Institiúid Teicneolaíochta Chorcaí
Cork Institute of Technology

# Report of Validation Panel

**Date of Meeting:** 2 March 2012

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| **Named Award:** | Higher Diploma in Science |
| **Programme Title:** | Software Development /<br>Cloud Computing /<br>Cloud & Mobile Software Development |
| **Award Type:** | Higher Diploma |
| **Award Class:** | Major Award |
| **NFQ Level**: | Level 8 |
| **Intakes Commencing:** | Software Development: September 2011 /<br>Cloud Computing / Cloud & Mobile Software Development: Jan. 2012 |
| **ECTS/ACCS Credits:** | 60 |

**PANEL MEMBERS**

| Name / Function / Institution |
|---|
| Mr Gerard O'Donovan, Head of School of Business, CIT (Chair) |
| Mr Eamonn de Leastar, Lecturer, Department of Computing, Mathematics & Physics, WIT |
| Mr Aidan Manning, Senior Network Engineer, Strencom, Cork |
| Ms Eva Juhl, Institutional Review Facilitator, CIT |

**IN ATTENDANCE**

| Name / Function / Institution |
|---|
| Dr Catherine Frehill, Module Moderator, CIT |
| Ms Noreen Lucy, Administrator, Department of Computing, CIT (Recording Support) |

**PROPOSING TEAM MEMBERS**

| Name / Function / Department |
|---|
| Mr Jim O'Dwyer, Head of Department of Computing |
| Mr Tim Horgan, Head of Cloud Computing Centre of Excellence, Dep't of Computing |
| Mr Paul Rothwell, Programme Coordinator, HDip in Science in Software Development, Dep't of Computing |
| Ms Mary Davin, Lecturer, Department of Computing |
| Mr Pat McCarthy, Senior Technical Officer, Faculty of Engineering & Science |
| Mr Denis Long, Lecturer, Department of Computing |
| Mr Gerard McSweeney, Lecturer, Department of Computing |
| Ms Aisling O'Driscoll, Lecturer, Department of Computing |
| Mr Karl Grabe, Lecturer, Department of Computing |
| Mr Gordon O'Reilly, Lecturer, Department of Computing |
| Ms Linda O'Sullivan, Lecturer, Department of Computing |
| Mr Colin Manning, Lecturer, Department of Computing |

**BACKGROUND TO THE PROPOSED PROGRAMMES**

The three programmes proposed, the Higher Diploma in Science in Software Development, the Higher Diploma in Science in Cloud Computing, and the Higher Diploma in Cloud & Mobile Software Development, arose from two HEA-funded Level 8 skills conversion initiatives published in January and November 2011 respectively. In each case, the lead-in time from the original HEA call for proposals to 'roll-out' was extremely short, resulting in a dramatically accelerated programme development cycle.

The programmes are designed to allow Level 8 graduates from other disciplines – cognate numerate and analytical disciplines in the case of Software Development, a variety of disciplines in the case of the Cloud programmes – to leverage their developed Level 8 skills set to acquire a specialised ICT qualification in a short period of time, thereby opening up to them the significant career opportunities currently available in this sector.

The HDip in Science in Software Development was accepted as part of the national 'Springboard' initiative in March 2011, and the first learner intake was in September 2011. The programme was put together using existing approved modules already delivered on other programmes of the department. Actual delivery of the HDip programme extends over three delivery periods, commencing in September and ending in December of the subsequent year, with only two modules including a project module delivered in the final period.

The deadline for submission of the HDip in Science in Cloud Computing and HDip in Science in Cloud & Mobile Software Development ("the Cloud programmes") was 22 December 2012, with first intake commencing on 5 March 2012. The Cloud programmes will be delivered over two delivery periods from March to December. It is intended that the second delivery period will be delivered via blended learning, with campus-based delivery limited to four days per month.

# FINDINGS OF THE PANEL

*NOTE: In this report, the term "**Requirement**" is used to indicate an action or amendment which in the view of the Panel **must** be undertaken prior to commencement of the Programme. The term "**Recommendation**" indicates an item to which the Institute/Academic Council/Course Board should give serious consideration for implementation at an early stage and which should be the subject of ongoing monitoring.*

The Panel has considered the documentation provided and has discussed the programme with the proposers. Based on this, the Panel has arrived at a number of Findings, Requirements and Recommendations as follows.

