

## UNIVERSITY OF GLASGOW

### Academic Standards Committee - Friday 23 May 2014

### Periodic Subject Review: Report of the Review of Computing Science held on 13 and 14 February 2014

Mrs Catherine H Omand, Clerk to the Review Panel

#### Review Panel:

Professor Frank Coton	Vice Principal (Learning and Teaching), Convener
Dr Alistair Edwards	University of York, External Subject Specialist
Dr Jane MacKenzie	Learning and Teaching Centre
Professor John McColl	School of Mathematics & Statistics, Cognate member
Professor Dave Robertson	University of Edinburgh, External Subject Specialist
Dr Don Spaeth	Senate Assessor on Court
Mrs Catherine Omand	Senate Office, Clerk to the Review Panel
Mr Eugene Zilberter	Student Representative

#### 1. Introduction

- 1.1 The School of Computing Science (hereafter, 'the School') is one of seven Schools of the College of Science and Engineering. The College was formed in 2010, when a major restructuring exercise reshaped the University from nine Faculties to four Colleges. The School previously existed as a department and represents a single subject discipline.
- 1.2 The previous institution-led review (previously known as the Departmental Programme of Teaching, Learning and Assessment (DPTLA)) took place in March 2008. It had concluded that the Department provided a quality overall student experience with proactive links with industry having significant benefits for students in relation to student experience and employability. A number of areas highlighted for improvement or enhancement had mainly been addressed. One area still outstanding was the requirement to provide more explicit mapping of assessment to programme and course Intended Learning Outcomes (ILOs). This is again raised under Section 4.4.
- 1.3 The Self Evaluation Report (SER) was co-ordinated by Dr Karen Renaud (Convener of the Learning and Teaching Committee) and Mrs Tania Galabova (Head of School Administration). All staff, Graduate Teaching Assistants (GTAs) and students had been given the opportunity to comment on the SER using a variety of means prior to submission.
- 1.4 The Review Panel met with Professor J Sventek, Head of School, Dr Karen Renaud, Convener of the Learning & Teaching Committee, Mrs Tania Galabova, Head of School Administration, 11 Undergraduate students, 5 Postgraduate Students, 9 Graduate Teaching Assistants (GTAs)/tutors, 9 members of key staff and 7

probationary members of staff. The Panel also spoke with 4 undergraduate students and further probationary member of staff based in Singapore via videoconference.

## 2. Background Information

### 2.1 Students

Student numbers in the School for 2013-14 were as following:

<b>Students</b>	<b>Headcount</b>	<b>FTE</b>
Level 1	237	76.8
Level 2	150	75.0 (incl 8.4 non CS)
Level 3	96	92.4 (incl 6.0 non CS)
Level 4	91	76.2 (incl 3.3 non-CS)
Level 5	9	19.7 (incl 0.9 non CS)
<b>Undergraduate Total</b>	<b>583</b>	
<b>Postgraduate Taught</b>	<b>131</b> (incl 29 non CS)	
<b>Postgraduate Research*</b> *(for information only - research is not covered by the Review)	91	

Summary of current and target student numbers on collaborative programmes:

<b>Partner</b>	<b>First intake</b>	<b>Current students</b>	<b>Target</b>
SYSU	2011	1	10
KMITL	2012	4	20
UGS and SIT	2013	58	120 (2014) 160 (2016)

### 2.2 Staffing

The staffing resource as at 1 January 2014 was as follows:

<b>Staff</b>	<b>Headcount</b>	<b>FTE</b>
Academic staff*	34	32.7
Research staff	43	41.3
Support staff**	15	14.8
<b>Total staff</b>	<b>92</b>	<b>88.8</b>

\*Excludes 2.8 FTE University of Glasgow Singapore academics [and 1 FTE administrative office and includes 3 staff members partially bought out by other institutions; backfill posts not included

\*\*includes 1 administrative officer for a Scottish-wide pooling award

### 2.3 Range of Provision

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

- BSc Single Honours degrees in Computing Science (including faster route), Mobile Software Engineering and Software Engineering (including faster route)
- MSci in Computing Science (including faster route), Mobile Software Engineering and Software Engineering (including faster route)
- Designated BSc Computing Science
- Joint BSc/BEng (Honours) Electronic and Software Engineering (joint with Engineering)
- Combined Honours BSc / MA /MA (SocSci) (Honours) Computing Science with another subject, MSci Computing Science and Mathematics and MSci in Computing Science and Physics
- Specialist Masters programmes in Computing Science, Data Science (new for 2014-15 subject to College and Senate approval), Information Security and Software Engineering
- The MScs in Mobile Design and Engineering and Search Engine Technologies Software Engineering are being withdrawn and will cease with completion of current cohort
- The MRes in Computing Science, Information Security Mobile Design and Engineering, Search Engine Technologies and Software Engineering are also being withdrawn
- Conversion (Generalist) MSc in Information Technology and MSc in Software Development

Contributions are made to the following degree programmes offered by other Schools:

*Undergraduate and integrated Masters*

- BEng Aerospace Systems – Software Engineering M (10 credits, core)
- MEng Audio and Video Engineering – Computing Science 1P (20 credits, elective)
- BEng/MEng Electronics and Electrical Engineering – level 2 courses (30 credits, electives), levels 4 and 5 courses (60 credits, electives)
- MEng Electronic and Software Engineering – level 5 courses (up to 40 credits, electives)
- BEng Mechanical Engineering – Software Engineering M (10 credits, elective)
- BEng Mechanical Design Engineering – Software Engineering M (10 credits, elective)
- MSc in Computer Systems Engineering (led by the School of Engineering and reviewed as part of the Engineering Review in Session 2012-13)

