UNIVERSITY OF GLASGOW

Academic Standards Committee - Friday 22 May 2015

Periodic Subject Review: Report of the Review of the School of Chemistry held on 5 March 2015

Ms Helen Clegg, Clerk to the Review Panel

Review Panel:

Professor Frank Coton	Vice Principal (Learning & Teaching), Convener
Professor Peter Skabara	University of Strathclyde, External Subject Specialist
Mr Jan Vlcek	Students' Representative Council, Student Panel member
Dr Claire Miller	School of Mathematics & Statistics, Cognate member
Dr Carl Goodyear	Institute of Infection, Immunity & Inflammation, Senate Assessor on Court
Dr Angela Jaap	Academic Development Unit, Learning and Teaching Centre
Ms Helen Clegg	Senate Office, Clerk to the Panel

1. Introduction

1.1 The School of Chemistry is one of seven Schools in the College of Science & Engineering. The Schools and College were formed in 2010, when a major restructuring exercise reshaped the University from nine Faculties to four Colleges.

1.2 The School last underwent full internal review in March 2009 as the Department of Chemistry, when it was one of three Departments in the Faculty of Physical Sciences. The outcome of that review was largely positive in terms of student satisfaction and the quality of provision. However, the Department was undergoing significant change at the time and substantial issues related to resource, planning and curriculum review were evident. For that reason, it was agreed that a follow-up visit two years later to review the progress of the recommendations made, and to receive an update on the resolution of the issues identified, would be beneficial. A follow-up visit took place in February 2011, and the Panel had concluded that the recommendations and open issues had been addressed, and that improvements were evident. One issue remaining unresolved was the heavy workload of the Head of Teaching, and the College was encouraged to find an effective means of reducing his administrative load.

1.3 The Self Evaluation Report (SER) was produced by Professor Bob Hill (Head of Teaching) with input from Professor Stephen Clark (Head of School), members of the School Teaching Committee, members of academic staff and student representatives.

1.4 The Review Panel met with Professor Stephen Clark (Head of School), Professor Bob Hill (Head of Teaching), Professor John Davies (College Dean of Learning & Teaching), thirteen members of staff, four probationary members of staff, six

Graduate Teaching Assistants, four Postgraduate Taught students and fifteen undergraduate students across all levels.

1.5 The School is located in the Joseph Black building at the Gilmorehill Campus. Accommodation includes lecture and small group space, several laboratories, an IT suite and a School library.

2. Background information

2.1 Students

Student numbers for the 2013-14 session were as follows:

Level 1	845
Level 2	214
Level 3	77
Level 4	61
Level 5	30
Undergraduate Total	1227
Postgraduate Taught	6
Total students	1233

2.2 Staffing

The School has 38 academic staff, comprised as follows:

Professor	9
Reader	8
Senior Lecturer	4
Lecturer	7
Teaching Professor	1
Senior University Teacher	1
University Teacher	2
Research Fellow	6
Total staff	**38**

2.3 Range of provision

The following range of provision offered by the School was considered:

- MSci Chemistry with Work Placement

- MSci Chemistry with European Placement
- MSci Chemistry with Medicinal Chemistry with Work Placement
- MSci Chemistry with Medicinal Chemistry with European Placement
- MSci Chemical Physics
- MSci Chemical Physics with Work Placement
- MSci Chemistry & Mathematics
- BSc (Hons) Chemistry
- BSc (Hons) Chemistry with Medicinal Chemistry
- BSc (Hons) Chemical Physics
- BSc (Hons) Chemistry & Mathematics
- BSc (Designated) Chemical Studies
- MSc Chemistry
- MSc Chemistry with Medicinal Chemistry

3. Context and Strategy

3.1 Context and Vision

3.1.1 It was evident that a number of substantial changes had been implemented since the last review. Ten undergraduate programmes and one postgraduate programme had been withdrawn, because of staffing changes and low student numbers on those programmes. Two new postgraduate programmes and a new designated BSc programme had been introduced.

3.1.2 The School's objectives were listed in the SER. These included the development and improvement of teaching quality and delivery, increasing student satisfaction scores, increasing undergraduate recruitment from the rest of the UK, and pursuing international activities. It aimed to focus on enquiry-led learning, integrate research-led teaching at all levels, and provide a friendly and supportive learning environment.

3.1.3 The Panel heard unanimous praise from the student groups in relation to the approachability and supportiveness of staff. It was reported that any student could approach staff members with questions or problems and they would be given appropriate help and support. Students valued this greatly and a strong sense of community was apparent. The Review Panel **commends** the School on providing such an open, friendly and supportive environment for its students.

3.1.4 In the meetings with the Head of School, the Panel heard that there were significant difficulties for the School related to physical space, and that this was restricting growth and strategic direction. The Head of School reported that two Chair positions remained vacant because the accommodation in the Joseph Black building was not sufficient to allow these appointments to be made, as any suitable appointee would require an appropriate amount of laboratory space for his/her research group. The limited laboratory space also meant that further expansion of student numbers at undergraduate level was not possible at present. Currently, only the highest-performing Honours students were able to undertake laboratory-based projects in their final year as a result of the limited laboratory space. The staff group shared the Head of School's concerns noting that, although the School was tasked with expanding and recruiting, the physical accommodation did not permit this.

