensure that PhD students understand the Research and Professional Development Plan (RPDP) process, which is an important component of student development. Equally, the requirement for, and benefit that can accrue from, a well-appointed Doctoral Studies Panel (DSP) should be stressed. There should be more focus on the formal UCD PhD procedures to ensure students have a clear understanding of the role of the DSP and the stage transfer assessment, and all PhD students should have a DSP meeting within 3 months of registration.
- 7.8 The need for increased formal training of PhD demonstrators was highlighted in focus groups and in the Review Group meeting with postgraduate students. The School should liaise with UCD Teaching & Learning to explore potential models of engagement of postgraduate

students in teaching such as the introduction of credit-bearing Graduate Teaching Assistant modules.

- 7.9 Currently post-doctoral researchers are not engaged in any teaching in the School. In most cases, they are keen to develop their teaching expertise. The Review Group recommends that the provision of lecturing and tutorial delivery opportunities should be an integral part of post-doctoral researchers' personal development within the School.
- 7.10 A formal mentoring programme should be established in the School for early career staff (temporary and permanent) and post-doctoral researchers.

8. Support Services

- 8.1 The School engages with a wide variety of supports provided by other UCD units, including the College of Science, Human Resources, the International Office, UCD Research, Estates and Finance. Overall, the School enjoys a very good working relationship with the Support Services it requires but there is scope for the School to benefit from increased engagement with particular supports.

Commendations

- 8.2 The School has in-house IT specialists.
- 8.3 The Library supports to the School are good, including spending on new e-books when requested and contributing to a module (SCI10010 Principles of Scientific Enquiry) and Library orientation for students.
- 8.4 The School has an excellent working relationship with the Pre-Award Research administrative team and are appreciative of the support received.

Recommendations

- 8.5 The School should develop a closer relationship with the International Office, to make full use of its marketing supports for both MSc and BSc (occasional students). Targeted marketing should also be developed as appropriate to each degree programme.
- 8.6 The School should engage further with, and benefit from, the advantages of the UCD Research Repository.
- 8.7 The School should liaise with the Post-Award Research administrative team to explore ways of improving communication to facilitate the effectiveness of the post-award process for the School.
- 8.8 The School should liaise with the University Internship Manager and the UCD Career Development Centre to enhance career development guidance for its undergraduate

students. It was evident to the Review Group that industry partners were very keen to assist the School and opportunities for students to engage with such industry partners should be developed.

9. External Relations

- 9.1 The School has numerous long-standing relationships with external organisations in academia, industry and public agencies, cutting across geoscience disciplines and international boundaries.
- 9.2 As set out above, the School houses the Irish Centre for Research in Applied Geosciences (iCRAG), which is a major initiative by Science Foundation Ireland, the European Regional Development Fund and industry partners. The School has developed strong formal links with six third-level institutions across Ireland, and with a wide range of industry and state stakeholders, through this flagship research programme. Comprising 150 researchers, seven research institutions and collaborating with more than sixty industry partners, the impact of this on the School cannot be overstated, although its success brings problems of space and how best to manage a large influx of people at various research levels (see also section 3 above).
- 9.3 In addition, the School has very supportive links with industry across a range of sectors, especially petroleum, although it does not necessarily draw on this existing goodwill to its full potential, for example, in engineering geology.
- 9.4 The School uses its external contacts informally to inform course content and quality at both undergraduate and postgraduate levels.
- 9.5 The School is involved in Public Engagement at a variety of levels. There was considerable praise from research staff in iCRAG for the proactive programme of public engagement training.
- 9.6 Industry representatives that met with the Review Group commented that perhaps the degree programme (Undergraduate) was too academically focussed with insufficient linkage to employability. Feedback from industry noted that internships are often perceived as difficult due to associated costs and Health & Safety requirements. Industry representatives also reported that while many requests for placements are received, they are more typically from outside Ireland and that requests from UCD students are unusual. Fewer challenges were identified in respect of short-term work experience/placements, including shadowing.

Commendations

- 9.7 The School has strong external links, particularly in terms of research, and, up to the time of this review, has increased its international profile in master's teaching.