*Postgraduate taught programmes*

- MSc in Bioinformatics, Polyomics and Systems Biology – Programming (20 credits, core) and Information Systems and Databases 3 (10 credits, core)
- MSc in Computer Forensics and E-Discovery – level 4 and 5 core courses (Advanced Research Readings in Computing Science, Cybersecurity M, Human-Centred Security, Research Methods and Techniques, Systems and Networks).
- MSc in Embedded Electronic Systems – Advanced Operating Systems (10 credits, core), Computer Architecture (10 credits, elective), Advanced Programming (10 credits, elective) and Mobile HCI (10 credits, elective)

- MSc in Global Security (Politics, Information and Security) – Systems and Networks (10 credits, core) and Human-Centred Security (10 credits, elective)
- MSc in Nanoscience and Nanotechnology – Research Methods and Techniques (10 credits, core)

#### *Collaborative arrangements*

- In 2010, the University of Glasgow established a partnership agreement with King Mongkut's Institute of Technology, Ladkrabang (KMITL), (Thailand) enabling students to study for two years at KMITL followed by two years at Glasgow. Within the School, eligible students are admitted to the third year of the BSc (Hons) Software Engineering programme. The first intake was in 2012 and there are currently 4 students undertaking this arrangement with the School.
- A similar partnership agreement exists with Sun Yat-Sen University (China). Eligible students can be admitted to BSc (Hons) Computing Science or BEng (Hons) Electronics & Electrical Engineering. Students can elect to study for an additional year for the award of MSci or MEng, subject to satisfying the progression criteria. The first two BSc (Hons) Computing Science students graduated in 2013. There is currently 1 student undertaking this arrangement with the School.
- The School entered into partnership with Singapore Institute of Technology (SIT) which is an in-country collaborative programme (University of Glasgow Singapore (UGS)) intended for students with good grades in an appropriate diploma from one of the polytechnics in Singapore offers an opportunity to upgrade diploma qualifications to an Honours degree with a further two years study, normally undertaken in Singapore. The programme includes a four-week visit to Glasgow in the summer between the two years. Fifty-eight students enrolled in 2013, the first year of intake.

### **3. Overall aims of the School's provision and how it supports the University Strategic Plan**

#### **Breadth of provision**

- 3.1 The overall impression was that the School provided broad based as well as specialist teaching. This balance was considered appropriate, but as a medium sized School, it was conceded that the School was under pressure to accommodate the diversification of the subject area.
- 3.2 The Review Panel recognised that the School was well established and had a very good reputation within the subject area; noting from the SER that it was ranked 4<sup>th</sup> in the UK in The Complete University Guide 2014, 8<sup>th</sup> in the UK in the last research assessment exercise (RAE 2008), ranked 2<sup>nd</sup> in the Guardian University Guide league table 2014, 8<sup>th</sup> in the Times and Sunday Times combined 2014 league table and was in the top 100 in the QS World University Rankings by Subject 2013. The School had ambition to be within the top 50 world ranking. At the meeting with the Head of School, clarification was sought as to what strategy the School had in place to achieve this ambition, particularly when it had to compete with significantly larger Schools. Professor Sventek confirmed that the School aspired to increase staffing from 35 to 50 but current insufficient accommodation hindered this aspiration.
- 3.3 The SER highlighted how the School accommodated a diverse student intake, in terms of level of prior education in the discipline, into UG programmes but as Computing

Science expands; the Review Panel queried whether or not this would be sustainable. (please refer to Section 4.7.2)

- 3.4 The Panel welcomed the approach the School had taken to the recently commenced partnership with Singapore Institute of Technology (SIT). Fifty eight students had enrolled during the first intake and, although numbers were small, the Panel recognised that there were opportunities for this partnership to evolve as well as provide potential for research reciprocation.

### **Postgraduate taught provision**

- 3.5 It was noted from the SER, that the School had designed specialist Masters' programmes that developed practical skills and therefore enhanced opportunities for graduates to be well equipped for employment in the IT industry. Teaching within Undergraduate and Masters' courses were informed by research interests within the School with some undergraduate MSci projects being of such a high standard that they had been presented at conferences, published in journals and received external awards. The Review Panel **commends** the high standard of MSci projects and **commends** the high quality student intake which was evident at the meetings with the students and Graduate Teaching Assistants.
- 3.6 From discussion with the Postgraduate Taught (PGT) students, the Review Panel was informed that the MSc programmes were considered well balanced but flexible, allowing for specialisation, accommodating individual requirements such as technical or entrepreneurial interests.

## **4. An Evaluation of the Student Learning Experience**

### **4.1 Overall**

The aims appeared appropriate to the discipline and were in line with the subject benchmark and objectives of the external bodies and cohered with the University's overall aims.

### **4.2 Accreditation**

All single BSc (Honours) and the joint honours Electronic & Software Engineering degree programmes were accredited by the British Computer Society (BCS) and the Institution of Engineering & Technology (IET) as fulfilling the requirements for Chartered IT Professional (CITP) and partial Chartered Engineer (CEng)/Chartered Scientist (CSci) accreditation. MSci programmes were accredited CITP and partial CSci. There was an anomaly that meant integrated Masters programmes could not be accredited with partial CEng as the IET had determined that this would undermine the clarity of the accreditation message to third parties who would not understand the distinction between partial and full CEng accreditation of these programmes. The MSci programmes do not meet the criteria for full CEng status and therefore undergraduate students advancing to level 5 graduate with reduced accreditation compared to those of their peers who completed at the end of level 4. From the SER and from discussion with the Head of School, it was evident that a lot of effort had gone into obtaining BCS/IET accreditation but there was uncertainty over the necessity of accreditation as honours students and employers did not appear to place much significance on it. In addition, some requirements obstructed certain curriculum changes the School wished to make. The School has consequently instigated consultation with other Russell Group institutions to discuss the accreditation process and how it could be made more relevant to both students and employers. However, there was a possibility that the School would not renew its accreditation in 2017, if amendments were not made to the

process. The Review Panel was satisfied that the School was fully considering the consequences of withdrawing from accreditation and would encourage the School, as part of this process, to consider how it would benchmark future provision should it decide to end accreditation.

