Programmatic Review of the Faculty of Faculty of Engineering & Science 2017

Phase 2: Programme Review

PROGRAMME PANEL REPORT

SCHOOL:	School of Science and Informatics
DEPARTMENT:	Department of Computer Science
DATE:	March 29th and 30th 2017

PROGRAMMES SUBMITTED FOR REVIEW

Major Awards

- Bachelor of Science (Honours) in Software Development
    - Bachelor of Science in Software Development
    - Higher Certificate in Software Development
- Bachelor of Science (Honours) in Web Development
- Bachelor of Science (Honours) in Computer Systems

Non-Major Awards

None

PROGRAMME REVIEW PANEL MEMBERSHIP

Dr Brendan Ryder, Head of Department of Visual and Human-Centred Computing, Dundalk Institute of Technology [Chair]

Dr Gearóid Ó Súilleabháin, Head of Department, Department of Technology Enhanced Learning, Cork Institute of Technology [Panel Member and Recording Secretary]

Dr Sean Duignan, Head of Department of Computer Science, Galway-Mayo Institute of Technology

Mr Donnacha Forde, Senior Software Engineering Manager, Intel Security,

Niall Cody, Software Engineer, IBM Cloud Products Engineering

PROGRAMME REPRESENTATION

Programme Staff

Dr Sean McSweeney

Dr Ted Scully

Dr Ruairi O'Reilly

Dr Paul Davern

Ms Helen Fagan

Mr David Murphy

Dr Samane Abdi

Mr Gary Couse

Ms Mary Davin

Learner Representatives

Karolina Kubek, DNET2

Alan Kelly, DNET3

Kyle Williamson, DCOM4

Calvin Riordan, COM2

Ben O'Donnell , COM2

Sinead McDonnell, DWEB4

Louise Jennings, DWEB4

David Good, DWEB4

Brian Covency, COM3

Graduates

Dylan Smyth, DNet (currently researcher in Nimbus)

Employers

Michael McCourt, McAfee

Juan Miguel Camarasa, Johnson Controls

A. PROGRAMME SUMMARY AND MAJOR CHANGES PROPOSED

1. BSc (Hons) Software Development

1.1. **Programme Summary**

The BSc (Hons) in Software Development is a four-year ab-initio level 8 degree programme that provides students with the theoretical knowledge and practical competencies necessary to support a career in the software development industry. More specifically, the programme provides students with an in-depth knowledge of modern software development languages, techniques, tools and methodologies and their application to real-world problems. Students will be proficient in the application of state-of-the-art technologies in areas such as cloud computing, Big Data and data analytics. Students will also be equipped with research skills that will enable to them to become independent self-learners. On successful completion of this degree programme, there are further taught postgraduate study options in the Department of Computer Science as well as research and PhD programmes.

The programme runs over 4 years, organised over 8 semester with each semester worth 30 ECTS credits. All learners undertake six modules in each semester, each module is worth 5 ECTS credits. From semester three students undertake an elective each semester. The electives allow opportunities to focus on specific modules and some students opt for free choice electives.

Work Placement is scheduled in Semester 6 and is worth 30 ECTS credits. There is a group project in in Semester 5 and the individual final year project is completed in Semester 7, (Research Phase) which is followed by the implementation phase in Semester 8.

The BSc (Hons) in Software Development is not offered in part-time mode.

1.2. **Major Changes Now Proposed**

The key changes proposed may be summarised as follows:

- A change to the work placement element of the programme to make all undergraduate programmes in the department consistent in this regard and base them all around one single shared 30 credit Work Placement module. There is also a related change in the timing of the work placement element to allow students to be in placement from January right into early September if required (previously students were only required to complete work placement for half of one semester). For those who cannot undertake the new work placement option there are a range of new “internal” semester 6 modules which, together with one single Free Choice modules (FREE6001), constitute the requisite 30 credits for this semester.
- Extensive revision of the programme curriculum based on a “themed approach to curriculum development”. This was an iterative process based around key defined themes such as Data, Networking, Programming, and involved ongoing consultation with staff, students and other programmes stakeholders. At the end of the process the vast majority of existing programme modules were either revised or retired and, in the case of this programme, some 22 new modules were developed.

