

Validation Report



BN518

MASTER OF SCIENCE IN COMPUTING

(90 ECTS credits leading to NFQ Level 9 Award)

with the following embedded programmes

BN517

Postgraduate Diploma in Science in Computing

(60 ECTS credits leading to NFQ Level 9 Award)

Introduction

The Institute of Technology Blanchardstown was established in 1999. The mission of the Institute is to serve its students and the community by meeting the skills needs in the economy and increasing the level of participation in third-level education and training, particularly in Dublin North-West and its environs.

The Institute in 2006 was awarded delegated authority enabling the development, validation, implementation and continuous improvement of its existing taught higher education and training programmes up to and including level 9 of the National Framework of Qualifications.

In keeping with the Institute's mission statement, course and programme development is on-going. This programme supports the mission of the Institute and facilitates much wider access to the Institute by a cohort of potential students whose needs are currently not being met.

The purpose of this document is to report on the findings of the peer review panel established to validate this proposed programme against the criteria for the validation of programmes as stipulated in the Institute policy document 2MP01¹.

This submission by the School of Informatics and Engineering evolved through:

- examining the competence, expertise and experience of it's staff in addition to the strategy of the department/school/Institute and Government educational policy
- responding to market research and market needs – there are currently no courses on business intelligence in Ireland.
- updating the existing level 9 programme i.e. BN512 Master of Science in Computing

¹ 2MP01 Design, validation and accreditation of new academic programmes

Programme overview

The emphasis of this programme is that of a theoretical and practical approach in a modern working environment with the latest appropriate technology and techniques necessary for the cultivation of advanced computing skills valuable to today's IT market place at the level appropriate for a Masters of Science in Computing.

The following four programme streams have been identified with skills shortages and provide indicative pathways that learners may take. These include:

Software engineering stream

The application of knowledge of written and spoken language to the development of software based information, information-retrieval, transaction, web services, agents, tools including machine translation technologies, web friendly mark-up languages including XML, and communication systems so that they can recognise, understand, interpret, manipulate and generate human language.

Business intelligence and data mining stream

Business intelligence (BI) is a growing area across a variety of organizations and industries, and is reported by Gartnerⁱ to be one of the fastest growing areas in the field of information technology, moving from 12th place in 2006, to 1st place in 2007 and 2008. TechCentral.ie identified business intelligence as the number one technology priority for businesses in Ireland in 2008ⁱⁱ.

According to Gartner, business intelligence will be less affected by the economic downturn than other technology areas, and so will continue to grow in the coming years (Gartner, 2009ⁱⁱⁱ). This reflects the need for companies to do business more smartly, enabled by business intelligence. Advances in tools to facilitate front end delivery, such as data visualization tools, dashboards and business score cards, are contributing to the growth in business intelligence, both among large corporations and SME's (Gartner, 2009).

There are currently no courses in Business Intelligence in Ireland (north or south). Several Universities in the UK have recently introduced postgraduate courses in the area of data mining and knowledge management.

ⁱ Gartner, Inc. (NYSE: IT) a leading information technology research and advisory company.

ⁱⁱ <http://www.techcentral.ie/article.aspx?id=11716>

ⁱⁱⁱ Richardson J., Magic Quadrant for Business Intelligence Platforms, Gartner RAS Core Research Note G00163529, Jan 2009.

Information security and digital forensics stream

Today's society and business practices rely on digital information more now than at any time in the past for availability, integrity and confidentiality. Underlying these requirements are hardware, software and communication systems, the basic components of the digital information infrastructure, each with its own specific set of vulnerabilities that can affect the performance and integrity of the technological information systems. Central to any information systems is the organisations that control the information and the people that interact with the information, both producers and consumers.

The purpose of the information security and digital forensics stream is to provide students with an all round perspective on information security and associated risk management. The stream also covers the steps in conducting a digital forensics investigation where evidence may be needed to secure a prosecution in the case of wrong doing.

Cross discipline computing skills stream

This stream allows for the selection of individual modules in a variety of subject areas giving a broad spectrum of exposure to the different areas in computing. This approach will be attractive to candidates that don't wish to specialise in one area or for suitably qualified candidates from another science or engineering discipline that wish to develop their skills and careers in the computer science area.

A possible selection of modules would be:

- Distributed systems
- Cyber crime investigation
- Mobile computing in converged networks
- Knowledge discovery on data
- Enterprise computing web services
- Biometrics

Such a selection of modules would expose the student to the following range of subject knowledge and computing skills:

- how networked distributed systems are designed and what are the issues relating to the architecture and operation of such systems;
- the background and operational skills needed to carry out a cyber crime investigation and how evidence is presented for analysis;
- investigation of mobile networking and the standards in use;
- introduction to data mining and its application;

- coverage of web services and how they are applied in business; knowledge of biometrics and their importance in modern information systems.