#### **4.3 Validity of programmes**

The Review Panel, guided by the views of the External Subject Specialists, **confirmed** that, at the time of the Review, programmes offered by the School were current and valid in light of developing knowledge in the discipline, and practice in its application.

#### **4.4 Intended Learning Outcomes (ILOs)**

It was evident from a number of sources (previous DPTLA report, Accreditation Report, External Examiner report) that Intended Learning Outcomes were previously found to lack sufficient distinction between programmes. Referring to the fact that some programmes are developed from a set of existing core programmes, the SER stated: "There is an expected level of similarity, however, given the derivations from core programmes" (Section 3.2, page 16). At the meeting with key staff, it was verified that ILOs were similar reflecting the generic skills that were common to the different programmes. While the Review Panel accepts that the School had given substantial attention to ILOs and had recently completed an action plan for their accreditation panel which confirmed satisfaction with amended ILOs, nevertheless, ILOs should appropriately reflect the differences between programmes. There would be value in supporting the School's future efforts to ensure ILO sets are distinctive for each programme of study with assessment clearly mapped to the learning outcomes. The Review Panel **recommends** the School and the Learning and Teaching Centre Academic Development Unit work together to continue to develop ILOs that appropriately reflect the distinctive nature of different programmes even when there are common elements. The School should also be supported in developing effective mechanisms to ensure that the mapping of these ILOs onto assessment is clearly communicated to students.

#### **4.5 Assessment, Feedback and Achievement**

##### *Assessment*

4.5.1 The School employs a wide range of assessment methods including student collaboration, peer assessment using Aropa, independent project work, industrial placements, electronic voting, interaction with research groups, oral presentations and written reports. At the meeting with the undergraduate students, Year 3 students confirmed that the industrial assignments were stimulating and creative. The Panel **commends** the use of industrial assignments.

4.5.2 From discussion with the Postgraduate Taught students who met with the Panel, it was evident that there was satisfaction regarding the delivery and range of teaching. One concern was raised in relation to the clarity with which assessments were specified. Although the marking scheme was usually clearly defined, some elements of the required assessment task had been unclear; where it was necessary for the student to discuss further as to what was required. Assessment deadlines were also close together placing further pressure on students and they suggested that it would be beneficial if deadlines could be timetabled more efficiently. All examinations also took place at the end of Semester 2, 11 in total, and the students would prefer for these to be split between the two semesters. Year 3 students also indicated that additional pressure was placed on them as a consequence of all examinations being taken at the end of the year. The Singapore students also expressed concern over the limited amount of time for revision for the examinations.

4.5.3 The undergraduate students highlighted that better balance could be achieved in relation to Year 3 workload and that sometimes an inappropriate amount of time was required to complete certain assessment exercises, with the weighting not reflecting the amount of effort involved. In some instances, it was the lack of clarity of the expected outcomes that caused additional time to be spent on assessment. The students also suggested better coordination between courses in relation to assignment due dates. At the meeting with the Graduate Teaching Assistants (GTAs), they confirmed that there was a substantial increase in workload from Year 2 to Year 3 which was intensified by the phasing of assignment deadlines. The Probationary staff also confirmed that there was a substantial leap in Year 3. The Panel raised at the meeting with key staff whether or not the School was satisfied with the amount of work being undertaken in each Year and whether the weighting was reflective of that work. The Panel was advised that the cover sheets attached to assignments included an estimated amount of time expected to complete the work but some technical or programming elements were more difficult to estimate. The Review Panel considered the assignment cover sheet as **good practice** but questioned whether or not the School was possibly over assessing at both UG and PGT level and had this been taken into consideration during the vertical review. (please refer to 4.6.2) The Panel highlighted that over assessment could have a significant impact on academic workload and suggested that there might be scope to assess less, while ensuring standards were maintained. The Review Panel **recommends** that the School reviews both the scale and timing of assessments, including examinations, to ensure the assessment load on staff and students is appropriate and optimally phased.

#### *Feedback*

4.5.4 Both undergraduate and PGT groups of students indicated that feedback on assessment, while excellent in some cases, was variable and depended on the individual lecturer. Some staff provided feedback quickly and would discuss issues, whilst others only provided a mark with no indication on how to improve. There was no awareness of any specific timescale for receiving feedback. Year 1 and 2 students advised that laboratory feedback was good. Timing of feedback was also raised by the undergraduate and PGT students; with some feedback being received too late to be considered prior to the following assignment. The Review Panel **recommends** that the School puts in place measures to ensure the consistency of student feedback on assignments both in relation to timescale and quality in accordance with the University's Assessment Policy.

4.5.5 In relation to student course evaluation, Year 4 and 5 students indicated that they had seen changes made to courses following feedback given in previous years.

4.5.6 The Review Panel noted that, although Staff Student Liaison Committee (SSLC) minutes were published on the 'Student Voice' (internal University student website forum), these did not appear to show any closure of issues or reporting mechanism for reporting back on issues previously raised by students and how these were resolved. There was a mechanism in 'Student Voice' for raising, progressing and completing issues raised and the Review Panel **encourages** the School to fully use this facility.

## **4.6. Curriculum Design, Development and Content**

### *Undergraduate*

4.6.1 The Review Panel noted with interest the different routes offered in First Year depending on programming experience.