- In tandem with the above curriculum design process, a more balanced and better distributed schedule of student assessment tasks and exams is being proposed by the head of the department for all 8 semesters of the programme. The need for this proposed revision arise from a sense that the existing schedule is non-optimised as it arises out of staff setting assessment tasks and exams on a per modules basis without an overview of the assessment schedule as a whole. The proposed revision aims to ensure that students do not have more than two continuous assessment elements due in any given week of a semester. It also changes the number of terminal exams for each semester. If this proposed schedule is approved by the programmatic review panel each module is to be updated to reflect these changes before final approval.
- In addition to the above, a number of operational changes have been introduced with regard to final year projects which leave the two relevant modules INTR8016 and INTR8015 unchanged but which bring a more systematic approach to the project/research proposal process, student supervision and project reports.

2. BSc in Computing/ Software Development

2.1. **Programme Summary**

The BSc in Computing is a three-year ab-initio level 7 degree programme designed to provide students with the theoretical and practical skills necessary to gain employment in the software development industry. More specifically, the programme will provide students with relevant skills and knowledge in the area of modern software development focusing on languages, techniques, tools and methodologies and their application to real-world problems. On successful completion of this degree programme there is a progression pathway available to enable students to enter the Level 8 BSc (Hons) in Software Development programme (see above).

Learners undertake six modules 5 ECTS credit per semester. In semester three students undertake an elective each semester. Work Placement is scheduled in Semester 6 and is worth 30 ECTS credits. There is a group project in in Semester 5.

The programmes is offered in part-time mode with modules being delivered on-campus by night from Monday to Friday and Saturday mornings. The programme is very popular with 116 first year registrations.

2.2. **Major Changes Now Proposed**

The key changes proposed may be summarised as follows:

- Change in title to the “BSc in Software Development”. A transitional schedule was provided to the panel for same.
- The introduction of a work placement element for this programme where none had existed before. This brings the BSc in Computing/ BSc in Software Development into line with other undergraduate programmes in the department which all now devote semester 6 to student work placement. For those who cannot undertake the new work placement option there are a range of new “internal” semester 6 modules which, together with one single Free Choice modules (FREE6001), constitute the requisite 30 credits for this semester.

- Extensive revision of the programme curriculum based on a "themed approach to curriculum development". This was an iterative process based around key defined themes such as Data, Networking, Programming, and involved ongoing consultation with staff, students and other programmes stakeholders. At the end of the process the vast majority of existing programme modules were either revised or retired and, in the case of the proposed BSc in Software Development, some 16 entirely new modules were developed.
- In tandem with the above curriculum design process, a more balanced and better distributed schedule of student assessment tasks and exams is being proposed by the head of the department for all 6 semesters of the programme. The need for this proposed revision arise from a sense that the existing schedule is non-optimised as it arises out of staff setting assessment tasks and exams on a per modules basis without an overview of the assessment schedule as a whole. The proposed revision aims to ensure that students do not have more than two continuous assessment elements due in any given week of a semester. It also changes the number of terminal exams for each semester. <u>If this proposed schedule is approved by the programmatic review panel each module is to be updated to reflect these changes before final approval.</u>

3. Higher Certificate in Computing/Software Development

3.1. **Programme Summary**

The Higher Certificate in Computing/ Software Development is a two year ab-initio level 6 programme that aims to provide students with the fundamental knowledge and software development skills that will enhance their employment opportunities, while also providing a platform for pursuing further education. The programme exists to equip students with essential theoretical and practical skills in software development, specifically focusing on topics such as programming languages, software development methodologies, database management systems, operating systems and web development. On successful completion of this degree programme there is a progression pathway available to enable students to enter the Level 7 BSc in Software Development programme.

The Higher Certificate in Computing is offered in part-time mode. Modules are delivered on-campus by night from Monday to Friday and Saturday mornings.

3.2. **Major Changes Now Proposed**

The key changes proposed may be summarised as follows:

- Change in title to the "Higher Certificate in Software Development". A transitional schedule was provided to the panel for same.
- Extensive revision of the programme curriculum based on a "themed approach to curriculum development". This was an iterative process based around key defined themes such as Data, Networking, Programming, and Information and involved ongoing consultation with staff, students and other programmes stakeholders. At the end of the process the vast majority of existing programme modules were either revised or retired and, in the case of the Higher Certificate in Computing/Software Development in Computing, some entirely new modules were developed.

