



# Student Handbook

BSc (Honours) Computer Science

Year 3

DT228

Academic Year 2018-2019

## Table of Contents

Table of Contents .....	i
Welcome to DT228-3 .....	iv
1. My Year .....	1
1.1 Registration .....	1
1.2 Contact Details .....	1
1.3 The Building .....	1
1.4 Timetable and Calendar .....	2
1.5 Attendance Requirements .....	2
1.6 Modules .....	2
1.7 Selection of Modules .....	6
1.8 Supervision Arrangements .....	6
1.9 Assessment .....	6
1.10 Submission Guidelines .....	6
1.11 Getting my results .....	7
1.12 Obtaining Feedback .....	7
1.13 Assessment Regulations .....	7
1.14 Progression .....	8
1.15 Applying for Exemptions .....	8
1.16 Health and Safety .....	8
1.17 IT .....	8
1.18 Webcourses .....	9
1.19 Rules and Regulations .....	9
1.20 Student Charter .....	9
2. My Programme .....	10
2.1 Programme Structure .....	10
2.2 Modules per semester .....	10
2.3 Study Abroad Opportunities .....	11
2.4 Work Placement Opportunities .....	11
2.5 Outcome and Career Opportunities .....	12
2.6 Transfer and Progression .....	12

2.7	Professional Body Accreditation.....	12
2.8	External Examiners .....	12
3.	My Input.....	13
3.1	Introduction .....	13
3.2	Providing Feedback.....	13
3.3	Student Representation .....	13
3.4	Programme Review.....	14
4.	My Life in DIT .....	14
4.1	Planning my Studies.....	14
4.2	Clubs and Societies .....	14
4.3	Supports .....	14
4.4	Become a student ambassador .....	15
5.	Frequently Asked Questions .....	15
5.1	I can't find the information I need on the website .....	15
5.2	What if I think I'm on the wrong course? .....	15
5.3	What is a first, two-one and two-two? .....	15
5.4	What if I encounter personal circumstances that means I can't continue with my programme? 16	
5.5	What if I am sick and unable to do an exam?.....	<b>Error! Bookmark not defined.</b>
	What if I am sick during the semester? .....	<b>Error! Bookmark not defined.</b>
5.6	What are ECTS credits? .....	16
5.7	I can't find my class.....	16
5.8	What if I fail to submit an assessment? .....	16
5.9	What if I didn't meet a deadline for submitting an assessment? .....	17
5.10	I've lost my student card .....	<b>Error! Bookmark not defined.</b>
5.11	What public transport goes to the various DIT locations? .....	<b>Error! Bookmark not defined.</b>
6.	Useful Links.....	<b>Error! Bookmark not defined.</b>
	Appendix A: DIT Academic Calendar – Session 2017/2018.....	<b>Error! Bookmark not defined.</b>
	Appendix B: Information Leaflet In Relation To Cheating .....	19
	Introduction .....	<b>Error! Bookmark not defined.</b>
	Definitions.....	<b>Error! Bookmark not defined.</b>
	How to avoid plagiarism .....	<b>Error! Bookmark not defined.</b>

Procedure for suspected case of plagiarism .....	<b>Error! Bookmark not defined.</b>
Initial stage .....	<b>Error! Bookmark not defined.</b>
Enquiry Stage.....	<b>Error! Bookmark not defined.</b>
Appendix C: Student regulations governing the use of computer resources	<b>Error! Bookmark not defined.</b>
1. Introduction.....	<b>Error! Bookmark not defined.</b>
2. Confidentiality .....	<b>Error! Bookmark not defined.</b>
3. Use of Computer Resources .....	<b>Error! Bookmark not defined.</b>
4. Discipline.....	<b>Error! Bookmark not defined.</b>
Appendix D: Module Descriptors .....	27
Applied Intelligence .....	28
Business and Enterprise.....	32
Client-Server Programming .....	35
Cloud Computing.....	39
Computational Mathematics .....	42
Databases 2 .....	44
Games Logic and Design .....	47
Introduction to Artificial Intelligence.....	50
Mobile Robotics .....	54
Mobile Software Development.....	57
Individual Project .....	60
Quantitative Methods and Tools for Data Analysis.....	63
Service-Learning and Civic Engagement.....	65
Software Engineering 3.....	69
System Administration.....	73
System Security .....	75
Team Project.....	78
Universal Design and Assistive ICT .....	80
Work Placement.....	83

## **Welcome to DT228-3**

On behalf of the teaching team, we would like to welcome you back, to year 3 of DT228 – the Bachelor of Science in Computer Science at Dublin Institute of Technology. A special welcome to advanced entry students who are joining the programme this year.

In year 3 you will have an opportunity to undertake work placement or study specialist option options, and year 4 where you will complete a final year project, finish your degree, and begin a rewarding career.

Throughout this handbook you will get information on your modules, your assessment, your programme and your life in DIT. You can get a great deal of additional information through the DIT website and from your year tutor.

Wishing you the very best of luck with your studies this year,

Mr. Damian Bourke (Programme Chairperson)

and

Dr. Susan McKeever (Year Mentor)

## **1. My Year**

### **1.1 Registration**

You are required to register before you commence our studies. Once you register, you will be provided with a student card and a student number, as well as login details for your e-mail account and other DIT systems – including webcourses (the online system you can use to access many of your notes and submit your assignments). Information on how to register, obtain a student card and pay fees is available online at <http://dit.ie/currentstudents/studentservices/registration/>.

### **1.2 Contact Details**

Your programme chairperson is Dr. Susan McKeever. She is responsible for managing the overall programme and co-ordinating the programme committee (which consists of lecturing staff and students). You should contact her if you need advice about the overall programme, the structure of the programme or your progression on your modules.

Your class mentor is Susan McKeever. She acts as a contact point if you have any queries relating to your modules, any medical circumstances or any other particular queries relating to the course.

Mr. Damian Bourke

[damain.bourke@dit.ie](mailto:damain.bourke@dit.ie)

Room: KE 1-013A

Dr Susan McKeever

[susan.mckeever@dit.ie](mailto:susan.mckeever@dit.ie)

Room: KE 201

The School Office for the School of Computing is located on the third floor of the Annexe in Kevin St, beside the entrance to the bridge.

### **1.3 The Building**

Rooms are identified by a combination of letters and numbers e.g. KE1-008 (this room is in the Kevin street Main Building [KE], on the first floor [1]). The Kevin St campus has two buildings – the Annex (room numbers start with KA) and the Main Building (room numbers start with KE).

All of your lectures and most of your lab sessions will be held in Kevin St. Some of you will also use the lab rooms in Aungier st, where the School of Computing labs are located on the first floor: 1-005 and 1-006.

#### **1.4 Timetable and Calendar**

You can access your personal timetable online at <http://www.dit.ie/timetables/>. This link also provides you with a guide on using the timetabling system.

The DIT academic calendar is available online at <http://www.dit.ie/academicaffairsandregistrar/calendar/> and is included as an Appendix at the end of this handbook. The year is divided into two semesters. Each semester is comprised of 13 weeks of classes followed by examinations. There is one review week in each semester, which is a week specially reserved for assessment and revision. Semester 1 runs from September to January. Semester 2 runs from January to May.

Note that the online timetabling system uses a different week numbering system to the academic calendar. The copy of the academic calendar included as an Appendix is updated to include the week numbers using in the online system.

#### **1.5 Attendance Requirements**

You will have both lecture and lab classes. In each lab classes, you will typically be doing practical work to reinforce and learn the hands-on aspects of your modules.

There is a strong correlation between attendance at classes and marks achieved. If you are unable to attend classes you should inform your mentor and the relevant lecturer.

Attendance will typically be recorded in laboratories, and may account for a portion of your continuous assessment mark, depending upon the marking scheme used by the individual lecturer. Individual lecturers may also track attendance at their lectures.

#### **1.6 Modules**

This year you will be completing 6 modules in the first semester – with semester 2 depending upon the choice taken on work placement, special engagement project or specialist option module study in DIT. Each module has the following:

- **ECTS Credits:** These are credits which you gain for successfully completing the module. Over this year, you will complete a total of 60 ECTS credits. Each module has a multiple of 5 ECTS credits, as you will see on the next page.

- **Semester:** This is the semester in which the module is offered, which will be Semester 1 (September to January), Semester 2 (January to May) or Year-long (September to May).
- **Module Title:** This is the name of your module.
- **Module Code:** This is a code which is sometimes used to identify the module.
- **Continuous Assessment (CA) Weighting:** Modules have two forms of assessment (or assessment components). Continuous assessment takes place on an ongoing basis throughout the year, through lab work, assignments and reports. The continuous assessment mark you achieve is combined with the examination mark to get the overall mark for the module. Marks are combined using the *weightings* outlined for each component. For example if a module mark consists of 60% exam and 40% CA, then the module mark will be calculated as (Exam Mark %\*0.6) + CA Mark % \*0.4).
- **Examination Weighting:** This is the weighting for the examination, which takes place at the end of the semester.
- **Pass requirements:** This is the rule sets out the requirement to pass the module.
- **Lecturer:** This is the lecturer for the module, along with their contact details.



Module Code	Module Title	ECTS	Assessment	
			Exam Weight	Non-Exam Weight
CMPU3005	Cloud Computing	5	50%	50%
CMPU3006	Client-Server Programming	5	60%	40%
CMPU3010	Databases 2	5	60%	40%
CMPU3017	Mobile S/W Development	5	50%	50%
CMPU3024	Introduction to Artificial Intelligence	5	60%	40%
CMPU3038	Software Engineering 3	5	60%	40%
	<b>Semester 2:</b>			
CMPU3035	Work Placement <i>or</i> Service-Learning and Civic Engagement	30		
	<b>OR 30 ECTS of specialist modules (not all of these will run)</b>			
CMPU3004	Applied Intelligence	5		100%
CMPU3007	Business and Enterprise	5	50%	50%
CMPU3008	Computational Mathematics	5	70%	30%
CMPU3015	Games Logic and Design	5	60%	40%
CMPU3025	Mobile Robotics	5	50%	50%
CMPU3050	Programming Smart Objects	5	50%	50%
tba	Computing in the Community	5		100%
CMPU3033	Quantitative Methods and Tools for Data Analysis	5	60%	40%
CMPU3049	System Administration	5	60%	40%
CMPU3042	System Security	5	50%	50%
CMPU3046	Universal Design and Assistive ICT	5	70%	30%
CMPU3039	Software installation and maintenance (added 201718)	5	60%	40%
	Team project or individual project	10		100%

The pass mark is 40%. Mobile S/W Development also has a **written exam** threshold mark of 40% in order to pass the module. Each module has a detailed module descriptor which is included in the Appendix of this document. The definitive source programme and module information is

your programme document, which is available at the *DT228 Course Document and Information* module in Webcourses at:  
<http://www.dit.ie/lttc/webcourseslinks/>.

### **1.7 Selection of Modules**

In year 3, all modules in semester 1 are core. Semester 2 depends upon the pathway chosen.

### **1.8 Supervision Arrangements**

This is not applicable to third year DT228 students.

### **1.9 Assessment**

Students on this programme are assessed through:

- Continuous Assessment
- Examination

Examinations take place in December/ January and May in locations, some of which may be off campus, and which will be notified to you, as detailed in the academic calendar -

<http://www.dit.ie/academicaffairsandregistrar/calendar/>.

Continuous assessment takes place throughout the semester. It is very important that you keep up to date with your continuous assessments for your modules – as the standard repeat mechanism is to wait for the next running of the module the following academic year.

You will get an assessment schedule from your year mentor at the start of each semester. The assessment schedule will be available online in the DT228 Course Document and Information module on Webcourses.

The weighting for the continuous assessment and examination components for your modules are included in section 1.6 above.

### **1.10 Submission Guidelines**

The individual lecturers will instruct you on how and where to submit your assignment. Most will use Webcourses, but others may use either the School Office or email. You are required to submit assignments by the deadline set by your lecturer. The penalty for late submission is set by the individual lecturer. If you are unable to submit an assignment on time for a valid reason (valid reasons are set out in the Personal Circumstances form) you may be able to submit a Personal Circumstances form with supporting documentation to your lecturer and year mentor. The Personal Circumstances form is available at <http://www.dit.ie/qualityassuranceandacademicprogrammerecords/student-assessment-regulations/general/>

All assessments are intended to determine the skills, abilities, understanding and knowledge of each of the individual students undertaking the assessment. Cheating is defined as obtaining an unfair academic advantage and any student found using any form of cheating, attempting to cheat or assisting someone else to cheat may be subject to disciplinary action in accordance with the Institute's Disciplinary

Procedure. You should consult the Information Leaflet In Relation To Cheating which is included as an appendix to this document.

### **1.11 Getting my results**

You will complete examinations in December/January and May, at the end of semester 1 and 2 respectively. Following these examinations, an examination board is held to confirm your marks, after which marks are released online. You will receive an e-mail providing you with details of how to access these results when they are released. Following the completion of semester 2, you will also receive written notification of your results.

If you are completing examinations in the supplemental session in August, you will receive notification of your results online in September. You will receive an e-mail providing you with details of how to access these results when they are released.

### **1.12 Obtaining Feedback**

Individual lecturers will provide you with feedback on your assignment(s).

Upon completion of the examination process, you can view your examination script. To do so you must submit a request to the School Office.

The rules for rechecks, remarks and appeals are outlined in the General Assessment Regulations as described in section 1.13.

### **1.13 Assessment Regulations**

The General Assessment Regulations govern all assessment in the Institute, including all rules regarding:

- Absence
- Appeal
- Assessment
- Carrying modules
- Compensation
- Conduct during examinations
- Coursework
- Deferral
- Examinations
- Notification of Results
- Personal Circumstances
- Progression
- Reassessment
- Recheck and Remark

The General Assessment Regulations are available online at <http://www.dit.ie/qualityassuranceandacademicprogrammerecords/student-assessment-regulations/general/>

The programme document contains a detailed description of this programme. It is available through the library and online in the DT228 Course Document and Information module on Webcourses.

#### **1.14 Progression**

In order to progress from this year to year 4 of the programme, you are required to pass all modules. Compensation rules may apply, as set out in the General Assessment Regulations (see section 1.13).

If you do not pass a module, you will be informed of the requirements to retake that module or a component of the module. Examinations can typically be retaken in the supplemental examination session in late August. The standard repeat mechanism for the Continuous Assessment component of a module is to retake it when the module is next running - which is typically the following academic year.