3.1.5 The Panel considered that the School would be assisted in achieving its aspirations if it could develop a vision for the future shape of the School that

was shared by the College and the University. Although a number of commendable and achievable objectives had been set for the short term, there was a lack of clarity in terms of long-term vision and how the School would work towards the achievement of this in line with College strategy. It was evident that there were constraints in terms of staffing and space as described above, but the Panel believed that these constraints were limiting the School's strategic vision and its ability to formulate an evidence-based case for change. The Review Panel **recommends** that the School renews its dialogue with College Management with a view to forming a clear vision for the future shape of the School that is aligned to the College's strategic plans for the future. This should include consideration of the physical estate and the School's plans for growth. School, College and University engagement is critical in order to support the School's vision.

3.1.6 It was reported in the SER that the School had a high student:staff ratio compared to Chemistry schools/departments in other Russell Group institutions, and there was some concern that this was adversely affecting the student experience.

3.2 Strategic approach to enhancing learning and teaching

3.2.1 The Panel noted that the School's Learning & Teaching strategy was appropriate and well-considered, but its alignment to a clear vision was not evident and it was not clear how the School's objectives would be achieved.

3.2.2 The School's strategy included an expansion of undergraduate student numbers, but the School reported there was no capacity for growth.

3.2.3 The strategy did not give consideration to the areas highlighted in the National Student Survey (NSS) as requiring improvement, but stated the objective of exceeding 90% satisfaction in the NSS. The Panel considered that it would have been helpful to see how the School intended to achieve this.

4. Enhancing the Student Experience

4.1 Admissions, Retention and Success

4.1.1 It was evident that the School concentrated a good deal of effort on attracting applicants through open days, applicant visits and school visits. The School was also involved in the Salters' Festival of Chemistry and was piloting the Schools' Collaborative Crystal Chemistry Project in seven schools. The Panel **commends** the School for its involvement in a range of interesting and useful recruitment activities.

4.1.2 The School teaches large numbers of first year students though it was noted that students did not have to choose their degree subject until the end of second year. Therefore, analysing first, second, third and fourth year student numbers for progression information was not meaningful. Additionally, students committed to chemistry were able to change degree programme within the School. It was stated in the SER that 'widening participation' students made up around 25% of current first year students who intended to continue to chemistry. This was higher than the University average.

4.1.3 The latest available figures showing graduates' first employment destinations indicated that 14% of chemistry graduates had not found employment. This

was higher than the typical figure of 5 to 7%. It was normally the case that around half moved into employment and half entered further study.

4.1.4 The Panel noted that the proportion of first class and upper second Honours degrees was low compared to other Russell Group institutions. The Head of School was asked to comment on this, and on whether this might be contributing to the higher unemployment rate, particularly in respect of graduate positions. The Head of School reported that there were many upper second class awards made in the MSci cohorts, with some being considered 'borderline firsts'. He believed that it was difficult to award outstanding marks across the entire range of assessment, as students had particular strengths and weaknesses, and their grades tended to average out to a more middling grade. He was concerned that this perhaps did not allow very strong students to excel, and suggested that increasing the weighting of the final year project might improve final degree classifications. However, he added that it was unusual for students to receive exceptionally high project grades. Projects were difficult to assess, taking into account the different perceptions of different markers.

4.1.5 The Panel noted that postgraduate student numbers were low. The staff group reported that the pool of students holding a sufficiently broad first degree in chemistry as preparation for the Masters programmes was small. They explained that around 100 applications were typically received for the Masters programmes, and that a large number of offers were made. However, only a small number of offers were accepted and some of the applicants accepting an offer did not arrive at registration. It was believed that the applicants applied to a large number of institutions and this led to a low conversion rate. It was also noted that many of the applicants did not have suitable backgrounds for entry to the Masters degrees.

4.1.6 It was noted that the Masters degrees had received accreditation by the Royal Society of Chemistry, and the staff group were optimistic that this would strengthen the appeal of these degrees to potential applicants. Many other institutions offered specialist Masters degrees, which would not attract accreditation. The Panel considered that the postgraduate students with whom it met during the review were excellent ambassadors for the programmes and the University, and the students had confirmed they would be willing to talk about their experiences. The Panel **recommends** that the School has dialogue with the College and the Recruitment & International Office, with a view to producing video testimonials of the current postgraduate students for use in recruitment to the Masters programmes.

4.1.7 The staff group reported feeling constrained in terms of the School's postgraduate provision, due to limited accommodation and staffing resource. They reported that the existing Masters programmes had been developed to use minimal resource, taking advantage of as much shared teaching as possible. Staff agreed that provision could be strengthened with additional resource, but also noted that the School's strategic priority was undergraduate provision. They considered that any expansion of postgraduate provision would be to the detriment of undergraduate provision. However, staff acknowledged that the top international universities had a postgraduate focus and that, if Glasgow wished to aspire to be in this group, a change in focus was needed.

4.2 Equality and Diversity

4.2.1 It was stated in the SER that the School aimed to provide an inclusive and safe environment. Teaching laboratories were wheelchair accessible and low level benches and fume cupboards were available. The School intended to develop a personal learning plan for all students in the School declaring a disability, though recognised that not all students with a disability would declare it.

4.2.2 In order to support students in the School who did not speak English as a first language, as well as those with other needs, lecture and laboratory notes were provided on Moodle. The range of languages spoken by staff and demonstrators was also found to be helpful in supporting students, particularly in the laboratory setting. The staff group confirmed that all teaching was in English, but that staff members might chat informally to students in their native language, particularly at the beginning of their studies, to help them feel welcome and settled.

