Independent Evaluation Report on an Application for Validation of a Programme of Education and Training

Part 1

Provider name	National College of Ireland
Date of site visit	5th February, 2020
Date of report	23/04/2020

Overall recommendations

Principal programme	Title	Bachelor of Science (Honours) in Computing
	Award	Bachelor of Science (Honours) in Computing
	Credit	240 ECTS
	Recommendation *Satisfactory OR Satisfactory subject to proposed conditions OR Not Satisfactory*	Satisfactory

Embedded programme	Title	Bachelor of Science (Ordinary) in Computing
	Award	Bachelor of Science (Ordinary) in Computing
	Credit	180 ECTS
	Recommendation *Satisfactory OR Satisfactory subject to proposed conditions OR Not Satisfactory*	Satisfactory

Evaluators

Evaluators		
Name	**Role**	**Affiliation**
Mr Danny Brennan	Chair	Former Registrar, Letterkenny Institute of Technology and Principal, DNB Education Consultants
Dr Catherine Peck	Recording Secretary	Independent Education Consultant
Professor Keshav Dahal	Subject Expert	University of the West of Scotland, UK
Dr Irene Murtagh	Subject Expert	Technological University, Dublin (Blanchardstown)
Dr Jelena Vasic	Subject Expert	Technological University, Dublin (Tallaght)
Mr Iain Hull	Industry Expert	Workday, Ireland
Mr Cathal Curry	Student Member	Dublin City University

Principal Programme

Names of centres where the programmes are to be provided	Maximum number of learners *(per centre)*	Minimum number of learners
National College of Ireland, IFSC Campus	130	15

Enrolment interval *(normally 5 years)*	**Date of first intake**	September 2020
	Date of last intake	August 2025
Maximum number of annual intakes	2	
Maximum total number of learners per intake	130	
Programme duration (months from start to completion)	4 years	
Target learner groups	The Bachelor of Science (Hons) in Computing is aimed at full time and part time students. There are a number of different categories of potential students that have been identified as suitable candidates for this course: • Students who have their Leaving Certificate complete and who wish to pursue a career in ICT • Part-time students who are currently working in ICT who don't have the relevant academic experience and are looking for a progression path in their current working environment or are looking to upskill and move to a new job in the field	
Approved countries for provision	Republic of Ireland	
Delivery mode: Full-time/Part-time	Full Time and Part Time and Online and Blended	

The teaching and learning modalities	Blended learning combining different strategies, including traditional classroom lectures, tutorials and seminars, flipped classroom, problem and project-based learning, team work and work-based learning. Synchronous Online delivery may also be used in some cases.
Brief synopsis of the programme (e.g. who it is for, what is it for, what is involved for learners, what it leads to.)	This programme is a 4-year Bachelor of Science (Hons) degree aimed at Leaving Certificate graduates or mature applicants who wish to follow a career in computing. The programme will run both on part-time and full-time basis in order to cater to the different types of students. The students will have to attend lectures and tutorials in the classroom or online over the academic year, as well as to study independently. Students will study for 4 stages taking modules that cover topics such as Mathematics, Programming, Problem Solving, Data Communications and Networking, Software Quality and Testing, Innovation and Business Entrepreneurship, Security Fundamentals and Development, Cloud Application and Development, Data Governance, Security and Ethics. An important component of the programme will be the 6 months Work Placement in stage 3, as well as the capstone Software Project in stage 4. The programme leads to a level 8 academic award Bachelor of Science (Hons) in Computing awarded by QQI. Graduates of this programme may pursue further education or employment in the field of computing.

Summary of specifications for teaching staff	**WTE**	**Qualifications and experience**
	14	Lecturers with a Masters or PhD level qualification in computing or a related discipline with academic experience delivering modules in ICT, Maths and Programming at level 8.
	2	Programme Director who is responsible for the academic management of the programme and may also be a lecturer on the programme. The programme director will have at least a Masters or PhD qualification in computing or a related discipline.
	1	Programme Co-ordinators with experience in relationship management and programme co-ordination .