## 1. Programme-Level Findings

### 1.1 NEED FOR THE PROGRAMME

| **Validation Criterion: Is there a convincing need for the programme with a viable level of applications?** |
|---|
| Overall Finding: Yes |

### 1.2 AWARD

| **Validation Criterion: Are the level and type of the proposed award appropriate?** |
|---|
| Overall Finding: Yes, subject to certain Requirements and/or Recommendations |

The proposed Programme Outcomes as presented to the Panel are attached as Appendix 1.

The Panel found that the award of Higher Diploma in Science (Level 8) was appropriate to the nature of the three programmes proposed for validation and to the needs of graduates and the profession for each.

1.2.1.

The Panel noted that the programme outcomes of the HDip in Science in Cloud & Mobile Software Development paralleled those of the HDip in Software Development and did not fully reflect the specialisation of the graduate. The proposers stated they were clear on the skills profile of the intended graduate, but due to the extremely short gestational period allowed had been unable to finalise full specification of this skills set in the programme outcomes.

**Requirement:** A set of programme outcomes for the HDip in Science in Cloud & Mobile Software Development which fully describes the specific skills set of the intended graduate should be developed as a matter of urgency. The finalised programme outcomes should be circulated to the Panel members for final confirmation prior to validation.

### 1.3 LEARNING EXPERIENCE

**Validation Criterion: Is the learning experience of an appropriate level, standard and quality overall?**

Overall Finding: Yes, subject to certain Requirements and/or Recommendations

Findings, requirements and recommendations concerning individual modules (if any) are recorded in Section 2 below.

1.3.1

The Panel discussed the internship arrangements in the Cloud programmes with the programme team. The team stated that the internships did not form an integral part of the programmes, but based on its extensive and close discussions with industry it was confident that internships would be available to all graduates on conclusion of the programme. This was confirmed by the industry representative present on behalf of his company.

**Recommendation:** As workplace immersion is perceived as a core feature of the ICT Skills Conversion programmes, both by the HEA in its original call and by stakeholders, the Panel asks the programme team to re-investigate the feasibility of accommodating an internship as a structured element within the programme design. This in the Panel's view would raise the profile both the internship element and the programme as a whole. Doing so would not necessarily require a revision of the credit structure of the programme; rather the possibility of creating an additional creditable / certifiable element should be considered.

1.3.2

The Panel heard that the mapping of module learning outcomes against the programme outcomes had not been completed in the programme descriptors due to the very brief period allowed for programme development.

**Requirement:** The Panel requests that the mapping should be completed for all three programmes as soon as possible.

1.3.3

**Recommendation:** A series of seminars or workshops on CV preparation and career planning should be delivered to learners on the Cloud programmes.

1.3.4

**Recommendation:** The Panel asks the programme team to formalise its links with industry and ensure appropriate recording of such links in the programme documentation.

### 1.4 PROGRAMME STRUCTURE

**Validation Criterion: Is the programme structure logical and well designed (including procedures for access, transfer and progression)?**

Overall Finding: Yes, subject to certain Requirements and/or Recommendations

The Semester Schedules as proposed are in Appendix 2.

1.4.1

The Panel noted that in its view the HDip in Science in Software Development as currently configured did not include enough award-level material to enable achievement of higher-order learning outcomes in the area of specialisation. The programme team had considered this issue and proposed to address it by replacing the two Intermediate modules scheduled for delivery during the final delivery period, COMP 7002 *Application User Interfaces* and SOFT7009 *Software Project*, with appropriate Advanced-level modules.

**Requirement:** The Panel asks the programme team to replace COMP 7002 and SOFT7009 with suitable Advanced modules as suggested. Should this require drafting of new modules, following module moderation the draft module(s) should be presented to the Panel for final sign-off in the context of the programme.

1.4.2

Following discussion with the programme coordinators, the Panel was satisfied that the mechanisms for applicant information and selection for the Cloud cohorts as outlined by the coordinators were appropriate.

**Recommendation:** For future iterations of the programmes, the Panel recommends that the nature and stringent technical demands of the programmes should be unambiguously indicated in any programme literature and online information materials provided for the guidance of potential applicants.

### 1.5 PROGRAMME MANAGEMENT

**Validation Criterion: Are the programme management structures adequate?**

Overall Finding: Yes

### 1.6 RESOURCE REQUIREMENTS

**Validation Criterion: Are the resource requirements reasonable?**

Overall Finding: Yes

The Panel was assured on behalf of the President and Head of Faculty/College/School that appropriate resources in terms of staffing and facilities will be put in place when the programme is validated.