4.6.2 The SER had indicated that, from student feedback, there was some duplication across Levels 1 and 2 and a perceived lack of challenge in Level 2. In comparison, the

workload in Level 3 was considered too high. At the meeting with the Head of School, the Panel was advised that the School was undertaking a vertical review of subject strand coherence to ensure that any inappropriate duplication was removed and it was expected that more choice would be made available and the workload would be reduced in Level 3; for instance Professional Skills would be taught in Year 3. From the meetings with the undergraduate students and GTAs, the students did not seem aware of the vertical review of the curriculum even though the School had solicited their views through a variety of mechanisms. The Review Panel **recommends** that GTAs and students are made more aware of consultation processes and the mechanisms through which they can contribute to these, to encourage more direct engagement from the students.

- 4.6.3 At the meeting with the undergraduate students, the students expressed overall satisfaction with the programmes undertaken, enjoying the lectures and practical experience attained. Laboratories were considered better than lectures for acquisition of knowledge. Students from Years 3-5 especially valued the range of specialist courses and projects and the support provided from project supervisors. In general, students found staff approachable. However, the students advised that Years 1 and 2 were considered too easy and Year 3 was considered too challenging. The students recommended placing more practical elements and/or projects into Years 1 and 2 as they found their learning was enhanced by interaction and from application. The students found team work the most important aspect for providing 'real life' scenarios.
- 4.6.4 The undergraduate students appeared to be familiar with the intended learning outcomes but advised that course descriptors were not always accurate, and in some instances, changes were made to courses as they ran which were not always communicated to the students. An example given was a change to a member of staff where the Year 2 course examination changed to reflect the lecturer's expertise.
- 4.6.5 From the SER, it was evident that the School extensively collaborated with industry. Students had a highly valued opportunity to develop technical and professional skills which greatly enhanced employability. The Panel **highly commends** the strong links with industry and employability.
- 4.6.6 The School had developed a strong relationship with secondary schools by introducing the credit-bearing 'Computing Science in the classroom' where students acted as classroom assistants and tutors promoting both Computing Science and the University. The School has also developed a nationwide CPD programme for teachers, funded by the Scottish Government. The Review Panel **commends** both practices.

#### *Postgraduate Taught*

- 4.6.7 The Panel learned from the PGT students that they found the one-year Masters programme difficult and suggested that six 10-credit courses per semester was too onerous and that three 20-credit courses would be welcomed. The value of the compulsory course, Professional skills and issues, (required by accreditation) was discussed. The PGT students found this course unnecessary and suggested it would be more relevant for undergraduate students.

### **4.7 Student Recruitment**

- 4.7.1 Since the last review, student recruitment had significantly improved with growth in the Home EU student population. The Review Panel **commends** the School's success in diversifying programmes and successfully recruiting undergraduate and postgraduate students from a wide variety of backgrounds. The new collaboration with SIT in Singapore was a latest example of the School's efforts in this regard. However, the Review Panel recognised that the main challenge the School faced was how to



balance workload, if student numbers continued to grow and whether they could maintain the same level of commitment, particularly at project level for honours and Masters' levels. The Review Panel **recommends** that the School considers its approach to teaching and how it will maintain quality of support provided to students at a different operative scale, particularly as staff will be under additional pressure from the Singapore intake. (please also refer to Section 4.7.2 and 4.8.1)

4.7.2 Currently, the School was unable to control admissions, but Schools within the College of Science and Engineering had been negotiating subject level admission which would allow for some control. At the meeting with key staff, it was acknowledged that student growth was not necessarily accompanied by increased revenue to recruit further staff and/or provide further facilities. The Review Panel was concerned that the School was forced into a position of having to quickly react to recent changes in the student population without sufficient resources (staffing and accommodation) to support. In addition, the School was involved in other new activities such as international collaboration and it was unclear to the Panel what shape and provision the School wanted to aspire to. The School needed to consider phased change and what it could sustain in the short to medium term, but also plan for phased future growth, clearly defining future provision and required facilities and the benefits this would bring to the School and College. The Review Panel **strongly recommends** that the School develops a coherent strategic vision in terms of future growth and range of provision, working with the Head of College, to produce a phased plan as to how to reach its vision. Given the current constraints on teaching space and the growth in student numbers, the Panel further **recommends** that the College considers the space limitations currently experienced by the School as a result of the loss of previous laboratory space in the Boyd Orr Building and gives consideration to identifying and developing additional accommodation for current as well as future provision.

4.7.3 At the meeting with key staff, there was discussion on the inability of planning as class sizes were unknown until the first week of semester and due to ineffective room booking and timetabling facilities the first 2 to 3 weeks of teaching was disrupted. It was noted that difficulty had also been experienced finding a suitable room for both a member of staff and a student with a disability. The Panel **recommends** that this information be drawn to the attention of the Director of Estates and Buildings to inform the ongoing developments in support of improved timetabling and room booking.

## **4.8 Student Progression, Retention and Support**

### *Progression and Retention*

4.8.1 There appeared to be no retention issues and the new admissions tariff was credited to have improved retention figures significantly. Indeed, from discussion with the Head of School, high retention along with increased student numbers was placing additional pressure on the School. The Panel acknowledged the high student satisfaction results from surveys but was aware that increased student numbers could have an impact on these rates, if it led to decreased contact time with staff and decreased time for research. Consequently, the School was considering introducing a School-specific progression policy, whereby the School defined minimum attainment levels allowing School control over the number of students progressing.

