

**QQI**Quality and Qualifications Ireland
Dearbhú Cáilíochta agus Cáilíochtaí Éireann

Report of the Programme Evaluation Panel

Provider's Name:	National College of Ireland
Address:	Mayor Square
	IFSC
	Dublin 1
QA procedures agreed on:	2006
QA procedures reviewed on:	2010
Programme submitted for approval*:	Leading to the award of:
1. Higher Diploma in Science in Computing	Higher Diploma in Science
2.	
3.	
4.	
5.	
Date submitted to QQI:	11 th April 2016
Date of Evaluation:	16 May 2016
Date of Report:	16 May 2016

Membership of the Programme Evaluation Panel:

Role	Name	Area of Expertise	QQI Peer Review Reference Listing
Chairperson	Dr Joseph Ryan	Registrar, Athlone Institute of Technology	
External Specialist	Prof Christian Horn	Dundalk Institute of Technology	
External Specialist	Dr Liam Noonan	Limerick Institute of Technology	
Industry/Employer Perspective	Mr Derek Harnett	Intel	
Rapporteur	Dr Maurice FitzGerald	National College of Ireland	



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Quality and Qualifications Ireland
Dearbhú Cáilíochta agus Cáilíochtaí Éireann

1 Profile of provider:

The National College of Ireland (NCI) has an immensely proud history as a third level educational institution. Established by the Jesuit order in 1951 as the Catholic Workers College it quickly gained recognition for excellence in its subject fields, particularly human resource management and industrial relations, and for the provision of high quality educational opportunities for employees entering third level education. In the late 1990's the College became the National College of Ireland and entered a new phase of its development expanding its part-time provision to a number of off-campus locations throughout the country and extending its full-time undergraduate programmes to include accountancy, finance and informatics. In 2002 the College moved from its original site in Ranelagh to a new 'State of the Art' purpose built premises in Dublin's International Financial Services Centre.

NCI's educational philosophy and operational structure embody participation, collaboration and applied problem solving strategies. These are enabled by a faculty whose qualifications and professional experience help integrate academic theory with current practical application. The College assesses both the quality of its academic programmes and the academic achievement of its students and utilises the results of these assessments to improve academic and institutional quality.

The primary focus of NCI is on maintaining a centre of excellence that is centered on the changing needs of today's learner. National College of Ireland provides a broad range of high-quality education programmes for today's knowledge-based society.

In line with its mission of widening access to education, the College places a strong emphasis on the needs of the learner, bringing a unique student-centered approach to all aspects of its teaching and research. National College of Ireland provides a range of learning options that extend beyond traditional classroom dynamics, including distance learning and internet-based learning programmes.



2 Context of validation

The Higher Diploma in Science in Computing was first validated in 2013 with 5 elective streams. The programme has run with 2 cohorts annually, mainly populated by learners who are eligible for Springboard/ICT funding from the HEA.

In order to accommodate the evolving nature of the Computing discipline, the College wishes to introduce three additional elective streams to the programme.

- Internet of Things, (Group Elective 6)
- Cyber Security, (Group Elective 7)
- Software Quality and Testing. (Group Elective 8)

These specialisations complement the existing programme and the suite of specialisations already validated in the area of Mobile Application Development, Software Development, Cloud Computing, Mobile Cloud Gaming and Computing Infrastructure.

In addition, as a result of the most recent Springboard call for tenders, an additional elective module – Domain Skills – has been included in the schedule. This module has been designed to accommodate localised requirements of specific companies or sectors who may wish to offer the programme in-house or to recruit candidates with a specific skillset.

In accordance with QQI Criteria and Policy for Validation, these amendments have been proposed to be considered under differential validation. The report below therefore reflects the consideration of the panel on those elements of the programme that have been amended.

3 Planning:

Programme development since agreement of QA procedures / the last review

The College has developed a significant number of programmes since its last institutional review culminating in 2015 with a complete programmatic review of its portfolio across the Business, Computing and Education subject areas.