### 1.7 IMPACT ON THE INSTITUTE

**Validation Criterion: Will the impact of the programme on the Institute be positive?**

Overall Finding: Yes

## 2. Module-Level Findings

The Panel notes that **ALL modules** on the proposed HDip in Science in Software Development HDip, (**7**) **modules** on the proposed HDip in Science in Cloud Computing and (**8**) **modules** on the proposed HD in Science in Cloud & Mobile Software Development are pre-approved modules which may be delivered across several CIT programmes. Any Panel recommendations regarding approved modules should be taken into account and implemented as appropriate at the next point of revision.

The Panel was informed that the draft modules in the Cloud programmes were sent to internal and external subject experts for comment prior to submission to the Validation Panel.

**2.1 ALL MODULES**

**Requirement:** Any revisions to Module Descriptors or Semester Schedules made to address the recommendations and requirements in this report require sign-off from the CIT Module Moderator and the Registrar's Office prior to approval by the CIT Academic Council.

**2.2 ALL MODULES**

**Requirement:** The Panel asks the proposers to ensure that all module descriptors include an appropriate re-assessment strategy.

**2.3 ALL MODULES**

**Recommendation:** The coursework breakdown should be reviewed across the modules to ensure that each assessment event is accompanied by a meaningful description.

**2.4 ALL MODULES**

**Recommendation:** For future iterations of the Cloud programmes, the programme team should consider how any pre-requisite learning with the potential to impact on successful completion of the module might be integrated into the programme respectively the appropriate module descriptors.

**2.5 ALL DRAFT MODULES (Cloud programmes)**

**Recommendation:** In general security is underrepresented across the Cloud programmes, and should be actively tackled in each of the new modules.

**2.6 MODULE *Cloud Computing Infrastructure* (Draft) / MODULE *Spring Applications Development* (Draft)**

**Requirement:** The descriptors for both 15-credit modules should be revised with a view to articulating more explicitly the integrated and authentic nature of the learning and the extent of learner responsibility for her/his own learning.

**Recommendation**: The descriptions of the projects should also be revised in both modules to give more clarity on the nature and breakdown of individual project elements / tasks. Learners should also receive detailed and timely guidance on the project deliverables expected of them and on project management arrangements as part of the programme information.

**Recommendation**: Furthermore, for future iterations of the Cloud programmes, the programme team should consider re-articulating these modules more fundamentally, focussing on the general principles and foundation technologies as opposed to the specific libraries and frameworks, as the Panel considers the lifespan of the modules may be affected by their current formulation.

**2.7 MODULE: *Spring Applications Development* (Draft)**

**Recommendation:** In a revised formulation of this module, the following topics should be included, and should also be considered as candidate topics in the near term:

- Representational State Transfer Principles (REST)
- Service Oriented Architecture (SOA).
- API Design
- NoSQL movement and relationship to traditional ORM

**2.8 MODULE: *Cloud Computing with Python* (Draft)**

**Recommendation**: The module should incorporate a treatment of 'Non-Blocking Input/Output', particularly as this approach can address the c10k problem (http://www.kegel.com/c10k.html). In Python, this issue can be usefully tackled with the Twisted Framework (http://twistedmatrix.com/trac/).

Other approaches include node.js, which could be surveyed for some context. If the module were reformulated at a high level of abstraction, node.js/javacript based solutions could be an alternative to the Python material as currently specified.

**2.9 MODULE: *Mobile Apps Development* (COMP 8021)**

**Recommendation**: In the Panel's opinion, the module descriptor is outdated and makes no reference to the actual content as proposed by the programme team in the programme documentation and discussion (Android & related). The Panel recommends that the module descriptor should be revised at the next occasion possible to reflect this intention. Among the topics that could reasonably appear in a reformulation (in addition to a comprehensive mobile OS and API treatment) should be:

- Security & privacy
- Caching strategies
- User experience in general and wire framing in particular
- The Mobile Web.

## 3. Conclusion

Based on the above findings, the Panel has arrived at the following Conclusions:

- The Programmes meet the required standards for an award in the Computing field of study at Level 8 of the National Framework of Qualifications.

- The Programmes meet the criteria for validation of a new programme adopted by the Academic Council of Cork Institute of Technology.

