University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

Fheabhsú Cáilíochta
Quality Enhancement

Quality Enhancement Plan

School of Chemistry

March 2019

FOR COMPLETION BY QEU
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Health and Safety		
1	The Panel strongly believes that the current state of some of the teaching labs in the Kane Building has severe implications on the Health & Safety of anyone entering the labs, as well as on the student experience, and brings a significant risk to student recruitment and income generation. These facilities are wholly inadequate in terms of fabric of building and fixtures and fittings. It is the Panel's strong view that the entire future of the Department is at risk in terms of H&S, student experience, reputation, recruitment and income generation, without a very significant upgrading and modernisation of facilities.	We agree with the panel's view on the poor condition of the teaching labs in the Kane Building and the urgent need to upgrade and modernise the facilities. Since the review the School has undertaken the following: i) Engaged with the Head of SEFS, Buildings & Estates and senior management in UCC to prioritise the refurbishment of the Chemistry teaching labs as a matter of urgency. ii) Submitted an ambitious 3 phase refurbishment plan to the Head of SEFS and Buildings & Estates for consideration. iii) Worked with SEFS and Buildings & Estates to select a design team tasked with drawing up plans for the refurbishment of the Kane Building and in particular the Chemistry teaching labs. Funding of between €4-5M

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		has been ring-fenced by Buildings & Estates to begin refurbishment of the Kane building, with a significant amount being used to make the teaching labs safe. Work on the first stage of refurbishment is anticipated to start in summer 2018. The budget required to completely refurbish the Kane Building is estimated to be >€30 M, with a large portion of that funding needed for lab and office refurbishment in Chemistry. The Head of School and the School Executive Team (EAT) will undertake the following actions over the next 2-3 years to help fund the refurbishment of the School: i) Develop a detailed refurbishment proposal in collaboration with Buildings & Estates and the Head of SEFS for submission to relevant infrastructure calls, *e.g.* HEA PRTLI. ii) Work with the Head of SEFS, Building & Estates and the Development and Alumni Office to put together a business plan for bringing in external funding, *e.g*. bank loans, donations from local industries *etc*., for urgently required modernisation of the School of Chemistry's infrastructure. The Head of School has already initiated discussions with Mr Rob Donelson, the new Executive Director in the Development & Alumni Relations Office at UCC.
2	Some of the necessary renovation and modernisation to meet H&S requirements would benefit from a more constructive approach from the UCC H&S Office that would allow the implementation of solutions that are widely used to meet requirements of H&S regulations in this jurisdiction and elsewhere. The Panel recommends that a review is undertaken by an external expert consultant and is supported by appropriate benchmarking visits to other institutions. Consideration could be given to combined laboratories that could meet the needs of more than just Chemistry in the Kane Building. A potential solution might be to consider creating different types of labs – dedicated synthesis labs and labs that can be used for more than one discipline. Whilst we recognise the significant funding implications, creative solutions need to be found by the University working with the	Since the review, the Head of School and Chair of the School Safety Advisory Committee (Dr Ger McGlacken) met with the Corporate Secretary, Ms Nora Geary, on Health & Safety matters in the School and what constructive approaches can be provided by the Health & Safety Office at UCC to meet our needs. An assessment of the School's undergraduate synthetic labs (organic teaching) was undertaken by CMSE Consultancy in August 2017. The Head of Chemistry also visited the teaching laboratories in the School of Chemistry at UCD as part of a benchmarking process. Chemistry is currently in the process of engaging with Buildings & Estates and the Kane Refurbishment design team to develop creative ideas for the existing teaching labs and support infrastructure. The design team are