#### **1.15 Applying for Exemptions**

If you think that you have already completed sufficient previous study to qualify for an exemption on a module, you may apply for an exemption. You will be required to complete an exemption form, and provide documentation to support your case that of how previous work equates to the content of the module you wish to be exempt from. You should contact your mentor in order to submit an exemptions application.

#### **1.16 Health and Safety**

All students must familiarise themselves with the Health and Safety rules of the Institute, which are available online at <http://www.dit.ie/healthsafety/>.

#### **1.17 IT**

You are provided with your login for the Institute's IT Systems when you register. You use the same login for:

- Webcourses: <http://www.dit.ie/webcourses>
- Email: <http://mydit.ie/>
- Computer laboratories
- Wifi

You will find a detailed explanation of how to use the DIT IT systems, including those listed above, printing services, password facilities and others at <http://www.dit.ie/is/student/>.

Prior to using DIT computer services, all students should familiarize themselves with DIT's Student Regulations Governing the use of Computer Resources -

<http://www.dit.ie/is/governance/regulations/studentregulations/>. A copy of these regulations is provided as an Appendix to this document.

You can get support for your IT queries by contacting [support@dit.ie](mailto:support@dit.ie) or by ringing 01 402 3123.

### **1.18 Webcourses**

Webcourses is DIT's online virtual learning environment. Most, but not all, lecturers use webcourses to support the teaching of their module. This system is used for delivery of lecture notes, online discussion, assignment submission and assessment feedback. You can access webcourses online at <http://www.dit.ie/ltc/webcourseslogin/> using your IT login. If you cannot access a particular module, you should contact the module lecturer.

You will only be able to access Webcourses if you have registered.

### **1.19 Rules and Regulations**

You should review the rules and regulations of the Institute, which cover the following areas:

- Registration Regulations
- Regulations Governing the use of Computer Resources
- General Assessment Regulations
- Disciplinary procedures
- Identity and Access Management
- Social Welfare Fraud Controls
- Student Alcohol Policy
- Student Dignity and Respect Policy

These are available online at

<http://www.dit.ie/student-services/student-service-centres/dit-rules-regulations-for-students/>

### **1.20 Student Charter**

The mission of the Institute emphasises partnerships between staff and students and working together to improve the quality of service and the response to diversity of needs. The focus in our Institute community is thus on personal responsibility to each other. Our Student Charter is intended to underpin this joint personal accountability, and was drawn up by a group of staff and students after consultation

with staff and students across the Institute. It sets out the level of service and standards of excellence we intend to provide for our students from the point of making an application to come to the Institute, to student life while studying here including the academic, social, cultural & athletic environments of the Dublin Institute of Technology and describes the Institute's expectations of students in such matters.

The student charter is available online at

<http://www.dit.ie/student-services/student-service-centres/dit-rules-regulations-for-students/>.

## 2. My Programme

### 2.1 Programme Structure

Semester 1 of year 3 are core and common to all students.

At semester 2 of year 3 students have the option to take one of the following three paths:

1. Work Placement: Students undertake a placement in industry for six to seven months.
2. Take a Service Learning and Civic engagement project whereby students are immersed in an environment different to their typical environment. For example, previous students have undertaken projects in Malawi, working with the Wells for Zoe charity.
3. Specialist Modules: Students undertake a team project and four modules in specialist subject areas

Full details of the programme structure are available in the programme document.

### 2.2 Modules per semester

The following are the modules you will be studying in year 3 by semester. The full descriptors for the modules are shown in the appendices of this document.

The list of modules and lecturers is shown in the table. Occasionally, the lecturer assigned to a module may change - particularly for modules scheduled ahead in Semester 2. As at Sept 2015, the scheduled names are:

Semester	Module Name	Lecturer	Lecturer's contact details
1	Cloud Computing	Basel Magablah	basel.magableh@dit.ie
	Client-Server Programming	Damian Bourke	<a href="mailto:damian.bourke@dit.ie">damian.bourke@dit.ie</a>
	Databases 2	Patricia O'Byrne	<a href="mailto:patricia.obyrne@dit.ie">patricia.obyrne@dit.ie</a>
	Mobile S/W Development	Dr. Susan	<a href="mailto:susan.mckeever@dit.ie">susan.mckeever@dit.ie</a>

		McKeever	
	Introduction to Artificial Intelligence	Richard Lawlor	<a href="mailto:richard.lawlor@dit.ie">richard.lawlor@dit.ie</a>
	Software Engineering 3	Ciaran Cawley	<a href="mailto:Ciaran.cawley@dit.ie">Ciaran.cawley@dit.ie</a>
	<b>OR one of</b>		
<b>2</b>	(1) Work Placement	Iseult Kelly/ Leslie Shoemaker	<a href="mailto:Iseult.kelly@dit.ie">Iseult.kelly@dit.ie</a>
	(2) Service-Learning and Civic Engagement	Leslie Shoemaker	<a href="mailto:Leslie.shoemaker@dit.ie">Leslie.shoemaker@dit.ie</a>
	<b>(3) Specialist modules: Current projected choice:</b>		
	Team Project	Paul Bourke	<a href="mailto:paul.bourke@dit.ie">paul.bourke@dit.ie</a>
	Business and Enterprise	Liz McKeever	TBC
	Mobile Robotics	Dr. Patrick Tobin	<a href="mailto:Patrick.Tobin@dit.ie">Patrick.Tobin@dit.ie</a>
	Programming Smart Objects	Richard Lawlor	<a href="mailto:Richard.Lawlor@dit.ie">Richard.Lawlor@dit.ie</a>
	Universal Design and Assistive ICT	Dr. John Gilligan	<a href="mailto:john.gilligan@dit.ie">john.gilligan@dit.ie</a>
	System Security	Yupeng Li	<a href="mailto:Yupeng.li@dit.ie">Yupeng.li@dit.ie</a>
	<i>CMPU 3039 Software Install &amp; Maintenance</i>		

### 2.3 Study Abroad Opportunities

In third year of this programme, you have the opportunity to study for one semester with our international partners in Toulouse (France), Darmstadt (Germany), Brussels (Belgium), Varna (Bulgaria), Brno (Czech Republic), Barcelona (Spain) or Oulu (Finland). Further details and pre-requisites can be seen at <http://www.dit.ie/erasmusandexchange/>

### 2.4 Work Placement Opportunities

In third year of this programme, you have the opportunity to undertake placement for six months with an industry partner. The work placement module is very popular, providing students with real experience of working and learning in industry. Preparation for work placement begins with CV



preparation and interview techniques training. Those who opt for a work placement will then be put forward for interview by DIT with our work placement companies.

## 2.5 Outcome and Career Opportunities

Graduates of this programme are equipped with the skills to work in a variety of role in the science and technology industries. They are very successful on gaining employment in Ireland, but with some opting to go abroad to work with companies further afield.

In addition, some of our students opt to take further study at either MSc or PhD level.

Given the nature of Computer Science and its relevance to new products and services, we also have a cohort of graduates who choose to set up their own businesses. T

## 2.6 Transfer and Progression

Students gain a BSc (Hons) in Computer Science on successful completion of year 4 of the programme. However, if you have completed year 2, you have the option of exiting the programme with the award of Higher Certificate in Computer Science. You can exit after year 3 with BSc (Ordinary) Computer Science. To exit after Year 3, you must complete the Level 7 **individual project module**.

If you wish to apply for a transfer to another programme in the School such as the part-time BSc programme, you should contact the programme chairperson.

## 2.7 Professional Body Accreditation

This programme is accredited by the Chartered Body for Science and Technology. Students entering the programme will be eligible for membership of BCS, The Chartered Institute for IT upon graduation with an Honours Degree.

Your final degree award will be classified as follows, with the final average calculated from your fourth year results.

Average Mark	Classification
$\geq 70\%$	First Class Honours (usually called a <i>first</i> )
60%- 69%	Second Class Honours, Upper Division (usually called a <i>two-one</i> )
50%-59%	Second Class Honours Lower Division (usually called a <i>two-two</i> )
40% - 49%	Pass

## 2.8 External Examiners

In the final year of your programme, you may be invited to meet with the external examiners at the time of the final examination board in June.

The external examiners for the programme play a vital role in assuring the quality of the programme. The external examiners for your programme are:

- Paul Collins
- Kevin Foley

### **3. My Input**

#### **3.1 Introduction**

Students play a vital role in programme development and monitoring. As a student, you can provide feedback both formally and informally. You are also represented, through your class representative, on the programme committee, and by the Student Union on College Board and Academic Council.

Your class rep attends programme committee meetings. These meetings are usually held during review week in Sem 1, and during the first week of March Sem 2. - with any extra meetings scheduled if needed. This year, the meetings are scheduled for November 4<sup>th</sup> 2017, and during week 1 March 2018.

#### **3.2 Providing Feedback**

Upon completion of each module, you are asked to submit a Student Feedback Form (Q6A) to your lecturer. Your lecturer will use this feedback in the ongoing development of their module.

Once per year you are asked to provide general feedback on your programme using the Programme Survey Questionnaire (Q6C). This feedback is provided to school management and is used for the ongoing development of the programme.

Copies of these forms are available online at

<http://www.dit.ie/qualityassuranceandacademicprogrammerecords/forms/>

Staff-student meetings are held throughout the year, during which you get an opportunity to provide feedback to the academic staff on the programme.

You can, at any point, ask to meet with your lecturer or your class mentor to provide informal feedback.

#### **3.3 Student Representation**

The Programme Committee is responsible for designing, monitoring and managing your programme. The Programme Committee meets at least once per semester. Your class representative is a member of this committee, and can bring issues of concern to the committee. At the end of year academic year the programme committee produces an Annual Monitoring report which provides a review of the year, incorporating feedback from students, staff and external examiners, leading to actions which will help enhance the programme in the following year.

College Board has responsibility for developing and monitoring the implementation of academic policy matters and in particular academic quality assurance procedures. All modifications to your programme need to be approved first by the Programme Committee and then by College Board. General academic issues of relevance to programmes in the College are discussed at College Board. You are represented at College Board by your Student Union.

Academic Council is a statutory body, provision for which is made in the DIT Act. It is appointed by the Governing Body of the Institute to assist it in the planning, co-ordinating, developing and overseeing the academic work of the Institute and in protecting, maintaining and developing the academic standards of the programmes and other academic activities of the Institute. You are represented on Academic Council by your Student Union.

### **3.4 Programme Review**

Every five years the Programme Committee is required to review the programme, and present the reviewed programme to a panel comprised of academic staff from DIT, academic staff from elsewhere and industry representatives. This review is informed by the annual monitoring process and your feedback.

## **4. My Life in DIT**

### **4.1 Planning my Studies**

You can access DIT's online library system at <http://www.dit.ie/library/>. Certain facilities require the use of a login name and password. DIT library staff can advise you on how to access these systems.

Opening hours for the library vary according to the time of year. You can find opening hours online at <http://www.dit.ie/library/openinghours/>.

The Institute's Maths Learning Centre is provided to support you if you are having difficulty with Mathematics. You can find more information about this at <http://www.maths.dit.ie/mlc/>.

### **4.2 Clubs and Societies**

There is a vast array of societies on offer in DIT. Currently there are in excess of 75 societies which range from volunteering, performing arts, course-related, campaigning & political, religious, sign language, student media, plus so much more. DIT Societies are run by the students for the students and supported by the staff of the society's office through advice, administration and finance.

For more details see <http://www.dit.ie/societies/>.

### **4.3 Supports**

Check out DIT's Campus Life (<http://www.dit.ie/campuslife/>) for information about:

- Accommodation
- Careers

- Chaplaincy
- Counselling
- Disability Service
- Health Centre
- Mature Student Support
- Sports
- Student Financial Aid

Supports and advice for students are available online at <http://www.dit.ie/fyi/>.

Find out about your Student Union at <http://www.ditsu.ie/>.

#### **4.4 Become a student ambassador**

Every year, the College of Sciences and Health selects a number of Student Ambassadors to represent the College at events such as our Open Days. If you are interested in becoming an ambassador, send an e-mail to [science@dit.ie](mailto:science@dit.ie).

### **5. Frequently Asked Questions**

#### **5.1 Where can I find general DT228 info?**

We have a blog for the DT228 programme – linked here: <http://dt228dit.blogspot.ie/>

This is an central point for links to info about exam rules, timetables, handbooks and general notices for the students on DT228.

#### **5.2 I can't find the information I need on the DIT website**

The DIT website has a search functionality which you can use to locate the information that you need. If you are still unable to find it, please talk to your Year Mentor.

#### **5.3 What if I think I'm on the wrong course?**

Talk to your year mentor.

#### **5.4 What is a first, two-one and two-two?**

This is the classification system we use in DIT for final degree awards. A first is a First Class Honours – the highest grade possible, achieved when your mark is at least 70%. A *two-one* is a Second Class Honours – Upper Division, for marks of at least 60% but below the level of first class honours. A two-two is a Second Class Honours Lower Division, for marks of at least 50% but below the level of Second Class Honours, Upper Division.

### **5.5 What if I encounter personal circumstances that means I can't continue with my programme?**

In a situation like this, you should always talk to your year mentor. You may also wish to talk with some of the other DIT services, including those listed at <http://www.dit.ie/campuslife/>.

### **5.6 What if I am sick and unable to do an exam?**

You should contact the examinations office immediately, and submit to the examinations office a Personal Circumstances form with supporting documentation within the required time period as set out in the form - <http://www.dit.ie/qualityassuranceandacademicprogrammerecords/student-assessment-regulations/general/>.

### **What if I am sick during the semester?**

You should contact your year mentor immediately, and submit to the year mentor a Personal Circumstances form with supporting documentation within the required time period as set out in the form - <http://www.dit.ie/qualityassuranceandacademicprogrammerecords/student-assessment-regulations/general/>.

### **5.7 What are ECTS credits?**

This is the credit system we use in DIT and elsewhere in Europe. It is the European Credit Transfer System, through which all modules and programmes have a number of credits which represents notionally the amount of learning hours you're usually expected to complete in order to complete the module. Each credit equates to 20 learning hours, and each year of your programme typically requires the completion of 60 ECTS credits. Typically, a one semester module represents 5 ECTS credits, and a year-long module (such as Programming) represents 10 ECTS credits – although there are exceptions within the programme to this.