The Panel therefore recommends that the **Higher Diploma in Science in Software Development**, the **Higher Diploma in Science in Cloud Computing** and the **Higher Diploma in Science in Cloud & Mobile Software Development** be validated for five academic years, or until the next programmatic review, whichever is soonest, subject to implementation of the Requirements above, and with due regard to the Recommendations made.

| **Implementation of Requirements** |
|---|
| **Requiring Panel Sign-Off:** |
| 1.2.1 (relates to HDip in Science in Cloud & Mobile Software Development only): **Complete.** Panel sign-off . *Revised* Programme Outcomes included in Appendix 1. |
| 1.4.1 (relates to HDip in Science in Software Development only): **Complete.**<br>COMP7002 and SOFT7009 replaced by Advanced Object Programming (Draft) and "Project – Implementation Phase" (INTR8015; preapproved generic Science project module). Panel sign-off 20/04/12. |
| **Requiring Registrar's Office Sign-Off:** |
| 1.3.2: **Complete**. Mapping conducted for all three programmes. |
| 2.1: Modules and Semester Schedules in<br>HDip in Science in Software Development: **Signed off by Module Moderator and Registrar's Office 17/04/12.**<br>HDip in Science in Cloud Computing:<br>HDip in Science in Cloud & Mobile Software Development: |
| 2.2: **Complete.** Reassessment strategy included in *Object-Oriented Programming 1 & 2*, *Cloud Computing Infrastructure* and *Cloud Application Frameworks* (previously *Spring Applications Development*). |
| 2.6: **Complete.** *Spring Applications Development* retitled *Cloud Application Frameworks*. |

**APPENDIX 1 – Proposed Programme Outcomes**

**Higher Diploma in Science in Cloud Computing**

## Programme Outcomes

On successful completion of this programme the learner will be able to :

| | | |
|---|---|---|
| **PO1** | **Knowledge - Breadth** | Knowledge of the theory and concepts in computer architecture, databases, software & web development and the design, planning, deployment and management of cloud-based infrastructures and services within a wide range of business environments. |
| **PO2** | **Knowledge - Kind** | An ability to critically evaluate both structured and unstructured information, to develop business-led plans and strategies and to manage the migration to those strategies being aware of both internal and external factors. |
| **PO3** | **Skill - Range** | The ability to analyse problems within a range of business contexts and to develop and articulate appropriate virtulisation, storage, networking and software plans which support the overall business strategy. |
| **PO4** | **Skill - Selectivity** | The ability to manage a cloud computing project through all stages of development, evaluating user requirements, design, compatibility and technology selections within agreed environmental and financial constraints. |
| **PO5** | **Competence - Context** | The ability to analyse, research, develop and deploy cloud based solutions, while applying the appropriate technical, professional and legal standards and practices. |
| **PO6** | **Competence - Role** | The ability to work effectively on any stage of a project as an autonomous individual or as a part of a multidisciplinary team, recognising the different roles within a team and the different ways of organising and leading those teams. |
| **PO7** | **Competence - Learning to Learn** | The capacity to identify learning needs and to undertake continuous learning (including lifelong learning and continuing professional development), incorporating the ability to closely and continuously follow progress in IT by consulting newly published works, assimilating such information and applying it independently. |
| **PO8** | **Competence - Insight** | The ability to articulate the wider social, political and business context within which the IT professional operates and the need for high ethical and professional standards in ones work. |

**Higher Diploma in Science in Cloud & Mobile Software Development** (*revised* as per Requirement 1.2.1)

## Programme Outcomes

On successful completion of this programme the learner will be able to :

| | | |
|---|---|---|
| **PO1** | **Knowledge - Breadth** | Knowledge of the theoretical, conceptual, practical and commercial elements involved in creating and successfully deploying mobile and cloud based applications. |
| **PO2** | **Knowledge - Kind** | An in-depth knowledge of high level computer programming languages and frameworks, computer architectures, networking , database and the process of software development, testing and maintenance. |
| **PO3** | **Skill - Range** | The ability to analyse problems from various problem domains, design appropriate software and web solutions, and implement, test and deploy solutions to high professional and agreed standards. |
| **PO4** | **Skill - Selectivity** | The ability to manage the development of software projects through all stages of development, evaluating user requirements, design, compatibility, and technology selections within agreed environmental and financial constraints. |
| **PO5** | **Competence - Context** | The ability to analyse a problem domain, specify requirements, model and design an appropriate solution, implement and test within particular application domains while adhering to a specified plan. |
| **PO6** | **Competence - Role** | The ability to work effectively on a software development project as an autonomous individual or as a part of a multidisciplinary development team, recognising the different roles within a team. |
| **PO7** | **Competence - Learning to Learn** | The ability to identify limitations of own knowledge, to keep skills relevant and up-to-date, and to appreciate the need for continuous learning within a rapidly evolving industry. |
| **PO8** | **Competence - Insight** | Act in a manner consistent with the best interests of clients, colleagues and other stakeholders and the general public; maintain integrity and independence in professional judgement. |