- 9.8 UCD leads iCrag, which is a phenomenal initiative in the fields of energy security, raw materials supply, groundwater protection, safeguarding the geomarine environment and protection from natural hazards.
- 9.9 Industry representatives who met with the Review Group were highly complimentary about the UCD SES graduates, and their research. They commented that they valued UCD SES in terms of both its research and teaching.
- 9.10 The industry representatives also commented that field training was excellent and should be retained.

Recommendations

- 9.11 The School should build on its industry links to the benefit of its staff and students, by engaging with industry leaders and graduates/alumni by, for example:
 - 9.11.1 Encouraging external mentoring for staff (academic and research) and PhD students.
 - 9.11.2 Inviting graduates, at different levels of seniority in industry, to be role models for undergraduates, postgraduates and research staff.
 - 9.11.3 Using novel approaches to get students to network with industry, for example, 'speed dating'.
 - 9.11.4 Developing joint seminars between academic staff and industry to share views on currently active topics.
 - 9.11.5 Establishing an industry advisory panel to provide input into the nature of the curriculum and how best to balance the demands of academic thoroughness and employability in a developing world.
 - 9.11.6 Considering how industry experts could contribute to the delivery of the curriculum, for example, in the fields of geotechnical engineering, hydrogeology, legislation surrounding the environment or resource exploitation.
 - 9.11.7 Exploring with industry how short-term work experience/placements (shadowing) could be established.
 - 9.11.8 Encouraging students to make use of the online tools at the Geological Society of London in respect of careers advice; this includes a list of companies that offer placements.
- 9.12 The School should develop Quaternary Geology at UCD and links with industry in this field should be developed with the aim of working together to emphasise the importance of Earth Science to society.

- 9.13 The School should extend the public engagement training to PhD, MSc and UG students; this could be centred around identifying how students could contribute through blogs and mini videos to improving public awareness and perception of UCD Earth Sciences which could aid recruitment of (UG and MSc) students.

UCD School of Earth Sciences – Full List of Commendations and Recommendations

This Appendix contains a full list of all commendations and recommendations made by the Review Group for the UCD School of Earth Sciences and should be read in conjunction with the specific chapter above. *(Please note that the paragraph references below refer to the relevant paragraphs in the report text).*

2. Organisation and Management

Commendations

- 2.6 The School has maintained its collegiality and mutual support during a period of significant change and expansion.
- 2.7 The School has managed to do this while absorbing the major iCrag research centre without losing its focus or established sense of itself
- 2.8 The approachability of all staff as individuals is a significant and commendable strength.
- 2.9 The School exudes a general sense of common purpose and appears to run quite smoothly.
- 2.10 Well-prepared SAR and efficient provision of additional information to the Review Group as required.

Recommendations

- 2.11 While the current informal approach to organisation and management has been effective to date, the Review Group recommends that the School review its network of formal structures and meetings. This should clearly address those entitled/expected to be present at the various meetings, which is a growing issue in the light of the changed School profile arising from the establishment of iCrag.
- 2.12 Consideration should be given to developing a smaller School Executive that is not effectively a meeting of the full academic staff but is representative of the School as a whole, including research staff and students as appropriate.
- 2.13 The School should formalise the recording of all School committee meetings.

3. Staff and Facilities

Commendations

- 3.10 The School has a strong and inclusive work ethic that permeates throughout all parts of Earth Science teaching, research and administration, including staff and students alike.
- 3.11 The academic, research, administrative and technical staff is hard-working and dedicated, demonstrating an exceptional commitment to both teaching and research.
- 3.12 Academic staff members are highly approachable, resulting in a strong collegiate atmosphere.
- 3.13 The incorporation of iCrag into SES has been remarkably successful.
- 3.14 The ongoing replacement of technical staff, supporting SES, NCIG and iCrag, has been excellent with an uplift in overall capabilities.
- 3.15 Continuity of academic and technical staff numbers despite the withdrawal of industry funding.
- 3.16 The successful award and recruitment of an SFI Professor.

Recommendations

- 3.17 The School should strategically plan to engage with University plans to appoint 100 additional academics across the institution in the next year (and up to 500 over the next 5 years); these appointments will be allocated to strategic areas of growth and opportunity.
- 3.18 The School, College and University need collectively and urgently to resolve the issue of refurbishment of Science West through an open dialogue, to provide an acceptable and fit-for-purpose environment for teaching and research, which should improve the student learning experience and, potentially, support increased recruitment of future students and staff to join SES. It is presently not fit-for-purpose and runs a high risk of damaging the School's international standing at a critical time of growth.
- 3.19 The Review Group urges that an appropriate group of senior UCD staff, including the Vice-President for Campus Development, the Director of Estates, and the College Principal meet with the newly reconstituted SES executive to find a solution that enables the University's refurbishment plans with regard to Science West to be implemented at the earliest opportunity.
- 3.20 The financial responsibility for the refurbishment has been extensively debated within UCD over several years and urgently needs to be resolved, once-and-for-all.