Targeted Catchment Groups

The targeted catchment groups for the proposed programme are as follows:

- Degree holders working as IT professionals at the level of the enterprise. (Business intelligence and data mining).
- Degree holders working in information security and risk evaluation (Information security and digital forensics).
- Degree holders working as IT professionals in software engineering. (Software engineering)
- Degree holders requiring a skills conversion to an IT environment. We envisage that this will be of interest to a wide variety of people who wish to redirect their career into the IT industry. (Cross discipline computing skills)

Delivery mode

It is envisaged that the proposed programme can be studied in full-time mode or on a part-time basis. The full-time mode is run over 3 semesters. Six modules are taken in the first two semesters (3 modules in each) and the third semester is reserved for the research project (see table below).

Full-time delivery mode			
Semester	Start date	End date	Modules
1	September	December	3
2	January	May	3
3	June	September	Research project

The part-time offering will be run over four semesters.

Part-time delivery mode			
Semester	Start date	End date	Modules
1	September	December	2
2	January	May	2
3	September	December	2
4	January	May	Research project

Exit award

The Postgraduate Diploma in Science in Computing is an exit award for students of the Master of Science in Computing programme that have successfully completed the level 9 taught modules but have either:

- decided not to take the research project module or
- taken the research project module and found that they were unable to develop research skills at a sufficiently acceptable level to be awarded the Masters of Science degree in Computing.

The Postgraduate Diploma in Science in Computing follows the same course schedule as laid out for the Master of Science in Computing.

Learners that graduate with this Postgraduate Diploma may only proceed to the linked Master of Science in Computing (BN518) once they have surrendered their Postgraduate Diploma. Learners may not obtain this award and the linked Master of Science for the same body of work

Programme detail

Programme title	Master of Science in Computing
Award title	Master of Science
NFQ^I level	9
ECTS^{II} credits	90
Programme code	BN518
Banner code	BN_KMSIT_R

Embedded awards

Banner code	ITB code	Programme title	Award title	ECTS credits	Format
BN_KMSIT_G	BN517	Postgraduate Diploma in Science in Computing	Postgraduate Diploma in Science	Level 9 60 credits	Ab initio

^I National Framework of Qualifications

^{II} European Credit Transfer and Accumulation System

Panel members

Chairperson	Mr. Tony Quinlan Registrar (retired) Galway-Mayo Institute of Technology
Panel member 1	Ms. Deirdre Lillis Dublin Institute of Technology
Panel member 2	Mr. Feargal McDonnell System Dynamics
Panel member 3	Ms. Jen Harvey Dublin Institute of Technology
Panel member 4	Mr. Nigel Whyte Institute of Technology Carlow
In attendance	Dr. Diarmuid O'Callaghan IT Blanchardstown Mr. Michael Keane IT Blanchardstown
Date of Panel Meeting	Wednesday 29 th April 2009

Institute staff present

Session I Meeting with Head of School and Programme Leaders

Mr. Larry McNutt, Head of School of Informatics and Engineering

Dr. Brian Nolan, Head of Department of Informatics

Dr. Anthony Keane

Ms. Geraldine Gray

Session II Meeting with lecturing staff

Mr. Larry McNutt, Head of School of Informatics and Engineering

Dr. Brian Nolan, Head of Department of Informatics

Dr. Anthony Keane

Ms. Geraldine Gray

Mr. Ivan Smyth

Dr. Markus Hoffman

Dr. Simon McLoughlin

Ms. Laura Keyes

Dr. Barry Fitzpatrick

Ms. Orla McMahon

Mr. Tom Nolan

Mr. Hugh McCabe

Panel findings

Section I

In evaluating the appropriateness, quality and proposed operation of this programme the following criteria has been considered and is hereby reported upon:

Strategic planning

The panel was satisfied that the programme is in keeping with the Institute's mission, that it does not constitute redundant provision and that it makes efficient use of resources.

Evidence of consultation

In determining the needs and subject content of the degree, the panel were informed of how a survey was conducted of the former students on the original offering namely, BN512 Master of Science in Computing, as well as a number of key industries in the Dublin area. The results of the survey indicated that the IT industry in Ireland, and particular in North Dublin, has a constant need for personnel with advanced problem solving skills appropriate to a Master of Science in Computing, that is, mastery of computing across a number of domains coupled with the best practices of computer, engineering and manufacturing environments, focused on customer solutions, and who appreciate the importance and need for quality.