4.3 Supporting Students in their Learning

4.3.1 It was noted that some students undertook an online summer school, which was intended to bridge the gap between school and the first year of university study. Induction sessions were also held, at which new students received information about the University and School, and about the transition from school to University. Whilst feedback on the sessions was positive, attendance was low.

4.3.2 All first year courses presented additional information about study techniques, and on what was expected of students in their assessed work. Formative tests were set, which allowed staff to identify problems at an early stage. For students experiencing difficulty with the course material, revision tutorials were arranged.

4.3.3 Some undergraduate students reported that, without a mathematical background, some of the material in the programme was challenging. Although it was noted that a mathematics course was offered in year 2, some students said they would appreciate additional mathematics support, particularly those following the MSci programmes. Other students reported that the mathematical material was sometimes over-simplified and it was not always clear how the solutions had been derived. All students agreed that a compulsory mathematics course, with particular application to chemistry, would be extremely useful. The Panel **recommends** that the School give consideration to means of embedding the development of mathematical skills, with a chemistry application, throughout the undergraduate curricula. Consideration should be given to means of identifying the varying skill levels in first year in order to tailor mathematics teaching, and full detail of the derivations of mathematical solutions should be posted on Moodle for students to consult, further supporting their learning.

4.3.4 The undergraduate students in the later years of their degree stated that the transition from year 2 to year 3 had been challenging, but that year 3 was well balanced in terms of laboratory classes, lectures and tutorials.

4.3.5 The undergraduate students reported that the connection between lectures and laboratory classes was not always evident, because the sequence of laboratory sessions did not match the sequence of lectures. Additionally, they reported varying degrees of assistance from the GTAs who demonstrated in laboratories. Whilst they confirmed many of the GTAs were extremely supportive and helpful, this was not the case for all. The students reported

that some GTAs were unhelpful, appeared annoyed when asked for assistance, and expected students to understand experiments straight away. Some students reported being 'made to feel stupid' for asking questions. Students noted that this was particularly unfair if they had not yet had the lecture relating to the topic of the experiment. There was also a perception of unfair marking, often by GTAs who had not taken the laboratory they were assessing and had not seen how the students worked in the laboratory setting. Students recognised that GTAs were allocated to laboratories and sometimes demonstrated experiments outside of their area of expertise. This meant the GTAs could not always answer students' questions. The Panel **recommends** that the School works with the Learning & Teaching Centre to develop appropriate, structured training of GTAs for their demonstration duties, and that GTAs must have practiced the related laboratory experiments prior to the demonstration. GTAs should also be provided with feedback on their performance and receive clear guidance on marking to ensure consistency with the other markers.

4.3.6 Third and fifth year students reported that year three laboratories were very useful and that they learned useful experimental techniques. They recalled first year laboratories focusing more on laboratory skills rather than particular content. Laboratory manuals were provided and students were expected to read these in advance. Students pointed out that there were minor errors in the laboratory handouts, and the School undertook to correct these.

4.3.7 Honours students stated that they would appreciate the opportunity to gain experience in essay writing, as they were required to write an Honours dissertation. Students described the experience of learning how to do this as 'chaotic' and found it very difficult to start the writing process. It was noted that the 'Frontiers of Chemistry' course, which was included in the MSci programmes, had an essay requirement, and that it would be useful if this course was compulsory for all undergraduate students. This would give students experience in essay writing and appropriate referencing. The Panel Convener also suggested an exercise could be set whereby students were given three essay examples and a marking scheme, and were asked to mark the examples. The Panel **recommends** that the School ensures all undergraduate students are prepared for writing a dissertation by introducing a compulsory element of essay work, either via the Frontiers of Chemistry course or a revision to an existing course to include an essay element, or by means of an essay marking exercise.

4.3.8 Feedback on progress was given to students at all levels. Class examination scripts with comments were returned to students, and revision sessions were arranged for students requiring to take resit examinations.

4.3.9 It was stated in the SER that attendance and performance of students was monitored, and any student deemed 'at risk' would be asked to meet with the class head or their Adviser of Studies. Additionally, all third year students had individual meetings arranged to discuss their progress and career aspirations.

Advising system

4.3.10 All students were assigned an Adviser of Studies, with whom they could discuss progress and course choice. The Head of Teaching advised that, since the introduction of MyCampus, first year students had not routinely met with the Senior Adviser to agree and approve their curriculum and timetable. This had the effect of sometimes limiting the students to one degree programme, or allowing students to enrol on a course for which they later

discovered they were not eligible. Those students then found it difficult to find alternative courses at such a late stage.

4.3.11 Similar difficulties had arisen with international students, who no longer met with an Adviser before the start of semester. This had been important as Advisers could judge the students' abilities and agree on the level of courses they should study. Now, students were allocated to courses by staff in the Recruitment & International Office, based on the information in their application forms. It had been found that some students were enrolled on courses at the wrong level as a result. The School wished to return to a system whereby all students met on a one-to-one basis with their Adviser. The Panel **recommends** that, if desired by the School and considered feasible, the School re-introduce a system whereby all students are offered enrolment meetings with their Adviser of Studies, in order to prevent difficulties with unsuitable course choices and levels. This is embedded practice elsewhere in the University and the School could draw on this experience.

4.3.12 It was clear from the student meetings that all students particularly valued the open-door policy of staff within the School. Students reported that they were encouraged to speak to any staff member about any issue they experienced in their studies, and that they had found them immensely approachable, supportive and helpful. The Panel was impressed by how approachable and supportive staff were in the School. This was highly valued by students.