### **5.8 I can't find my class**

You need to check your timetable frequently, especially early in the semester as there may be changes made at short notice. Your timetable is on the web timetables system at <http://www.dit.ie/timetables/>.

### **5.9 What if I fail to submit an assessment?**

If you fail to submit, you risk forfeiting the marks for that assessment – with late penalties potentially applied, depending up on the conditions set by your lecturer. Be aware that continuous assessments do not as standard have a repeat opportunity within the same academic year, unlike written exams which have a supplemental session in August/ September. It is very important that you keep up with your coursework.

### 5.10 What if I didn't meet a deadline for submitting an assessment?

Each lecturer sets the conditions for late submissions, typically applying a late penalty. For example, a lecturer may specify that submissions that are late, but within a week of the deadline lose 50% of their mark.

If you have extenuating circumstances for missing deadlines, such as medical circumstances, please make sure to inform your year mentor.

### 5.11 I've lost my student card

A replacement is available (for a fee) from Registrations, <http://dit.ie/currentstudents/studentservices/studentcard/>. Remember you will not be admitted to your exams without this card.

### 5.12 What public transport goes to the various DIT locations?

See <http://www.dit.ie/campuslife/transport/>

## 6. Useful Links

- DT228 blog: <http://dt228dit.blogspot.ie/>
- School of Computing website - <http://www.dit.ie/computing/>
- Dublin Institute of Technology – <http://www.dit.ie>
- College of Sciences and Health – <http://www.dit.ie/science>
- Academic Calendar - <http://www.dit.ie/academicaffairsandregistrar/calendar/>
- Accommodation Service - <http://www.dit.ie/campuslife/student-support/accommodation/>
- Campus Life - <http://www.dit.ie/campuslife/>
- Careers Service - <http://www.dit.ie/careers/>
- Chaplaincy - <http://chaplaincy.dit.ie/>
- Counselling - <http://www.dit.ie/counselling/>
- Disability Support Service - <http://www.dit.ie/campuslife/disability/>
- EMail - <http://mydit.ie/>
- Feedback Forms - <http://www.dit.ie/qualityassuranceandacademicprogrammerecords/forms/>
- First Year Experience - <http://www.dit.ie/fyi/>
- General Assessment Regulations - <http://www.dit.ie/qualityassuranceandacademicprogrammerecords/student-assessment-regulations/general/>
- Health and Safety - <http://www.dit.ie/healthsafety/>
- Health Centre - <http://www.dit.ie/campuslife/studenthealthservice/>
- Information Systems - <http://www.dit.ie/is/student/>
- Library - <http://www.dit.ie/library/>
- Library Opening Hours - <http://www.dit.ie/library/openinghours/>

- Mature Student Support – <http://www.dit.ie/campuslife/studentssupport/studentfinancialsupport/generalstudentfinancialaid/>
- Quality Enhancement Handbook - <http://www.dit.ie/qualityassuranceandacademicprogrammerecords/handbook/>
- Registrations - <http://www.dit.ie/currentstudents/studentsservices/registration/>
- Societies - <http://www.dit.ie/societies/>
- Sports - <http://www.ditsports.ie/>
- Student Financial Assistance Scheme - <http://www.dit.ie/campuslife/studentssupport/studentfinancialsupport/>
- Student Regulations for Information Systems - <http://www.dit.ie/is/governance/regulations/studentregulations/>
- Student Union - <http://www.ditsu.ie/>
- Study Skills - <http://www.dit.ie/campuslife/campuslifeoffice/studyskillssupport/>
- Timetables - <http://www.dit.ie/currentstudents/studentsservices/programmetimetables/>
- Webcourses - <http://www.dit.ie/webcourses>

## **Appendix A: DIT Academic Calendar – Session 2018/19**

***(The Academic Year comprises 2 Semesters of 15 weeks during which student learning and assessment takes place.) . \*Review week dates for DT228 will be communicated at start of term.***

A copy of the Academic Calendar can be viewed and downloaded from the DIT website at:

<http://www.dit.ie/academicaffairsandregistrar/calendar/>



## **Appendix B: Information Leaflet In Relation To Cheating**

### **Introduction**

All assessments are intended to determine the skills, abilities, understanding and knowledge of each of the individual students undertaking the assessment. Cheating is defined as obtaining an unfair academic advantage and any student found using any form of cheating, attempting to cheat or assisting someone else to cheat may be subject to disciplinary action in accordance with the Institute's Disciplinary Procedure.

The Dublin Institute of Technology takes this issue very seriously and students have been expelled or had their degrees withheld for cheating in assessments. Plagiarism, and other forms of cheating, are breaches of academic values, academic conventions and codes of practice. It is widely accepted within academia that in the pursuit of knowledge, innovation and creativity academics and students alike will build upon the works of others. Fundamental to this process of human inquiry and discovery is the prerequisite that all sources of information utilised should be appropriately acknowledged. This elementary precondition enables the cultivation of scholarly activities and research to progress in an open and free environment.

If you are having difficulty with your work it is important to seek help from your mentor rather than be tempted to use unfair means to gain marks. Do not risk losing your degree and all the work you have done.

### **Definitions**

The Institute's regulations define a number of different forms of cheating, although any form of cheating is strictly forbidden. These are:

- submitting other people's work as your own - either with or without their knowledge. This includes copying in examinations; using notes or unauthorised materials in examinations;
- impersonation - taking an assessment on behalf of or pretending to be another student, or allowing another person to take an assessment on your behalf or pretend to be you;
- plagiarism - taking or using another person's thoughts, writings or inventions as your own. To avoid plagiarism you must make sure that quotations from whatever source must be clearly identified and attributed at the point where they occur in the text of your work by using one of the standard conventions for referencing.

The Institute provides clear guidance on how to reference your work correctly and your mentor can also help you. It is not enough just to list sources in a bibliography at the end of your essay or dissertation if you do not acknowledge the actual quotations in the text. Neither is it acceptable to change some of the words or the order of sentences if, by failing to acknowledge the source properly, you give the impression that it is your own work.

- collusion - except where written instructions specify that work for assessment may be produced jointly and submitted as the work of more than one student, you must not collude with others to produce a piece of work jointly, copy or share another student's work or lend your work to another student in the reasonable knowledge that some or all of it will be copied;
- duplication - submitting work for assessment that is the same as, or broadly similar to, work submitted earlier for academic credit, without acknowledgement of the previous submission;
- falsification - the invention of data, its alteration, its copying from any other source, or otherwise obtaining it by unfair means, or inventing quotations and/or references.

### **How to avoid plagiarism**

Plagiarism can be either an intentional act whereby work is deliberately utilised and claimed as one's own, or it can occur unintentionally either through bad academic practice by the student or failure to inform yourself about the Institute's regulations. Plagiarism is not confined to written assignments, projects or theses; it incorporates all academic work, including practical workshops, demonstrations, three dimensional work and artistic practice.

The best way to avoid plagiarism is to become informed. You should request information from your lecturer, examine programme writing style guides and conventions, access programme documents and consult the Institute's General Assessment Regulations. Be clear about the particular referencing system of the discipline concerned, while noting that with modularisation students may study modules in different disciplines. Therefore, be sure you are using the correct referencing procedure appropriate to the discipline you are studying. Above all, clearly acknowledge all sources of information you have accessed during your work. The Institute's Library Services have several useful texts on plagiarism which are both accessible and informative, and they are a good guide to referencing. Library staff provides Information Literacy sessions that include guidance on referencing and plagiarism.

Students may be asked to sign a declaration on all written assignments/theses submitted to verify that the work is not plagiarised. If such a declaration is not signed, however, students will still be subject to the regulations governing plagiarism.

### **Procedure for suspected case of plagiarism**

While the lecturer may utilise their own professional judgement firstly to resolve the matter, some suspected cases of plagiarism may have to be dealt with by following due process as outlined below. Any judgement made will be confined to academic assessment principles, the Institute's regulations and based on an academic decision.

#### **Initial stage**

If a lecturer suspects that plagiarism has occurred, they shall notify the Head of School/Department/Assistant Head of School, as appropriate, who will inform the student of the

concern and arrange a meeting (within 10 working days). In attendance should be the relevant Head of Department/Assistant Head of School, the lecturer, the student and a student representative (optional student's choice). During this meeting the student will be clearly informed of the precise nature of the concern. The student will be asked to provide clarification relating to the concern, and may also provide additional details in relation to the matter. At the end of this meeting the Head of Department/Assistant Head of School and the lecturer will consider the case (taking into account the academic experience of the student) and make an academic decision, choosing one of the following options:

- The matter has been resolved
- To resolve the matter the student may need to resubmit the work in question
- The matter is not resolved.

### **Enquiry Stage**

If the matter is not resolved (option 3) the Head of Department/Assistant Head of School should promptly report the case to the Head of School who in turn will request the College Administrator to move the case to the Panel of Enquiry stage as provided for in Section 11.6 of the General Assessment Regulations. The student has a right to be informed of the membership of the Panel of Enquiry.

## **Appendix C: Student regulations governing the use of computer resources**

### **1. Introduction**

- A. Email/Internet services are Institute facilities intended for use for teaching, learning, research and administration in support of the Institutes objectives.  
Email addresses and Internet access, (where available to Staff), are provided for this purpose.
- B. Computing resources are provided to support the academic, research, institutional, and administrative objectives of the Institute. These resources are intended for the sole use of the Institute's staff and other authorised users ("users") to accomplish tasks related to the user's status and duties as a member of the Institute consistent with the Institute's objectives. These resources, including software and data provided by the Institute, must not be used for commercial use or significant personal use.
- C. Computers are powerful communication tools and must be used wisely. Use of these resources in a manner which contravenes these Regulations may result in disciplinary action which may include suspension or expulsion from the Institute.
- D. The basic principle is that all users are expected to use common sense and to conduct themselves in a professional and appropriate manner in their emails and use of the Institute's computer facilities and the Internet. Staff are reminded that network postings or messages may be archived for years in various Internet search databases. In addition, these messages may be produced to others or to a Court in connection with litigation or disclosed under the Freedom of Information Act.
- E. Users are individually accountable for all actions associated with their use of the Institute's information and technology systems.
- F. Use of the Institute's computer facilities is a privilege granted to Institute Staff and the Institute reserves the right to withdraw or limit access to such facilities.
- G. These Regulations apply to all staff of the Institute and to all users of Institute computer resources.

### **2. Confidentiality**

- A. The Institute does not provide users a guarantee or right to privacy or confidentiality in connection with the use of email and internet systems, and users should have no expectation of privacy in this regard.
- B. The Institute reserves the right to retrieve information from its computers for the purpose of finding lost information or retrieving information lost due to system failure. The Institute reserves the right to monitor computer usage if there is a suspicion on reasonable grounds of criminal activity or any breach of these Regulations, and in this event there should be no expectation of prior warning or notice.
- C. Such monitoring includes the generation of logs which may be posted to detect and establish breaches of these Regulations. The Institute's computers and networks are

Institute property and subject to standard maintenance and auditing activities as well as reasonable cause searches without notice to staff.

- D. Users consent to such monitoring and accept that it is essential to properly safeguard the business of the Institute and to protect the rights of all staff.
- E. Data is backed up as a regular feature of network administration. Deletion of email messages and other data does not necessarily prevent the retrieval of items. The Institute will not accept liability for lost or deleted data.

### **3. Use of Computer Resources**

#### **A. General**

Users are required to abide by the law, by these Regulations, by the Data Protection Legislation, by the HEAnet Acceptable Usage Policy (attached), and by any additional regulations as may be laid down from time to time, in relation to the proper usage of computer equipment and materials.

It is the user's responsibility to be informed of the correct operating procedures for the computer resources or products used. A user who is uncertain as to the correct procedure in any situation should obtain clarification before proceeding.

Users must not engage in conduct which interferes with others' use of shared computing resources and/or the activities of other users, including studying, teaching, research and administration in or for the Institute.

#### **B. Reporting/Queries**

Users must immediately advise the relevant members of staff of any suspected acts of violation, breach in the security system or virus.

If users have any queries about the Institute's information and technology systems they should seek advice from the relevant member of staff.

#### **C. User Access**

Users must not utilise any other person's access rights.

Users must not attempt to gain access to resources or data for which they have not been specifically authorised nor should they attempt to bypass or probe any security mechanisms governing access to the computer systems.

A user must not misrepresent himself or herself as another individual in electronic communications.

Users must not divulge their Institute email address to any website that is not required by virtue of their designated duties, studies or research.

#### **D. Content**

The Institute's computer facilities and services should not be used to create, send, post, download, forward, view, store or display offensive, abusive, slanderous, vulgar, threatening or defamatory messages, text, graphics, or images or material from whatever source which may put the Institute at risk of prosecution, civil action, embarrassment or loss of reputation. This includes harassment, discrimination and intimidation of individuals on the basis of race, sex, religion, ethnicity, sexual

orientation, disability, age marital status, family status or membership of the traveller community, etc. Specific examples include, but are not limited to, material that:

- is sexually explicit (whether visually or in written form) including descriptions or images of nudity or sexual acts;
- is discriminatory;
- advocates or supports violent or criminal acts;
- involves gambling;
- is by way of chain letter;
- violates copyright laws;
- breaches the Institute's harassment guidelines;
- involves use or transfer of unauthorised or unlicensed software;
- involves knowingly transferring viruses or virus based files;
- involves participation in responses to SCAMS, SPAMS or illegal activities.

Provided that the user first obtains the consent in writing from his or her Head of School or other designated officer, access to material described above for the purposes of bona fide study or research undertaken as part of an Institute programme of studies is not prohibited.

Email messages should be accurate, courteous and necessary.

Users should note that all messages on the Internet or access to Internet sites coming from the Institute's information and technology systems are identified as Institute activities. Electronic mail will be treated as a record of the Institute. It may be required to be retrieved as legal evidence. Therefore electronic mail should be used in the same way as other forms of written communication on Institute notepaper and all electronic mail messages should be regarded as permanent documents which will or may become public whether under the Freedom of Information Act or otherwise.

Users must not use Institute computer facilities to comment or communicate unofficially on any legal disputes or actions involving the Institute, its employees or students.

#### E. Computer Security

Users must not remove the Institute's information and technology equipment from Institute premises without prior authorisation of Head of Department or more senior officer. Users are responsible for the safekeeping of such information in computers whilst they are off-site and for reporting any associated loss of such information or computers to Head of Department or more senior officer.