Drafts of the proposed curriculum were considered by independent experts before finalisation of this course proposal. A list of module areas and external reviewers is shown below:

Area	External reviewer
Business Intelligence	IBM, Bank of Ireland
Information Security	ISSA, HP, Symantec, ELAN, Cernam Ltd
Digital Forensics	Deloitte, Rits, Espion
Software Engineering	Intel, Symantec, Connect Business Solutions

Detailed feedback received from the external reviewers was presented to the panel within the submission document. The panel was satisfied with this consultation.

Learner employment potential

Through the Institute's close working links with local industry it has been identified that there is a definite need for graduates with both specialist and general computing and information technology skills in an ever-growing IT environment.

Specific skills identified included computing, software development, back-end operating systems and server management, distributed computing, web development and web services, enterprise computing with the management of the enterprise information resource, localisation and language engineering skills in software. All discussions held with local companies (for example, Intel, IBM, Symantec, Connect Business Solutions) pointed to the need for core computing skills with domain specialisations, coupled with the "soft skills" necessary for the success of team-based enterprise scale projects within the Irish and international IT industry.

Graduates from the business intelligence and data mining stream will be equipped for employment in sectors where data analysis is a critical component, such as the insurance, retail, pharmaceutical, biotechnology, business, travel, telecommunication, government, and intelligence sectors. Companies such as Google, eBay, Intel, HP, financial organisations, telecommunication companies and insurance companies are only some of the players based in Dublin 15 which could potentially employ, and benefit from, such graduates.

The need for graduates from the information security and digital forensics stream has been outlined in numerous survey reports including the following:

- According to the results of "*The ISSA/UCD Irish Cybercrime Survey 2006: The Impact of Cybercrime on Irish Organisations*" report, Irish organisations are significantly affected by cybercrime where virtually all (98%) of respondents indicated that they had experienced some form of cybercrime with losses of productivity and data being the main consequences.
- The annual *Ernst & Young Global Information Security Survey 2008* has revealed that global respondents ranked privacy and data protection among the top three drivers of information security. Also reported is that despite tightening economies, the survey indicates that organizations are increasing investments in information security and more organizations are adopting international security standards.

- Digital Rights Ireland has an extensive list of legal battles to defend the rights of Irish citizens to the creeping changes in law in response to computer crime and government response to it. <http://www.digitalrights.ie/>
- Enterprise Ireland has many articles relating to the importance of awareness to cybercrime in business. www.ebusinesslive.ie/newsletter/Story/4/791/ob.html/179

Typical careers include:

Information Security Crime Investigator/Forensics Expert	System, Network, and/or Web Penetration Tester
Forensic Analyst	Incident Responder
Security Architect	Malware Analyst
Network Security Engineer	Security Analyst
Computer Crime Investigator	CISO/ISO or Director of Security
Application Penetration Tester	Security Operations Centre Analyst
Prosecutor Specializing in Information Security Crime	Technical Director and Deputy CISO
Intrusion Analyst	Vulnerability Researcher/ Exploit Developer
Security Auditor	Security-savvy Software Developer
Security Maven in an Application Developer Organization	Disaster Recovery/Business Continuity Analyst/Manager

Protection of learners

Section 43 of the Act¹ does not apply.

¹Qualifications (Education and Training) Act, 1999

Quality assurance

The panel was informed of how the submission had been developed and approved internally whilst complying with the Institute's quality assurance policies and procedures. The panel concurred that said policies and procedures had been applied to the development of the proposed programme.

Programme titles and award titles

Following discussion, the panel was satisfied that the title of the proposed programme, and its embedded sub-award is clear, accurate and fit for the purpose of informing prospective learners and other stakeholders and consistent with HETAC award titles.

Ethics

The panel was satisfied that the Institute has internal policies and procedures in place to ensure that all teaching, learning or research activity across the spectrum of NFQ levels is conducted / delivered in a manner that is both morally and professionally ethical.

Section II

In evaluating this programme the following specific aspects have been considered and are hereby reported upon:

Unity

The panel found that the programme design is consistent with HETAC's policy on accumulation of credits and certification of subjects, that it has an underlying unifying theme with modules bonded by linkages being either implicit or explicit. It was also clear to the panel how the standards of knowledge, skill and competence evolve throughout the programme as a whole.

Teaching and learning methods

The panel discussed with staff of the Institute the various modes of interaction practised with learners. Evidence of a clear dialogue was confirmed, enabling learners to develop and have available to them the support of academic staff.