- In tandem with the above curriculum design process, a more balanced and better distributed schedule of student assessment tasks and exams is being proposed by the head of the department for all 6 semesters of the programme. The need for this proposed revision arise from a sense that the existing schedule is non-optimised as it arises out of staff setting assessment tasks and exams on a per modules basis without an overview of the assessment schedule as a whole. The proposed revision aims to ensure that students do not have more than two continuous assessment elements due in any given week of a semester. It also changes the number of terminal exams for each semester. <u>If this proposed schedule is approved by the programmatic review panel each module is to be updated to reflect these changes before final approval.</u>

4. BSc (Hons) in Computer Systems

4.1. **Programme Summary**

The BSc (Hons) in Computer Systems is a four-year ab-initio level 8 degree programme designed for students who have a keen interest in computer system, embedded systems and software development. With the advent of the Internet of Things (IoT), computer systems engineering is a fast growing sector of the international computing industry. Embedded systems have become widespread and can be found in almost all modern consumer devices, from washing machines to modern cars. A computer systems engineer is someone who combines knowledge of computer science, engineering, and mathematical analysis to develop, test and evaluate software for personal computers and more. Students will gain an understanding of the fundamental principles of computer systems, embedded systems, systems programming and real time systems, along with knowledge and understanding of modern computer architectures. Students are encouraged to use initiative and confidence in approaching problems, investigating solutions using a blend of analytical and practical skills.

The programme runs over 4 years, organised over 8 semester with each semester worth 30 ECTS credits. All learners undertake six modules in each semester, each module is worth 5 ECTS credits. From semester three students undertake an elective each semester. The electives allow opportunities to focus on specific modules and some students opt for free choice electives.

Work Placement is scheduled in Semester 6 and is worth 30 ECTS credits. There is a group project in in Semester 5 and the individual final year project is completed in Semester 7, (Research Phase) which is followed by the implementation phase in Semester 8.

The BSc (Hons) in Computer Systems is not offered in part-time mode.

4.2. **Major Changes Now Proposed**

The key changes proposed may be summarised as follows:

- A change to the work placement element of the programme to make all undergraduate programmes in the department consistent in this regard and base them all around one single shared 30 credit Work Placement module. There is also a related change in the timing of the work placement element to allow students to be in placement from January right into early September if required (previously students were only required to complete work placement for half of one semester). For those who cannot undertake the

new work placement option there are a range of new "internal" semester 6 modules which, together with one single Free Choice modules (FREE6001), constitute the requisite 30 credits for this semester.

- Extensive revision of the programme curriculum based on a "themed approach to curriculum development". This was an iterative process based around key defined themes such as Data, Networking, Programming, and Information and involved ongoing consultation with staff, students and other programmes stakeholders. At the end of the process the vast majority of existing programme modules were either revised or retired and, in the case of BSc (Hons) in Computer Systems, some 23 entirely new modules[1] were developed.
- In tandem with the above curriculum design process, a more balanced and better distributed schedule of student assessment tasks and exams is being proposed by the head of the department for all 8 semesters of the programme. The need for this proposed revision arise from a sense that the existing schedule is non-optimised as it arises out of staff setting assessment tasks and exams on a per modules basis without an overview of the assessment schedule as a whole. The proposed revision aims to ensure that students do not have more than two continuous assessment elements due in any given week of a semester[2]. It also changes the number of terminal exams for each semester. If this proposed schedule is approved by the programmatic review panel each module is to be updated to reflect these changes before final approval.
- In addition to the above, a number of operational changes have been introduced with regard to final year projects which leave the two relevant modules INTR8016 and INTR8015 unchanged but which bring a more systematic approach to the project/research proposal process, student supervision and project reports.

5. BSc (Hons) in Web Development

5.1. **Programme Summary**

The BSc (Honours) in Web Development is a four-year level 8 honours degree. The programme is designed to provide students with the skills necessary to develop software primarily for the World Wide Web. The programme also provides them with a broad overview of Computer Science fundamentals. This results in graduates who are competent developers in multiple modern programming languages and have a strong understanding of the theoretical concerns that underpin Computer Science such as Operating Systems, Software Engineering, Computer Architecture, Security and Database Systems. As a result, the degree will prepare students for a career in a fast paced and continually evolving industry. Specialised modules outline the design and development methodologies necessary for providing complex front-end behaviour and scalable back-end solutions. Not only are students exposed to state-of-the-art technologies and practices currently in use, they also acquire the skills necessary to keep up to date with changes in the industry, and learn how to adapt to new technologies and paradigms as they arise. As students progress through the programme they gain an appreciation for the nuances in the design and development of web applications. This is enhanced by modules concerned with

[1] Figure includes 3 new semester 6 modules for those not undertaking work placement

[2] An exception being learning journals which, by their nature, take place regularly and repetitively.

human computer interaction, user experience and visual design. As such, students attain a rich appreciation for the design process and a greater understanding of how complex user requirements are fulfilled in a simple and elegant manner.