3.1 Purpose of the award

Does the proposed programme address a clear market demand? Yes✓ No

The **IoT** elective group comprises a suite of modules which enables the learners to obtain specialised knowledge and technical skills in the area of Internet of Things. In particular, the IoT principles module imparts knowledge of underlining technologies, and the potential impacts of the many machine to one human paradigm. This core theoretical basis is augmented by Fundamentals of Mobile Communication module. IoT is inherently a physical computing domain, as such IoT Software Development serves as the primary practical module for the stream. Therein, the learner will gain experience in building reusable and bespoke IoT software. It was a natural fit to incorporate the existing Multimedia and Mobile Application Development module in the curriculum. Mobile phones, tablets, and wearables are key candidates for M2M communication with constrained devices. The judicious use of multimedia is key to providing a fluid interaction experience for the user.



The **Cyber Security** elective group comprises a suite of modules that enables the learners to obtain specialised knowledge and technical skills in the area of Cyber Security. In particular, the learners would first get grounding in the key concepts from the Security area (e.g. Security principles module) and practical experience in Cyber Security by developing secure applications (e.g. Secure Programming module) and by identifying malware, attacks, issues and discrepancies (Digital Forensics module and Penetration Testing module).

The **Software Quality and Testing** elective group comprises a suite of modules which enables the learners to obtain specialised knowledge and technical skills in the area of Software Quality and Testing. The modules for this stream were designed and developed based on Industry feedback given by SQS, an international Software Quality and Testing provider and trainer, and Irish Software Association. The modules were developed over a series of discussions, and are designed to meet the industry needs of project management, Quality and Testing theory and practical software testing.

3.2 Avoidance of duplication

Has the Programme Development Team identified the availability of similar programmes locally, regionally, nationally?

Comment: None Yes✓ No

3.3 Stakeholder consultation

Was the level of stakeholder engagement satisfactory? Yes✓ No

Comment: None

Support for the programme (industry/business/community) Yes✓ No

The programme is satisfied that the rationale for the amendments made have included appropriate consultation. The programme information would benefit from an articulation of the expected role that graduates would undertake for each of the streams added to the programme – particularly in relation to ensuring that the scope of the role is clearly identified. This is particularly true of the Cybersecurity stream.

3.4 Efficient and effective use of resources

Does the proposed programme represent both efficient and effective use of the provider’s resources?

Comment: None Yes✓ No



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Quality and Qualifications Ireland
Dearbhú Cáilíochta agus Cáilíochtaí Éireann

3.5 Resource development over last 5 years (or in direct support of this programme)

Specific Comments:

Staff: The panel is satisfied that there are appropriate staff employed to deliver this programme.

Accommodation: The panel is satisfied that the College's accommodation is appropriate to this programme.

Information technology: The panel is satisfied that the College's ICT infrastructure is appropriate to this programme.

Library: The panel is satisfied that the College's Library & Information Service is appropriate to this programme.

Administration: The panel is satisfied that there are appropriate administrative and programme administration structures appropriate to this programme.

Publicity/public information: The panel is satisfied that appropriate marketing and public information materials are available

3.6 Planned development over the coming 5 years?

Have the QQI award standards been explicitly referred to in the programme and does the programme meet those standards at the specified level?

Yes✓ No

Comment: None

Has the Provider complied with Protection for Enrolled Learner requirements?

Yes✓ No

The panel understands that PEL requirements for any learners recruited under HEA labour activation schemes will be provided by the HEA. Otherwise PEL will be provided under an arrangement with HECA which is currently being finalised and will be made available to QQI prior to the enrolment of any learner.

3.7 Access

Is the expected minimum and maximum number of all learners entering the programme explicitly stated?

Yes✓ No

Comment: None

Have any/all prerequisite knowledge, skills or competence or any other specific entry requirement been articulated?

Yes✓ No

Comment: None



4 Quality Assurance

4.1 Application of agreed quality assurance procedures for development of programmes

Were the agreed quality assurance procedures for programme development followed?

Comment: None Yes✓ No

Has the programme team demonstrated how programme delivery will be monitored in accordance with agreed QA procedures?

Comment: None Yes✓ No

Are programme management arrangements adequate and coherent?

Comment: None Yes✓ No



5 Programme structure and content

Is the programme structure well designed, coherent and fit for its stated purpose?