### *Student Support*

4.8.2 The compiled UG class guide was considered **good practice** by the Review Panel. The guide gave a clear outline of structure of UG teaching. There was scope to develop this further by including various contact information and links to the SRC website with a brief outline of other services available. The Masters Programmes handbook was very clear and concise giving an overview of programme details.

However, some information in the PG handbook was more detailed than the UG handbook and vice-versa and the Panel **recommends** a review of both UG and PG handbooks to ensure the best presentation of information is used consistently in both handbooks.

- 4.8.3 The SER highlighted that the School offered both formal and informal support and supervision arrangements were robust. The Review Panel learned from the Undergraduate and Postgraduate students that they were well supported by staff who were considered approachable and sympathetic. The distribution of course material and electronic submission of coursework using Moodle was considered **good practice**. It was noted in the SER that some staff were concerned that some students decided not to attend class as a consequence of making all course notes available on Moodle. However, at the meeting with the undergraduate students they confirmed that lectures were attended if stimulating and provided more than reading through the slides. (please see Section 6.9)
- 4.8.4 The Panel learned from the PGT students that they found the one-year Masters programme difficult, mainly due to the heavy workload but also due to differences in previous undergraduate background or experience and therefore those from outside the UK initially struggled with some of the differences in teaching. However, staff were helpful and provided additional support. The Review Panel queried as to whether staff would be able to continue to provide such support if student numbers substantially grew.
- 4.8.5 The Review Panel noted from the SER the introductory week for Masters' programmes included formatively assessed revision sessions where student were able to transfer to another programme as appropriate. The Review Panel **commends** this **good practice**.
- 4.8.6 The School offered five £2,000 scholarships for international students to study a Masters but, due to low take up, the School concluded that the discount was insufficient and was currently considering a more viable model for awarding a discount for high quality international students. The University of Glasgow, with the British Council, also supported Indian students to study the MSc in Computing Science through the GREAT scholarship scheme. This scheme had been developed in partnership with the UK Government's GREAT campaign. For Session 2014-15, the School has been allocated two GREAT scholarships of £3,000 each.
- 4.8.7 From discussion with the Singapore students, the 4 representatives advised that they had been encouraged to email staff to seek advice or discuss any problems. The School had provided a bridging course as well as a mock examination to give the UGS student experience of the University of Glasgow type examination which the students found useful, particularly those that were returning to education. The Panel **commends** this as **good practice**. However, there seemed to be a perception by the UGS students that moderation of marks potentially entailed marking the Singaporean students down, although the School had advised that moderation of marking was not out of step with current practice for students based in Glasgow and was only used across all students to ensure fairness. However the Panel encourages the School to ensure that moderation of marking was explained adequately. Support had also been provided in relation to assessment but some students who were returning to education from the military (2-5 years national service) felt at a disadvantage in relation to programming skills. Some students had no experience in the subjects/programming language being taught and only had a limited amount of time to learn.

4.8.8 The UGS students had arranged study groups to help each other with assignments and to share ideas. The student group was approached in the first instance for support with the stronger students assisting the weaker students. They did feel that they had to work hard. The students advised that they were a small group and consequently felt isolated. However some had participated in some organised social events. The Review Panel suggested that as other collaborative arrangements became established the number of University of Glasgow Singapore cohort would grow. It was also suggested that the School could get in touch with the Glasgow Alumni students based in Singapore to establish further contacts. The Review Panel was aware that the School would be carefully reviewing the arrangements with UGS and **recommends** that the School pays particular attention to the support given to the UGS students in their transition to studying at the University of Glasgow at the end of the first year of operation in Singapore.

## 5. The Quality of Learning Opportunities

5.1 The range of provision was considered appropriate, offering both broad and specialist provision. The strong links with industry enhanced the student learning experience as well as employability.

5.2 From discussion with the key staff and with the students, the classroom experience ranged from traditional type lecturing to more interactive teaching. Staff had autonomy to choose a style, but it was apparent from the discussions with the students that the more interactive style was preferred. (please refer to Section 6.9) The Review Panel recognised the benefits of balancing teaching styles but **recommends** the School builds on its existing activities for sharing good practice in teaching across the School to encourage further developments of teaching, engaging both staff and students with the process.

5.3 It was evident from discussions with the students that the in-depth detail of Honours and Masters' courses were highly valued.

5.4 The quality and enthusiasm of the UG and PGT students and GTAs was evident to the Panel. The students, who met with the Review Panel, expressed overall satisfaction with the quality of their learning opportunities and their experiences as students.

## 6. Resources for Learning and Teaching

### *Accommodation*

6.1 At the meeting with the Head of School, the lack of accommodation was highlighted as a major problem in relation to growth and there was concern about the impact current limited space was having on the student experience, particularly PhD students. (please refer to 4.7.2)

6.2 Both the undergraduate and PGT students highlighted that there was a need for more social learning space to give students an opportunity to meet and discuss issues of interest and to accommodate collaborative group work.

### *Computing laboratories*

6.3 The SER report indicated that the computing laboratories were in poor condition. The SER and the Head of School also indicated an acute problem with laboratory space and an inadequate ratio of machines to students. The GTAs advised that, although

there was overcrowding, they considered the condition of the laboratories to be satisfactory and had seen consistent improvement made to them over time. However, the GTAs highlighted that several interspersed tutorials used the laboratories at the same time which did cause problems when teaching. The undergraduate students appeared generally satisfied with the laboratory space, highlighting limited space and minor issues in relation to some faulty keyboards and chairs. However, staff found the conditions basic, particularly when compared to facilities elsewhere. From discussion with the PGT students, they considered the laboratories to be over-crowded and highlighted that not all computers were linked to a printer which limited availability further. The Panel was advised that the University had commenced a refurbishment programme of laboratory provision, with the Level 1 computing laboratory scheduled to be upgraded during summer 2014. However, this did not address the School's concerns relating to limited accommodation. (please refer to 4.7.2 and 6.1)