The programme endeavours to develop these skills in unison, encouraging students to develop complete solutions from start to finish utilising the abilities they have attained throughout the programme. This produces a graduate who has the capacity to take a project from the initial concept/design stage right through to delivering the final product. The programme runs over 4 years, organised over 8 semester with each semester worth 30 ECTS credits. All learners undertake six modules in each semester, each module is worth 5 ECTS credits. From semester three students undertake an elective each semester. The electives allow opportunities to focus on specific modules and some students opt for free choice electives.

Work Placement is scheduled in Semester 6 and is worth 30 ECTS credits. There is a group project in in Semester 5 and the individual final year project is completed in Semester 7, (Research Phase) which is followed by the implementation phase in Semester 8.

The BSc (Honours) in Web Development is not offered in part-time mode.

5.2. **Major Changes Now Proposed**

The key changes proposed may be summarised as follows:

- The BSc (Hons) in Web Development will continue to have a 30 credit Work Placement. All other programmes in the Department of Computer Science are now aligned with this model
- Extensive revision of the programme curriculum based on a “themed approach to curriculum development”. This was an iterative process based around key defined themes such as Data, Networking, Programming, and Information and involved ongoing consultation with staff, students and other programmes stakeholders. At the end of the process the vast majority of existing programme modules were either revised or retired and, in the case of the BSc (Honours) in Web Development, some 23 entirely new modules were developed.
- In tandem with the above curriculum design process, a more balanced and better distributed schedule of student assessment tasks and exams is being proposed by the head of the department for all 8 semesters of the programme. The need for this proposed revision arise from a sense that the existing schedule is non-optimised as it arises out of staff setting assessment tasks and exams on a per modules basis without an overview of the assessment schedule as a whole. The proposed revision aims to ensure that students do not have more than two continuous assessment elements due in any given week of a semester3. It also changes the number of terminal exams for each semester. <u>If this proposed schedule is approved by the programmatic review panel each module is to be updated to reflect these changes before final approval.</u>
- In addition to the above, a number of operational changes have been introduced with regard to final year projects which leave the two relevant modules INTR8016 and

[3] An exception being learning journals which, by their nature, take place regularly and repetitively.

INTR8015 unchanged but which bring a more systematic approach to the project/research proposal process, student supervision and project reports.

B. PANEL FINDINGS AND RECOMMENDATIONS

1. OVERALL RECOMMENDATION TO ACADEMIC COUNCIL ON REVALIDATION

Contingent upon confirmation of the successful completion of the internal programme and module moderation process, the Panel **recommends to Academic Council that the programmes listed above be revalidated** for a further five years or until the next Programmatic Review, whichever is sooner, with immediate effect.

Other than Registrar's Office approval of the programme and module specifications on conclusion of internal moderation, no conditions are attached to this recommendation.

2. GENERAL

2.1 **Commendation**. The panel would like to commend the programme team on their collaborative, systematic and theme-based approach to the redesign of their undergraduate programmes and on the quality and extent of documentation provided to the review panel in support of same.

2.2. **Commendation**. The panel would like to commend the obvious engagement and enthusiasm of the department staff which was clearly evident over the two days of discussion. Their care and support for their students is apparent and is to be highly commended.

2.3 **Commendation**. The panel furthermore commends the very high quality delivery, flow between years, commitment to the development of the student, relevance, depth and field of all programmes under review. Programmes are well-scaffolded and the students in general are closely monitored and supported. There is good integration of the theory, technology and industry practice, a strong level of engagement by faculty and notably high levels of satisfaction indicated by all stakeholders.

2.4 **Commendation**. The significant engagement with industry was apparent throughout the review process, from the department staff themselves right through to ongoing involvement by a range of industry stakeholders, and the employer representatives. The programmes under review have been updated in a way that aligns with current and emerging industry trends and practices.

2.5 **Commendation.** Graduates emerge from these undergraduate programme as well-rounded, with industry relevant skills, and adaptability in a context of an industry in constant change.

2.6 **Recommendation** The panel would recommend that the department gives thought to tracking the long terms effects of the proposed changes, which are significant, and determining the metrics and mechanism for same.

2.7 **Recommendation** The panel recommend the institute and department need to define mechanisms for tracking graduate destination and their ultimate career paths.

3. Entrant and Graduate Profile, Award and Professional Environment

3.1 **Commendation**. The programmes under review represent a series of coherent programme offerings specified to the needs of industry and to providing graduates with an adaptability and preparedness for future learning and performance challenges.

3.2 **Commendation**. Although the three level 8 degrees under review are four year ab initio programmes, the panel are pleased to see there is a transfer option, for those attaining a sufficiently high exit award, onto these programmes from the department's level 7 BSc in Computing. In addition, the panel welcomes the provision of alternative entry routes such as QQI-FET application routes inc the local Cork Colleges Profession Scheme; The Disability Access Route to Education (DARE) admissions scheme and various additional routes for mature learners through, inter alia, CAO and CIT's Advanced Entry process.