- 3.21 The teaching rooms should be refurbished in a way that maximises their versatility, including moveable tables, retractable computer screens and suitable storage facilities for earth science equipment and samples; this may require designation as a shared space with the versatility to enable both earth science and non-earth science teaching to be undertaken.
- 3.22 Although iCrag workspace is clean and modern, it is not fit-for-purpose. As part of the refurbishment plans for Science West, space allocation should include the co-location of SES and iCrag in order to maximise both the quality and effectiveness of the research work and to improve the working environment for all concerned. This co-relocation would mitigate any evolving separation of iCrag from SES (e.g. as the number of staff in iCrag grows), and thus avoid reducing UCD's longer-term earth science research and teaching effectiveness.
- 3.23 Providing suitable accommodation for the newly appointed SFI Professor and his research group (12-15 PhD students) is an urgent issue that needs to be resolved in the immediate-term.
- 3.24 The rock cutting and rock sample preparation area needs immediate attention, with an independent health and safety review recommended; the expectation should be more than the minimum health and safety requirement and a total refurbishment is probably necessary.
- 3.25 Older non-teaching laboratories and public spaces within SES would also benefit in the interim from a 'spring clean' and redecorating to improve the quality of the working environment for its users.
- 3.26 The large cohort of post-doctoral research staff is an underutilised resource that could be used more effectively in supporting the School's large teaching workload.
- 3.27 The large and relatively rapid increase in the research staff population, mainly in iCrag, requires the introduction of more formal procedures to maintain both good communication and the School's renowned collegiality.
- 3.28 The School should introduce a more formal induction procedure for new academic staff, support staff, research staff and research students.
- 3.29 A mentoring programme should be introduced for early-career staff.
- 3.30 The Review Group supports the School's ambition to diversify into other subject areas, especially Quaternary Geology and Geophysics/Remote Sensing.
- 3.31 The efforts to improve gender diversity must continue, including strong engagement with Athena SWAN. The School should engage with UCDHR in terms of maximising applications and recruitment from a diverse range of applicants.

4. Teaching, Learning, Assessment and Curriculum Review: BSc (Hons) Geology

Commendations

4.17 The geology programme at UCD is characterised by:

- Extremely high-quality teaching.
- Uniformly very enthusiastic and supportive staff.
- A strong sense of collegiality and teamwork.
- Very committed and hard-working staff.
- Excellent support staff.
- A highly intensive educational experience.
- Strong fieldwork component.
- A wide variety of assessment methods.
- An integrated and communal environment.

4.18 The School has taken the sensible initiative to explore new programmes with Geography.

4.19 Undergraduate and postgraduate taught course students were unanimously complimentary of the School and the care and attention given by staff to their academic and pastoral development.

Recommendations

4.20 The Undergraduate degree programme, from entry route to specialisation, is complex and difficult to follow for anyone who is not well-versed in UCD entry requirements – provision of additional information about how it works could address the issue of prospective geology students who find it off-putting and then select to apply to competitor institutions. It could be helpful to get present and recent former students to engage in discussions with prospective students.

4.21 An urgent review of the curriculum should be undertaken by the School. The focus should be on ensuring that the following aims are met:

- (i) first year modules (including the elective modules) should be sufficiently engaging and exciting to attract students to the geology degree stream. Students suggested further

integration of a new flagship fieldwork component, if possible. A top-down approach engaging students with the major issues of the day could also be considered.