Yes✓ No

The panel is satisfied that the programme structure has not been affected by the amendments proposed for the programme.

5.1 Programme learning outcomes

Do the programme learning outcomes comply with national standards for the level of award proposed?

Yes✓ No

While the programme learning outcomes have been previously reviewed, the panel requires that the programme learning outcomes are extracted from the mapping table. An exercise should be undertaken to ensure that the taxonomy used is consistently appropriate to the level of the programme and that they can be appropriately assessed at a modular level

Are module descriptions adequate and relevant?

Yes✓ No

Comment: None

Are modules relevant and current?

Yes✓ No

Comment: None

Does the combination of modules chosen have the coherence to support the proposed award?

Yes✓ No

The panel is satisfied that the coherence of the programme has not been affected by the amendments proposed.

5.2 Learning Modes

Can the teaching and learning strategies proposed support achievement of the required learning outcomes?

Yes✓ No

Comment: None

Are the delivery mechanisms proposed adequate to the needs of the programme and the proposed learner cohorts?

Yes✓ No

Comment: None

5.3 Assessment strategies

Are assessment processes and methods adequately described?

Yes✓ No

Are these strategies appropriate to this type of award, in terms of type, frequency and volume?



The panel would like to see more detail at a modular level to ensure that it is clear what is expected of the learner and that the assessment is at the appropriate level.

Yes✓ No

Is assessment explicitly linked with intended learning outcomes? Yes✓ No

Comment: None

Does the assessment strategy underpin the achievement of the relevant standard of knowledge, skill and competence?

Yes✓ No

Comment: None

5.4 Duration

What is the intended duration of the Programme?

One calendar year

What is the lifespan of the programme (e.g. single cohort intake to satisfy limited local demand; multiple intakes over the following 5 years etc.?)

This programme has consistently recruited since 2010.

Does the Panel believe this to be realistic? Yes✓ No

The panel notes that this programme has consistently attracted Springboard and ICT funding.

Are there flexible modes of participation? Yes✓ No

Comment: None

5.5 Credits

Is credit allocation in accordance with national and international guidelines?

Yes✓ No

Comment: None

Considering the level, outcomes and volume of each module, is the number of credits attached to each appropriate?

Yes✓ No

Comment: None

Considering the stated objective of the programme is the number of credits attached to the award appropriate?

Yes✓ No

Comment: None



QQI

Quality and Qualifications Ireland
Dearbhú Cáilíochta agus Cáilíochtaí Éireann

5.6 NFQ Level

Is the proposed level of the programme in accordance with institutional policy/national norms?

Comment: None Yes✓ No

5.7 Programme titles and award

Is the title consistent with national policy, is it informative and is it fit for purpose?

Comment: None Yes✓ No

5.8 Transfer and Progression

Has the Programme Development Team identified realistic transfer and progression opportunities/possibilities that learners may avail of following achievement of this award?

Comment: None Yes✓ No



6 Module Titles, Content and Assessment Strategy

6.1 Domain Skills

Is the title informative and is it fit for purpose? Yes✓ No

The panel recommends that as this concept is being introduced across a number of programmes, the title of the module should related at minimum to the subject area e.g. Domain Skills for Web Technologies.

Are the specific learning outcomes a) properly stated, b) sufficient and c) achievable?

Yes✓ No

The taxonomy used for the module learning outcomes should be reviewed to ensure that they are appropriate to the level and can be appropriately assessed

Is the content sufficiently informative and is it fit for purpose? Yes✓ No

Comment: None

Does the Assessment Strategy align sufficiently with the intended learning outcomes?

Yes✓ No

The parameters for the assessment of this module should be reviewed to ensure that it is scalable and that consistency can be achieved.

Is the required reading and supplementary reading appropriate, current and realistic?

Yes✓ No

Comment: None

6.2 Internet of Things (IoT) Stream

The panel accepts the inclusion of this stream/group elective

6.2.1 IoT Principles

Is the title informative and is it fit for purpose? Yes✓ No

Comment: None

Are the specific learning outcomes a) properly stated, b) sufficient and c) achievable?