- 6.4 Both Hons and PGT students have 24-hour laboratory access. Level 1 and 2 have access in accordance with Boyd Orr opening hours of 8 am to 10.30. Some of the students observed that storage quotas were limited such that they were sometimes unable to store all their work. Upgrades to the servers would be needed to address this. (please also refer to Section 6.6)
- 6.5 At the meeting with the PGT students, they advised that access to pcs was good and welcomed the provision of larger monitors. However, IT support was not sufficiently responsive for their requirements. They commented on Moodle which functionality they found basic and also MyCampus which they found restrictive, unresponsive and unclear. They suggested more collaborative and distance group assignments would be useful if available on Moodle or other Virtual Learning Environment (VLE). The Panel raised this at the meeting with key staff who advised that the School was well aware of the restrictions caused by MyCampus and the impact this was having on the student experience.
- 6.6 The Review Panel discussed with the Head of School the replacement of PCs and was informed that the University replacement policy of every 5 years was inadequate for Computing Science. Computers were intrinsic to the subject; requiring highly intensive use that was very different in nature from normal student use. Higher specification computers and regular upgrades were important to the quality of the student experience. The Review Panel **recommends** that the College, School and IT Services should discuss developing a sustainable upgrading model that will secure appropriate PC facilities with adequate storage capacity, higher specifications and on a shorter replacement cycle for Computing Science laboratories.

#### *Singapore Institute of Technology*

- 6.7 The Panel learned from the UGS students that all studying was undertaken within 2 rooms: a computing laboratory and a meeting room. The laboratory did not contain computers as the students were expected to bring their own laptops which serve as workstations providing access to a shared server. They had been advised what software to install and had virtual access for assignments.

#### *Staffing*

- 6.8 The Review Panel **commends** the excellent balance of teaching and research that the School had achieved which provided an excellent student experience. However, it was noted, from the SER, that the number of administrative and technical support staff in the School had diminished after restructuring. The School reported that a consequence of this was academic staff had taken on more administrative tasks which had significantly contributed to higher workload and pressure. The Review Panel

**recommends** that the College reviews the effectiveness of current administrative and technical support arrangements for the School and where appropriate takes action to provide more effective support.

- 6.9 From discussion with the undergraduate and postgraduate taught students, it was evident that the students enjoyed those lectures designed to be interactive allowing for students to voice an opinion and accommodate discussion during the class. Flip teaching was also discussed where the students confirmed that this style of teaching encouraged students to think and reflect on what was being taught and also motivated students to work in advance of the lecture in order to discuss issues. It was noted that there were still a small number of staff that simply read the slides during the lecture and the students considered these lectures to be of limited value. The students present informed the Panel that, amongst staff who delivered traditional lecture-style teaching, there was no consistent approach used by the lecturers. (please refer to Section 5.2)
- 6.10 The UGS students confirmed that lectures were good and that staff were knowledgeable and knew the course material well. Lecturers were also approachable. At the meeting with probationary staff, the Singapore based staff confirmed that a range of teaching styles had been adopted. Probationary staff at the University of Glasgow stated that it depended on content where key or particularly heavy content was being taught by more traditional methods. They also discussed that it could be difficult implementing more innovative teaching methods where delivering someone else's material, although it was easier to adapt the style having taught it for a year or two.

#### *Staff support*

- 6.11 The Review Panel noted from the SER the use of an in-house online web portal for staff that automated teaching and learning tasks such as coursework deadlines and extensions, examination management, timetabling issues, extension requests, attendance monitoring, coursework deadlines etc. Although the Panel did not have an opportunity to discuss this further with staff during the review, it was recognised as **good practice** with potential for wider use across the University.

#### *Probationary staff*

- 6.12 At the meeting with the probationary staff, it was indicated that staff were satisfied with the level of support they were given and welcomed the gradual increase in teaching responsibility, although laboratory teaching and project supervision could be intensive. It was indicated that the balance of some courses could be amended in order to teach more concepts and not just technology and make them more up-to-date. It was agreed that additional staff would ease workload pressure.
- 6.13 The Panel learned that staff were assigned to research groups and substantial support had been given for developing research grants. Some probationary staff had been included in the Research Excellence Framework (REF). It appeared to be a well-developed community with many staff who had previously been either undergraduates or taught postgraduates in the School. This had both positive and negative implications.
- 6.14 There appeared to be no formal mentoring arrangements established with more informal support undertaken within research groups and staff were satisfied with this arrangement.
- 6.15 The probationary staff based in Singapore felt supported in relation to teaching but some frustration was experienced due to the lack of opportunity to undertake research,

as the partnership was in the early stages. UGS colleagues from other subject areas and other universities had research laboratories and the Panel recognised that a network needed to be developed. Attempts were being made to attain government and industrial funding to establish research as well as develop collaboration with staff based at Glasgow.

- 6.16 Staff based in Singapore recognised the importance of the additional support students required, particularly as students were entering into Year 3 directly. They also had additional pressure due to the substantial differences between the UK higher education system and the system in Singapore. In relation to marking, moderation took place between marking teams.
- 6.17 The Panel was informed that those that had undertaken the New Lecturer Training Programme had found it to be beneficial.