Summary of specifications for the ratio of learners to teaching-staff	**Staff to learner ratio**	**Learning activity type**
	1:100	Lectures
	1:25	Tutorials/labs
Overall WTE staff/learner ratio	1:8	

Programmes being replaced (applicable to applications for revalidation)		
Code	Title	Last enrolment date
PG22548	Bachelor of Science (Honours) in Computing	August 2020

Embedded programme

Names of centres where the programmes are to be provided	Maximum number of learners *(per centre)*	Minimum number of learners
National College of Ireland, IFSC Campus	130	15

Enrolment interval *(normally 5 years)*	Date of first intake	September 2020
	Date of last intake	August 2025
Maximum number of annual intakes	2	
Maximum total number of learners per intake	130	
Programme duration (months from start to completion)	3 years	
Target learner groups	The Bachelor of Science (Ord) in Computing is aimed at full time and part time students. There are a number of different categories of potential students that have been identified as suitable candidates for this course: • Students who have their Leaving Certificate complete and who wish to pursue a career in ICT • Part-time students who are currently working in ICT who don't have the relevant academic experience and are looking for a progression path in their current working environment or are looking to upskill and move to a new job in the field.	
Approved countries for provision	Republic of Ireland	
Delivery mode: Full-time/Part-time	Full Time and Part Time and Online and Blended	
The teaching and learning modalities	Blended learning combining different strategies, including traditional classroom lectures, tutorials and seminars, flipped classroom, problem and project-based learning, team work and work-based learning. Synchronous Online delivery may also be used in some cases.	
Brief synopsis of the programme (e.g. who it is for, what is it for, what is involved for learners, what it leads to.)	This 3-year Bachelor of Science (Ord) degree is an exit award aimed at full-time and part-time students who do not wish to progress to the Award Stage of the principal programme.	
	WTE	**Qualifications and experience**

Summary of specifications for teaching staff	14	Lecturers with a Masters or PhD level qualification in computing or a related discipline with academic experience delivering modules in ICT, Maths and Programming at level 8.
	2	Programme Director who is responsible for the academic management of the programme and may also be a lecturer on the programme. The programme director will have at least a Masters or PhD qualification in computing or a related discipline.
	1	Programme Co-ordinators with experience in relationship management and programme co-ordination.
Summary of specifications for the ratio of learners to teaching-staff	Staff to learner ratio	Learning activity type
	1:100	Lecturers
	1:25	Tutorials/labs
Overall WTE staff/learner ratio	1:8	

Programmes being replaced (applicable to applications for revalidation)		
Code	Title	Last enrolment date
N/A	Not Applicable	N/A

Other noteworthy features of the application

Not Applicable

Part 2 Evaluation against the validation criteria

Criterion 1

The provider is eligible to apply for validation of the programme
a) The provider meets the prerequisites (section 44(7) of the 2012 Act) to apply for validation of the programme. b) The application for validation is signed by the provider's chief executive (or equivalent) who confirms that the information provided is truthful and that all the applicable criteria have been addressed. c) The provider has declared that their programme complies with applicable statutory, regulatory and professional body requirements.

Satisfactory (yes, no, partially)	Comment
Yes	

Principal programme

The panel is satisfied that NCI is eligible to apply for revalidation of the programme.

NCI has complied with section 44(7) of the 2012 Act. NCI had its procedures for quality assurance (QA) approved by QQI in 2019. During the revalidation panel's site visit in 2020, the panel explored how specific aspects of NCI's QA were operationalized in relation to the proposed programme (for example, supports for learners and the continuing professional development of teaching staff). Following these discussions with NCI's representatives, the panel were satisfied that the provider's institutional QA fully comprehend the programme submitted for revalidation. The provider has also outlined procedures for access, transfer and progression, which are discussed under Criterion 4 in this report.

A declaration accompanying the application for revalidation has been signed by the acting Head of the Coordinating Provider Vice President Professor Jimmy Hill on behalf of Gina Quin, President of NCI. This declaration verifies the accuracy of the information provided, as well as providing an assurance that resources are in place to deliver the programme. The declaration further states that the proposed programme complies with applicable statutory, regulatory and professional body requirements.

Embedded programme

As per commentary in relation to the principal programme, the panel is satisfied that NCI has met Criterion 1.

Criterion 2

The programme objectives and outcomes are clear and consistent with the QQI awards sought
a) The programme aims and objectives are expressed plainly.
b) A QQI award is specified for those who complete the programme.
(i) Where applicable, a QQI award is specified for each embedded programme.
c) There is a satisfactory rationale for the choice of QQI award(s).
d) The award title(s) is consistent with unit 3.1 of QQI's *Policy and Criteria for Making Awards.*
e) The award title(s) is otherwise legitimate for example it must comply with applicable statutory, regulatory and professional body requirements.
f) The programme title and any embedded programme titles are
(i) Consistent with the title of the QQI award sought.
(ii) Clear, accurate, succinct and fit for the purpose of informing prospective learners and other stakeholders.
g) For each programme and embedded programme
(i) The **minimum intended programme learning outcomes** and any other educational or training objectives of the programme are explicitly specified.
(ii) The minimum intended programme learning outcomes to qualify for the QQI award sought are **consistent with** the relevant QQI awards standards.
h) Where applicable, the **minimum intended module learning outcomes** are explicitly specified for each of the programme's modules.
i) Any QQI minor awards sought for those who complete the modules are specified, where applicable.
For each minor award specified, the minimum intended module learning outcomes to qualify for the award are consistent with relevant QQI minor awards standards.