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	Department and the College such as dedicated bank loans, industry, philanthropy, alumni fundraising, industrial development agencies, etc.	tasked with putting together a detailed refurbishment plan for the Kane Building over the next 5 years, assuming that the necessary funding can be acquired. As mentioned above, the School is already engaging with the Head of SEFS and the Development & Alumni Relations Office at UCC to progress creative solutions for funding the refurbishment of the School.
3	The Panel was also made aware of existing money and proposals being made to external funding sources and would strongly recommend that the priority for use of these funds is given to H&S and teaching and learning over external appearance and features of the building.	As mentioned above, €4-5M has been allocated for phase 1 of the Kane refurbishment in 2018. Buildings & Estates have acknowledged that the priority for this funding is the teaching labs and associated facilities within Chemistry and Physics.
4	The Panel recommends the establishment of School Safety Officer to report to the School Safety Committee with representation across the School. The Panel feels this is important to ensure that the profile of H&S is increased, including training and monitoring of H&S through risk assessments, regular inspections, monitoring etc. The Panel is concerned that some of these activities are inadequate at present; the Panel observed that the fume hoods both in number and type are inadequate, there was also a solvent smell in the laboratory. Establishing safe working practices is a key requirement in Chemistry, and not just in relation to the fabric of the building. It is essential that the School Safety Committee interfaces effectively with the University Safety Office.	Within the new School of Chemistry structure the Safety Advisory Committee comprises of at least one member of academic staff from each discipline (Organic & Pharmaceutical, Physical, Inorganic and Analytical), one Administrative Executive and at least one Technical Officer. The committee assists the School in all matters relating to Safety and liaises with the University, College and School on safety matters. The assignment of a School Safety Officer within Chemistry has been discussed with the Head of SEFS and the SEFS College Manager, however there is no budget, at least in the short to mid-term, to finance such a position. The Head of Chemistry has also discussed the idea of having a dedicated Safety Officer within Chemistry, or even within SEFS, with UCC's Corporate Secretary. The Head of Chemistry will continue to work with SEFS and the Corporate Secretary to identify opportunities for recruiting dedicated Health & Safety personnel. The new Chief Technical Officer to be appointed in Chemistry in 2018 will also play a key role in championing best Health and Safety practices throughout the School. Since the panel visit, the following Health & Safety changes have been made within the School: i) The School has engaged with external safety consultants (CMSE Consultants) to evaluate the safety of the undergraduate synthetic labs (organic) in the Kane Building (August 2017) and on the best

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		practice/process for handling solvents within the School (December 2017). Changes to H&S procedures have been made based on the CMSE reports, including the purchase of new equipment. The School plans on purchasing new personal respiratory protection equipment for handling bulk solvents in 2018, in line with recommendations made in the CMSE report. ii) Risk assessments were updated on-line for all Chemistry teaching and research labs in the Kane Building in July 2017. As a result of these assessments and the external safety reports from CMSE, a number of experiments in the teaching laboratories were either modified or removed from the undergraduate curriculum (which affects the student experience and threatens the accreditation of our Chemistry degrees). The reinstatement of some of these practicals is reliant on improved ventilation being installed in the labs as part of the refurbishment plan. iii) B&Es were supplied with a list of items in June 2017 requiring immediate attention, *e.g.* replacement of water and gas taps, installing window blinds *etc*. This work is still on-going. iv) The School has recently received funding to purchase new equipment for the undergraduate synthetic teaching labs. This equipment will minimise fire risk in the labs and also help to reduce the amount of solvent vapour present in the undergraduate teaching labs. This new equipment should be in place by summer 2018. New fire safety cabinets will also be purchased for teaching and research labs within the Kane Building. Installation of these cabinets is expected to be completed by summer 2018. v) The School received funding from SEFS to dispose of unwanted chemicals, most of which were legacy chemicals from the last 40+ years. In January 2018 over 2,500 unwanted chemicals and waste solvents were removed from the Kane Building and the acid store for destruction by an external company. There are a few samples which need further testing before they can be removed. This process should be completed by summer 2018.

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		vi) The School is in the process of purchasing chemical inventory software for use in all of the Chemistry teaching and research labs in the Kane building, allowing the creation of a chemical database within the School and better management of chemical disposal. We anticipate that the roll out of this software within the School will be complete by autumn 2018. vii) A number of staff have received first aid and fire safety training since the review. An external consultant was hired to provide fire safety training to 10 Chemistry postgraduate students/demonstrators. We hope to expand this training to other postgraduate students on a yearly basis, depending on financial budgets. A number of senior Chemistry staff also attended a training course on managing Health & Safety within the workplace in autumn 2017. viii) The Head of Chemistry has initiated discussions with the SEFS College Manager to develop a SEFS wide safety module for all postgraduate students. Discussions with SEFS and the Corporate Secretary to make on-line training modules available to postgraduate students are currently on going. ix) New safety posters have been placed outside each teaching lab in Chemistry, highlighting the chemical hazards and safety rules associated with each laboratory. x) The School intends to create safety web- pages on its web-site in 2018. These pages will provide all of the Health & Safety information required by staff and students working in the School.
Business plan		
5	The Department should develop a five-year business plan by working proactively with the College and the University Finance and Development Offices. The Department should utilise expertise from other areas in the University to develop this plan	As mentioned above, the Head of School is currently engaging with the Head of SEFS and the Executive Director in the Development & Alumni Relations Office at UCC to develop a business plan for modernising Chemistry's infrastructure in the Kane Building and generate additional income to recruit new staff into the School.