- (ii) new concepts used by industry should be embedded into the curriculum at an early stage with opportunities at later years of the programme to further develop associated knowledge and skills.
 - (iii) the important components of delivery and assessment, and the integrity of the degree programme should be retained, while overall contact hours and workloads should be reduced, thus freeing up staff time for research.
- 4.22 As geology evolves as a subject it is impossible for an undergraduate degree to include everything and the degree should adapt to the changing needs of the world.
- 4.23 The School should create formal mechanisms whereby research staff can participate in teaching, providing career development opportunities for staff and easing the teaching workloads of academic staff.
- 4.24 The School needs to investigate how it can mitigate the impact of the 6-week mapping project on students while retaining its academic integrity. Absorption into the teaching terms, reduced duration or division over two summers are examples of solutions that might be considered.
- 4.25 The School, together with relevant UCD units, must find an urgent and satisfactory solution to the entry requirements issue that adversely affects recruitment of students to the School. This should address the need to provide alternative/additional entry routes that include not only mathematics/physical sciences, but also chemistry/biology. In addition students often become interested in geology through physical geography at pre-university level, so formal links with geography should be strengthened. The financial model is based on an internal market of student numbers but should not be a hindrance to these discussions, and compromise may be necessary.
- 4.26 Students entering through common entry need appropriate information to make decisions. For many students the subjects being offered at UCD (e.g. geology) are unknown quantities and current mechanisms for informing students on arrival prior to making selections seem to be ineffective for geology. The School should focus on how they can promote their discipline.
- 4.27 The School should continue to explore options with other Schools to develop programmes with geology components.
- 4.28 The School should develop a bespoke geoscience career support programme for students involving external speakers. Role models, drawn from successful career graduates, should form a central component taking into account the principles of equality and diversity, for example as expressed through the Athena SWAN charter.

- 4.29 While communication was generally excellent, the School should discuss with current students where communication appears to have broken down, for example, fieldwork dates and accessing coursework component marks.
- 4.30 The inclusion of Quaternary Geology in the curriculum offers an opportunity to develop a holistic approach to geoscience and should include applied aspects such as geotechnical engineering, hydrogeology and aggregates.
- 4.31 The School should develop a focussed student recruitment programme directed at second-level schools to better explain the nature of the subject plus the entry and progression requirements. This could initially be based on data held by UCD as to where previous graduates have been drawn from. The use of successful career graduates through short videos could be particularly aspirational, whether on the web or through school visits.
- 4.32 External experts could be used more to the advantage of the School and, especially, to inspire students and researchers in their career development (see 4.28 above).
- 4.33 Involvement of non-academic staff (e.g. PhD students, research staff and external contributors) should be formalised and, particularly where they are involved in assessment, appropriate training and monitoring should be a mandatory requirement.
- 4.34 The development of new modules and/or minor degrees with cognate disciplines is most welcome but the School should be cautious that these and further developments yield significant (financial) returns so as to benefit the School as a whole and do not simply stretch the staff further.
- 4.35 If undergraduate recruitment improves significantly the introduction of a student/staff forum may be something that requires more formal consideration.

5. Teaching, Learning, Assessment and Curriculum Review: MSc Petroleum Geoscience

Commendations

- 5.6 As is the case for the undergraduate programme, the MSc programme at UCD is characterised by:
- Extremely high-quality teaching
 - Uniformly very enthusiastic and supportive staff.
 - A strong sense of collegiality and teamwork.
 - Very committed and hard-working staff.

- Excellent support staff.
- A highly intensive educational experience.
- Strong fieldwork components.
- A wide variety of assessment methods.
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Recommendations

- 5.7 An urgent review of the curriculum and the market would be timely to explore whether a parallel MSc focussed on sustainable subsurface exploration and management could be introduced without the major petroleum component or title to attract a different group of students simultaneously.
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- 6.8 The high quality and high volume of research output, manifested by the rising trends for all research metrics.
- 6.9 The hard work and dedication of academic staff in maintaining their research active profiles, despite their large teaching workloads and increasing administrative demands.
- 6.10 The success in securing new research funds through a diverse array of funding opportunities, which is despite a reduction in national funding opportunities.
- 6.11 Maintaining the cohesion of earth science research in UCD, despite the physical separation between the SES and iCRAG.
- 6.12 The strong outward-looking research culture, which has strengthened the depth and breadth of research output and provides a sound platform for sustained growth.
- 6.13 The successful appointment of a new SFI-sponsored chair, which will further extend the School's research profile.
- 6.14 The Review Group noted the inclusion of post-doctoral researchers to plenary and other School meetings, allowing them to participate in broader academic discussions and integrate with the School body.