3.3. **Commendation.** The panel commends the changes to and decision to continue to provide a level 8 programme focussing on web development, a critical area given the role of the web as a content and software distribution platform and the way in which web development is now required and expected for so many aspects of contemporary software development work.

3.4 **Recommendation.** The panel welcome the effort of the department to improve the gender balance among applicants and, ultimately, their student body. It is recommended that these efforts continue and are augmented if possible and are monitored over time.

3.5 **Recommendation** The student and graduate sessions were positive and produced significant feedback and intelligence on the current configuration of the programme. The students' and graduate's ability to reflect on their experiences of the relevant programmes and articulate their views was impressive and no doubt reflects again the commitment, engagement and support of department staff. While verbal feedback with a representative student group was provided during the site visit, there was no evidence that regular formalised student feedback mechanisms and processes are in place within the department (e.g. programme and module feedback, Irish Survey of Student Engagement (ISSE). The panel recommends that such feedback mechanisms and processes are put in place.

3.6 **Recommendation** While intuitively and anecdotally it appears employment levels for graduates from the relevant programmes are high, the panel would like to have seen evidence of actual graduate destinations over time. The panel recommends that systematic mechanisms be put in place to track graduates and their employment outcomes (this recommendation may require Institute support in order to implement it effectively).

4. Programme Operation and Performance

4.1 **Commendation**. The department is commended for actively addressing issues around progression and retention through institute-wide supports such as the Good Start student induction program, the Peer Assisted Learning and Support (PALS) mentoring programme and the use of the institute's Academic Learning Centre which provides provide academic support to undergraduate students. The department's own initiatives and interventions in terms of random group assignment of first-year students, the reduction in the number of first year lecturers and a closer scrutiny of first year attendance and performance are also welcomed.

4.2 **Commendation**. The department is commended for its excellent ethos in terms of engagement with industry. The panel welcome and commend the related way in which thematic areas for the re-design of the programmes under review have been based on a recognition of current and emerging big industry trends and requirements and local employment opportunities.

4.3 **Recommendation**. The panel recommends the department carefully monitors the various initiatives and interventions indicated above to inform ongoing and future retention and progression efforts. Such monitoring will need to take into account the many variables and issues relating to non-progression and the individual student experience and likely go beyond quantitative statistics.

4.4 **Recommendation**. The availability and transparency of Post First-Year transfer between programmes is commended though it appears that applicants have to wait until mid-September to discover if they have been successful in their application. While the panel is aware of the need to await Autumn exam results before providing definitive confirmation to students, it recommends the department considers whether anything can be done to reduce some of the uncertainty surrounding the transfer process.

4.5 **Recommendation**. Student feedback suggested there may be issues at particular times of year with regard to accessing resources and labs. The panel recommend the department consider whether provision of a VPN for students or other overt ways to accommodate students using or bringing their over device (BYOD) might help alleviate some of these issues.

5. Proposed Programme Specification (incl. Delivery and Assessment)

5.1 **Commendation** There has been significant and critical reflection on the operation and structure of the current programme in terms of recruitment and entry; transfer and progression retention and student performance; and the students supports. This was clearly used subsequently in a positive and evidence-based way to inform revisions to the new programmes.

5.2 **Commendation**. The panel would like to commend the programme team on their collaborative, systematic and theme-based approach to the redesign of their undergraduate programmes and on the quality and extent of documentation provided to the review panel in support of same.

5.3 **Commendation** There have been extensive and work-intensive revisions to the programmes under review based on a systemic “themed approach to curriculum development”. This iterative process, based around key defined themes such as Data, Networking, Programming, and Information, involved ongoing consultation with staff, students and other programmes stakeholders and has delivered modules and programmes that are instructionally coherent, well-sequenced, industry-relevant, and student-focussed with good articulation between the modules and the overall programme aims. The department are again highly commended for their commitment, diligence and efforts in this regard.

5.4 **Commendation**. The proposal to change the work placement element of all programmes – and in the case of the BSc in Computing/Software Development to introduce such an element for the first time – is welcomed as is the related development of a new shared 30 credit work placement module across all programmes and the ability to extend student placements from January right into early September if required.

5.5 **Commendation**: The panel welcomes and commends the operational changes introduced with regard to final year projects for the level 8 programmes which bring a more systematic and thoughtful approach to, inter alia, the project/research proposal process, student supervision and project reporting.