**Higher Diploma in Science in Software Development**

# Programme Outcomes

On successful completion of this programme the learner will be able to :

| | | |
|---|---|---|
| **PO1** | **Knowledge - Breadth** | Knowledge of the theory and concepts in computer architecture, databases, software & web development and their place in a wide range of application areas. |
| **PO2** | **Knowledge - Kind** | An in-depth knowledge of high level computer programming languages, database, web based interfaces and the process of software development and testing. |
| **PO3** | **Skill - Range** | The ability to analyse problems from various problem domains, design appropriate software solutions and implement and test those solutions to agreed standards. |
| **PO4** | **Skill - Selectivity** | The ability to manage a small to medium scale software development project, evaluating the required architectural and software selections or trade-offs within agreed environmental and financial constraints. |
| **PO5** | **Competence - Context** | Apply computing knowledge and skills to a wide range of business problems. |
| **PO6** | **Competence - Role** | The ability to work as an individual or within a team, achieve IT Strategy objectives, participate in peer collaboration and evaluation exercises. |
| **PO7** | **Competence - Learning to Learn** | The ability to investigate new technologies, articulate lessons learnt directly from experience and appreciate the need for continuous learning within the software industry. |
| **PO8** | **Competence - Insight** | Act in a manner consistent with the best interests of clients, colleagues and other stakeholders and the general public; maintain integrity and independence in professional judgement. |

## Appendix 2 – Semester Schedules: Higher Diploma in Science in Cloud Computing

Semester 1

| Mandatory | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Mod Code** | **Module Title** | **Co-ordinator** | **Level** | **Credits** | **FT Hours Contact Hours** | **PT Hours Contact Hours** | **Course Work** | **Final Exam** |
| SOFT7004 | Object-Oriented Programming 1 (Approved) | JIM O DWYER | Intermediate | 5.0 | 5.00 | 5.00 | 50.0% | 50% |
| SOFT7007 | Requirements Engineering (Approved) | JIM O DWYER | Intermediate | 5.0 | 4.00 | 4.00 | 100.0% | 0% |
| SOFT7017 | Principles of Operating Sys (Draft) | JIM O DWYER | Intermediate | 5.0 | 4.00 | 4.00 | 30.0% | 70% |
| COMP6029 | Networking Systems 1 (Approved) | JIM O DWYER | Fundamental | 5.0 | 5.00 | 5.00 | 100.0% | 0% |
| COMP7028 | Database Systems (Approved) | JIM O DWYER | Intermediate | 5.0 | 4.00 | 4.00 | 100.0% | 0% |
| SOFT7008 | Server-Side Web Development (Approved) | JIM O DWYER | Intermediate | 5.0 | 4.00 | 4.00 | 100.0% | 0% |

Semester 2

| Mandatory | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Mod Code** | **Module Title** | **Co-ordinator** | **Level** | **Credits** | **FT Hours Contact Hours** | **PT Hours Contact Hours** | **Course Work** | **Final Exam** |
| SOFT8021 | Cloud Architectures (Approved) | JIM O DWYER | Advanced | 5.0 | 4.00 | 4.00 | 40.0% | 60% |
| No Code Yet | Cloud Computing with Python (Draft) | JIM O DWYER | Advanced | 5.0 | 4.00 | 4.00 | 100.0% | 0% |
| No Code Yet | Cloud Computing Infrastructure (Draft) | JIM O DWYER | Advanced | 15.0 | 12.00 | 12.00 | 100.0% | 0% |
| COMP8016 | Data Mining (Approved) | JIM O DWYER | Advanced | 5.0 | 4.00 | 3.00 | 20.0% | 80% |