Users must ensure that they do not deliberately or otherwise corrupt or destroy any software or data facilities or equipment accessible to them or introduce viruses to these resources. Users must not physically damage or deface any computer, ancillary equipment, documentation or related materials.

Messages should not be sent to a larger audience than is reasonably justifiable, in particular when they contain attachments.

Care should be taken when addressing email messages, to avoid mis-delivery.

Large and non-essential Internet downloads should be avoided, especially during peak hours, when they may be likely to impact on network performance.

Users are advised that software products are covered by licensing agreements. Such products and related materials shall not be copied.

Eating, drinking and smoking are strictly forbidden in any computer service area.

Users may not remove, disconnect, power off or otherwise interfere with any item of computer equipment without authorisation.

**F. Compliance**

Users must comply with the instructions and advice of Institute staff having responsibility for provision and support of computer services and for regulation of their use.

#### **4. Discipline**

Any user in breach of these regulations is liable for the legal and / or disciplinary consequences of that action which may take the form of withdrawal of facilities, suspension, expulsion or prosecution. These Regulations were adopted by the Dublin Institute of Technology Governing Body on 11th July 2001.

Any issues arising should be referred to local support staff in the first instance or escalated to the Information Services Support Desk (email: [support@dit.ie](mailto:support@dit.ie), Telephone: 01 402 3123).

## **Appendix D: Module Descriptors**

These are also available online in the DIT Module catalogue at:

<https://www.dit.ie/catalogue/Programmes/Details/DT228?tab=Programme%20Structure>



<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Applied Intelligence</b>
		5	CMPU3004	

## **Applied Intelligence**

### *Module Author*

Brian MacNamee and John Kelleher

### *Module Description*

This module introduces students to the power of artificial intelligence (AI) and machine learning (ML) by developing and exploring a series of ML and AI based applications primarily focused on using online data sources. While the module will cover AI and ML techniques these will not be covered in great depth, but rather the module will focus on the application of these techniques.

### *Module Aims*

The aims of this module are to:

- Introduce students key techniques from artificial intelligence and machine learning
- Develop in students a deep understanding of how AI and ML techniques can be applied to real world problems.
- Engage students in the development of a range of real solutions using ML and AI techniques.

### *Learning Outcomes*

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

1. Demonstrate an understanding of a range of machine learning and artificial intelligence techniques
2. Select appropriate ML and AI techniques to use to solve specific problems
3. Compare the suitability of different AI and ML approaches to solving the same problem
4. Develop a range of AI and ML solutions to real problems
5. Critique the limitations of AI and ML approaches

### *Learning and Teaching Methods*

Lectures, tutorials, lab demonstrations and discussions. This module will be primarily practical and while material will be presented in lectures a large amount of time will be spent developing solutions to real problems based on the material covered in lectures. A virtual Learning Environment is extensively used in this module.

### *Module content*

- Introduction to Applied Intelligence
  - What Is Artificial Intelligence (AI)?

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Applied Intelligence</b>
		5	CMPU3004	

- What Is Machine Learning (ML)?
- Limits of ML and AI
- Applications of AI and ML
- Making Recommendations
  - Collaborative Filtering
  - Collecting Preferences
  - Finding Similar Users
  - Recommending Items
  - User-Based or Item-Based Filtering?
  - Applications of Recommender Systems: Online Retail Recommendation System, Social Network Friend Recommendation
- Discovering Groups
  - Supervised versus Unsupervised Learning
  - Hierarchical Clustering
  - K-Means Clustering
  - Clusters of Preferences
  - Applications of Clustering: Customer Segmentation, Player Segmentation
- Searching and Ranking
  - What's in a Search Engine?
  - A Simple Crawler
  - Building the Index
  - Querying
  - Content-Based Ranking
  - Applications of Search: Building the next Google!
- Optimization
  - Representing Solutions
  - The Cost Function
  - Random Searching
  - Hill Climbing
  - Simulated Annealing

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Applied Intelligence</b>
		5	CMPU3004	

- Genetic Algorithms
- Optimizing for Preferences
- Network Visualization
- Applications of Optimization: Price Modelling, Parameter Selection
- Building Classification Models
  - Documents and Words
  - Modelling with Decision Trees
  - Modelling with Naïve Bayes Classifier
  - Modelling with k-Nearest Neighbours Classifier
  - Applications of Classification Models: Filtering Spam, Filtering Blog Feeds, Building Price Models, Social Network Friend Matching
- Evolving Intelligence
  - What Is Genetic Programming?
  - Genetic Programming Approaches
  - Applications of Genetic Programming: Games, Optimisation, Search
- APIs and Languages
  - Suitable APIs (e.g. Google API, Facebook API) and programming languages (e.g. Python) and techniques will be used to develop the sample applications described above.

### ***Module Assessment***

Continuous assessment - 100%

The module will be evaluated based entirely on continuous assessment. Students will be asked to develop a range of solutions to real problems using the approaches discussed in lectures. Students will also be tasked with presenting their opinions of the state of the art of AI and ML applications and the limitations of ML and AI based approaches in a series of in-class presentations.

### ***Essential Reading***

Toby Segaran, 2007, Programming Collective Intelligence: Building Smart Web 2.0 Applications, O'Reilly Media.

### ***Supplemental Reading***

Russell & Norvig, 2009, Artificial Intelligence – A Modern Approach (3rd ed), Prentice Hall

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Applied Intelligence</b>
		5	CMPU3004	

Ethem Alpaydin, 2004, Introduction to Machine Learning, MIT Press

Tom Mitchell, 1997, Machine Learning, McGraw Hill

***Web references, journals and other***

Machine Learning, Springer Science + Business Media

ACM Journal of Machine Learning Research, ACM

IEEE Transactions on Pattern Analysis and Machine Intelligence

IEEE Intelligent Systems

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Business and Enterprise</b>
		5	CMPU3005	

## **Business and Enterprise**

### *Module Author*

Hugh McAtamney

### *Module Description*

In this module the students will study the business environment, the nature of enterprise, the generation of potential business idea and how to package this knowledge in a professional formal, realistic and professional business plan. It also introduces students to the concepts of thinking laterally, creating new ideas and how to develop business ideas for starting up a new business.

### *Module Aims*

The aims of this module are to:

- Provide Idea Generation Tools
- Provide an introduction to the business environment and particularly the role of the small to medium sized business,
- Help students generate potentially commercial ideas from their computer studies, to evaluate this idea and package it as a product, process, service or concept in the form of a formal professional business plan.
- Present this plan as a project in seeking finance

### *Learning Outcomes*

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

1. Assess project viability and determining what constitutes a 'good' idea
2. Describe the increased importance of enterprise and innovation for the Irish economy
3. Attempt to identify potential commercial opportunities from their knowledge base, research skills and course
4. Understand the nature and role of the entrepreneur in the business set up and corporate intrapreneurship
5. Research a market and to measure its business potential
6. Critically evaluate the business set up planning process
7. Develop and produce a comprehensive business plan
8. Identify and source the financial resources to set up a business
9. Present a critical evaluation of good business practice

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Business and Enterprise</b>
		5	CMPU3005	

### *Learning and Teaching Methods*

Lectures, case studies, workshops, guest lectures.

### *Module content*

Lateral thinking & thinking outside the box, Applied idea generation techniques , Morphological analysis,

Random Association, Thinking Backwards

The growing importance of Small to Medium sized Business (SMEs).

The Irish and European business economic structure.

The Barriers to innovation in SMEs and their potential for growth.

Characteristics of Entrepreneurs, corporate entrepreneurship and the entrepreneurial process.

Idea generation, evaluation and protection. (Registration, Register Design, Trade Marks Patents, copyright etc.).

Business planning process and preparation of a business plan.

Marketing research, management, production and finance planning

Business support initiatives

Strategic planning for the SME

Presentation and evaluation of the business plan

### *Module Assessment*

Examination: 50%

Continuous Assessment: 50%

- Business Plan (teams): 70% for plan and 30% for presentation

### *Essential Reading*

Starting your own Business, Brian O’Kane, Latest Ed. Oak Tree Press.

Annual Competitiveness Reports. Forfas

Global Entrepreneurship Monitor reports

<i>Pre-Requisite Modules code(s)</i>	Co-Requisite Modules code(s)	ECTS Credits	Module Code	<b>Business and Enterprise</b>
		5	CMPU3005	

### *Supplemental Reading*

Magazines: Business and Finance, Running Your Business, The Economist

Business newspapers and current affairs.

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Client-Server Programming</b>
		5	CMPU3006	

## **Client-Server Programming**

### *Module Author*

Damian Bourke

### *Module Description*

Client-Server applications are of critical importance to modern enterprise systems. This module introduces the student to the concepts behind the development and deployment of such applications. Essentially it builds upon the student's understanding of data communications and network technologies and introduces the student to the higher layer functionality associated with the ISO OSI and TCP/IP reference models. It also introduces the techniques for installing and configuring applications. The student is expected to write a significant amount of code and to use their problem solving skills to develop complex client and server applications.

### *Module Aims*

The aim of the module is extend the student's software development skills to a networked environment and to extend the student's knowledge of common network issues. The student will also gain experience working in a command-line mode for the development and roll-out of application software.

### *Learning Outcomes*

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

1. Describe the client-server computing paradigm
2. Explain the difference between protocols and services
3. Describe the purpose of the transport layer and the services provided by this layer
4. Compare and contrast the functionality associated with the transport and network layers
5. Describe the functionality associated with common network applications.
6. Produce iterative and concurrent networked applications
7. Demonstrate the installation and configuration of networked applications
8. Demonstrate and evaluate the operation of the transport layer using networked applications
9. Demonstrate the use of standard network monitoring tools
10. Demonstrate and explain the use of standard UNIX tools to configure the starting and stopping of services in different UNIX run-levels



<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Client-Server Programming</b>
		5	CMPU3006	

### *Learning and Teaching Methods*

Learning will be achieved through a combination of lectures and laboratory sessions. Lectures will draw upon current theory content and case studies. Weekly laboratory sessions will be used to reinforce lectures and will facilitate the student's self-directed learning.

In addition there will be at least two assignments covering theoretical and practical content. These will facilitate the student's self-assessment.

### *Module content*

#### Introduction

- The Client-server model
- Concepts
- Concurrent server-class machines/programs

#### The Transport Layer

- Services and protocols
- Transport addresses
- Transport connections
- Transport layer operational concepts

#### The Application Layer

- Address resolution
- Common networked applications

#### The Berkeley Sockets API

- The Socket Abstraction
- The Socket interface/primitives
- Addressing
- Remote and local process-to-process and inter-process communications
- Iterative and concurrent applications

#### Software Management and Deployment

- Control Scripts
- Management of Services
- Management of software installation and maintenance

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Client-Server Programming</b>
		5	CMPU3006	

- UNIX man pages – writing and maintenance

### *Module Assessment*

The student will be assessed on their practical and theoretical attainment throughout the module through a combination of laboratory and class-room and/or written assessment. In addition the student will also be assessed at the end of the module using a written paper.

The end-of-semester written examination accounts for 60% of the overall module marks.

The continuous assessment accounts for 40% of the overall module marks.

### *Essential Reading*

Data and Computer Communications, 9th Edition. William Stallings. Prentice Hall, ISBN-10: 0131392050, 2010

Edward C. Bailey, 1997, Maximum RPM, (Imprint: Sams) Macmillan Computer Publishing, Indiana. ISBN: 0-672-31105-4

### *Supplemental Reading*

Computer Networks, 4th Edition, Andrew Tanenbaum. Prentice Hall ISBN: 0130661023, 2002

TCP/IP Network Administration 3rd edition. Craig Hunt, O'Reilly Publishers 2002.

Internetworking With TCP/IP Volume 1: Principles, Protocols and Architecture, 5th edition, Douglas E. Comer, Prentice Hall, ISBN 0-13-187671-6, 2006

Computer Networks and Internets, 5th Edition, Douglas E. Comer, Prentice Hall, ISBN 0-13-606127-3, 2009

Hands-on Networking with Internet Applications, 2nd Edition, Douglas E. Comer, Prentice Hall, ISBN 0-13-144310-0, 2004.

### *Web references, journals and other*

Multimedia Communications : Applications, Networks, Protocols and Standards, Fred Halsall, Addison Wesley, UK, 2000, 0-201-39818-4.

Donnie Barnes, 1999, The RPM How-To Guide (<http://www.rpm.org/RPM-HOWTO/>), Red Hat Inc. Accessed 7th March 2006

Article: What You Need to Write Man Pages. By Peter Seebach

<http://www.linux.com/article.pl?sid=04/02/05/1651203> (Accessed: 12th March)

<i>Pre-Requisite Modules code(s)</i>	Co-Requisite Modules code(s)	ECTS Credits	Module Code	<b>Client-Server Programming</b>
		5	CMPU3006	

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Cloud Computing</b>
		5	CMPU3007	

## **Cloud Computing**

### ***Module Author***

Paul Doyle

### ***Module Description***

This module looks at the history and evolution behind cloud computing followed by a review of the latest technologies within it. This module is designed to provide the student with both a practical and theoretical understanding of existing cloud systems and their underlying technologies. The technologies focused on will include grid computing, virtualisation, distributed computing, cloud storage, security within the cloud in addition to reviewing a number of existing cloud environments.

### ***Module Aims***

The aim of this module is to provide the learner with both a theoretical and practical understanding of the technologies used to enable Cloud Computing.

### ***Learning Outcomes***

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

1. Demonstrate an understanding of the fundamentals of Cloud Computing
2. Demonstrate an understanding of the evolution of Cloud Computing technologies
3. Demonstrate a practical understanding of cloud technologies within a laboratory environment.
4. Configure basic infrastructural components used within the cloud
5. Critically analyse different methods for implementing Cloud solutions

### ***Learning and Teaching Methods***

The course delivery involves a combination of lectures and labs. Students will be expected to put into practice some of the module concepts by interacting with existing public cloud infrastructures.

### ***Module content***

What is cloud computing?

Classifications of Clouds

Evolution of Clouds

Technologies within the cloud

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Cloud Computing</b>
		5	CMPU3007	

Virtualisation

Storage and Security

Hadoop

Case Studies of Commercial Clouds (AZURE, Google APPS, Amazon EC2, OpenStack)

### ***Module Assessment***

Assessment will be through a combination of continuous assessment and a written exam.