5.6 **Commendation**. Proposals for a more balanced and better distributed schedule of student assessment tasks and exams are positive and progressive. The proposed revisions ensure students do not have more than two continuous assessment elements due in any given week of a semester which will reduce unnecessary stress and "assessment fatigue" and improve the overall student experience. The panel approves the changes proposed

5.7 **Recommendation**. In context of the above commendation (5.6), and notwithstanding other changes recommended or arising from this review, the panel asks that the modules be updated to reflect proposed changes to the assessment schedule before they are finally approved.

5.8 **Recommendation**. Based on student feedback, the panel recommends that supports such as debriefing or "back to study" sessions be considered to help students transition from work placement back to college in semester 7.

5.9 **Recommendation** As noted above, significant work and deliberation has been completed with regard to assessment load and schedule. Staff, it is suggested, should be aware, however, of the need to balance regular formative assessment with the overall quantum of work demanded of the students and to consider the validity and limitation of final exams as an assessment method.

6. MODULES

This section presents the findings and recommendations from an indicative review of modules carried out by the members of the Peer Review Panel. The Panel notes that a comprehensive survey of module specifications could not be carried out in the context of this review.

Therefore, a recommendation of the Panel to revalidate the programme(s) under review is contingent on the successful completion of the subsequent internal programme and module moderation process carried out by, or on behalf of, the CIT Registrar's Office.

6.1 **Commendation**. The panel reviewed all modules for all programmes with staff, prioritising new or substantially updated modules. The panel were impressed by the depth of engagement and obvious expertise of staff in succinctly explaining each module and, moreoever, explain the place and role of each module in the department's overall provision of programmes.

6.2 **Commendation**. It was clear in the presentation and survey of the modules that the inclusion – and indeed exclusion – of a number of components of the curriculum had given rise to extensive debate and reflection. The programme teams, department and head of department are commended, however, for arriving at a shared vision of a complex interrelated series of modules that together constitute a range of well-thought out and coherent undergraduate offerings.

6.3 **Commendation**. The introduction of Cloud oriented development practices such as microservices and cloud storage architectures (including NoSQL databases) is a welcome progression to keep students up to date.

6.4 **Commendation**. Attention in the curricula to the "non-coding" aspects of a developer's job such as, in particular, source control tools such as GitHub and understanding and implementing the Agile development methodology is welcomed by the panel. Such aspects are critical to helping students hit the ground running both in work placement and employment after graduation.

6.5 **Commendation** The panel commend the provision in semester one of a Mathematics module specific to the needs of Computing students

6.6 **Recommendation**. While the panel welcomes and approves the change from Java to Python across a number of related modules as an introductory computing language, the panel recommends the impact be carefully monitored for at least the initial 2 years to ensure, inter alia, students don't subsequently struggle to make the leap to languages such as Java.

6.7 **Recommendation**: The programme team should consider whether the final examination assessment in the module User Experience Theory (Semester 8, BSc in Web Development) in appropriate.

6.8 **Recommendation**: All programme modules assessment components should be reviewed to ensure that there is a sufficient level of detail provided. For example, there are a number of module where a high percentage is provided with no detailed explanation. Also, programme assessment schedules should ensure a balance between individual, group and peer assessment. The Department should ensure that suitable rubrics are provided to students for all assessments, particularly group assessments.

7. Other Findings and Recommendations

7.1 **Recommendation**: While students are supported by lecturers, there was little clear evidence of student participation in programme boards. Students should be actively engaged in quality assurance and enhancements processes within the Department. This should be reviewed by the programme teams

8. Derogations Sought

Derogations were sought as follows:

- Continue the derogation from Free Choice in year one, Semester 2 to facilitate the operation of the common first year curriculum.
- Derogation from Free Choice also sought for Semester 4 in the BSc (Hons) in Software Development and the BSc (Hons) in Computer Systems to facilitate the delivery of the Probability & Statistics module on both programmes.
- Derogation from Free Choice is also sought for Semester 3 of the BSc (Hons) in Web Development to facilitate the delivery of the Linear Data Structures & Algorithms module.

C. PROGRAMME FINALISATION

1. IMPLEMENTATION OF PANEL REQUIREMENTS/RECOMMENDATIONS

Please note there were no requirements. The list below indicates the recommendations received from the panel.