Yes✓ No

The taxonomy used for the module learning outcomes should be reviewed to ensure that they are appropriate to the level and can be appropriately assessed

Is the content sufficiently informative and is it fit for purpose? Yes✓ No

The panel reviewed a similar descriptor for another programme evaluated on the day and recommends that this descriptor should become the baseline descriptor for this module. In particular, references to the societal impacts of IoT are not viewed as being of a critical nature and the emphasis should be placed on enabling technologies. In order to facilitate



the evolving nature of this subject matter, a placeholder should be set in the module descriptor for 'emerging trends.'

Does the Assessment Strategy align sufficiently with the intended learning outcomes?

Yes✓ No

The assessment strategy for the module should be made more specific rather than an outline of what may be used.

Is the required reading and supplementary reading appropriate, current and realistic?

Yes✓ No

Comment: None

6.2.2 IoT Software Development

Is the title informative and is it fit for purpose?

Yes✓ No

Are the specific learning outcomes a) properly stated, b) sufficient and c) achievable?

Yes✓ No

The taxonomy used for the module learning outcomes should be reviewed to ensure that they are appropriate to the level and can be appropriately assessed

Is the content sufficiently informative and is it fit for purpose?

Yes✓ No

The panel and the programme team had significant discussion over the programming language in use for this suite of modules. The panel is of the view that learners should be exposed to C++ to enable the learners to benefit from this

Does the Assessment Strategy align sufficiently with the intended learning outcomes?

The assessment strategy for the module should be made more specific rather than an outline of what may be used

Yes✓ No

Is the required reading and supplementary reading appropriate, current and realistic?

Yes✓ No

Comment: None

6.2.3 Fundamentals of Mobile Communication

Is the title informative and is it fit for purpose?

Yes✓ No

Are the specific learning outcomes a) properly stated, b) sufficient and c) achievable?

Yes✓ No

The taxonomy used for the module learning outcomes should be reviewed to ensure that they are appropriate to the level and can be appropriately assessed

Is the content sufficiently informative and is it fit for purpose?

Yes✓ No



Comment: None

Does the Assessment Strategy align sufficiently with the intended learning outcomes?

Yes✓ No

The assessment strategy for the module should be made more specific rather than an outline of what may be used

Is the required reading and supplementary reading appropriate, current and realistic?

Yes✓ No

Comment: None

6.2.4 Multimedia and Mobile Application Development

Is the title informative and is it fit for purpose?

Yes✓ No

Are the specific learning outcomes a) properly stated, b) sufficient and c) achievable?

Yes✓ No

The taxonomy used for the module learning outcomes should be reviewed to ensure that they are appropriate to the level and can be appropriately assessed

Is the content sufficiently informative and is it fit for purpose?

Yes✓ No

Comment: None

Does the Assessment Strategy align sufficiently with the intended learning outcomes?

Yes✓ No

The assessment strategy for the module should be made more specific rather than an outline of what may be used

Is the required reading and supplementary reading appropriate, current and realistic?

Yes✓ No

Comment: None

6.3 Cybersecurity Stream

The panel accepts the inclusion of this stream/group elective

6.3.1 Security Principles

Is the title informative and is it fit for purpose?

Yes✓No

Are the specific learning outcomes a) properly stated, b) sufficient and c) achievable?

Yes✓ No



The taxonomy used for the module learning outcomes should be reviewed to ensure that they are appropriate to the level and can be appropriately assessed

Is the content sufficiently informative and is it fit for purpose? Yes✓ No

Comment: None

Does the Assessment Strategy align sufficiently with the intended learning outcomes?

Yes✓ No

The assessment strategy for the module should be made more specific rather than an outline of what may be used

Is the required reading and supplementary reading appropriate, current and realistic?

Yes✓ No

Comment: None

6.3.2 Secure Programming

Is the title informative and is it fit for purpose? Yes No✓

The panel is of the view that this module should be sufficient distinguished from the module delivered on the honours degree due to the differences of the cohorts taking the module. The module may be better titled as Principles of Secure Programming.

Are the specific learning outcomes a) properly stated, b) sufficient and c) achievable?