4.3.13 The School advised that, although laboratories were arranged for Wednesday afternoons, due to the laboratory time requirement of the Royal Society of Chemistry, it was possible to offer flexible arrangements for students with sporting commitments. The Panel **commends** the School's commitment to supporting students with Wednesday afternoon commitments.

4.3.14 The SER detailed a study conducted by Professor Hill, the Head of Teaching in the School, and Dr Sneddon from the School of Physics & Astronomy. The study examined the attitudes of chemistry students towards laboratory work. The findings of the study informed the development of laboratory teaching in the School. The Panel **commends** the School for its research-based teaching developments in relation to laboratory work.

4.4 Student Engagement

4.4.1 It was evident to the Panel that the student groups were highly engaged in their learning. Students reported learning material that was new and challenging, and valued the range of views in class discussions, which helped them improve their learning and identify their strengths and weaknesses. They reported that staff made the material very clear and supported them in their learning.

4.4.2 The postgraduate students reported that tutorials were extremely supportive, and laboratory classes were well organised. They felt they were not under pressure and could ask as many questions as they considered necessary for their understanding of the material. Although they stated that the cohort was very small – only four students – and that a group of 10-12 would be optimal, they worked well together and confirmed unanimously that they would have no hesitation in recommending their programme, and the School, to others.

4.4.3 The SER stated that a focus group had been held with class representatives, who had agreed that staff were 'enthusiastic, approachable, and made chemistry enjoyable'. Students valued the use of current research examples and research-led teaching. Moodle was a heavily-used resource for teaching

and learning, including interactive quizzes, and electronic handsets were used in lectures to actively involve students. The postgraduate students valued Moodle very highly, stating that it provided all the material they needed, including material provided to previous cohorts. They found this extremely useful.

4.4.4 As a result of feedback from External Examiners, the School had reviewed its policy on question choice in examinations. It had been noted that certain questions were being avoided by students, and a move to make all questions compulsory ensured that students had a thorough understanding of all topics before progressing.

4.4.5 At the request of students, the number of tutorials in second and third year had been increased. Attendance at tutorials was monitored in all years, and students missing a tutorial were sent an email by the School. As a result of the change in policy, it was reported that attendance at tutorials had improved.

The development of graduate attributes and employability

4.4.6 The development of graduate attributes was embedded throughout the curriculum, with an emphasis on developing the skills required by a future professional chemist.

4.4.7 Students were offered employability training in first and second year, which focused on skills such as communication, personal development planning, networking and CV writing. Students were encouraged to practice these skills and discuss progress regularly with their Adviser and other staff members throughout their degree. Additionally, MSci students spent a year on placement, which allowed the development of these skills in a professional setting. Assessment of the placement was heavily focused on transferable skills.

4.4.8 The undergraduate students reported that they received a weekly email containing information on employment opportunities, and that sessions focusing on interview techniques were arranged by the School. Although appointments could be made with the Careers Service, there was a lengthy waiting list, and students believed they would receive more relevant information and advice from staff within the School.

4.4.9 Employers visited the School to give presentations relating to career opportunities. While some students valued these, others noted that the same companies visited annually and that the information they provided could generally be found online. They also noted that most of the companies represented 'big pharma' and focused on research and development positions. Many students did not intend to work in that sector or in research and development roles, and therefore did not find the presentations particularly useful.

4.4.10 The undergraduate students who had completed a placement reported that the experience had been of enormous use, particularly in terms of developing laboratory and other professional skills. They reported having a more mature outlook when they returned to University for their final year.

Internationalisation

4.4.11 It was noted that MSci students had the opportunity to spend time either in industry, or at another institution overseas, and that many were keen to do so. The School welcomed ERASMUS students annually, but reported that Glasgow students were less keen to participate in the exchange, due to

language ability issues. The staff group also explained that the European method of teaching chemistry varied from the UK method and that this also presented a barrier to outgoing students. Incoming ERASMUS students were considered by staff to be a valuable addition to the School, due to their interaction with students and the exchange of knowledge, ideas, experience and culture.

4.4.12 The staff group advised that links with European and international organisations presented excellent placement opportunities for students. Staff reported that the students understood they had to perform well in their studies in order to access the best opportunities. The period overseas enhanced the student experience and students returned with the tools to carry out excellent projects in their final year, further strengthening their degree.

The effectiveness of feedback mechanisms

4.4.13 It was stated in the SER that mechanisms within the School for student feedback were effective, including the Staff/Student Liaison Committee (SSLC) meetings. It was reported that action was normally taken immediately (where appropriate) or in the following academic year. The School saw student feedback as a valuable means of informing improvement of the students' learning experience and development of the curriculum. The staff group agreed that SSLC meetings were effective, and that student suggestions were acted upon and communicated to the student group. Staff reported that they received frequent, often informal, feedback from students and representatives.

4.4.14 Students were informed about changes in several ways. They were consulted on course proposals, which were also discussed at SSLC meetings, and other matters were posted on Moodle as well as being emailed to students. Although Student Voice was available, many students reported not using it, preferring instead to set up class Facebook groups. The open, approachable environment in the School also allowed for much informal discussion of issues.