Recommendations

- 6.14 The Review Group supports the aspiration for financially sustainable research growth, including increases in full-time academic staff, in order to fulfil its ambitious research targets.
- 6.15 The School should articulate a clearer research strategy that takes into account the significance of the iCRAG development in UCD.
- 6.16 iCRAG could be used as a vehicle for sharing UCD's expertise throughout the national earth science community.
- 6.17 The Review Group recommends that UCD review the proportion of overhead income that is returned to research groups, and consider providing a substantial increase on the present 10% figure to stimulate further research and development.

- 6.18 The School should explore ways to reduce teaching and administrative workloads for early career academics, especially those on fixed-term contracts, to assist them to maximise their early research development.
- 6.19 The rapid increase in staff in SES/iCrag requires a more formal approach to communication in order to maintain inclusivity and collegiality that has thus far been a proud hallmark of the School.
- 6.20 The collegiate nature of the SES and iCrag is being threatened by the two separate locations and the physical merging of the two entities is strongly recommended.
- 6.21 The Review Group notes that academic leadership is shared widely among all academic staff and recommends that a more focused approach is considered.
- 6.22 The Review Group recommends that the School consider ways to increase the amount of quality research time by, for example, reducing administrative workloads, possibly by appointing additional administrative staff.
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7. Management of Quality and Enhancement

Commendations

- 7.3 The External Examiner reports in the past five years have been overall very positive about the undergraduate BSc in Geology and the MSc Petroleum Science.
- 7.4 Student feedback by module is very good with an overall upward trajectory over recent years.
- 7.5 Students feel academic and administrative staff are very approachable and helpful always.
- 7.6 Through iCrag research staff receive media training and both research staff and PhDs can avail of public engagement opportunities.

Recommendations

- 7.7 The School should ensure that PhD students understand the Research and Professional Development Plan (RPDP) process, which is an important component of student development. Equally, the requirement for, and benefit that can accrue from, a well-appointed Doctoral Studies Panel (DSP) should be stressed. There should be more focus on the formal UCD PhD procedures to ensure students have a clear understanding of the role of the DSP and the stage

transfer assessment, and all PhD students should have a DSP meeting within 3 months of registration.

- 7.8 The need for increased formal training of PhD demonstrators was highlighted in focus groups and in the Review Group meeting with postgraduate students. The School should liaise with UCD Teaching & Learning to explore potential models of engagement of postgraduate students in teaching such as the introduction of credit-bearing Graduate Teaching Assistant modules.
- 7.9 Currently post-doctoral researchers are not engaged in any teaching in the School. In most cases, they are keen to develop their teaching expertise. The Review Group recommends that the provision of lecturing and tutorial delivery opportunities should be an integral part of post-doctoral researchers' personal development within the School.
- 7.10 A formal mentoring programme should be established in the School for early career staff (temporary and permanent) and post-doctoral researchers.

8. Support Services

Commendations

- 8.2 The School has in-house IT specialists.
- 8.3 The Library supports to the School are good, including spending on new e-books when requested and contributing to a module (SCI10010 Principles of Scientific Enquiry) and Library orientation for students.
- 8.4 The School has an excellent working relationship with the Pre-Award Research administrative team and are appreciative of the support received.

Recommendations

- 8.5 The School should develop a closer relationship with the International Office, to make full use of its marketing supports for both MSc and BSc (occasional students). Targeted marketing should also be developed as appropriate to each degree programme.
- 8.6 The School should engage further with, and benefit from, the advantages of the UCD Research Repository.
- 8.7 The School should liaise with the Post-Award Research administrative team to explore ways of improving communication to facilitate the effectiveness of the post-award process for the School.

- 8.8 The School should liaise with the University Internship Manager and the UCD Career Development Centre to enhance career development guidance for its undergraduate students. It was evident to the Review Group that industry partners were very keen to assist the School and opportunities for students to engage with such industry partners should be developed.

9. External Relations

Commendations

- 9.7 The School has strong external links, particularly in terms of research, and, up to the time of this review, has increased its international profile in master's teaching.
- 9.8 UCD leads iCrag, which is a phenomenal initiative in the fields of energy security, raw materials supply, groundwater protection, safeguarding the geomarine environment and protection from natural hazards.
- 9.9 Industry representatives who met with the Review Group were highly complimentary about the UCD SES graduates, and their research. They commented that they valued UCD SES in terms of both its research and teaching.
- 9.10 The industry representatives also commented that field training was excellent and should be retained.