Yes✓ No

The taxonomy used for the module learning outcomes should be reviewed to ensure that they are appropriate to the level and can be appropriately assessed

Is the content sufficiently informative and is it fit for purpose? Yes✓ No

Learners should be exposed to C++ programming in order to benefit most from taking this stream.

Does the Assessment Strategy align sufficiently with the intended learning outcomes?

Yes✓ No

The assessment strategy for the module should be made more specific rather than an outline of what may be used

Is the required reading and supplementary reading appropriate, current and realistic?

Yes✓ No

Comment: None

6.3.3 Penetration Testing

Is the title informative and is it fit for purpose? Yes✓No



QQI

Quality and Qualifications Ireland
Dearbhú Cáilíochta agus Cáilíochtaí Éireann

Are the specific learning outcomes a) properly stated, b) sufficient and c) achievable?

Yes✓ No

The taxonomy used for the module learning outcomes should be reviewed to ensure that they are appropriate to the level and can be appropriately assessed

Is the content sufficiently informative and is it fit for purpose? Yes✓ No

Comment: None

Does the Assessment Strategy align sufficiently with the intended learning outcomes?

Yes✓ No

The assessment strategy for the module should be made more specific rather than an outline of what may be used

Is the required reading and supplementary reading appropriate, current and realistic?

Yes✓ No

Comment: None

6.3.4 Digital Forensics

Is the title informative and is it fit for purpose? Yes✓No

Are the specific learning outcomes a) properly stated, b) sufficient and c) achievable?

Yes✓ No

The taxonomy used for the module learning outcomes should be reviewed to ensure that they are appropriate to the level and can be appropriately assessed

Is the content sufficiently informative and is it fit for purpose? Yes✓ No

Comment: None

Does the Assessment Strategy align sufficiently with the intended learning outcomes?

Yes✓ No

The assessment strategy for the module should be made more specific rather than an outline of what may be used

Is the required reading and supplementary reading appropriate, current and realistic?

Yes✓ No

Comment: None

6.4 Software Quality and Testing Stream

The panel accepts the inclusion of this stream

6.4.1 Business Analysis & Problem Solving Techniques



QQI

Quality and Qualifications Ireland
Dearbhú Cáilíochta agus Cáilíochtaí Éireann

Is the title informative and is it fit for purpose? Yes✓ No

The panel notes that the module presented) has been updated and presented as part of another submission. (Business Analysis & Communication) Clarity is required on the module being delivered on this programme.

Are the specific learning outcomes a) properly stated, b) sufficient and c) achievable?

Yes✓ No

Is the content sufficiently informative and is it fit for purpose? Yes✓ No

Comment: None

Does the Assessment Strategy align sufficiently with the intended learning outcomes?

Yes✓ No

Is the required reading and supplementary reading appropriate, current and realistic?

Yes✓ No

Comment: None

6.4.2 Fundamentals of Software Quality and Testing

Is the title informative and is it fit for purpose? Yes✓No

Are the specific learning outcomes a) properly stated, b) sufficient and c) achievable?

Yes✓ No

The taxonomy used for the module learning outcomes should be reviewed to ensure that they are appropriate to the level and can be appropriately assessed

Is the content sufficiently informative and is it fit for purpose? Yes✓ No

Comment: None

Does the Assessment Strategy align sufficiently with the intended learning outcomes?

Yes✓ No

The assessment strategy for the module should be made more specific rather than an outline of what may be used

Is the required reading and supplementary reading appropriate, current and realistic?

Yes✓ No

Comment: None

6.4.3 Practical Software Testing

Is the title informative and is it fit for purpose? Yes✓No



The panel recommends that Applied Software Testing may be a more appropriate title

Are the specific learning outcomes a) properly stated, b) sufficient and c) achievable?

Yes✓ No

The taxonomy used for the module learning outcomes should be reviewed to ensure that they are appropriate to the level and can be appropriately assessed

Is the content sufficiently informative and is it fit for purpose? Yes✓ No

The curriculum for this module should be expanded to ensure that all stakeholders understand what is expected.

Does the Assessment Strategy align sufficiently with the intended learning outcomes?

Yes✓ No

Is the required reading and supplementary reading appropriate, current and realistic?