#### *Graduate Teaching Assistants*

- 6.18 At the meeting with key staff, the level of support for Graduate Teaching Assistants (GTAs) was discussed. The Panel was advised that most GTAs supported laboratory sessions and moderated Level 1 and 2 assignments. Tutors received weekly briefings. From discussion with the Graduate Teaching Assistants (GTAs), it was apparent that tutors were well supported and were very positive about their experience. It was evident from discussion with the GTAs that they were aware of the different level of support and preparation required between Levels 1 and 2. The GTAs confirmed that they were able to balance teaching duties with their studies and found the skills they were learning useful.
- 6.19 In relation to marking, the GTAs advised that they were given very comprehensive answers which were linked to grading. Due to the type of work assessed in First Year, GTAs were able to apply discretion; marking focussed on whether or not concepts had been understood. The GTAs appeared to have sufficient awareness of the use of English in an academic environment. Tutorial groups rotated between GTAs to ensure fairness and group marking sessions were also available if there was any uncertainty and where consensus could be sought.
- 6.20 The Panel was impressed with the quality and dedication of the GTAs, a number of whom had deliberately supported courses outside of their specialist area to build upon their own skills and knowledge. They found teaching interesting and felt that they were also learning from the students due to differing perceptions. The Panel **commends** the high level of support provided to the GTAs and also the quality and dedication of the GTAs.

## **7. Maintaining the Standards of Awards**

- 7.1 All programmes are scrutinized by external examiners. The External Examiners had praised the School's ongoing course development and high standards of student work.
- 7.2 The School has also introduced an industrial external examiner for the conversion Masters' programmes who provides specific feedback on projects to ensure that they are industrially relevant. The BCS commended this practice during their recent visit.
- 7.3 From discussion with PGT students, it was evident that they could distinguish between UG and PGT level as they recognised the difference in approach and the higher level of expectation from the students.

- 7.4 All single BSc (Honours) and the joint honours Electronic & Software Engineering degree programmes were accredited by the British Computer Society (BCS) and the Institution of Engineering & Technology (IET) as fulfilling the requirements for Chartered IT Professional (CITP) and partial Chartered Engineer (CEng)/Chartered Scientist (CSci) accreditation. MSci programmes were accredited CITP and partial CSci. (see Section 4.2)

## **8. Assuring and Enhancing the Quality of the Students' Learning Experience**

- 8.1 The Panel was impressed with the links with industry for Honours and Masters' projects as well as the credit-bearing industrial placement for Software Engineering students during the summer vacation after Level 3.
- 8.2 The relationship established with secondary schools and the promotion of the subject through the credit-bearing 'Computing Science in the Classroom' also gave students a valued learning opportunity by acting as classroom assistants and tutors.
- 8.3 The Review Panel was impressed by the bespoke project allocation system for undergraduate students. The system was also a project management system for handling the marking of projects. The students confirmed that they valued the high quality contact time with staff with research interests in the chosen specialism. From discussion with key staff, the Panel learned that the system allowed staff to propose projects which the students self-selected. Students selected a number of options with the intention that they would be allocated first to third choice.
- 8.4 At the meeting with the Head of School, the limited student international mobility was discussed. The Panel was advised that there was insufficient student interest and the group work undertaken in Year 3 ran over two semesters making it difficult to offer study abroad placements. However, in discussion with the students, it became clear that there was interest for opportunities to study abroad. The Review Panel agreed that the curriculum should not be too restrictive so as to prevent student mobility and that bilateral agreements could be established to accommodate the School requirements. The School could also be more creative, possibly allowing for remote input into group projects or other potential opportunities. The Review Panel **recommends** that the School consults with the Recruitment and International Office and the Dean of International Mobility in revising their approach to student mobility.

## **9. Summary of Perceived Strengths and Areas for Improvement in Learning and Teaching**

### **9.1 Key Strengths**

The following key strengths were noted:

- Approachable, dedicated and supportive staff
- The School's rankings in quality league tables and evident strong research
- The breadth of provision and the ability to support specialist areas
- The links with industry which greatly enhanced the student experience and ensured that the subject was up-to-date with industrial requirements and students were employable.
- The link with secondary schools and the positive learning experience this provided the students
- The support given to Graduate Teaching Assistants and probationary staff.

- The Review Panel was very impressed by the students they had met. There were reflective, articulate, dedicated and very supportive of the School. This highlighted the School's commitment in providing a positive student experience

## 9.2 Areas for improvement

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

- A phased strategic plan for future provision and size
- Approach to teaching and how to maintain quality at a different operative scale
- Re-examination of assessment and whether the School is over-assessing
- Standardising assignment feedback in relation to timescale and detail
- Establish distinctive Intended Learning Outcomes for each programme
- Inclusion of students and GTAs during curriculum review
- Consideration of opportunities for student mobility

## 9.3 Conclusion and recommendations

The Review Panel recognised that the School was well established and had a worldwide reputation within the subject area. The Review Panel observed a highly successful, dedicated and hard-working School that aimed to provide the best learning and teaching environment for their students. The Panel was most impressed with the links the School had established with industry and with Secondary Schools and was highly impressed by the quality of the students it had met with. The Panel recognised that, as a medium sized School, it was under pressure to cover a diverse range of teaching and research and therefore the main area for improvement was for the School to establish a clear vision and strategy for growth: what range of activity would best suit the School and what overall target should be set in relation to student population. Strategy would need to be built into the College of Science and Engineering plans for growth and it was therefore important for the School to demonstrate to the College its potential and the benefit this would provide both the College and University. It was recognised that due to the current flux in student numbers, the School may have to initially establish controls to allow its plan to develop and to enable the School to maintain its research excellence.