Marks will be allocated as follows

- Written Exam (50%): The written exam will be conducted under normal DIT Exam regulations and will be based on the theory covered during lectures.
- Continuous Assessment (50%): The CA elements of the course will be based on the implementations of basic cloud technologies.

### ***Essential Reading***

Velte/Elsenpeter 2009, Cloud Computing A Practical Approach, McGrawHill

Rosenberg/Mateos 2010, The Cloud at your service, Manning

Mather/Kumaraswamy/Latif Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance (Theory in Practice) 2009, O'Reilly Media

George Reese, 2009, Cloud Application Architectures: Building Applications and Infrastructure in the Cloud, O'Reilly

### ***Supplemental Reading***

Armbrust, 2009, Above the clouds: A Berkeley view of Cloud Computing,UCB/EECS

Kesselman/Foster, 1998, The Grid: Blueprint for a new computing infrastructure, Morgan Kaufmann Publishers

### ***Web references, journals and other***

<http://aws.amazon.com/ec2/>

<http://www.ibm.com/ibm/cloud/>

<http://code.google.com/appengine/>

<http://www.microsoft.com/windowsazure/>

<i>Pre-Requisite Modules code(s)</i>	Co-Requisite Modules code(s)	ECTS Credits	Module Code	<b>Cloud Computing</b>
		5	CMPU3007	

<http://www.grid.ie/>

<http://www.openstack.org/>

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Computational Mathematics</b>
Mathematics 2		5	CMPU3008	

## **Computational Mathematics**

### ***Module Author***

John Gilligan, Shane Mulligan

### ***Module Description***

This is an advanced module in Mathematics, which will give the student the necessary mathematical skills and tools, to deal with specialised areas in computing, such as Graphics, Image processing, Games development and Cryptography.

### ***Module Aims***

The aim of this module is to give the student the necessary knowledge and competence to deal with specialised applications in computer science, such as graphics, image processing and cryptography. It will present the necessary mathematical tools and how they can be applied to various problem areas. It will present mathematics as an exact science, and a powerful tool to model and analyse problems.

### ***Learning Outcomes***

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

1. Define and use linear algebra techniques in geometry.
2. Explain the set-up and application of linear transformation, and matrix techniques in Graphics.
3. Apply coordinate geometry algorithms in 2 and 3 dimensions.
4. Develop and apply computational techniques which have application in topics such as image processing and intelligent analysis. These methods include, for example, numerical analysis and soft computing approaches and algorithms from number theory, and their application to cryptography.

### ***Learning and Teaching Methods***

This module will consist of lectures and tutorials. Exercises and continuous assessments will be given to ensure that the student understands and masters the material, and to give them practice at representing and solving simple problems.

### ***Module content***

Vectors and Matrices: Vectors, vector operations, cross product, normal vector. Matrices, multiplication, transpose, determinants.

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Computational Mathematics</b>
Mathematics 2		5	CMPU3008	

Geometry. Co-ordinate systems, homogeneous coordinates. Line, circle, plane equations, parametric forms. Normal vector. Geometrical transformations and matrices, scaling, translation, rotations, and their composition. Projections and projection matrices.

Geometric algorithms: Euclidean distance, areas, intersection of line and plane, point-in-triangle test, area of a polygon.

Computational methods Numerical Algorithms, Methods from Number Theory, Soft Computing Methods, Applications in Computer Science

### ***Module Assessment***

Written Examination 70%

Practical 30%

### ***Essential Reading***

Foley J. D., A. van Dam, S. K. Feiner, J. F. Hughes, 1990, Computer Graphics – Principles and Practice, 2nd Edition, Addison-Wesley.

### ***Supplemental Reading***

Bishop Cryptography with Java Applets Jones and Bartlett Comp Sci 2003

Karray and De Silva Soft Computing and Intelligent Systems Design Addison Wesley 2004

### ***Web references, journals and other***

[www.mathworks.com](http://www.mathworks.com)



<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Databases 2</b>
Databases 1 Programming		5	CMPU3010	

## **Databases 2**

### *Module Author*

Databases Group

### *Module Description*

The material covered will build on student's knowledge and skills to include design and transaction processing on a multi-user environment. The student will use a procedural language extension to allow for sequential, selective and iterative processing. Triggers, functions and procedures will enrich the student's ability to store and retrieve data securely. The student will apply the concepts to a case study.

### *Module Aims*

The aims of this module are to:

- Enhance design skills using Data Normalisation and Extended Entity Relational Modelling.
- Expand the student's ability to ensure data integrity using further database objects, such as triggers, functions and procedures.
- Furnish the student with the skills to undertake multi-layer transactions using a procedural language extension to the relational database, and a third-generation language.

### *Learning Outcomes*

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

1. Apply ER Modelling skills to a medium-sized database application area.
2. Normalise data to third normal form.
3. Demonstrate an understanding of ACID properties.
4. Design and implement a multi-statement transaction using a procedural extension to the relational database.
5. Write and use functions, procedures and triggers where appropriate.
6. Configure user access and transactions to allow for multiple users with different needs to access the database.
7. Practice multi-layer transaction processing.

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Databases 2</b>
Databases 1 Programming		5	CMPU3010	

### ***Learning and Teaching Methods***

This module will be delivered over four hours per week for one Semester. This will consist of one hour lecture, one hour tutorial and one two-hour laboratory session. During the lecture, new material on modelling, transaction processing and programming with relational databases will be disseminated. Techniques will be applied in the practical laboratory sessions, including the use of a case study. Where appropriate, students will work in teams. The tutorials will review theory and practice, to prepare them for practical and examination work, in accordance with the requirements of the students.

### ***Module content***

Techniques of Data Normalisation and Extended Entity Relationship Modelling.

Architecture and layering of transactions in a relational database.

Concepts of procedural programming as applied in the language extension.

I/O to the client from the language extension and from a 3GL.

Stored Functions and procedures.

Trapping and propagating errors from the database to a client process.

Allocating privileges to schema users, depending on the user requirements.

ACID properties, concurrency and locking.

Audit and constraint triggers.

### ***Module Assessment***

Module will be assessed by both non-exam and examination assessment. Students must pass the examination component. Students must pass the entire module. Continuous assessment 40%, examination 60%.

### ***Essential Reading***

Elmasri & Navathe, 2010, 'Fundamentals of Database Systems' 6th Ed., Addison Wesley.

Depending on database being used, examples are:

Sunderraman, R., 2007, 'Oracle 10g Programming: A Primer, Addison Wesley

Sack, J., 2008, SQL Server 2008 Transact-SQL Recipes: A Problem-Solution Approach, APress

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Databases 2</b>
Databases 1 Programming		5	CMPU3010	

Geschwinde, E., 2001, PostgreSQL Developer's Handbook, 2nd Ed., Sams

### *Supplemental Reading*

Connolly & Begg, 2009, 'A practical approach to design, implementation and management' 5th ed. Addison Wesley

### *Web references, journals and other*

References to specific vendors will depend on the DBMS being used:

[www.oracle.com](http://www.oracle.com)

[www.postgresql.org](http://www.postgresql.org)

[http://msdn.microsoft.com/en-us/library/bb510741\(SQL.100\).aspx](http://msdn.microsoft.com/en-us/library/bb510741(SQL.100).aspx)

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Games Logic and Design</b>
		5	CMPU3015	

## **Games Logic and Design**

### ***Module Author***

Hugh McAtamney

### ***Module Description***

The aim of this module is to introduce students to theory and practice of game development. This will be achieved by enabling students to develop computer game prototypes. The course will introduce students to the fundamental concepts of game development such as game design principals, game engines, computer graphics, sound and artificial intelligence.

### ***Module Aims***

This module aims to expose students to the important considerations in game logic and design by enabling students to create 2D computer games. Students will use an industry standard game engine that they can enhance and reuse to build a variety of game prototypes.

Students will learn the basics of game logic and design by understanding how to create a reusable game engine; capture keyboard, mouse, and joystick input; animate graphical objects with sprites; detect collisions between sprites; play digital sound effects and music and give game characters intelligent behavior.

### ***Learning Outcomes***

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

1. Demonstrate an understanding of the history, context and ethical issues of modern computer games
2. Demonstrate an understanding of the main concepts involved in developing computer games
3. Use mathematics and algorithms to develop 2D games
4. Analyse and define the rules and logic of a game
5. Develop game prototypes integrating OOP concepts and industry standard API's
6. Discuss game theory, sprite animation, sprite artificial intelligence
7. Program path finding and vector based collision detection algorithms

### ***Learning and Teaching Methods***

Class time is split into a series of interactive "studio classroom" based lectures and practical problem solving in labs. In lectures, students have access to a PC, with appropriate software and development kits, so that material and examples can be examined in a live environment. In

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Games Logic and Design</b>
		5	CMPU3015	

In addition, students will be expected to proactively and independently seek out resources on the internet and from the library to supplement their own learning.

A Virtual Learning Environment (VLE) will be employed to distribute all teaching materials and to support student interaction with both other students and academic staff. Where new material is not presented in lectures, such material will be made available through the VLE and students are expected to proactively use this resource.

### *Module content*

Game Logic and design

- History of computer games, technology, game theory, gameplay, game balance, design documentation, ethics and societal issues in games.

Game Engines

- Introduction to the game loop and the role of object orientated concepts in game development.

Game Logic

- Mechanics, game logic, balance, progression

Graphics & Animation

- Co-ordinate systems, color, device contexts, pens, brushes, bitmaps, fonts, graphics primitives, sprites, managing sprites, animation.

Input

- Accessing keyboard, accessing mouse, interacting with joysticks and joypads,

AI

- Rule based AI, roaming, chasing and evading.

### *Module Assessment*

The module will be assessed through a combination of a written exam and continuous assessment. The continuous assessment aspect of the course will consist of the development of a game prototype. The final grade will be made up of 50% continuous assessment and 50% examination

### *Essential Reading*

Michael Morrison , XNA programming, Published by Sams , ISBN:0672326590; 2004

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Games Logic and Design</b>
		5	CMPU3015	

### *Supplemental Reading*

The Game Programming Gems series published by Charles River Media

Wendy Stahler, 2004, Beginning Math and Physics for Game Programmers , New Riders

### *Web references, journals and other*

Gamasutra – [www.gamasutra.com](http://www.gamasutra.com)

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	<i>ECTS Credits</i>	<i>Module Code</i>	<b>Introduction to Artificial Intelligence</b>
		5	CMPU3024	

<b>School Responsible:</b>	School of Computing
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Module Name:

### **Introduction to Artificial Intelligence**

<b>Module Overview:</b>
<p>The purpose of this module is to introduce the students to the use and practice of the broad scope of artificial intelligence techniques within the computer science domain. The module will introduce students to the issues and factors involved in building modern complex intelligent systems, and act as an introduction to more specialist modules. There is a strong practical emphasis in the module to allow students to gain experience of tools and techniques to assist in this process.</p>

<b>Learning Outcomes (LO):</b>	
On Completion of this module, the learner will be able to	
	On completion of this module, the learner will be able to:
<b>1</b>	<ul style="list-style-type: none"> <li>• Demonstrate an understanding of the meaning and history of Artificial Intelligence (AI) and Knowledge Representation.</li> </ul>
<b>2</b>	<ul style="list-style-type: none"> <li>• Outline the relationship between key Artificial Intelligence specializations including Planning, Inference, Knowledge Representation and Machine Learning</li> </ul>
<b>3</b>	<ul style="list-style-type: none"> <li>• Outline the relationship between Artificial Intelligence and key application domains such as Natural Language Processing, Business Systems Intelligence, and Bioinformatics</li> </ul>
<b>4</b>	<ul style="list-style-type: none"> <li>• Demonstrate an understanding of different approaches to Knowledge Representation &amp; Reasoning</li> </ul>
<b>5</b>	<ul style="list-style-type: none"> <li>• Implement a Knowledge Representation &amp; Reasoning System using an appropriate AI related language</li> </ul>
<b>6</b>	<ul style="list-style-type: none"> <li>• Explain the nature and typical application of Machine Learning based classification system</li> </ul>
<b>7</b>	<ul style="list-style-type: none"> <li>• Apply K-Fold Cross Validation in the context of the typical Machine Learning study cycle</li> </ul>

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Introduction to Artificial Intelligence</b>
		5	CMPU3024	

<b>8</b>	<ul style="list-style-type: none"> <li>Outline how uncertainty can be handled in an AI system.</li> </ul>

<b>Indicative Syllabus:</b>
<ul style="list-style-type: none"> <li>Definition of Artificial Intelligence</li> <li>Overview of the AI landscape: Uses in the real world</li> <li>Introduction to AI sub-topics including Knowledge Representation, Reasoning, Planning, and Machine Learning – emphasis on definitions and applications in the real world.</li> <li>Declarative versus procedural programming. Logic programming. Predicate calculus.</li> <li>Introduction to knowledge representation, semantic networks, conceptual dependency and natural language processing</li> <li>Introduction to AI algorithms and state based search</li> <li>Introduction to a Machine Learning classification technique</li> <li>Introduce the Machine Learning Life Cycle through a supervised classification method <ul style="list-style-type: none"> <li>Data - Target Variables and Features</li> <li>K-Fold Cross Validation with Train / Test splits</li> <li>Classifier Training and Use</li> <li>Evaluating Accuracy</li> </ul> </li> <li>Reasoning with uncertainty, Bayesian reasoning</li> </ul>

<b>Learning and Teaching Methods:</b>	
The module will be delivered primarily through lectures and laboratory work. The material will be developed in an informal way during lectures. It is envisaged that the students will assimilate much of the material through problem solving and exercises It is important that students be able to link the concepts and techniques learnt in this module to real world problems through practical laboratory work.	
<b>Total Teaching Contact Hours</b>	52



<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Introduction to Artificial Intelligence</b>
		5	CMPU3024	

<b>Total Self-Directed Learning Hours</b>	48
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<b>Module Delivery Duration:</b>
One semester

<b>Assessment</b>		
Assessment will be based on a two hour end of semester written exam and continuous assessment during the semester. This module should have a 60% weighting for the examination and a 40% weighting for the continuous assessment. While it is important that the student can demonstrate their technical ability with coursework, it is more important that they demonstrate an understanding of the theoretical aspects of knowledge systems.		
<b>Assessment Type</b>	<b>Weighting (%)</b>	<b>LO Assessment (No.)</b>
Written exam	60	1,2,3,4,6,8
Continuous assessment	40	5,7

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	<i>ECTS Credits</i>	<i>Module Code</i>	<b>Introduction to Artificial Intelligence</b>
		5	CMPU3024	

<b>Module Specific Assessment Arrangements (if applicable)</b>		
(a) Derogations from General Assessment Regulations		
(b) Module Assessment Thresholds		
(c) Special Repeat Assessment Arrangements		

<b>Essential Reading</b>
Luger, 2008, Artificial Intelligence: International Version: Structures and Strategies for Complex Problem Solving, Addison Wesley.
<b>Supplemental Reading</b>
Negnevitsky, 2011, Artificial Intelligence: A Guide to Intelligent Systems, Addison Wesley.
<b>Web References, Journals and Other</b>
As specified by lecturer.