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6	Replacements of senior staff will require clear business planning to develop pathways for the future; the need for additional staff has to be considered in the context of ensuring delivery of School goals, with clear criteria in the job specification to ensure delivery of the core Chemistry within the taught programmes, but not ending up with sub-disciplinary silos. Specifically, the Panel recommend a move away from just appointing to Inorganic, Organic and Physical sub- sections.	The School of Chemistry is committed to leadership in Analytical, Inorganic, Organic, Pharmaceutical and Physical Chemistry. International experience has demonstrated that it is critical for teaching quality and external research credibility that each of these sub-disciplines of Chemistry is led by Chaired Professors. Appointing high-calibre Chairs to act as Heads of Discipline is essential to remain academically renowned and internationally competitive. Currently the School does not have Chaired Professors in Inorganic, Organic and Physical Chemistry. The Chair in Analytical Chemistry will also become vacant in 2019. On balance, the School did appoint Chaired Professors in Materials Chemistry and Nanochemistry in 2008 and 2012 respectively. Subsequent to the panel review, Chemistry submitted a 5 year staffing plan, which included the recruitment of non-traditional positions, *e.g.* a Professor in Sustainable Materials, to the Head of SEFS. Whilst the 5 year plan was approved by SEFS new staff members can only be recruited on a cost-neutral basis, *i.e.* due to retirements or the generation of an additional income source. Identifying additional income sources for staff recruitment will form part of the School's business/recruitment plan. The poor quality of the infrastructure in the Kane building will have a major impact in our ability to recruit talent into the School, particularly ERC or funded cost-neutral positions from places that are well funded with world-class infrastructure *etc*. There is a disconnect between where the School wants to be, in terms of staff profile and Professorial leadership, and the quality of workplace environment that can be offered within the School.
Resources – staffing and equipment		
7	In order for the Department to meet its aims and objectives, appropriate administrative supports need to be in place. Interactions with the College as well as internal focus on income generation should be considered to help support the structures required.	The Head of School will work with SEFS and the Development & Alumni Relations Office at UCC to develop a business plan to address the lack of institutional funding. A particular opportunity exists to appoint an 'Industrial Services Manager' to manage and expand the analytical services offered to industry by the School.

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8	The Panel also recognises the need for a Chief TO role and senior academic appointments as outlined previously.	A job description for a Chief Technical Officer (CTO) was approved by the Department of Human Resources in December 2017. The appointment of a CTO in Chemistry should happen in the first quarter of 2018.
9	There is a significant need to replace aging and outdated equipment with dedicated modern equipment for teaching, with appropriate maintenance contracts and technical support.	As mentioned above, the School recently received funding to purchase new equipment for the undergraduate synthetic teaching labs to minimise fire risk and reduce the amount of solvent vapour present in the lab environment. This new equipment should be in place by summer 2018. Additionally, electrical PAT testing of existing equipment in the teaching labs has revealed that a significant number of items need replacing, especially as many are greater than 20 years old and do not meet current electrical safety standards. The Head of Chemistry is currently in discussion with SEFS to identify opportunities to fund the new equipment required. The economic climate over the last 10 years has meant that a number of technical staff who retired during this period were not replaced. Hence, the School does not currently have the human resources required to maintain all of the equipment within the School. As part of the business plan, income sources to fund service contracts and hire additional support staff will be explored.
Reduction in teaching and assessment		
10	A critical review of hours delivered versus credits should be carried out (explicitly to reduce contact in those modules which exceed the University norm for lecture load for 5 credit modules) and mechanisms put in place to avoid future proliferation and ensure teachers work within an envelope and are effective. This needs to be addressed effectively and robustly to improve the student experience and create time for staff to pursue the other recommendations, as well as their research. Suggestions from staff and students we interviewed include: o Introducing directed reading tasks; o Streamlining continuous assessment to avoid congestion;	A critical and comprehensive review of all teaching modules was undertaken from Feb to May 2017. From the 2017/18 academic year the direct contact hours (lectures, workshops, tutorials) on all Chemistry 5 credit undergraduate modules were reduced to 24 hours per module (from 30 to 36 hours previously) in line with other units within SEFS. Contact hours for all Chemistry 10 credits undergraduate modules were reduced to 48 hours (from as high as 72 hours previously). 'Directed study' has been introduced for all modules (up to 6 hours per 5 credit module). This is reflected in 39 Book of Modules changes for the 2018/19 academic year. From the 2017/2018 academic year profiling of continuous assessment and directed study has been introduced by the School Teaching & Learning Committee to avoid overloading the students with work during the