Yes✓ No

A review of the booklist should be undertaken to ensure the most current editions are cited.

7 Specific Issues to be addressed by the provider

7.1 Conditions of Approval:

- C1. Programme learning outcomes should be separately listed in the documentation. An exercise should be undertaken to ensure that the taxonomy used for these outcomes is consistently appropriate to the level of the programme and their articulation allows the module to be appropriately assessed.
- C2. Module learning outcomes need to be written using a suitable taxonomy (i.e. the verbs employed must be appropriate to their level)
- C3. In turn, there needs to be real alignment and clarity on the one hand regarding how module learning outcomes are assessed and, on the other, that there is appropriately detailed and varied assessment (and reassessment) strategies at module level (as well as across programmes as a whole).
- C4. The assessment approach for the *Domain Skills* module should be reviewed to ensure that it is scalable and standards are consistent.
- C5. The 'Secure Programming' module should be clearly identified as being an introductory module and differentiated from the similar module on the BSc Hons in Computing.
- C6. The *Principles of Internet of Things* module should be reviewed to ensure that emphasis is placed on enabling technologies. An emerging technologies section should be included in the module to allow for the rapidly evolving nature of the subject



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Quality and Qualifications Ireland
Dearbhú Cáilíochta agus Cáilíochtaí Éireann

- C7. Clarity is required on the title and descriptor of the module *Business Analysis & Problem Solving* being delivered on this programme
- C8. A graduate profile for each of the additional streams should be outlined which clearly identifies the scope of the award for both learner & employer

7.2 Recommendations:

- R1. Various typos occur throughout the paperwork but, given the fact that these documents constitute a public record, the many uses to which this paperwork can be used beyond this evaluation panel, etc., these should be eliminated as a matter of course.
- R2. Consider the titling of the Domain Skills module so that it accurately reflects its intent when applied across multiple programmes and/or subject domains.
- R3. Learners should be exposed to C++ programming where they are taking the Internet of Things or Cybersecurity streams.
- R4. Reading lists for all modules should be reviewed to ensure currency and that sufficient supplementary reading is cited.
- R5. The title of Practical Software Testing should be reviewed



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Quality and Qualifications Ireland
Dearbhú Cáilíochta agus Cáilíochtaí Éireann

8 Overall Result of Evaluation Panel Review:

The Programme is recommended to the Programmes and Awards Executive Committee for approval subject to the provision to QQI of a revised submission document including programme schedule(s), which addresses the conditions and recommendations required in the report and which has been signed off by the Panel Chair if necessary.

This report has been agreed by the Evaluation Panel and is signed on their behalf by the Chair.

Panel Chairperson:

Dr Joseph Ryan

Date: 1st June 2016

Signed _ Date _

The Report of the External Review Panel contains no assurances, warranties or representations express or implied, regarding the aforesaid issues, or any other issues outside the Terms of Reference.

While QQI has endeavoured to ensure that the information contained in the Report is correct, complete and up-to-date, any reliance placed on such information is strictly at the reader's own risk, and in no event will QQI be liable for any loss or damage (including without limitation, indirect or consequential loss or damage) arising from, or in connection with, the use of the information contained in the Report of the External Evaluation Panel.



Appendix 1: Staff

Staff Name	Role
Mr Michael Bradford	Lecturer
Dr Dominic Carr	Programme Director & Lecturer
Ms Adrianna Chis	Lecturer
Mr Sam Cogan	Computing Support Tutor
Mr Oisin Creanor	Associate Lecturer
Mr Ron Elliott	Associate Lecturer
Dr Mike Goldrick	Learning Support & Development Officer
Dr Paul Hayes	Lecturer
Dr Arghir Moldovan	Associate Lecturer
Ms Lisa Murphy	Lecturer
Mr Eugene McLaughlin	Associate Lecturer
Dr Eugene O'Loughlin	Lecturer
Ms Sinéad O'Sullivan	Director of Quality Assurance
Dr Pramod Pathak	Dean of the School of Computing
Dr Anu Sahni	Lecturer
Frances Sheridan	Lecturer
Dr Paul Stynes	Vice Dean, Academic Programmes and Research