<b>Version No:</b>		<b>Amended By</b>	
<b>Commencement Date</b>		<b>Associated Programme Codes</b>	

# Modules that are to be offered as Stand-Alone CPD Programmes must have an NFQ level assigned

\*Details of the assessment schedule should be contained in the student handbook for the programme stage.

**Date of Academic Council approval .....**

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Mobile Robotics</b>
		5	CMPU3025	

## **Mobile Robotics**

### *Module Author*

Brian MacNamee and John Kelleher

### *Module Description*

An introduction to mobile robotics including underlying theory and applications. The module will have a large practical component.

### *Module Aims*

This module provides a broad introduction to the field of mobile robotics, from a software perspective. It covers the basics of mobile robot control, software architectures, navigation and localization algorithms, and surveys common application areas. The practical aspects of the course will give students experience in developing real robotic systems.

### *Learning Outcomes*

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

1. Critique the appropriateness of using robotic solutions for various applications
2. Describe the main components of a mobile robotic system, including sensors, actuators, control architectures and power options
3. Differentiate between and compare different robotic sensor and actuator approaches
4. Compare different approaches to robot locomotion
5. Compare different approaches to robot localisation and mapping
6. Develop mobile robotic solutions to sample problems

### *Learning and Teaching Methods*

The module will be delivered through a mixture of lectures and lab sessions with a stronger emphasis on lab work towards the latter half of the course. Lab work will take the form of a robot workshop in which students will be divided into teams to develop mobile robot solutions to appropriate problems. A virtual Learning Environment will be used in this module.

### *Module content*

- Introduction
  - Key questions for mobile robots
  - Application areas
  - Key components of mobile robotic systems
- Sensors

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Mobile Robotics</b>
		5	CMPU3025	

- Basic concepts
- Contact sensors
- Internal sensors
- Range sensors
- Beacon based sensing
- Data fusion
- Biological sensing
- Visual sensors and algorithms
- Actuators
  - Electronics basics
  - Motors
  - Artificial muscles
  - Pneumatics
  - New materials
- Mobile Robot Locomotion
  - Wheeled robot topologies
  - Legged robot topologies
  - Legged robot gaits
  - Basic mobile robot kinematics
  - Representing robot positioning
  - Forward kinematic model
  - Mobile robot manoeuvrability
- Robot Control System Architectures
  - General Control Structure for Mobile Robots
  - Perception Action Models
  - Subsumption Hierarchies
  - Layered Models
  - Deliberative Agents
- Mapping and Localisation
  - Topologic maps

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Mobile Robotics</b>
		5	CMPU3025	

- Metric maps
- Construction of occupancy grids
- Localisation approaches
- Introduction to SLAM (simultaneous localisation and mapping)
- Planning and Navigation
  - Path-planning
  - Collision Avoidance
- Advances in Robotics
- Implementing Robotic Systems
  - An appropriate robotic API (e.g. ROS, Lejos)
  - An appropriate mobile robot hardware platform (e.g. Lego Mindstorms, iRobot Roombas)

### ***Module Assessment***

Written examination - 50%

Continuous assessment - 50%

### ***Essential Reading***

Roland Siegwart and Illah R. Nourbakhsh, 2004, "Introduction to Autonomous Mobile Robots", Bradford Books.

### ***Supplemental Reading***

Howie Choset, Kevin M. Lynch, Seth Hutchinson, George Kantor, Wolfram Burgard, Lydia E. Kavraki, and Sebastian Thrun, 2005, "Principles of Robot Motion : Theory, Algorithms, and Implementations", The MIT Press.

Gregory Dudek and Michael Jenkin, 2000, "Computational Principles of Mobile Robotics", Cambridge University Press.

Siciliano, Bruno; Khatib, Oussama (Eds.), 2008 "Springer Handbook of Robotics", Springer.

### ***Web references, journals and other***

Singularity Hub ([www.singularityhub.com](http://www.singularityhub.com))

NASA robotics ([robotics.nasa.com](http://robotics.nasa.com))

Robots.net ([www.robots.net](http://www.robots.net))

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Mobile Software Development</b>
Object-Oriented Programming		5	CMPU3026	

## **Mobile Software Development**

### *Module Author*

Programming and Algorithms Group

### *Module Description*

This module covers the knowledge and practical skills to design and implement basic mobile phone applications, in a specific mobile development environment. In order to set mobile software development in context, it also covers background mobile communication technologies such as GSM, GPRS, EDGE, 3G, Bluetooth, and examines leading mobile development platforms and typical mobile data applications.

### *Module Aims*

The aim of this module is to enable the learner to develop mobile phone applications in a leading mobile phone development platform, whilst also providing an understanding of relevant mobile phone technologies in order to set the application development in context.

### *Learning Outcomes*

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

1. Develop mobile phone applications in a leading mobile development platform;
2. Understand and apply good design guidelines for mobile application development;
3. Discuss and compare the leading mobile development platforms such as but not limited to: Android, Qt, Windows Mobile, and iOS (Apple);
4. Discuss and compare the mobile phone communication technologies such as, but not limited to: GSM, GPRS, EDGE, 3G, Bluetooth;

### *Learning and Teaching Methods*

Classroom based lectures will be used to explore and explain concepts, technologies, environment features, code examples and any other material relevant to the course that requires in class coverage.

A critical part of the module is the practical lab sessions where students will implement development concepts covered in lectures. Practical exercises will be completed within the lab, with practical assignments completed outside of class time, in the students own time. The students will use an Integrated Development Environment in the lab to support their programming work if appropriate for the platform selected.

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Mobile Software Development</b>
Object-Oriented Programming		5	CMPU3026	

A tutorial session will also be included to provide a discussion forum where students can explain the problems that have had in lab sessions or with concepts covered in lectures. The tutorial session will also be used to introduce new material as needed to supplement material covered in lecture time.

### ***Module content***

Technologies for mobile software development have and continue to develop and change rapidly. Therefore, no specific mobile platform is prescribed. The content is described generically, and will be covered for the particular platform used when the module is taught:

Mobile phone development: typical applications, technologies, usage;

Mobile communications technologies: local (e.g. Bluetooth) and network technologies (e.g. GSM, 3G);

Use of the relevant IDE for application development;

Mobile GUI components such as widgets, containers, menus;

Mobile GUI Layouts;

Mobile communications via the Internet;

Using persistent data with mobile applications;

Design consideration for mobile application development.

### ***Module Assessment***

This module will be based on 50% continuous assessment and 50% written examination. The continuous assessment will be based upon practical assignments that will reinforce and assess the practical learning outcome of application development. The written exam will test the student's understanding of the concepts covered of application development but will also assess the learning outcomes related to wider knowledge of mobile phone technologies.

### ***Essential Reading***

This will be prescribed by the lecturer at the beginning of the module as it will be specific to the mobile platform used.

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Mobile Software Development</b>
Object-Oriented Programming		5	CMPU3026	

### *Supplemental Reading*

This will be prescribed by the lecturer at the beginning of the module as it will be specific to the mobile platform used.

### *Web references, journals and other*

A series of relevant content references will be provided to students to support their learning activities.



<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Individual Project</b>
		10	CMPU3018	

## **Individual Project**

### *Module Author*

Damian Bourke

### *Module Description*

This module requires the student to propose, design, implement, test, document and present a software project to demonstrate the level of knowledge gained over the course of their studies. The project must be an independent piece of work which is both coherent and well structured. The student is expected to be self-motivated so as to drive this work through to completion. They are expected to identify the key areas of the project and to make real decisions that will ultimately affect the end deliverable. The project deliverable will be an assessable, independent body of work that will demonstrate the student's ability to work on their own and their ability to communicate key aspects of the project.

### *Module Aims*

The aim of this module for the student is to complete a software system implementation. This includes all aspects of software development including, but not limited to; analysis, design, development, implementation, integration, and documentation. In addition the student is required to produce an academic quality report outlining the key steps undertaken, the key decisions that were made, an evaluation of the outcomes, and the student's conclusions about the success or failure of the delivered system.

### *Learning Outcomes*

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

1. Define a problem area and write a project proposal
2. Evaluate similar systems to their proposal identifying a set of clear user requirements
3. Undertake research of the problem area to determine the boundaries and scope of the project
4. Undertake research of the proposed solution to identify appropriate technologies to use
5. Select and implement a formal design methodology
6. Write a project plan and project manage the project to completion
7. Develop a fully operational software/hardware system
8. Produce a report (in English) of academic quality with appropriate referencing
9. Present and defend their findings

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Individual Project</b>
		10	CMPU3018	

### *Learning and Teaching Methods*

The project module involves a combination of seminars, self-paced work, research, and weekly meetings with their assigned supervisor. This is primarily a self-learning module with the supervisor providing guidance and feedback to the student throughout the project. The student is expected to state at the outset the objectives for the project and to meet these objectives throughout the year. The student is also given explicit verbal feedback at the Interim report stage which is a presentation by the student on the work completed so far and the work planned in the future.

In addition to the dedicated supervisory resources the School will also provide a second reader for the purposes of assessing the student's work.

### *Module content*

Students are provided with detailed guidelines on the project process. These guidelines detail the requirements of the project in terms of the project content and deliverables and they also provide guidance on the content and format of the Interim Report and Final Project Manual. The guidelines also explain the roles of the key stakeholders including the student, the supervisor, second reader and project co-ordinator.

### *Module Assessment*

The module assessment will comprise 100% Continuous Assessment.

There are two key milestones within the project lifecycle at which the student is assessed. At the Interim Report stage the student is assessed on their research findings, system design, report writing and project management. The assessment is based on a key set of criteria set-out in the guidelines document.

At the Final Report stage the student is assessed on any additional research undertaken post-design, the system implementation phase, testing and evaluation phase, report writing, communication skills, project management, and the quality, complexity and usability of the delivered system. The assessment is based on a key set of criteria set-out in the guidelines document.

### *Essential Reading*

Damian Bourke, 2010. The Project Guidelines

Kathy Schwalbe, 2005, A Guide to the Project Management Body of Knowledge: Course Technology

Strunk, W. and White, E. B., 2000, The Elements of Style (4th ed.) Longman

<i>Pre-Requisite Modules code(s)</i>	Co-Requisite Modules code(s)	ECTS Credits	Module Code	<b>Individual Project</b>
		10	CMPU3018	

Booth, W., Colomb, G.C., Williams, J.M., 2003, The Craft of Research, University of Chicago Press

Dawson, C., 2005, "A Practical Guide to Research Methods: A User-friendly Manual for Mastering Research Techniques and Projects", How To Books

### ***Supplemental Reading***

Evaluating Software Architectures Methods Studies

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Quantitative Methods and Tools for Data Analysis</b>
Mathematics 2		5	CMPU3033	

## **Quantitative Methods and Tools for Data Analysis**

### *Module Author*

Svetlana Hensman

### *Module Description*

This module introduces the students to the basics of the probability theory and statistical methods. It provides a background and variety of examples of the application of the different methods for collecting and presenting data, as well as the statistical techniques used in practice. It also provides knowledge of some of the currently available statistical packages.

### *Module Aims*

The aims of this module are to:

- Provide the student with a comprehensive foundation in probability theory and statistics
- Enable the students to scientifically collect, interpret and analyse data and familiarise them with advantages of using statistical packages
- Introduce the theoretical and practical aspects of the applications of the linear models in statistical data analysis and illustrate tests for differences between groups by applying analysis of variance

### *Learning Outcomes*

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

1. Calculate probabilities of events and expectations of random variables for elementary problems, such as games of chance
2. Understand and apply a variety of methods for collecting, representing, visualising and analysing data and recognise the distribution of collected data
3. Apply statistical models and methods to solve wide range of practical problems and evaluate the suitability of a chosen statistical model
4. Interpret the results of a statistical analysis
5. Use hypothesis tests to make decisions
6. Perform analysis of variance (ANOVA)
7. Confidently use statistical software

### *Learning and Teaching Methods*

The module is delivered in the form of one lecture, one tutorial and one lab session weekly over one semester. This will allow the use of a combination of variety of learning and teaching

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Quantitative Methods and Tools for Data Analysis</b>
Mathematics 2		5	CMPU3033	

methods, including lectures, discussions, problem-solving exercises, computer-based learning, self-directed learning and problem-solving.

### ***Module content***

#### Probability Theory

- Review of the probability rules. Bayes' theorem. Random variables – discrete and continuous. Expected values and variances. Chebyshev's inequality. Binomial, Poisson and Normal distributions.

#### Estimation and Hypothesis testing

- Point and interval estimates of means and proportions. Large and small samples. Z and t-tests. Chi-squared tests.

#### Linear Regression Simple linear regression.

- Method of the least squares. Appropriateness of a regression model. Coefficient of determination and correlation coefficient. Transformation to linear form.

#### Analysis of Variance

- One way completely randomized design. F-test for equality of treatment means. Estimation of model parameters.

### ***Module Assessment***

Class test will comprise 40% of the marks for this module, and examination, the remaining 60%.

### ***Essential Reading***

Neter J., Wasserman W. and Whitmore G.A., 1993, Applied Statistics, Prentice-Hall, Inc.

Walpole R. and Myers R., 1989, Probability for engineers and Scientists, Macmillan Publishing.

### ***Supplemental Reading***

Levine D., Ramsey P. and Smidt R. 2001, Applied statistics for engineers and scientists: using Microsoft Excel and MINITAB, Prentice-Hall, Inc.

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Service-Learning and Civic Engagement</b>
		30	CMPU3035	

## **Service-Learning and Civic Engagement**

### *Module Author*

Ciarán O'Leary

### *Module Description*

This module is designed to help learners develop their understanding of how their behaviour as graduates and professionals can impact upon the world around them, including how their skills and abilities can and should be used with a sense of responsibility to improve the lives of others. As such, it meets the requirements of a modern liberal education, and is informed by the skills requirements of employers and professional accreditation bodies.