## Commendations

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

### Commendation 1

The Review Panel commends the high standard of publishable MSci projects. [Paragraph 3.5]

### Commendation 2

The Review Panel commends the high quality student intake which was evident at the meetings with the students and with the Graduate Teaching Assistants. [Paragraph 3.5]

### Commendation 3

The Review Panel commends the use of industrial assignments. [Paragraph 4.5.1]

### Commendation 4



The Review Panel highly commends the strong links with industry and employability. [Paragraph 4.6.5]

#### Commendation 5

The Review Panel commends the two practices introduced to strengthen relationship with secondary schools: the credit-bearing 'Computing Science in the classroom' where students act as classroom assistants and tutors promoting both Computing Science and the University; the development of a nationwide CPD programme for teachers, funded by the Scottish Government. [Paragraph 4.6.6]

#### Commendation 6

The Review Panel commends the School's success in diversifying programmes and recruiting undergraduate and postgraduate students from a wide variety of backgrounds. [Paragraph 4.7.1]

#### Commendation 7

The Review Panel commends the good practice of providing the introductory week for Masters' programmes which includes formatively assessed revision sessions where students are able to transfer to another programme as appropriate. [Paragraph 4.8.5]

#### Commendation 8

The Panel commends the practice of providing a bridging course as well as a mock examination to UGS students. [Paragraph 4.8.7]

#### Commendation 9

The Review Panel commends the excellent balance of teaching and research that the School had achieved which provided an excellent student experience. [Paragraph 6.8]

#### Commendation 10

The Panel commends the high level of support provided to the GTAs and also the quality and dedication of the GTAs. [Paragraph 6.20]

### Recommendations

A number of recommendations have been made, many of which concern areas that the School had itself highlighted for further development in the SER or during discussion. The recommendations directed at the School are to support the School in its reflection and to enhance provision in relation to teaching, learning and assessment. The recommendations interspersed in the preceding report are summarised below. They have been cross-referenced to the paragraphs in the text of the report to which they refer and are **grouped together** by the areas for improvement/enhancement and are **ranked in order of priority**.

#### *Recruitment*

##### Recommendation 1

The Review Panel strongly recommends that the School develops a coherent strategic vision in terms of future growth and range of provision, working with the Head of College, to produce a phased plan as to how to reach its vision. [Paragraph 4.7.2]

**For Action: Head of School/Head of College**

##### Recommendation 2

The Panel recommends that the College considers the space limitations currently experienced by the School as a result of the loss of previous laboratory space in the Boyd Orr Building and gives consideration to identifying and developing additional accommodation for current as well as future provision. [Paragraph 4.7.2]

**For Action: Head of College**  
**For information: Head of School**

### Recommendation 3

The Review Panel recommends that the School considers its approach to teaching and how it will maintain quality of support provided to students at a different operative scale, particularly as staff will be under additional pressure from the Singapore intake. [Paragraph 4.7.1]

**For Action: Head of School**

### *Learning and teaching resources*

### Recommendation 4

The Review Panel recommends that the College reviews the effectiveness of current administrative and technical support arrangements for the School and where appropriate, takes action to provide more effective support. [Paragraph 6.8]

**For Action: Head of College**  
**For information: Head of School**

### Recommendation 5

The Review Panel recommends that the College, School and IT Services should discuss developing a sustainable upgrading model that will secure appropriate PC facilities with adequate storage capacity, higher specifications and on a shorter replacement cycle for Computing Science laboratories. [Paragraph 6.6]

**For Action: Head of College**  
**For information: Head of School, Director of IT Services**

### *Assessment*

### Recommendation 6

The Review Panel recommends that the School reviews both the scale and timing of assessments, including examinations, to ensure the assessment load on staff and students is appropriate and optimally phased. [Paragraph 4.5.3]

**For Action: Head of School**

### *Feedback*

### Recommendation 7

Review Panel recommends that the School puts in place measures to ensure the consistency of feedback to students on assignments both in relation to timescale and quality in accordance with the University's Assessment Policy. [Paragraph 4.5.4]

**For Action: Head of School**

### *Curriculum Design*

### Recommendation 8

The Review Panel recommends that GTAs and students are made more aware of consultation processes and the mechanisms through which they can contribute to these, to encourage more direct engagement from the students. [Paragraph 4.6.2]

**For Action: Head of School**

*Intended Learning Outcomes (ILOs)*

Recommendation 9

The Review Panel recommends the School and the Learning and Teaching Centre Academic Development Unit work together to continue to develop ILOs that appropriately reflect the distinctive nature of different programmes even when there are common elements. The School should also be supported in developing effective mechanisms to ensure that the mapping of these ILOs onto assessment type is clearly communicated to students. [Paragraph 4.4]

**For Action: Head of School and Director of the Learning and Teaching Centre**

*Quality of learning opportunities*

Recommendation 10

The Review Panel recommends the School builds on its existing activities for sharing good practice in teaching across the School to encourage further developments of teaching, engaging both staff and students with the process. [Paragraph 5.2]

**For Action: Head of School**

Recommendation 11

The Review Panel recommends that the School consult the Recruitment and International Office and the Dean of International Mobility in revising their approach to student mobility [Paragraph 8.4]

**For Action: Head of School**

**For information: Director of Recruitment and International Office/  
Dean of International Mobility**

*Student support*

Recommendation 12

The Panel recommends the information on timetabling and room booking problems highlighted in paragraph 4.7.3 be drawn to the attention of the Director of Estates and Buildings to inform the ongoing developments in support of improved timetabling and room booking. [Paragraph 4.7.3]

**For Action: Director of Estates and Buildings**

Recommendation 13

The Review Panel recommends that the School pays particular attention to the support given to the UGS students in their transition to studying at the University of Glasgow at the end of the first year of operation in Singapore. [Paragraph 4.8.8]

**For Action: Head of School**

Recommendation 14

The Review Panel recommends a review of both UG and PG handbooks to ensure the best presentation of information is used consistently in both handbooks. [Paragraph 4.8.2]

**For Action: Head of School**

**For information: Head of School Administration**