4.4.15 NSS results in recent years had been of concern within the School, although the Head of School explained that the detail of the scores for each section did not differ markedly from the scores achieved by other Schools in the College. Issues believed to contribute to the lower scores were accommodation problems (including lecture theatres) and the inability of the School to offer a practical, laboratory-based project to all final year students. The School conducted its own 'mock NSS' survey and found that satisfaction scores were higher in 2014, at almost 100%, than in 2013. Students had reported that their experiences in third year affected their scoring, and it was noted that third year had been the most problematic in terms of lecture theatre allocation.

4.4.16 Staff feedback was given through the Teaching Committee, staff meetings, course review groups, and by informal means. The feedback from External Examiners was said to provide inspiration for enhancing the student experience.

5. Enhancement in Learning and Teaching

5.1 Learning and Teaching

Curriculum design

5.1.1 The School stated in the SER that it aimed to demonstrate clear links between research and teaching. Current research was used as examples in teaching

and laboratories. Most staff were research active, and their research and advances in the field of chemistry inspired curriculum development. Students appreciated the use of up-to-date examples.

5.1.2 The School gave several examples of enhancement and development of the curriculum, including development of the Science Skills course materials with the involvement of three undergraduate students. It was reported that the course had exceeded the expectations of staff and students. Additionally, several final year projects had focused on the development of teaching resources for first year students.

5.1.3 A new designated BSc Chemical Studies programme had been introduced following consultation with students, staff, employers and external examiners. An increase in the entry requirement for third year Honours courses had meant that more students moved onto the designated degrees. Completion rates were poor as those students attended the same classes as Honours students, and students who graduated did so without completing any project work. The new BSc Chemical Studies included a project work element and examinations were tailored to designated degree level. It was reported that this led to a positive learning experience and that students were more engaged, performed better academically, and were better prepared for the workplace. The School had worked hard to develop class cohesiveness, form a self-supporting group, and build each student's self-confidence. The Panel **commends** the School on the care taken to develop the designated degree and on the positive impact on the student experience.

5.1.4 New Masters programmes in Chemistry, and Chemistry with Medicinal Chemistry, had been developed. It had been found that entrants lacked confidence in some of the basic skills expected of them, and the School introduced extra tutorials as well as additional experiments in order to support those students. Feedback from students had been positive.

5.1.5 All of the School's programmes, with the exception of the Chemical Physics programmes and the designated BSc Chemical Studies, were accredited by the Royal Society of Chemistry in January 2015. The Chemical Physics programmes were accredited by the Institute of Physics in March 2014. Student numbers on the Masters degrees were very low, but the School hoped that the recent accreditation of the degrees by the Royal Society of Chemistry would encourage greater interest.

5.1.6 Undergraduate students on the Medicinal Chemistry programmes expressed a preference for less focus on physical chemistry, and felt the offering in terms of organic chemistry was insubstantial. They reported that most of the options in the final year related to physical chemistry. The Head of School explained that External Examiners had previously advised the School that too many optional courses were offered, and provision had been reduced in response to this. The Panel **recommends** that the School reviews the current extent of organic chemistry provision and, if appropriate, takes steps to improve the balance of options available to students.

5.1.7 Undergraduate students questioned the need for the inclusion of the Nuclear Magnetic Resonance material in both years three and four. They stated that the material was almost identical, the teaching was rushed, and that assessment was marked harshly. Some students did not understand why they were learning the material, and it was considered that a large amount of effort was required for a comparatively small contribution to the final grade. The Head of School advised that feedback from a previous cohort had indicated that a 'refresher' of the material would be useful, and that this was

included in year three. The Panel **recommends** that the School reviews Nuclear Magnetic Resonance teaching at levels three and four and, if appropriate, takes action to remove unnecessary duplication of material.

Intended Learning Outcomes

5.1.8 Intended Learning Outcomes (ILOs) were made explicit in course and programme documentation, which was provided to all students, and were reviewed annually. It was stated in the SER that examination questions were set with reference to the ILOs, which the Panel considered to be good practice. The use of ILOs had been commended by the Royal Society of Chemistry at its accreditation review.

Technology Enhanced Learning and Teaching

5.1.9 The School reported that it had enhanced its e-learning provision, in alignment with the University's E-Learning Strategy, since the last Periodic Subject Review. It was reported that Moodle was used extensively in all years and that this not only made course material accessible, but also supported international students and students with disabilities. Feedback on grades was provided via Moodle, and it facilitated formative and summative assessments. Students had requested additional Moodle quizzes.

5.1.10 Several lecturers had introduced the use of Electronic Voting System (EVS) handsets in lectures, and this helped students to feel more engaged with the lecture material. Echo360 was used to record some lectures for the summer school programme which was delivered by distance learning. Pre-laboratory video recordings were intended to be used to engage students with chemistry concepts and demonstrate correct procedures prior to laboratory teaching. It was hoped this would increase the amount of effective laboratory time for students and also had the benefit of increasing safety awareness.

5.2 Assessment and Feedback

5.2.1 The School employed a range of assessment methods including laboratory reports, tutorial work, tests, essays, oral and poster presentations, group work, project work, placements and examinations. Most methods were used to provide both formative and summative assessment and feedback.

5.2.2 It was noted from the Annual Monitoring Reports that some students believed marking was unfair for laboratory assessment. The Head of School explained that students tended to compare their work, and their marks, with peers. Although making schemes were used, there were likely to be small differences in marking as laboratory assessments were marked by different GTAs. The Head of Teaching added that the School used a bespoke system to review the grades allocated by each marker and the average marks they allocated, so any significant deviations would be detected and resolved.