Learners will be required to participate actively and meaningfully in a six month long project, whereby they are immersed in an environment different to their typical environment. The learner must acquire sufficient knowledge and skills during this period to complete a project which meets a specific community need related to the learner's domain of study.

The precise details of the project are defined through negotiation with the module coordinator and a partner organisation, based in a disadvantaged community, a community in a developing country, or some similar environment. The partner organisation will be sourced by the module coordinator, and will typically be a voluntary or non-governmental organisation or charity.

Depending on their domain of study, the student may participate in a variety of activities during this time. Computing students, for example, may spend this time teaching basic computing skills to pupils or teachers. Others may teach English, for example, or use their domain skills for some activity agreed through negotiation with the module coordinator and the partner organisation.

The learner uses the experience to discover and assess a particular need of the partner organisation or community. The need must be related to the learner's domain of study, and will lead to the implementation of a project to address this need before the completion of the module.

The module is divided into four components, which can be completed in series or in parallel, or a combination of both, depending on the nature of the project and partner organisation. Similarly, the time periods allocated to the individual components will vary depending on the nature of the project. Crucially, all decisions relating to the design of the project will be made through negotiation between the learner, the partner organisation and the module coordinator.

The learner's personal development and ongoing reflection on their experience is intended to contribute to the development of their world-view and understanding of their current and

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Service-Learning and Civic Engagement</b>
		30	CMPU3035	

future role in society. As such, the learner is required to negotiate a personal development plan and complete reflection tasks which inform and demonstrate their learning.

The key transferable skills of problem solving, written and oral communication, critical and creative thinking, teamwork, negotiation, and civic responsibility and engagement represent the core of this module. These skills are identified in numerous reports and investigations as the key skills expected of graduates by employers.

### ***Module Aims***

The aims of this module are to:

- Develop the learner's critical thinking, creative thinking and problem solving by presenting them with real problems in the real world.
- Require the learner to communicate effectively and with impact while interfacing with professionals and others.
- Encourage the learner to broaden their world-view and develop their understanding of their current and future role in society and their community.
- Facilitate the learner in developing their understanding of the potential role for the skills acquired from their specific domain of study in disadvantaged communities and societies.
- Develop the learner's organisational abilities and sense of responsibility, as required of all effective professionals.
- Encourage personal reflection on the learner's values, motivation and contribution to society.

### ***Learning Outcomes***

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

1. Effectively communicate with others, using verbal, written and other means as required.
2. Develop strategies for identifying needs, assessing and defining problems, critically analysing potential solutions, and solving real world problems related to their domain of study.
3. Fully appreciate the importance of good timekeeping and time management, commitment and responsibility, personal presentation and professionalism in the work environment.
4. Work closely with others in a variety of roles and appreciate the value of working with, as well as for, others.
5. Identify and describe the role that their domain of study plays in the world, and how they, as professionals, can help in addressing the problems of disadvantage and

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Service-Learning and Civic Engagement</b>
		30	CMPU3035	

exclusion in the modern world.

### *Learning and Teaching Methods*

- Class-based seminars and tutor-led group reflection sessions during the latter two stages.
- Self-directed site-based research and project work.
- Web-based research and literature analysis.
- Supervision and feedback from the module coordinator and partner organisation.

### *Module content*

The module is divided into four components, which can be completed in series or in parallel, or a combination of both, depending on the nature of the project and partner organisation. The time periods allocated to the individual components will vary depending on the nature of the project. All decisions relating to the design of the project will be made through negotiation between the learner, the partner organisation and the module coordinator.

Prior to the commencement of the project, interested learners must apply to participate in the module. Participants will be selected based on a number of criteria, including their existing commitment to voluntary work and social engagement, if any, their proven reliability and ability, and references. If selected, the learner usually will begin negotiating with the module coordinator regarding how they will meet the learning outcomes of the module. If required, the learner usually will begin fundraising at this point.

Preparation: Starting in semester 2 of the academic year (usually at the end of January or start of February) the learner will formally begin the module. The learner will complete negotiation of the learning contract and personal development plan with the module coordinator and partner organisation, and will commence a period of formal preparation. Preparation may include collection or design of learning and teaching materials, development of websites, accumulation of contacts, continuation of fundraising, organisation of travel, negotiation of services, learning of a language, completion of short courses, search of relevant literature etc.

Immersion: The learner will be based in a disadvantaged community or society for an agreed period of time. The learner will be supervised by members of a support organisation or network, approved by the module coordinator. The learner will carry out the work required of them as agreed in the learning contract. During this period the learner will assess the needs of the community with a view to suggesting a role for their domain of study in that community. As an example, electronic engineering students may assess the need for satellite or mobile devices, computing students may assess the need for improved selection of software in schools or colleges, other learners may assess the need for improved access to learning materials in



<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Service-Learning and Civic Engagement</b>
		30	CMPU3035	

schools or colleges. The precise details of the needs will not be known until the learner experiences the environment during the immersion component of the module.

**Project:** The learner will complete a project based on and informed by their experience during the immersion component. The learner may, for example, develop software, compile learning materials, complete documentation or anything else as agreed in their learning contract.

**Completion:** Coming at the end of the module, the learner may revisit the community to implement their project, or may hand over their project with required documentation to someone else who will continue the work. The learner will complete their submission of learning materials including, for example, reflection on critical incidents which occurred during the module.

### ***Module Assessment***

The learner is to participate in a personal development process, beginning with the development of a personal development plan. As part of this, the learner is required to select and employ an appropriate reflection model, to address their personal, academic and societal reflection which demonstrates their learning. This will be supplemented with the submission of a final report, documenting the learner's experience and personal development.

The quality of the project and feedback from the organisation with which they were working will contribute significantly to their assessment.

Specific details on the assessment weighting will be agreed with the learner as part of the negotiation of their learning contract.

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Software Engineering 3</b>
Software Engineering 2		5		

## **Software Engineering 3**

### ***Module Author***

Andrea Curley, Richard Lawlor, Patricia O'Byrne

### ***Module Description***

This module builds on the Object Oriented Software Engineering material from stage 2 by a covering advanced Analysis and Design and putting into practice material covered in the previous modules. The key practitioner skills of project management and version control management will also be covered.

### ***Module Aims***

The aims of this module are to:

- Reinforce and extend the skills and knowledge gained in Stage 2 into a comprehensive Object Oriented approach.
- Provide the student with the skills and knowledge to document and manage their Final Year Project and apply this training to the development of software systems projects in the workplace.

### ***Learning Outcomes***

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

1. Apply concepts and skills learnt to conduct an analysis, design and implementation of a system using Object Oriented techniques and languages
2. Produce appropriate documentation for test management, including test plans, test schedules and test progress monitoring
3. Design the software architecture for a system containing diverse technologies and identify the software technologies suitable to implement the various layers and the interfaces between the layers
4. Understand Design Patterns and their use in Frameworks
5. Understand the role of evolutionary/emergent design and refactoring in the modern software lifecycle
6. Understand design by contract and software verification
7. Implement, manage and use a source version control system
8. Use Project Management techniques to manage a software development project

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Software Engineering 3</b>
Software Engineering 2		5		

### ***Learning and Teaching Methods***

Lectures with tutorials and laboratory sessions to give the student experience in developing models and specifications of a variety of suitable systems with lecturer feedback. A team-based case study with an assessment component will reinforce group learning and enable larger applications to be considered. The use of a CASE tool will provide standards, rigour and guidance to the specifications. Collaboration with the associated software development courses to reinforce the skills.

### ***Module content***

Advanced Software Analysis: Class modelling, Class Layers, Generalisation, Inheritance, Aggregation and Delegation modelling.

Implementation: Component Diagrams, Deployment Diagrams, Strategies, Reviews.

Software Architectures: Component based modelling, tiered architectures.

Design Patterns: Design Patterns, Reusable Design Patterns and Frameworks.

Source Control: Different source control approaches, managing source control.

Development Processes: Evolutionary and emergent design, refactoring, agile practices, design by contract, code verification.

Continuous Testing: Types of Tests, Strategies, Test Driven Development. Automated Tests, and Change Management.

Project Management: Teams, Goals, Deliverables, Milestones, Gantt Charts.

### ***Module Assessment***

Formative assessment is via continuous assessment using practical assignments. Summative assessment is via an end of module written examination.

For of 2015/16 There is a 40% weighting for the continuous assessment and a 60% weighting for the examination.

### ***Essential Reading***

Mark Priestley, Object-oriented Design with UML, 2<sup>nd</sup> edition 2004

Craig Larman, Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Software Engineering 3</b>
Software Engineering 2		5		

### *Supplemental Reading*

R. Pressman, Software Engineering: A Practitioner's Approach., 6th Ed., McGraw Hill 2005

Relevant supplemental references will be indicated during the teaching of the module.

### *Web references, journals and other*

Up to date Web references placed in the course notes web page on specific topics

<i>Pre-Requisite Modules code(s)</i>	Co-Requisite Modules code(s)	ECTS Credits	Module Code	<b>Software Engineering 3</b>
Software Engineering 2		5	CMPU3038	

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>System Administration</b>
Operating Systems 2		5	CMPU3049	

## **System Administration**

### *Module Author*

Ronan Bradley

### *Module Description*

This module provides the student with knowledge of the fundamentals of UNIX and Windows system administration including common network services for authentication, naming and file sharing.

### *Module Aims*

The aim of the module is to equip the student with a sufficient understanding of and skills in the configuration and administration of a mixed network of UNIX and Windows based computers. The students will acquire an understanding of how the core services such as naming and file sharing operate from both theoretical and practical perspectives.

### *Learning Outcomes*

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

1. Configure the user and group management mechanisms on Windows and UNIX systems
2. Modify the start-and shutdown order of services on a UNIX system.
3. Utilise performance analysis tools on the UNIX platform
4. Configure authentication mechanisms on the UNIX platform and between Windows and UNIX Platforms
5. Configure file sharing mechanisms on the UNIX platform and between Windows and UNIX platforms
6. Configure host name resolution mechanisms on the UNIX platform and between Windows and UNIX platforms
7. Design a systems integration plan to support file sharing, identity sharing and other resource sharing between UNIX and Windows systems.

### *Learning and Teaching Methods*

This module will be taught through a combination of lecture, tutorials and practical lab-based sessions.

Supervised practical sessions will be used to complement material presented in lectures. Concepts from lectures will be applied via supervised lab based exercises and practical

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>System Administration</b>
Operating Systems 2		5	CMPU3049	

assignments. It will be expected that all students complete their exercises each week and be pro-active in their learning approach.

### ***Module content***

UNIX System start-up and shutdown control including configuration of run-levels

User Management on UNIX and Windows Systems including adding and removing users and groups

Operation of common performance analysis tools to analyse the current performance characteristics of the system and identify potential problems

Configuration and integration of authentication mechanisms on UNIX (e.g. Portable Authentication Module and directory services supporting Network information Service and LDAP used for authentication)

Selection of appropriate file sharing services for different networks

Configuring of file sharing services on UNIX such as SaMBa and nfs

Operation of the Domain Naming System and configuration using bind on a UNIX system

Overview of other network services commonly used (such as NTP)

### ***Module Assessment***

Assessment by a combination of Continuous Assessment and Exam

Exam 60%, Continuous Assessment 40%

### ***Essential Reading***

Marty Poniowski, 2002, UNIX User's Handbook, 2nd ed., Prentice Hall PTR

Steve Shah, Wale Soyinka. 2005, Linux Administration: A Beginner's Guide. Osborne/McGraw-Hill

### ***Supplemental Reading***

Relevant supplemental references will be indicated during the teaching of the module.

### ***Web references, journals and other***

Relevant web references, journals and other will be indicated during the teaching of the module.

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>System Security</b>
		5	CMPU3042	

## **System Security**

### *Module Author*

Fredrick Mtenzi

### *Module Description*

Recent developments in the computing technology, mobile device technologies and the increasing broadband availability globally are shaping our lives in ways unimaginable a few years ago. While these developments have provided an unprecedented access to information and connectivity, they have also led to increased security concerns regarding the safety of our systems, data and wellbeing. The rush to market software which forms the trend of most of the modern technology has enhanced the release of insecure software.

This module provides an overview of the fundamental concepts of security. It will introduce students to the basic principles of securely using computers, wired and wireless networks and the internet. Emphasis will be placed on understanding issues which will lead to sensible security and an appreciation that security is the weakest link problem. The user security social responsibility which is becoming more important now will be covered in the legal and ethical aspects of security. Relevant concepts covered in the module will be experimented by students in the labs.

### *Module Aims*

The aims of this module are to:

- introduce the students to the security principles,
- give the students a thorough understanding of the network security issues,
- provide them with sound practical knowledge of security tools, Operating Systems and Network security,
- provide them with an in-depth practical security knowledge in real-life.

### *Learning Outcomes*

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

- Define and describe network security,
- Discuss and relate the fundamental concepts of Security,
- Classify and analyse the nature and threat from malware,
- Design and deploy best practice techniques for securing Operating Systems and Networks,
- Compare and contrast different security tools and determine their appropriate use in a



<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>System Security</b>
		5	CMPU3042	

specific situation,

- Examine the trade-off of legal and ethical security issues in an organisation
- Assess and rank different systems security approaches according to the protection they provide in real-life applications.
- Recognise and deploy the different hacking phases in systems.

### ***Learning and Teaching Methods***

In this module a number of teaching methods may be employed including lectures, practical sessions, tutorials and case studies. At least one industrial seminar may be arranged. Focus should be placed on empowering the students to develop their skills independently of the presence of a tutor or lecturer.

### ***Module content***

Introduction to security

Classical encryption techniques and stream ciphers

User Authentication

Access Control

Physical and Infrastructure Security

Operating Systems Security

Network Security

Security Tools

Introduction to ethical hacking

The role of people in security

Legal and ethical aspects of security

### ***Module Assessment***

This module should have a 50% weighting for the examination and a 50% weighting for the continuous assessment. While it is important that the student can demonstrate their technical ability with coursework, it is equally important that they demonstrate an understanding of the theoretical aspects of security.

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>System Security</b>
		5	CMPU3042	

### *Essential Reading*

William Stallings, 2005, Cryptography and Network Security: Principles and Practice, 5th ed, Prentice Hall

### *Supplemental Reading*

Seymour Bosworth and M.E. Kabay, 2009, Computer Security Handbook, John Wiley & Sons. Inc.