Satisfactory (yes, no, partially)	Comment	
Yes		

Principal programme

The panel is satisfied that NCI's application meets this criterion. The programme aims and objectives are expressed clearly in the programme documentation presented by NCI. A QQI award is specified for those who complete the principal programme: *Bachelor of Science (Hons) in Computing*. This award title is consistent with unit 3.1 of QQI's 2014 Policy and Criteria for Making Awards. The panel is of the view that the award title is appropriately informative to prospective learners and other stakeholders, and represents the programme clearly and accurately for this purpose. A QQI award is also specified for the embedded programme (see below).

NCI has submitted comprehensive documentation, in which both the minimum intended programme learning outcomes (MIPLOs) and minimum intended module learning outcomes (MIMLOs) are explicitly specified. The programme team have mapped the MIPLOs to the Computing QQI Awards Standards (*Level 8*). The panel is of the view that NCI has provided sufficient evidence that attainment of the MIPLOs is consistent with those standards.

Embedded programme

As per commentary in relation to the principal programme, the panel is satisfied that NCI has met Criterion 2. Additionally:

- A QQI award is specified for those who complete the embedded programme: *Bachelor of Science (Ord) in Computing*.
- The programme team have mapped the MIPLOs to the Computing QQI Awards Standards (*Level 7*). The panel is of the view that NCI has provided sufficient evidence that attainment of the MIPLOs is consistent with those standards.

Criterion 3

The programme concept, implementation strategy, and its interpretation of QQI awards standards are well informed and soundly based (considering social, cultural, educational, professional and employment objectives)

   a) The development of the programme and the intended programme learning outcomes has sought out and taken into account the views of stakeholders such as learners, graduates, teachers, lecturers, education and training institutions, employers, statutory bodies, regulatory bodies, the international scientific and academic communities, professional bodies and equivalent associations, trades unions, and social and community representatives.

   b) The interpretation of awards standards has been adequately informed and researched;   considering the programme aims and objectives and minimum intended programme (and, where applicable, modular) learning outcomes.

      (i) There is a satisfactory rationale for providing the programme.

      (ii) The proposed programme compares favourably with existing related (comparable) programmes in Ireland and beyond. Comparators should be as close as it is possible to find.

      (iii) There is support for the introduction of the programme (such as from employers, or professional, regulatory or statutory bodies).

      (iv) There is evidence of learner demand for the programme.

      (v) There is evidence of employment opportunities for graduates where relevant.

      (vi) The programme meets genuine education and training needs.

   c) There are mechanisms to keep the programme updated in consultation with internal and external stakeholders.

   d) Employers and practitioners in the cases of vocational and professional awards have been systematically involved in the programme design where the programme is vocationally or professionally oriented.

   e) The programme satisfies any validation-related criteria attaching to the applicable awards standards and QQI awards specifications.

Satisfactory (yes, no, partially)	Comment
Yes	

Principal programme

The panel is satisfied that NCI's application meets this criterion. The programme team have engaged in formal and informal consultation with employers in the process of reviewing and preparing the programme proposed for revalidation. This has been facilitated via an industry panel, and additionally through regular interactions with employers hosting NCI students on work-placement. NCI provided the revalidation panel with an overview of the ICT knowledge requirements indicated, listed by company in its programme documentation. A further list of employers directly involved in validating the programme concept was provided. These included RTE, Bank of Ireland, Deloitte, Mediateam, ConsenSys, Ergo and Workday, among others.

In addition to industry consultation, the programme concept has been informed by the outcomes of research and reports on skills shortages in the sector. These include the Vacancy Overview 2018, produced by the Expert Group on Future Skills Needs (EGFSN), the National Skills Bulletin 2018 and Ireland's 3rd ICT Skills Action Plan (Technology Skills 2022), which was produced by the Department of Education and Skills. In preparing the programme for revalidation, NCI has also undertaken a review of currently advertised vacancies, and analysed the knowledge, skills and competences these outline as requirements for applicants.