5.2.3 Students received feedback following formal examinations, and written comments, Moodle feedback and face-to-face meetings provided feedback for other work. Extensive feedback on final year projects was given throughout the project process.

Code of Assessment

5.2.4 The School adhered to the University Code of Assessment, but noted that the proportion of first and upper second class degrees it awarded was low in comparison to other Russell Group institutions. The School advised it was

reviewing its assessment methods with a view to increasing the number of such degrees it awarded.

5.3 Engaging and Supporting Staff

Probationary staff

5.3.1 All new academic staff members were required to complete the Postgraduate Certificate in Academic Practice (PgCAP), and were assigned a senior staff member as a mentor. Informal support and advice was available from other staff members. Results of an Athena SWAN survey indicated that junior members of staff requested additional mentoring.

5.3.2 Probationary staff reported that their workload was typical of what was expected. They explained they had a reduced teaching load, and could refer to teaching resources produced by their predecessors. All stated that they felt supported in running their classes, and that they could ask for support from a range of staff members besides their allocated mentors. They were given probationary targets in relation to teaching, research and leadership, and these were made very clear.

5.3.3 Probationary staff reported that they supervised at least one research student, and they were encouraged to do this although it was not a requirement of probation.

5.3.4 There appeared to be some confusion regarding line management of probationary staff, as staff reported having different line managers for their staff grouping and research grouping.

Graduate Teaching Assistants

5.3.5 Training for GTAs was provided at the beginning of the academic session. This included the University's mandatory GTA sessions, the School's own safety training and examination, the School's demonstrator training and laboratory-specific training. Laboratory Heads assess the GTAs in their laboratory training.

The School was undertaking a trial of demonstrator feedback forms, which would be scrutinised by laboratory Heads. Feedback would then be given to the GTAs.

5.3.6 The GTA group reported that they enjoyed the role, and valued the opportunity to be able to share their interests and knowledge. They reported feeling comfortable with the material they were required to teach. Training was given and GTAs had the opportunity to practice experiments in the laboratory before demonstrating. Some laboratory classes had briefings beforehand, but not all.

5.3.7 The GTAs stated that they would appreciate more feedback from lecturers, as well as the lecture notes, to assist them in their role. This would also be useful for assessment purposes. The GTAs said they did not receive feedback from staff or students on their performance.

Ongoing support and development

5.3.8 All staff members underwent annual Performance Development & Review to identify training and support needs, and student evaluations were monitored to ensure any necessary action was taken with regard to staff performance. Support for staff was available through other University Services including the

Staff Development Service, the Equality & Diversity Unit and the Learning & Teaching Centre.

5.3.9 In 2014, the School had received the Athena SWAN bronze award. In the self-assessment process, a survey had confirmed that 70% or more of academic staff members in the School agreed that the School environment was inclusive to both men and women, that they had access to opportunities for professional development, that they had benefitted from the mentoring process and that they had been treated fairly in access to relevant training and to participation in decision making. The Panel **commends** the School on providing a supportive and inclusive environment for staff and on the achievement of the Athena Swan award.

5.3.10 The staff group reported that the Head of School kept them well informed of developments and decisions at University level, and they valued his open-door policy. Staff felt that they had the opportunity to influence decision making and that routes for doing so were available, though noted that this was not always effective and their concerns could not always be resolved.

5.4 Resources for Learning and Teaching

Staffing

5.4.1 At the last review of the School, it had been noted that the Head of Teaching's workload (particularly administrative) was excessive, and that this had been raised at the review in 2003. In 2003 a Teaching Administrator post had been approved, advertised and shortlisted, but then frozen. The Panel in 2011 had been supportive of a solution being found to reduce the Head of Teaching's workload in an immediate, appropriate and sustainable manner. The School reported that this matter had not yet been resolved and that the Head of Teaching's workload remained excessive. It was stated in the SER that, rather than reducing, the administrative burden on the Head of Teaching had increased with the introduction of MyCampus. The appointment of a full time Teaching Administrator was viewed as essential by the School. There was also an issue of succession planning, as the current Head of Teaching was due to retire in 2016.

5.4.2 The Head of School explained that any Teaching Administrator appointed would be required to understand the School's teaching, and would ideally possess a PhD in a chemistry related subject given the focus on laboratory-based teaching. It was likely the postholder would have teaching experience, though would not be expected to teach. The staff group reported that the School had been offered a part-time (0.5 FTE) Teaching Administrator, shared with the School of Physics & Astronomy. The Head of School and the staff group did not consider this to be adequate and believed it would be very difficult to recruit someone with appropriate experience in both subjects. The Panel was concerned that the person specification and the role of the potential Teaching Administrator was not clearly defined, and believed it would be useful if the School's requirements were reviewed by an experienced Teaching Administrator. The Panel **recommends** that the School work with the College to reach a mutually acceptable position in relation to the provision of teaching support. In this respect, it would be appropriate to review the person specification and remit for the proposed Teaching Administrator post and, if possible, engage an experienced Teaching Administrator on short secondment from elsewhere in the College to

consider the feasibility and suitability of the proposal. This would help to build the evidence base for future support

Accommodation & Equipment

5.4.3 The Panel were given a tour of the School's facilities and viewed several laboratories, the computing cluster, a lecture theatre and the School's library. It was noted that some of the teaching areas were in poor repair, with leaks evident in some.