Section	Feedback	Response
2.6	**Recommendation:** The panel would recommend that the department gives thought to tracking the long terms effects of the proposed changes, which are significant, and determining the metrics and mechanism for same.	Accepted. The programme boards intend to review the operation of the new programmes on an on-going basis.
2.7	**Recommendation:** The panel recommend the institute and department need to define mechanisms for tracking graduate destination and their ultimate career paths.	Accepted. The department has worked with the Alumni Office in the past and will continue to do so in the future. Other measures such as a LinkedIn Group for graduates has been put in place and an email will be sent to all graduates informing them about this group. In future, all final year students will be encouraged to join the department's LinkedIn Group.
3.4	**Recommendation:** The panel welcome the effort of the department to improve the gender balance among applicants and, ultimately, their student body. It is recommended that these efforts continue and are augmented if possible and are monitored over time.	Accepted, it's our intention to build on the good work already done in this area.
3.5	**Recommendation:** The student and graduate sessions were positive and produced significant feedback and intelligence on the current configuration of the programme. The students' and graduate's ability to reflect on their experiences of the relevant programmes and articulate their views was impressive and no doubt reflects again the commitment, engagement and support of	Accepted.

	department staff. While verbal feedback with a representative student group was provided during the site visit, there was no evidence that regular formalised student feedback mechanisms and processes are in place within the department (e.g. programme and module feedback, Irish Survey of Student Engagement (ISSE). The panel recommends that such feedback mechanisms and processes are put in place.	
3.6	**Recommendation:** While intuitively and anecdotally it appears employment levels for graduates from the relevant programmes are high, the panel would like to have seen evidence of actual graduate destinations over time. The panel recommends that systematic mechanisms be put in place to track graduates and their employment outcomes (this recommendation may require Institute support in order to implement it effectively).	Accepted, please see response to 2.7 above. There are resource implications and this may hinder the achievement of this recommendation.
4.3	**Recommendation:** The panel recommends the department carefully monitors the various initiatives and interventions indicated above to inform ongoing and future retention and progression efforts. Such monitoring will need to take into account the many variables and issues relating to non-progression and the individual student experience and likely go beyond quantitative statistics.	Accepted.
4.4	**Recommendation:** The availability and transparency of Post First-Year transfer between programmes is commended though it appears that applicants have to wait until mid-September to discover if they have been successful in their application. While the panel is aware of the need to await Autumn exam results before	The department will consider this recommendation but there isn't a straightforward solution. It's a transparent process that is outlined clearly and is fair for all students. Deciding transfers earlier may not achieve this goal.

	providing definitive confirmation to students, it recommends the department considers whether anything can be done to reduce some of the uncertainty surrounding the transfer process.	
4.5	**Recommendation:** Student feedback suggested there may be issues at particular times of year with regard to accessing resources and labs. The panel recommend the department consider whether provision of a VPN for students or other overt ways to accommodate students using or bringing their over device (BYOD) might help alleviate some of these issues.	The department would like to provide such access for students but unfortunately we do not have funding available to implement such a service.
5.7	**Recommendation:** In context of the above commendation (5.6), and notwithstanding other changes recommended or arising from this review, the panel asks that the modules be updated to reflect proposed changes to the assessment schedule before they are finally approved.	Completed
5.8	**Recommendation:** Based on student feedback, the panel recommends that supports such as debriefing or "back to study" sessions be considered to help students transition from work placement back to college in semester 7.	Will ask Work Placement Coordinators to review this recommendation and take action where necessary.
5.9	**Recommendation:** As noted above, significant work and deliberation has been completed with regard to assessment load and schedule. Staff, it is suggested, should be aware, however, of the need to balance regular formative assessment with the overall quantum of work demanded of the students and to consider the validity and limitation of final exams as an assessment method.	Accepted
6.6	**Recommendation:** While the panel welcomes and approves the change from Java to Python across a number of related modules as an introductory	Accepted

	computing language, the panel recommends the impact be carefully monitored for at least the initial 2 years to ensure, inter alia, students don't subsequently struggle to make the leap to languages such as Java.	
6.7	**Recommendation:** The programme team should consider whether the final examination assessment in the module User Experience Theory (Semester 8, BSc (Hons) in Web Development) in appropriate.	The module author has informed me that this elective module is entirely theory with no practical element and believes the large terminal exam is appropriate.
6.8	**Recommendation:** All programme modules assessment components should be reviewed to ensure that there is a sufficient level of detail provided. For example, there are a number of module where a high percentage is provided with no detailed explanation. Also, programme assessment schedules should ensure a balance between individual, group and peer assessment. The Department should ensure that suitable rubrics are provided to students for all assessments, particularly group assessments.	Accepted. All points have been addressed.
7.1	**Recommendation:** While students are supported by lecturers, there was little clear evidence of student participation in programme boards. Students should be actively engaged in quality assurance and enhancements processes within the Department. This should be reviewed by the programme teams.	Accepted. A major emphasis will be placed on holding Programme Board meetings at times that are more suitable for students.