Recommendations

- 9.11 The School should build on its industry links to the benefit of its staff and students, by engaging with industry leaders and graduates/alumni by, for example:
- 9.11.1 Encouraging external mentoring for staff (academic and research) and PhD students.
 - 9.11.2 Inviting graduates, at different levels of seniority in industry, to be role models for undergraduates, postgraduates and research staff.
 - 9.11.3 Using novel approaches to get students to network with industry, for example, 'speed dating'.
 - 9.11.4 Developing joint seminars between academic staff and industry to share views on currently active topics.
 - 9.11.5 Establishing an industry advisory panel to provide input into the nature of the curriculum and how best to balance the demands of academic thoroughness and employability in a developing world.

- 9.11.6 Considering how industry experts could contribute to the delivery of the curriculum, for example, in the fields of geotechnical engineering, hydrogeology, legislation surrounding the environment or resource exploitation.
 - 9.11.7 Exploring with industry how short-term work experience/placements (shadowing) could be established.
 - 9.11.8 Encouraging students to make use of the online tools at the Geological Society of London in respect of careers advice; this includes a list of companies that offer placements.
- 9.12 The School should develop Quaternary Geology at UCD and links with industry in this field should be developed with the aim of working together to emphasise the importance of Earth Science to society.
- 9.13 The School should extend the public engagement training to PhD, MSc and UG students; this could be centred around identifying how students could contribute through blogs and mini videos to improving public awareness and perception of UCD Earth Sciences which could aid recruitment of (UG and MSc) students.

UCD School of Earth Sciences – Response to the Review Group Report

The School would like to thank Professors O’Sullivan (Chair), Fitzpatrick, Johnson and Lovell for their extensive efforts both during the site visit and in preparing the draft review report. We would also like to acknowledge the excellent assistance provided to the School by the Quality Office, in particular Ms Elaine Hickey and Ms Bronwyn Molony.

2. SCHOOL’S RESPONSE TO KEY FINDINGS

The School is pleased by the extremely positive tone of the Quality Review Report as regards all of its core activities. It is gratifying to read of the “strong collegial ethos in the School” (2.1); that the faculty, staff, research staff and postgraduate (PhD MSc) student body are “hard-working and dedicated” with “exceptional commitment to both teaching and research”, “producing high quality research, exceeding that of comparable sized national and international institutions”; that taught course students were “unanimously complimentary of the School and the care and attention given by staff to their academic and pastoral development”; and, that the “approachability of all staff as individuals is a significant and commendable strength” (2.8).

There are five recommendations in the section “Key Findings of the Review Group”, the first four of which relate to Accommodation and Infrastructure (see also Recommendations 3.18 – 3.25), and the last to School Administrative structure (see also Recommendations 2.11 – 2.13). We address each of these below.

Accommodation and Infrastructure

This Review Group concluded that the School’s infrastructure is “not fit for purpose” (p.3).

- (1) This review group flagged that the condition of the rock cutting and rock sample preparation area, an essential technical platform, “may be sub-marginal from a health and safety perspective and this should be independently assessed at the earliest opportunity” (statement 3.7). Via safety audits arranged by the School Safety Committee we have been progressing this in 2018/19, but would welcome the University investigating this further and completing any remediation required.
- (2) The Review Group comments favourably on the quality of the iCrag space in Science East, but notes that it was not designed for various activities such as meetings/video-conferencing and thus can be a noisy working environment; it also lacks sample storage (3.8; 6.5).
- (3) The Review Group refer to the general dilapidated and outdated appearance of Science West (3.9). This includes most staff offices, but the priority as regards refurbishment should be the teaching laboratories: “old, inflexible and are, overall, not fit-for-purpose” and research space (3.9). We agree that this poses a threat to recruitment and retention of both students and staff, and clearly has a negative impact on the School’s international standing at a critical time of growth (3.18).

The School welcomes the recently initiated Phase III O’Brien Science Centre Refurbishment programme. It will engage fully with this to deliver expanded, purpose-built, state of the art teaching and research facilities for the School of Earth Sciences. The School will engage comprehensively and

early in the process with the design of the research facilities as it is imperative the final designs are optimal for the very specific requirements of the School's instrumentation platforms. We also anticipate that, as advocated by the Review Group, this refurbishment will co-locate the School's activities currently dispersed between Science East (what the report refers to as iCrag) and Science West (6.20).