Comparison with existing related programmes has also been undertaken. Internationally, NCI has reviewed the structure of programmes in the UK and USA, as well as comparable Irish programmes. Within Ireland, a detailed analysis has been undertaken of TU Dublin's BSc in Computing as well as Level 8

programmes offered by Limerick IT and IT Carlow. Learner demand for the programme is evident in CAO feedback, through NCI's international collaborative agreements with partners in Malaysia and China, and through articulation arrangements for advanced standing agreed with five FET colleges.

The panel is therefore of the view that NCI's interpretation of the Computing Awards Standards is adequately researched and informed. Moreover, the rationale for providing the programme is sound. There is a genuine and well-documented need for education and training in the discipline, and there is ample evidence of employment opportunities for graduates in the sector. Mechanisms exist for ongoing consultation with industry to keep the programme updated, including industry panels, industry partner showcases and interaction with employers due to work-placement elements of the programme.

Embedded programme

As per commentary in relation to the principal programme, the panel is satisfied that NCI has met Criterion 3.

Criterion 4

The programme's access, transfer and progression arrangements are satisfactory
a) The information about the programme as well as its procedures for access, transfer and progression are consistent with the procedures described in QQI's policy and criteria for access, transfer and progression in relation to learners for providers of further and higher education and training. Each of its programme-specific criteria is individually and explicitly satisfied.
b) Programme information for learners is provided in plain language. This details what the programme expects of learners and what learners can expect of the programme and that there are procedures to ensure its availability in a range of accessible formats.
c) If the programme leads to a higher education and training award and its duration is designed for native English speakers, then the level of proficiency in English language must be greater or equal to B2+ in the Common European Framework of Reference for Languages (CEFRL) in order to enable learners to reach the required standard for the QQI award.
d) The programme specifies the learning (knowledge, skill and competence) that **target learners** are expected to have achieved before they are enrolled in the programme and any other assumptions about enrolled learners (programme participants).
e) The programme includes suitable procedures and criteria for the **recognition of prior learning** for the purposes of access and, where appropriate, for advanced entry to the programme and for exemptions.

f) The programme title (the title used to refer to the programme):-
    (i) Reflects the core *intended programme learning outcomes*, and is consistent with the standards and purposes of the QQI awards to which it leads, the award title(s) and their class(es).
    (ii) Is learner focused and meaningful to the learners;
    (iii) Has long-lasting significance.

g) The programme title is otherwise legitimate; for example, it must comply with applicable statutory, regulatory and professional body requirements.

Satisfactory (yes, no, partially)	Comment
Yes	

Principal programme

The panel is satisfied that NCI's application meets this criterion. NCI has established procedures for access, transfer and progression within its QA, which were approved by a QQI appointed panel in 2019. The programme specific criteria and arrangements are specified in Section 4 of the programme document. These encompass NCI's policy on where information will be made available to learners about the programme prior to commencement (NCI website and prospectus; orientation and induction materials) and on registration (programme handbook; programme Moodle pages; module Moodle pages).

Entry requirements, including general and discipline specific learning, English language proficiency (CEFR B2+) and mathematical proficiency are explicitly specified in the programme documentation. Recognition of Prior Learning is assessed according to NCI's policy, and may entail a portfolio of evidence, an interview or a demonstration of technical or mathematical problem-solving skills. NCI has articulation arrangements for entry with advanced standing agreed with five FET colleges (entry to second year) and offers its own students undertaking the Higher Certificate in Computing to progress onto the programme (entry into third year). Progression routes from the principal programme to four NFQ Level 9 MSc programmes offered by NCI are also specified.

The panel is of the view that the programme title appropriately reflects the programme's MIPLOs. The title is unambiguous, will have long-lasting significance and is consistent with the purposes of the QQI awards to which it leads. Further, it is learner focused and will be meaningful to prospective or enrolled learners.

Embedded programme

As per commentary in relation to the principal programme, the panel is satisfied that NCI has met Criterion 4.

Additionally, the BSc (Ord) in Computing enables students to obtain recognition for the knowledge, skills and competences they have attained if they elect to exit the programme and enter industry after they have completed their work placement module.