2. Module and Programme Moderation

In total 63 modules were reviewed across the following programmes:

- Bachelor of Science (Honours) in Software Development
    - Bachelor of Science in Software Development
    - Higher Certificate in Software Development
- Bachelor of Science (Honours) in Web Development
- Bachelor of Science (Honours) in Computer Systems

In total 63 modules were reviewed across the programmes indicated in the report. All modules were updated in line with feedback received by the module moderator and are now ready to be approved.

Module ID	Module Name
12700	Programming Fundamentals
12695	Web Development Fundamentals
12620	Computer Architecture
12624	Physical Computing
12701	Modular Programming
12704	Intro to Databases
12705	Operating Systems in Practice
12702	Networking Fundamentals
12706	Security Fundamentals
12784	Object Oriented Principles
12793	Object Oriented Programming
12785	Operating Systems
12786	Requirements Engineering
12787	Routing and Switching Concepts
12847	Database Design
12789	Server-Side Web Development
12794	NoSQL Data Architectures
12689	C Programming
12800	OO Analysis & Design
12798	Web Publishing
12795	Virtualisation Technologies
12801	Scripting for System Admins
12799	Security for Web applications
12994	Client side Web Development
12788	Linear Data Struct. & Alg
12796	Non-linear Data Struct. & Alg.
12805	Distributed Programming
12814	Programming for Data Analytics
12808	Wireless Technologies
12806	Programming Microcontrollers

12812	Progressive Web Applications
12810	Methods in User Experience
12745	Cloud Development Frameworks
12400	Embedded Sys Tools & Models
12715	Advanced OS & Virtualisation
12898	Cloud Data Frameworks
12834	Big Data & Analytics
10890	Software Defined Networking
7547	Programming Mobile Devices
12830	Embedded Systems Programming
12831	Embedded Software Security
12822	Front End Frameworks
12832	Interactive Data Visualisation
12837	Security Penetration Testing
13173	Visual Design Principles
12797	Interactive Client-side Dev.
12824	App Development Frameworks
12825	Machine Learning
12996	Game Development
12820	User Experience Theory
12879	Advanced Web Publishing Apps
12811	Server Side Web Frameworks
12829	Real Time Systems
12992	Discrete Mathematics 1
13021	Probability and Statistics
12809	Agile Processes
10958	Technical Writing using XML
12807	Group project
13171	Open Source Projects
13176	Emerging Technological Trends
13175	Technical Communication Skills
13081	Maths for Computer Science
13094	Automata and Computation

All modules are ready to be approved, pending approval by academic council.

D. APPENDIX – TIMETABLE OF PHASE 2 MEETINGS

		Panel 1 Software Development Computer Systems	Panel 2 IT Management, Information Technology	Panel 3 MSc Cloud, MSc in Software
Day One Thursday March 30th 2017				
11.00 to 11.30 pm	Private Panel Meeting including presentation by Registrar's Office	Council Room, 2nd Floor, Administration Building		
11.30 to 12.00pm	Department Overview Presentation / Discussion			
12.00 to 12.30pm	Departmental Research Overview - Links to Teaching			
12.30 to 1.30 pm	**Private Panel Lunch**	Bistro		
1.30 to 3.00 pm	Meeting with Dept. Teams re Programme Operation and Performance	Boardroom, CREATE	Boardroom, Tourism & Hospitality	Business & Humanities Boardroom
3.00 to 3.30 pm	**Private Panel Meeting (Tea/Coffee)**			
3.30 to 5.00 pm	Meet with Dept. Teams re Proposed Changes to Programme Structures			
5.00 to 5.30 pm	Meet with Recent Graduates			
5.30 to 6.00 pm	Meet with Employers			
8pm	Panel Dinner	Kingsley Hotel		
Day Two Friday March 31st 2017				
9.00 to 9.15 am	Private Panel Meeting - emerging themes	Boardroom, CREATE	Boardroom, Tourism & Hospitality	Business & Humanities Boardroom
9.15 to 10.15 am	Meet with Students			
10.15 to 10.45 am	**Private Panel Meeting (Tea/Coffee)**			
10.45 am to 12.30 pm	Meet with Dept. Teams re General Review of Modules			
12.30 to 1.30 pm	**Private Panel Lunch**			
1.30 to 2.30 pm	Sub-panel meetings to draft outline reports			
2.30 to 3.00 pm	Feedback to overall panel - themes	Council Room		