William Stallings and Lawrie Brown, 2008, Computer Security: Principles and Practice, Prentice Hall

Markus Jakobsson, Zulfikar Ramzan, 2008, Crimeware: Understanding New Attacks and Defences, Symantec Press.

Charles P. Pfleeger and Shari Lawrence Pfleeger, 2007, Security in Computing, Prentice hall

Michael Gregg, 2008, Certified Ethical Hacker, Que Publishing

Vincent Nestler, Gregory White, Wm. Arthur Conklin and Corey Schou , 2010, Principles of Computer Security CompTIA Security+ and Beyond Lab Manual, McGraw-Hill Companies

### *Web references, journals and other*

IEEE security & privacy

ACM Transactions on Information and System Security (TISSEC)

<http://www.sans.org/rr/>

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Team Project</b>
		10	CMPU3045	

## **Team Project**

### *Module Author*

Ronan Bradley

### *Module Description*

This module offers the students the opportunity to use the knowledge and skills they have developed over the previous stages in the development of a complex software system. The project is a team project requiring the students to collaborate and organise themselves in a group to achieve the module objectives.

### *Module Aims*

This module aims to group students into small teams and familiarise them with a range of skills and knowledge necessary, to take a software application through its life cycle.

### *Learning Outcomes*

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

1. Demonstrate group interaction
2. Demonstrate ability to deliver individual objectives within a team structure
3. Demonstrate leadership and team collaboration skills
4. Demonstrate an ability to follow development processes from initiation through design, implementation, test and delivery
5. Implement a project design in an appropriate format from a requirements specification
6. Demonstrate a choice of appropriate technology
7. Implement role functionality
8. Determine group integration.
9. Develop presentation skills

### *Learning and Teaching Methods*

This module will be taught through a combination of lecture, tutorials and practical lab-based sessions.

The supervised practical sessions will be used to allow lecturers to review and assess the progress of the whole team and the individual team members. It will also be used for team demonstrations and presentations at least twice during the semester.

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Team Project</b>
		10	CMPU3045	

### ***Module content***

Students will be presented with a requirements specification, from which they must develop a software system in a group of between three and five students. These groups will be pre-assigned.

Topics which will be covered as part of the module include

- Project planning and management (including documentation requirements)
- Test planning and test implementation
- Application of software engineering concepts to team development projects

### ***Module Assessment***

The module is assessed entirely by continuous assessment. The continuous assessment mark is determined through a combination of report submissions, submission of the student's project journal, presentations and interviews which take place throughout the semester.

These are as follows:

- Group submission of project documentation artefacts (such as design documents, test plan, testing logs and project plans)
- Group presentation and defence of
  - the design (prior to implementation)
  - the final deliverable (including demonstration)
- Individual submission of a project journal
- Individual interview of each student within a group by the lecturer

A student's final mark will be composed of 40% of their group mark and 60% of their individual mark.

### ***Essential Reading***

To be provided at the start of the module.

### ***Supplemental Reading***

To be provided at the start of the module.

### ***Web references, journals and other***

To be provided at the start of the module.

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Universal Design and Assistive ICT</b>
		5	CMPU3046	

## **Universal Design and Assistive ICT**

### ***Module Author***

John Gilligan, Dave Carroll, Damian Gordon, Ciaran O’Leary

### ***Module Description***

This module embraces the paradigm of Assistive Technology. Its subject matter ranges from Disability Awareness, an overview of technology, the legal social and economic imperative of Accessible IT, Human Computer Interaction, Universal Design, Accessible Software and Accessible Web Design. It is intended to provide the learner with the necessary understanding and skills to develop Accessible User interfaces to Application Software and Accessible Web pages. The learner should understand the challenges of developing Inclusive IT solutions and be able to critique available solutions.

### ***Module Aims***

The aims of this module are to:

- Describe the context of Disability and explore the issues involved in Assistive Technology.
- Investigate the specific challenges of an inclusive Information Technology society.
- Demonstrate the relevance of the learners own IT skills to facilitating an inclusive Information Technology society.

### ***Learning Outcomes***

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

1. Describe the social and legal imperatives with regard to Assistive Technology.
2. Appreciate the environmental constraints of people with disability.
3. Describe the various technologies and specialised interfaces to assist people with disability.
4. Describe principles of user interaction and identify various disabilities that impact the Human Computer Interface.
5. Assess the accessibility of software within a universal design framework.
6. Design and implement software interfaces with improved accessibility.
7. Design and construct inclusive Web sites.

### ***Learning and Teaching Methods***

This module will be delivered using a combination of Lectures, Practicals, Case Studies, Role Playing, Discussions, and Thinking Skills. The main theoretical material will be delivered in

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Universal Design and Assistive ICT</b>
		5	CMPU3046	

lectures. The practical work to assess the accessibility of software, and design and implement accessible software interfaces evaluate accessibility, and inclusivity of Web sites will be carried out in laboratory sessions.

### ***Module content***

Disability Awareness: Overview of different conditions. Analysis of requirements imposed by these conditions. Social, Legal and Economic Models of Disability. Service Delivery Models.

Technical Overview: Relevant Technologies. Product Review. Software Support Systems. Hardware Overview. Specialized Interfaces. Augmentative Alternative Communication: Switch Access: Voice Recognition: Text to Speech Computer Vision: Environmental Control and Independent Living.

Specialized Interface design: Analysis of Requirements. Technical Constraints. Design Issues. Universal Design, Challenging the HCI user Model. Enhanced models of HCI.

Inclusive IT Universal Design Access issues, Matching Person and Technologies, Frameworks, Accessible Databases, Web Access. Usability, Technical Support.

The Education Paradigm Connecting to Learn, Education and Technology, Learning Styles, Individual Education Plans.

### ***Module Assessment***

Written Examination 70%

Practical 30%

### ***Essential Reading***

Cook and Hussey (2007), Assistive Technology Principles and Practice, (3rd Ed), Mosby.

### ***Supplemental Reading***

Scherer, Marcia J. (2003) Connecting To Learn, Educational and Assistive Technology for People With Disabilities, American Psychology Association

### ***Web references, journals and other***

National Disability Authority [WWW.NDA.IE](http://WWW.NDA.IE)

Web Access Initiative [www.w3.org/wai](http://www.w3.org/wai)

Higher Education Disability Site [www.Ahead.ie](http://www.Ahead.ie)

Central Remedial Clinic [www.crc.ie](http://www.crc.ie)

<i>Pre-Requisite Modules code(s)</i>	Co-Requisite Modules code(s)	ECTS Credits	Module Code	<b>Universal Design and Assistive ICT</b>
		5	CMPU3046	

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Work Placement</b>
		30	CMPU3048	

## **Work Placement**

### *Module Author*

Paul Doyle

### *Module Description*

This module is a 6 to 7 month full time industrial placement which provides students with the opportunity to obtain professional industry experience.

### *Module Aims*

The aim is to give students the opportunity to gain a structured learning experience within a professional / industrial environment so that they may consolidate and broaden the knowledge that they have gained in their academic studies to date. Students should gain a deep understanding of the business within which they are placed.

### *Learning Outcomes*

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

1. Work in a professional environment
2. Demonstrate extensive understanding of a particular project or area of work that they have been involved in
3. Reflect on the learning experience and outcomes of their work experience
4. Produce a professional report describing the details and experiences of their placement
5. Evaluate their contribution to the company
6. Critically assess the relationship between their academic knowledge and industrial experience
7. Demonstrate an understanding of the company's business model

### *Learning and Teaching Methods*

During the time in industry students may be working as part of a team or individually. Students are assigned a DIT industrial placement monitor for the duration of their work placement and deliver reflective documents demonstrating their learning as part of continuous assessment.

### *Module content*

Professional Development

Structured reporting on work performed

Teamwork within a professional organisation



<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Work Placement</b>
		30	CMPU3048	

Reflective writing and reporting

Presentation of work

IT skills specific to the work placement

### ***Module Assessment***

Assessment will be based entirely on continuous assessment.

The continuous assessment element of this course is comprised of regularly submitted reports by students on work placement, an end of year written report and an end of year presentation. The end of year presentation and report is jointly assessed by the Industrial placement monitor and the industrial placement coordinator.

### ***Essential Reading***

Jennifer A. Moon, 2004 A Handbook of Reflective and Experiential Learning: Theory and Practice ,

Lydia E. Anderson, 2007, Professionalism: Real Skills for Workplace Success, Prentice Hall

Paul Doyle, DIT School of Computing Industrial Placement Handbook

### ***Supplemental Reading***

David Boud, Reflection : 1985, Turning Experience into Learning, Routledge

Dannelle D. Stevens , Joanne E. Cooper, 2009, Journal Keeping: How to Use Reflective Writing for Learning, Teaching, Professional Insight and Positive Change , Stylus Publishing

### ***Web references, journals and other***

<http://www.comp.dit.ie/industrialplacement>

<http://www.dit.ie/careers/>

<i>Pre-Requisite Modules code(s)</i>	Co-Requisite Modules code(s)	ECTS Credits	Module Code	<b>Work Placement</b>
		30	CMPU3048	

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Programming with Smart objects</b>
		5	CMPU3050	

<b>School Responsible:</b>	School of Computing
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<b>Module Overview:</b>
<p>This module addresses the following areas:</p> <ul style="list-style-type: none"> <li>Development of standardized software on smart object devices.</li> <li>Development of a service to manage registered object(s) by a registered user, using industry standards.</li> <li>Programming of communication between the smart object and the service.</li> <li>Programming of communication between the service and a mobile platform.</li> <li>Overview of the capabilities and prospects for the Internet of Everything.</li> <li>Issues surrounding security, privacy and data persistence.</li> </ul> <p><i>Note: This is not an electronics module. Students are not expected to wire or produce embedded devices.</i></p>

<b>Learning Outcomes (LO):</b> (to be numbered)	
For a 5ECTS module a range of 4-10 LOs is recommended	
On Completion of this module, the learner will be able to	
<b>1</b>	Discuss the elements involved in implementing the Internet of Things
<b>2</b>	Connect a smart object to a network using a variety of means and protocols.
<b>3</b>	Program a smart object in a generic language, to sense sensors and activate actuators and to transmit and receive data.
<b>4</b>	Write a service to allow registered users to manage registered objects and to collect data from

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Programming with Smart objects</b>
		5	CMPU3050	

	them.
<b>5</b>	Enable access to the service from a variety of remote platforms.
<b>6</b>	Demonstrate an understanding of Ethical, Privacy and Security issues surrounding the Internet of Things.
<b>7</b>	Write a short academic paper on a relevant topic set by the lecturer.

<b>Indicative Syllabus:</b>
<p>What is 'the Internet of things'?</p> <p>A Microcontroller platform will be used for programming.</p> <p>Choosing and downloading firmware onto smart objects that is appropriate to the device and the development requirement.</p> <p>Programming smart object sensors and actuators.</p> <p>Developing an API for the object for the reception and transmission of network messages across different network structures and protocols.</p> <p>Development of a cloud service to manage registered objects for registered users.</p> <p>Development of an API for the service that is accessible from a variety of mobile platforms.</p> <p>Examination of security, privacy and ethical issues surrounding the collection, dissemination and use of data transmitted by smart objects.</p> <p>Data modelling and collection.</p> <p>Case study of smart objects.</p> <p>Emerging technologies and concepts.</p> <p>Resources:.</p>

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Programming with Smart objects</b>
		5	CMPU3050	

<b>Resources</b>
<p>Certain practical elements of this module will require special hardware, software services and network access for successful delivery.</p> <p>Arrangements must be put in place to give students and academics access to the relevant resources for successful delivery and completion of this module.</p>

<b>Learning and Teaching Methods:</b>	
This module will be taught over one semester, using a combination of lectures, tutorials, laboratory work and self-directed learning.	
<b>Total Teaching Contact Hours</b>	52
<b>Total Self-Directed Learning Hours</b>	48

<b>Module Delivery Duration:</b>
One semester.

<b>Assessment</b>		
<b>Assessment Type</b>	<b>Weighting (%)</b>	<b>LO Assessment (No.)</b>
Continuous Assessment  Broken up into: Academic Paper 15% (LO 1 and 7)  Laboratory and set assignment work 35% (LO 2 to 6)	50%	1 to 7
Written Exam	50%	1 to 7

<i>Pre-Requisite Modules code(s)</i>	<i>Co-Requisite Modules code(s)</i>	ECTS Credits	Module Code	<b>Programming with Smart objects</b>
		5	CMPU3050	

<b>Module Specific Assessment Arrangements (if applicable)</b>	
(d) Derogations from General Assessment Regulations	
(e) Module Assessment Thresholds	
(f) Special Repeat Assessment Arrangements	

<p><b>Essential Reading:</b> (author, date, title, publisher)</p> <p><b>Websites and sources as indicated by lecturer</b></p> <p><b>Supplemental Reading:</b> (author, date, title, publisher)</p> <p><b>Doukas, C., 2012 <i>Building Internet of Things with the Arduino</i> CreateSpace Independent Publishing Platform.</b></p>
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<b>Version No:</b>		<b>Amended By</b>	
<b>Commencement Date</b>	May 2014	<b>Associated Programme Codes</b>	

# Modules that are to be offered as Stand-Alone CPD Programmes must have an NFQ level assigned

\*Details of the assessment schedule should be contained in the student handbook for the programme stage.

**Date of Academic Council approval .....**

<i>Pre-Requisite Modules code(s)</i>	Co-Requisite Modules code(s)	ECTS Credits	Module Code	<b>Programming with Smart objects</b>
		5	CMPU3050	

<i>Pre-Requisite Modules code(s)</i>	Co-Requisite Modules code(s)	ECTS Credits	Module Code	<b>Programming with Smart objects</b>
		5	CMPU3050	



<i>Pre-Requisite Modules code(s)</i>	Co-Requisite Modules code(s)	ECTS Credits	Module Code	<b>Software installation and maintenance</b>
		5	CMPU3039	

This is a DT211C module which is now offered to DT228 students as of 201718.

The full module descriptor is at:

<https://www.dit.ie/catalogue/Modules/Details/CMPU3039>

<i>Pre-Requisite Modules code(s)</i>	Co-Requisite Modules code(s)	ECTS Credits	Module Code	<b>Software installation and maintenance</b>
		5	CMPU3039	