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	o Consider reducing the new material covered in the final teaching week of each semester (use this for revision classes, etc.).	semester. With the reduction in direct contact hours in the 2017/2018 academic year, Chemistry lectures are no longer given in the final week of the first semester (post first year), providing the undergraduate students with extra time to prepare for exams.
Curriculum reform		
11	There is an opportunity to rebrand and rationalise programmes and modules. In particular, the Panel recommends that the Chemistry with Forensic Science programme is reviewed to determine whether it meets the needs of potential employers, or whether rebranding of this as a UG programme in Analytical Chemistry might better meet current demands of students and employers.	Changes to the Chemistry with Forensics undergraduate programme were made shortly after the review, in time for the start of the 2017/18 academic year. In particular, progress was made in Autumn 2017 towards the accreditation of the course by the Royal Society of Chemistry. The programme will be reviewed again upon retirement of the current Chair in Analytical Chemistry and the recruitment of a new Professor in this area, probably not before 2020.
12	The Chemical Physics programme, although of very high quality, attracts only a very small cohort of students; the Panel recommends that rebranding is considered (including changing this programme title, if appropriate).	Discussions to potentially rebrand the current Chemical Physics degree will take place with staff from the Department of Physics in 2018. This will be done as part of a recruitment strategy for the course.
13	A review of the MSc Analytical programme is recommended, in order to service students appropriately who don't have a strong chemistry background, but also enable the development of an advanced analytical programme for those who have the appropriate prerequisites. The inclusion of options that allow a student to better align the programme with their previous experience and expertise is recommended. The increase in numbers on the MSc programme means that it also needs more structure.	The MSc Analytical programmes have undergone significant revision over the past 5 years under the guidance of the MSc Industry Advisory Board, that was established to bring the course more in-line with industry needs. In addition, a review of the programmes was undertaken at the end of 2017 as part of an application for RSC accreditation (submitted February 2018). The Head of School and the Director of the MSc Analytical programme have recently engaged (since Summer 2017) with local industries that form part of the South West Regional Skills Forum Pharma/Biopharma Industry Group. One aim of these meetings is to identify key industry requirements/skills that could be taught as part of UCC Chemistry's undergraduate and postgraduate programmes. In 2018/19 industry relevant modules and short

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		courses will be identified for the Analytical MSc programmes to provide students will more choice and opportunities for upskilling.
14	Internationalisation opportunities could be enhanced, for example, by examining the extent and nature of prerequisites for modules. The opportunities for collaborative programmes with international partners should be explored urgently.	Module prerequisites only apply to UCC students. International students are evaluated on a case-by-case basis and their suitability for a particular course depends on their academic background. The immediate priority of the School is to improve its research standing. The appointment of a team within the School to develop an internationalisation strategy is only possible with an increase in academic and support staff numbers. The School currently has a representative on the SEFS internationalisation panel, which is an appropriate forum for wider strategic engagement.
15	The Department should take the opportunity to identify and review high impact experiences such as projects, placements and skills units and where appropriate ensure these are shared across all programmes.	Given limited resources and the different academic requirements of the various undergraduate Chemistry programmes within the School, sharing high impact experiences across all programmes is challenging. However, in the 2017/18 academic year a number of final year CPC undergraduate chemistry projects were undertaken in industry. Additionally, 5 undergraduate Chemistry and CPC students were given credit for studying abroad for 12 months. We intend to identify and publicise further study opportunities for all undergraduate students within the School.
16	Students would appreciate integration of a set textbook with course delivery, mapping these in the lecture content and learning outcomes for each module.	Currently there is only a set text book for the 1st year Chemistry course. Having one set textbook for Chemistry is not plausible, but could possibly be done on a sectional basis, *i.e.* separate textbooks for Analytical, Inorganic, Organic and Physical Chemistry, which may provide clarity for the students with respect to their curriculum. A review by Heads of Discipline on the components of directed study offered within each section before the start of the 2018/19 academic year will also act as an opportunity for them to discuss textbooks.
PG representation		