5.4.4 The School reported in the SER that laboratories were operating at full capacity due to student numbers in undergraduate years one to three. This meant that further expansion of undergraduate student numbers was not possible. Additionally, restricted availability of laboratory space meant that not all final year students were able to complete a practical project. This was unsatisfactory for many students and impacted negatively on NSS scores. The Head of School also reported that the lack of available laboratory space was constraining collaborative activity. A planned 2+2 degree was under discussion with an overseas institution, and students on that programme would demand practical projects given their fee level. At present this could not be accommodated.

5.4.5 The Head of School reported that the lack of physical space, and particularly laboratory space, was hindering the School's expansion. In addition to being unable to recruit additional undergraduate students, it was not possible to appoint senior academic staff. He reported that vacancies could not be filled as there was insufficient space to accommodate new staff and their research groups. This in turn impacted on teaching and supervision, as the unfilled vacancies meant existing staff were required to teach more and supervise larger numbers of projects. The staff group advised that this situation was adversely affecting staff morale as well as NSS scores.

5.4.6 The staff group advised that there had been discussion about the refurbishment of the Joseph Black building, and then it had been suggested that the School would move to a different building. It appeared these discussions with Estates & Buildings had been ongoing for several years but no resolution had been reached.

5.4.7 The School had a small Branch Library and this was highly valued by students. It was noted that postgraduate students on the Masters programmes were keen to use this library in the evenings but access was not currently available. The Panel **recommends** that the School provides out-of-hours access to the Branch library for all taught postgraduate students.

5.4.8 It was stated in the SER that lecture theatre allocation had been unsatisfactory, resulting in students having to travel across campus for consecutive teaching periods. This reduced the amount of teaching time available and caused dissatisfaction amongst both students and staff. It was also noted that some lecture theatres were in poor repair. One example was given of a lecture theatre having several rows of seating removed for half the academic year, meaning students could not find seats in their lectures.

5.4.9 It was also reported in the SER that there was a lack of small group teaching space, with corners of laboratories being used.

5.4.10 The School reported that there was a lack of social and study space for students, and suggested this was impacting negatively on NSS results. Students had commented on the lack of availability of computers in the University Library, as well as the lack of power points for using their own laptops and other devices. The Conference Room in the Joseph Black building was available as social space but was also used for classes and meetings, so was often unavailable for social use.

6 Academic Standards

6.1 The Panel noted that there was a good deal of excellent teaching in the School's provision and that quality assurance procedures appeared to be in line with University policy and were applied effectively. It was clear that the staff members the Panel met were engaged in excellent teaching and were committed to ensuring the student experience was of the highest quality.

6.2 The School adhered to the University's processes for course and programme approval. Course and programme proposals were discussed in detail at the School's Teaching Committee, and consultation took place with students, external examiners and potential employers. Formal agreement of all proposals was sought at School staff meetings before being submitted to the College Learning & Teaching Committee and (for programme proposals) to ASC Programme Approval Groups.

6.3 Annual Monitoring Reports were completed each year for all courses. Course co-ordinators met to discuss the reports, evaluate the delivery of the courses and agree necessary changes. A summary report for the School was produced, which was submitted to the College of Science & Engineering. The summary report was scrutinised by the College Quality Assurance Officer, who then reported to the College Learning & Teaching Committee.

6.4 In addition to professional validation, External Examiners played an important role in ensuring standards were maintained, through providing a means of comparison with other institutions. Comments made by External Examiners fed into the review process. External Examiners' reports had been generally positive about the School and its provision, and had praised the high quality of students' work. However, it had also been suggested by External Examiners that the School's standards may be too high, given the comparatively small number of first and upper second class degrees awarded by the School.

6.5 The School was confident that its programme and courses were in line with the relevant benchmark statements. The Royal Society of Chemistry had supported this view earlier this year at its accreditation visit, though requested that the School differentiate the assessment of BSc (Hons) and MSci students.

7 Collaborative activity

7.1 The School was currently in discussion with the Beijing University of Chemical Technology (BUCT) regarding possible collaboration on two possible models – a 2+2 undergraduate chemistry programme for BUCT students, who would spend years 3 and 4 in Glasgow, and a collaboratively taught chemistry

programme taught at BUCT but with GU staff visiting to teach parts of the curriculum. It was intended that the 2+2 programme would be available from 2105-16. Early discussions were also taking place with a view to replicating the 2+2 model (or 3+1) in Mexico.

7.2 The School was also discussing possible research collaboration with Nankai University, which could offer work placement opportunities for students. Placement opportunities at the King Abdullah University of Science & Technology in Saudi Arabia were also being investigated.

7.3 The staff group were positive about the possibility of collaborative developments, though noted that additional staff resource would be needed as a result. Six staff members would be required to spend six months of the year in China, for example.

8 Summary of perceived strengths and areas for improvement

8.1 Key strengths

The following key strengths were noted:

- The commitment of staff to ensuring the student experience is high quality and engaging
- Good student support mechanisms, with helpful, approachable staff
- The commitment to excellent teaching and the willingness of staff to quickly adapt their teaching based on student feedback
- The commitment to research-led teaching
- The clarity of Intended Learning Outcomes and their relationship to assessment
- Innovative assessment methods and willingness to engage with e-learning initiatives
- The provision of an inclusive and supportive environment for staff

8.2 Areas for improvement

The Review Panel highlighted the following areas as opportunities for improvement:

- The clarity of the School's vision, including its accommodation and staffing needs, and how this is integrated into the College strategy
- The training of GTAs, the provision of feedback on their performance, and their engagement with the GTA role
- The development of mathematical skills throughout the undergraduate curricula, particularly for students without a strong mathematical background
- The balance of undergraduate options, particularly with respect to organic chemistry

9. Conclusion and recommendations

The Panel was impressed with the dedication and enthusiasm of the staff and students, and with the firm focus on excellence in teaching and support for students. The student groups were enthusiastic and positive, and a credit to the School.