We'd also like to acknowledge improvements since the Quality Review that have been supported by UCD. The Minor Works programme and the School co-funded (50% each) refurbishment of a teaching laboratory in summer 2018.

Pending the Science Phase III programme, there are a number of modest, but crucial, improvements that could be made to address the issues raised by the Quality Review.

- (a) provide visually attractive, portable, shelved storage cabinets to house teaching and research materials required regularly, to eliminate the requirement for storage of these in offices, the iCrag open plan area and the instrumentation suites.
- (b) provide the monies for portable benching in a small research laboratory and replacement of two small fumehoods (one of which is non-functioning and the other barely so). These are infrastructure linked to a recent staff appointment that it is important we deliver.
- (c) commit to the general spring clean and redecorating of the School advocated in 3.25.

When the School is decanted to temporary accommodation in advance of the refurbishment of Science West, the infrastructure provided must allow our teaching and research activities to continue – hence the emphasis in the list above on portable items (storage cabinets, tables, chairs etc) that can be incorporated into that temporary accommodation - and then back into Science West when refurbished.

School Administrative Structure

In its key findings the Quality Review Report invited the School to consider two aspects.

The first is “address those entitled/expected to be present at the various meetings”. The only cohorts not represented on the School's Executive Committee are the Research Staff, PhD/MSc students, and undergraduates. Of these only the latter are not (as of now) invited to the Plenary Meetings.

The second suggestion is that the School “review its network of formal structures and meetings”.

As the Review Group notes that “The School exudes a general sense of common purpose and appears to run quite smoothly” (2.9), “a spirit of unity and is reflected in a consensual approach to decision-making” (2.1) and “the current informal approach to organisation and management has been effective to date” (2.11), wholesale change to existing procedures is clearly not being advocated.

A sense of what is being suggested is given by:

- 2.5. “interviews with various cohorts not represented on the School Executive revealed gaps that tend not to occur in circumstances involving a more formal network of meetings”;
- 2.12. “Consideration should be given to developing a smaller School Executive ... that includes research staff and students as appropriate”.
- 3.27. “The large and relatively rapid increase in the research staff population, mainly in iCrag, requires the introduction of more formal procedures to maintain both good communication and the School's renowned collegiality.”

The idea of a more formalised committee structure has merit, is under discussion, and will be considered fully as part of the QIP following on from the review.

For now we note that the most abbreviated School Executive (SE) would require, at a minimum, participation of at least 50% of the faculty (Head of School, Deputy Head of School, Head of Research, Head of Teaching and Learning, Head of Subject, Programme Director and Admissions Officer for any MSc programme etc.) We would also wish to retain representatives from staff.

Most of the School's administrative positions are deliberately filled by faculty from the 50-65 age group as opposed to the 30-45 group (3.2). This is one of the few mechanisms the School has available "to reduce teaching and administrative workloads for early career academics, especially those on fixed-term contracts, to assist them to maximise their early research development" (6.18). Downsizing the SE would preferentially exclude younger/more recently appointed faculty. This could seriously undermine communication within the School, reduce the transparency and collectivity of decision making, and impact on our esprit de corps.

The sense we have from the Report is that the priority is to find a mechanism to capture the opinions of the 3 cohorts not represented on the SEC (research staff; postgraduate students; undergraduate students). They clearly wish to input more into the management of the School, a sentiment we welcome and will accommodate. We note the first two of these are already entitled to attend plenary meetings. How to increase the effectiveness of the plenary meeting, and if other committee structures would be useful, will be discussion for, and incorporated into, the QIP.

Elective Modules

4.7 'Anecdotal evidence suggested that some of the elective modules taken by large numbers of students, who did not go on to study geology, were considered easy options where students could pass, and that the modules were not sufficiently dynamic to encourage students to pursue a degree in geology.'

We acknowledge that the Review Group refer to this as anecdotal evidence. Nonetheless, some clarifications by us might be useful. Most students taking these Level 1 modules are 2nd-4th years (whether Science or non-Science) and cannot take a degree in Geology. As to their being "Easy options": for 1st year Science students the grade distribution profile matches well that of other 1st year Science modules. "Not sufficiently dynamic": our opinion would be that this isn't supported by the consistently very positive feedback for these modules (section 7.1.4: Figure 7.2).