Course management arrangements were discussed and deemed adequate, these included:

- survey of students by lecturer
- summary of survey of students by lecturer
- survey of students by department
- course boards

The panel heard how:

- Lectures, workshop exercises, tutorials, supervised independent learning, research work and project work pertinent to each module will be delivered in a structured manner.
- The programme will have a strong focus on creating a portfolio of literacy reviews and research papers from the first semester, including papers of a publishable standard.
- Students will also develop the hands on skills to work in this area, and explore research topics. Given this emphasis on practical work and the further emphasis discussed above on portfolio development, it is expected that the students will spend considerable time working in a self-directed manner, beyond their formal scheduled classes.

- Guest lecturers from allied industries will also be invited to make presentation to the students on special aspects of their work, their companies and their on topical issues that may arise from time to time.
- The final dissertation will give students responsibility for a substantial piece of independent work conducted at level 9 including independent research of a topic, and demonstrating an ability to conceptualise that research and analyse their results.

The panel was satisfied that the necessary staffing levels will be in place and were suitably impressed with the qualifications and experience of the academic staff involved in the programme design and future delivery and commended their obvious enthusiasm in their quest to deliver programmes reflecting the most up to date leading edge technologies.

Learner assessment

Through discussion with the design team, and from the submission document itself, it was explained in detail to the panel the multiple modes of assessment, both formal and informal that will be employed. Assessment procedures discussed included a combination of in-class tests, formal examinations, assignments, reports, projects, presentations and seminars. Where appropriate, both theoretical and experimental techniques will be covered, including the enhancement of skills in verbal and other communication.

The panel heard how at the commencement of each semester, students will be provided with a course handbook detailing module contents and assessment schedule (date, time, mode, and mark allocation) of each respective assessment. The panel deemed the level of learner assessment adequate.

Standards of knowledge, skill and competence

The panel felt having reviewed the syllabi and assessment methods that learners would be capable of attaining the standards of knowledge, skill or competence relevant for this award.

Access, transfer and progression

The programme incorporates the established procedures for access, transfer and progression allowing students to choose from various entry and exit points that support clear transfer and progression routes within the National Framework of Qualifications (NFQ).

Decision of the panel

The panel recommends the validation of the proposed programme including its embedded award namely:

Banner code	ITB code	Programme title	Award title	ECTS credits	Format
BN_KMSIT_R	BN518	Master of Science in Computing	Master of Science	Level 9 90 credits	Ab initio
BN_KMSIT_G	BN517	Postgraduate Diploma in Science in Computing	Postgraduate Diploma in Science	Level 9 60 credits	Ab initio

Panel Condition

This validation is subject to the following conditions:

1. Produce indicative course schedules for each identified stream with 3-4 specified core modules per stream with remaining modules as electives.
2. Clearly articulate the necessary skill sets prospective students would require to gain entry and engage effectively within each identified stream.

Panel recommendations

1. Consider tabulating the generic competencies across the identified streams to ensure consistency within the learning outcomes.
2. Encourage, where appropriate, furthering the use of enquiry based learning into the teaching and learning methods throughout the programme.
3. Consider the regulatory compliance concerns that the panel felt needed to be addressed within each identified stream.
4. Reconsider the submitted ratio of contact hours to practical/self directed learning hours as the panel felt that a ratio of 1:2 was more appropriate.
5. Tabulate the indicative contact hours for programme delivery in full-time, part-time and accelerated modes.
6. Consider expanding the syllabus on Data Warehousing to include extract, transform and load (ETL¹) covering common applications, and the advantages and disadvantages of different tools.
7. Review the content and terminology of the learning outcomes to ensure consistency, equity and relevance to specific NFQ levels throughout the submission document. The panel felt that the learning outcomes must be visibly measurable and map back to the learning outcomes of the individual modules.
8. Reconsider and clarify module and stream titles, and semester of delivery throughout the submission document as discussed at panel meeting.
9. Review the module syllabi to ensure that no pre-requisites exist between sequential odd and even semesters, and that pre-requisites are only used when necessary.
10. Make other technical and minor amendments as discussed at the panel meeting.

¹ In database management terms, extract, transform, and load (ETL) refers to three separate functions combined into a single programming tool. The extract function reads data from a specified source, the transform function works with the acquired data to convert it to the desired state and the load function is used to write the resulting data to a target database.

Panel observations

The panel commended the quality and detail of the proposal and congratulated the design team on this initiative to identify, address and respond to this sector's needs locally. They concurred on the wide range of skills a graduate of this programme seeking employment would require and felt that these were well reflected in the programme.

Panel signatures

Chairperson

Mr. Tony Quinlan _____ Date _____

Secretary

Dr. Diarmuid O'Callaghan _____ Date _____