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17	The Department should ensure that both the PGR and PGT cohorts are represented and have a voice. This is especially important as the size of the PGT cohort grows.	From October 2017 the School Staff-Student Committee now includes PGT representatives from all of the MSc and PGDip courses offered in Chemistry. A representative from the PGR cohort sits on the School Board, the School's Research & Graduate Studies and Athena Swan Committees.
18	The Department should establish a small team of staff to support the MSc programme.	Unfortunately, increased numbers on postgraduate programmes, particularly non- EU students, does not directly translate into more funds from the University to employ additional staff. However, through the introduction of a bench fee for the Analytical MSc programmes, the School has been able to co-fund a dedicated Technical Officer (December 2017). The Analytical MSc programmes are now supported by a team consisting of the Director, a Technical Officer, the Head of Analytical Chemistry and an Industry Advisory Board.
Sharing best practice		
19	Ensure good teaching practice is shared across all staff, for example, via brown bag lunch sessions.	A review of good teaching practice will be undertaken by the School's Teaching & Learning Committee in 2018.
20	Consider using input from students returning from placement to help junior students preparing for placements (as role models), using a development of the PAL model.	Feedback from returning placement students currently happens on an informal basis. However, communication between outgoing and returning students is generally excellent due to social media and the work of UCC's Chemical Society. For the CPC programme, presentations by returning student are sometimes organised by the Careers Office.
21	Continue and adequately resource student-focused responsiveness and availability and report what you are doing well by publicising and celebrating successes more widely, both internally and externally.	Through the School's Technical, Administrative and Support Committee (TASC), the School will continue to collect positive feedback about the School and the successes of our student and staff, for publication in our quarterly newsletter (established in 2017) and on the Chemistry web-site.

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22	Plan succession around key roles and activities (e.g. around industry links, technical support for IT).	As discussed above, since the review the School has submitted a 5 year staffing plan based around key roles and activities in the School. This plan has been approved by the Head of SEFS.
Tying of strategies		
23	Strategy for teaching needs to be aligned with the strategy for research & wider staffing plans, linking directly to the Business Plan.	Our senior undergraduate and postgraduate modules are very much aligned with School research themes, *i.e.* environmental, materials, pharmaceutical and separation science. As part of the School's staffing plan the recruitment of staff in these strategic areas has been identified and will form a key part of any business plan.
Research project developments		
24	The Panel supports the Department's exploration of alternative modes of project delivery, broadening the scope to include, for example, education and outreach innovation. Undergraduate projects do not need to involve lab- based activity; alternative projects could be offered to students with other interests, relieving some pressure on the research labs.	The School currently offers final year Chemistry students the option of lab or literature based projects. We agree that the scope of projects offered could be further broadened and has been considered by the School's Teaching & Learning Committee. In the 2017/18 academic year the School offered a number of education-based final year Chemistry and CPC research projects. For example, one Chemistry project was to investigate retention rates within the Chemistry programmes at UCC, supervised by Dr David Otway.
Industry		
25	The Panel supports establishment of a School Industry Advisory Board (chaired by a high profile external member). This will help to secure industry engagement across different sectors, enhancing industry engagement in a structured way will help to enable the School to deliver its strategy.	The School plans to establish a Chemistry External Advisory Group (CEAG) once significant progress has been made on the refurbishment of the Kane Building. The role of CEAG will be to offer guidance about all aspects of the School of Chemistry and also about its future direction. Representatives from a range of chemistry- related industries, government departments, NGOs and secondary schools will be invited to contribute their time and expertise. The

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		individuals would be selected to bring unique knowledge and skills to complement the research, training and teaching expertise available in the School.
26	As mentioned above, the School should ensure succession planning to retain links with Industry liaison partners.	A formal list of the Schools contacts with industry partners will be established by the TASC.
Panel Recommendation to the College ***Support for Head of School***		
27	The Panel wishes to make College level recommendations around putting support structures in place for the new Head of School, including: • Administrative support; • Teaching reduction; • Research support, for example, via provision of PDRA support to assist with the day-to-day management of the Head of School's research group. This is essential to ensure the Head of School has sufficient time available to take the School forward, while retaining research activity.	We agree with the panel that the support outlined is required for a Head of School