The reason students do not pursue a degree in Geology is not the quality of the modules available in their first year of DN200. We suspect the reasons are varied, as discussed in Appendix 10.1 (School of Earth Sciences Self-assessment Report). Key reasons are: all competing universities (TCD NUI,G, UCC) offer some form of denominated degree, and most exploit the link between geology and geography enshrined in the Leaving Cert (e.g. Geography and Geoscience: CAO code TR062 at TCD). The structure of DN200 in 1st, and especially, 2nd year makes selecting Geology as a degree difficult.



UCD School of Earth Sciences

Quality Review Site Visit -23-26 April 2018

TIMETABLE

MONDAY 23rd April 2018 Pre-Visit Briefing Prior to Site Visit

- 17.00-19.00 RG meet in hotel to review preliminary issues and to confirm work schedule and assignment of tasks for the site visit – RG and UCD Quality Office only
- 19.30 Dinner for the RG hosted by UCD Registrar and Deputy President – RG, UCD Deputy President and UCDQO only

TUESDAY 24th April 2018 Day 1

Venue: H1.47 Science Hub

- 08.45-09.00 Private meeting of Review Group (RG)
- 09.00-09.45 RG meet with UCD College of Science Principal and Dean of Science
- 09.45-10.15 Break – RG review key observations
- 10.15 –11.15 RG meet with Head of School and members of senior staff
- 11.15 – 11.30 Tea/coffee break
- 11.30 – 12.15 RG meet with group of current 3rd and 4th year undergraduates
- 12.15-12.45 Break – RG review key observations and prepare for lunch time meeting
- 12.45-13.45 Working lunch with employers and external stakeholders
- 13.45-14.15 RG review key observations
- 14.15-15.15 RG meet with representative group of academic staff – primary focus on Teaching and Learning, and Curriculum issues.

15.15-15.30	RG tea/coffee break – review observations
15.30-16.15	RG meet with support staff representatives
16.15-16.30	Break - RG review observations
16.30-17.15	RG meet UCD Programme Dean
17.15-17.30	Break - RG review observations
17.30-18.30	Tour of facilities
18.45	RG depart

WEDNESDAY 25th April 2018 Day 2

Venue: H1.47 Science Hub

08.45-09.15	Private meeting of the RG
09.15-10.00	RG meet relevant University support service representatives
10.00-10.15	Break - RG review observations
10.15-11.15	RG meet with the School Academic Staff – primary focus on research activities
11.15-11.30	RG tea/coffee break and review observations
11.30-12.15	RG meet with representative group of Research Staff
12.15-12.45	Break - RG review key observations
12.45-13.30	Working lunch - RG meet with a representative group of postgraduate students (taught and research) including graduates of the BSc and MSc programmes
13.30-14.15	Private meeting – Review Group only
14.15-15.00	RG meeting with College HR Partner, Head of School and School Administrator
15.00-15.15	Break - RG review observations
15.15-16.15	RG meet with recently appointed and non-permanent members of academic staff
16.15-16.30	Break - RG review observations
16.30-17.15	RG available for private individual meetings with staff and postgraduate students

17.15-18.00 RG private meeting – review key observations/findings

18.00 RG depart

THURSDAY 26th April 2018 Day 3

Venue: H1.47 Science Hub

09.00-09.30 Private meeting of RG

09.30-10.30 (Optional) RG meet with Head of School and/or specified University staff to clarify any outstanding issues or begin preparing draft RG Report

10.30-10.45 Break

10.45-11.15 RG meeting with College Director of Financial Planning & Strategy, Head of School and School Administrator

11.15-11.30 Break

11.30-12.30 RG continue preparing draft RG Report

12.30-13.15 Lunch – RG only

13.15-15.15 RG finalise first draft of RG Report and feedback commendations/recommendations

15.15-15.30 RG meet with College Principal to feedback initial outline commendations and recommendations

15.30-15.45 Break

15.45-16.00 RG meet with Head of School to feedback initial outline commendations and recommendations

16.10-16.15 RG move to G01 Earth Sciences

16.15 G01 Earth Sciences - Exit presentation to all available staff of the unit summarising the principal commendations/recommendations of the Review Group

16.45 Review Group depart