## Semester Schedules: Higher Diploma in Science in Cloud & Mobile Software Development

Semester 1

| Mandatory | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Mod Code** | **Module Title** | **Co-ordinator** | **Level** | **Credits** | **FT Hours Contact Hours** | **PT Hours Contact Hours** | **Course Work** | **Final Exam** |
| SOFT7004 | Object-Oriented Programming 1 (Approved) | JIM O DWYER | Intermediate | 5.0 | 5.00 | 5.00 | 50.0% | 50% |
| SOFT7007 | Requirements Engineering (Approved) | JIM O DWYER | Intermediate | 5.0 | 4.00 | 4.00 | 100.0% | 0% |
| SOFT7017 | Principles of Operating Sys (Draft) | JIM O DWYER | Intermediate | 5.0 | 4.00 | 4.00 | 30.0% | 70% |
| COMP6029 | Networking Systems 1 (Approved) | JIM O DWYER | Fundamental | 5.0 | 5.00 | 5.00 | 100.0% | 0% |
| COMP7028 | Database Systems (Approved) | JIM O DWYER | Intermediate | 5.0 | 4.00 | 4.00 | 100.0% | 0% |
| SOFT7008 | Server-Side Web Development (Approved) | JIM O DWYER | Intermediate | 5.0 | 4.00 | 4.00 | 100.0% | 0% |

Semester 2

| Mandatory | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Mod Code** | **Module Title** | **Co-ordinator** | **Level** | **Credits** | **FT Hours Contact Hours** | **PT Hours Contact Hours** | **Course Work** | **Final Exam** |
| COMP7013 | Object-Oriented Programming 2 (Approved) | JIM O DWYER | Intermediate | 5.0 | 5.00 | 5.00 | 50.0% | 50% |
| COMP8021 | Mobile Apps Development (Approved) | JIM O DWYER | Advanced | 5.0 | 5.00 | 5.00 | 100.0% | 0% |
| No Code Yet | Spring Application Development (Draft) | JIM O DWYER | Advanced | 15.0 | 12.00 | 0.00 | 100.0% | 0% |
| COMP8016 | Data Mining (Approved) | JIM O DWYER | Advanced | 5.0 | 4.00 | 3.00 | 20.0% | 80% |

## Semester Schedules: Higher Diploma in Science in Software Development

Semester 1

| Mandatory | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Mod Code** | **Module Title** | **Co-ordinator** | **Level** | **Credits** | **FT Hours Contact Hours** | **PT Hours Contact Hours** | **Course Work** | **Final Exam** |
| SOFT7004 | Object-Oriented Programming 1 (Approved) | JIM O DWYER | Intermediate | 5.0 | 5.00 | 5.00 | 50.0% | 50% |
| SOFT6003 | Operating Systems Fundamentals (Approved) | JIM O DWYER | Fundamental | 5.0 | 4.00 | 0.00 | 30.0% | 70% |
| COMP7025 | Database Systems 1 (Approved) | JIM O DWYER | Fundamental | 5.0 | 4.00 | 4.00 | 100.0% | 0% |
| SOFT7007 | Requirements Engineering (Approved) | JIM O DWYER | Intermediate | 5.0 | 4.00 | 4.00 | 100.0% | 0% |
| COMP6029 | Networking Systems 1 (Approved) | JIM O DWYER | Fundamental | 5.0 | 5.00 | 5.00 | 100.0% | 0% |
| SOFT7008 | Server-Side Web Development (Approved) | JIM O DWYER | Intermediate | 5.0 | 4.00 | 4.00 | 100.0% | 0% |

Semester 2

| Mandatory | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Mod Code** | **Module Title** | **Co-ordinator** | **Level** | **Credits** | **FT Hours Contact Hours** | **PT Hours Contact Hours** | **Course Work** | **Final Exam** |
| COMP7013 | Object-Oriented Programming 2 (Approved) | JIM O DWYER | Intermediate | 5.0 | 5.00 | 5.00 | 50.0% | 50% |
| SOFT7005 | OO Analysis and Design (Approved) | JIM O DWYER | Intermediate | 5.0 | 4.00 | 4.00 | 100.0% | 0% |
| COMP7002 | Application User Interfaces (Approved) | JIM O DWYER | Intermediate | 5.0 | 5.00 | 5.00 | 100.0% | 0% |
| COMP7006 | Database Systems 2 (Approved) | JIM O DWYER | Intermediate | 5.0 | 4.00 | 4.00 | 100.0% | 0% |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| SOFT7009 | Software Project (Approved) | JIM O DWYER | Intermediate | 10.0 | 14.00 | 14.00 | 100.0% | 0% |