The Panel, guided by the views of the External Subject Specialist, confirmed that, at the time of the Review, the programmes offered by the School were current and valid in the light of developing knowledge and practice within the subject area. This was supported by the accreditation of many of the programmes by the Royal Society of Chemistry.

The School demonstrated a number of strengths, as well as an awareness of the areas requiring improvement. The most substantive of these are reflected in the commendations and recommendations below.

Commendations

The Review Panel commends the School of Chemistry on the following, which are listed in order of appearance in this report:

Commendation 1

The Review Panel commends the School on providing such an open, friendly and supportive environment, which is highly valued by its students *[Paragraphs 3.1.3 and 4.3.12].*

Commendation 2

The Review Panel commends the School for its involvement in a range of interesting and useful recruitment activities *[Paragraph 4.1.1].*

Commendation 3

The Review Panel commends the School's commitment to supporting students with Wednesday afternoon commitments *[Paragraph 4.3.13].*

Commendation 4

The Review Panel commends the School for its research-based teaching developments in relation to laboratory work *[Paragraph 4.3.14].*

Commendation 5

The Review Panel commends the School on the care taken to develop the designated degree and on the positive impact on the student experience *[Paragraph 5.1.3].*

Commendation 6

The Review Panel commends the School on providing a supportive and inclusive environment for staff and on the achievement of the Athena Swan award *[Paragraph 5.3.9].*

Recommendations

The following recommendations have been made to support the School in its reflection and to enhance provision in relation to teaching, learning and assessment. The recommendations have been cross-referenced to the paragraphs in the text of the report to which they refer, and are ranked in order of priority.

Recommendation 1

The Review Panel recommends that the School renews its dialogue with College Management with a view to forming a clear vision for the future shape of the School that is aligned to the College's strategic plans for the future. This should include consideration of the physical estate and the School's plans for growth. School, College and University engagement is critical in order to support the School's vision. *[Paragraph 3.1.5].*

Action: Head of the College of Science & Engineering;

Head of the School of Chemistry

Recommendation 2

The Review Panel recommends that the School work with the College to reach a mutually acceptable position in relation to the provision of teaching support. In this respect, it would be appropriate to review the person specification and remit for the proposed Teaching Administrator post and, if possible, engage an experienced Teaching Administrator on short secondment from elsewhere in the College to consider the feasibility and suitability of the proposal. This would help to build the evidence base for future support. *[Paragraph 5.4.2].*

Action: Head of the School of Chemistry

For information: Head of the College of Science & Engineering

Recommendation 3

The Review Panel recommends that the School works with the Learning & Teaching Centre to develop appropriate, structured training of GTAs for their demonstration duties, and that GTAs must have practiced the related laboratory experiments prior to the demonstration. GTAs should also be provided with feedback on their performance and receive clear guidance on marking to ensure consistency with the other markers. *[Paragraph 4.3.5].*

Action: Head of the School of Chemistry

For information: Director of the Learning & Teaching Centre

Recommendation 4

The Review Panel recommends that the School give consideration to means of embedding the development of mathematical skills, with a chemistry application, throughout the undergraduate curricula. Consideration should be given to means of identifying the varying skill levels in first year in order to tailor mathematics teaching, and full detail of the derivations of mathematical solutions should be posted on Moodle for students to consult, further supporting their learning *[Paragraph 4.3.3].*

Action: Head of the School of Chemistry

Recommendation 5

The Review Panel recommends that the School ensures all undergraduate students are prepared for writing a dissertation by introducing a compulsory element of essay work, either via the Frontiers of Chemistry course or a revision to an existing course to include an essay element, or by means of an essay marking exercise *[Paragraph 4.3.7].*

Action: Head of the School of Chemistry

Recommendation 6

The Review Panel recommends that, if desired by the School and considered feasible, the School re-introduce a system whereby all students are offered enrolment meetings with their Adviser of Studies, in order to prevent difficulties with unsuitable course choices and

levels. This is embedded practice elsewhere in the University and the School could draw on this experience *[Paragraph 4.3.11].*

Action: Head of the School of Chemistry

Recommendation 7

The Review Panel recommends that the School reviews the current extent of organic chemistry provision and, if appropriate, takes steps to improve the balance of options available to students. *[Paragraph 5.1.6].*

Action: Head of the School of Chemistry

Recommendation 8

The Review Panel recommends that the School reviews Nuclear Magnetic Resonance teaching at levels three and four and, if appropriate, takes action to remove unnecessary duplication of material. *[Paragraph 5.1.7].*

Action: Head of the School of Chemistry

Recommendation 9

The Review Panel recommends that the School has dialogue with the College and the Recruitment & International Office, with a view to producing video testimonials of the current postgraduate students for use in recruitment to the Masters programmes *[Paragraph 4.1.6].*

Action: Head of the School of Chemistry

For information: Head of the College of Science & Engineering;

Director of the Recruitment & International Office

Recommendation 10

The Review Panel recommends that the School provides out-of-hours access to the Branch library for all taught postgraduate students *[Paragraph 5.4.7].*

Action: Head of the School of Chemistry