Criterion 5

The programme's written curriculum is well structured and fit-for-purpose
a) The programme is suitably structured and coherently oriented towards the achievement by learners of its intended programme learning outcomes. The programme (including any stages and modules) is integrated in all its dimensions.
b) In so far as it is feasible the programme provides choice to enrolled learners so that they may align their learning opportunities towards their individual educational and training needs.
c) Each module and stage is suitably structured and coherently oriented towards the achievement by learners of the intended *programme* learning outcomes.
d) The objectives and purposes of each of the programme's elements are clear to learners and to the provider's staff.
e) The programme is structured and scheduled realistically based on sound educational and training principles.
f) The curriculum is comprehensively and systematically documented.
g) The credit allocated to the programme is consistent with the difference between the entry standard and minimum intended programme learning outcomes.
h) The credit allocated to each module is consistent with the difference between the module entry standard and minimum intended module learning outcomes.
i) Elements such as practice placement and work based phases are provided with the same rigour and attentiveness as other elements.
j) The programme duration (expressed in terms of time from initial enrolment to completion) and its fulltime equivalent contact time (expressed in hours) are consistent with the difference between the minimum entry standard and award standard and with the credit allocation.

Satisfactory (yes, no, partially)	Comment
Yes	

Principal programme

The panel is satisfied that NCI's application meets this criterion. Prior to the site visit, the panel members had an opportunity to closely review NCI's documentation of the curriculum. Discussions during the site visit provided an opportunity for the panel members to pose questions pertaining to the programme as a whole, as well as query aspects of individual modules.

The panel discussion explored streams within the overall programme structure, including the development of programming skills across various modules and stages, the balance of theory and practice in learning activities and assessments and the potential for cross-modular assessment. NCI representatives also discussed how modifications to the module structure proposed for the fourth stage of the programme would potentially lead to increased student engagement and achievement.

Discussions of individual modules with NCI's programme team were detailed. Examples of that discussion, for indicative purposes, include:

- The allocation of 10 ECTS to the *Web Design and Development* module, and whether this was warranted. NCI representatives noted the significance of the module in providing learners with confidence that the skills they were learning could be applied tangibly early in the programme.
- The mode of examination for the *Introduction to Programming* module, which is invigilated in a lab room. Learners have access to a syntax sheet, but no access to documentation.
- The sequencing of topics and content within the *Object Oriented Programming* module.
- Whether encryption was covered within the *Advanced Databases* module, as it was not noted in the documentation.
- Confirmation that the 8 listed topics in the 12 week *Data Structures and Algorithms* module did not indicate a reduction in lectures.

- The use of peer review and the methods used to facilitate group formation and manage assessed team work in the *Team Project* module.
- The practical orientation of *Blockchain Foundations* was noted and commended.
- The discrepancy of ECTS allocated to *Internet of Things* in the documentation, and the otherwise commendable module outline.
- The format of the 60% weighted examination in the *Artificial Intelligence* module.

Embedded programme

As per commentary in relation to the principal programme, the panel is satisfied that NCI has met Criterion 5.

Criterion 6

There are sufficient qualified and capable programme staff available to implement the programme as planned

a) The specification of the programme's staffing requirements (staff required as part of the programme and intrinsic to it) is precise, and rigorous and consistent with the programme and its defined purpose. The specifications include professional and educational qualifications, licences-to-practise where applicable, experience and the staff/learner ratio requirements. See also criterion 12 c).
b) The programme has an identified complement of staff (or potential staff) who are available, qualified and capable to provide the specified programme in the context of their existing commitments.
c) The programme's complement of staff (or potential staff) (those who support learning including any employer-based personnel) are demonstrated to be competent to enable learners to achieve the intended programme learning outcomes and to assess learners' achievements as required.
d) There are arrangements for the performance of the programme's staff to be managed to ensure continuing capability to fulfil their roles and there are staff development opportunities.
e) There are arrangements for programme staff performance to be reviewed and there are mechanisms for encouraging development and for addressing underperformance.
f) Where the programme is to be provided by staff not already in post there are arrangements to ensure that the programme will not enrol learners unless a complement of staff meeting the specifications is in post.

Satisfactory (yes, no, partially)	Comment
Yes	

Principal programme

The panel is satisfied that NCI's application meets this criterion. NCI has specified programme staffing requirements in the programme documentation, and has made a commitment to ensuring that teaching staff appointed to teach on the programme have the required level of expertise and qualifications in the field on an on-going basis. Notably, NCI is a well-established provider of computing programmes, and this application pertains to the revalidation (with some modifications) of an existing programme. This means that an existing complement of qualified full-time and part-time staff are already in place. NCI representatives also discussed the benefit of the college's associate faculty model with the panel. This enables NCI to complement the full-time programme staff profiles (20 of whom were in place at the time of the panel's visit) with associate faculty, many of whom have had a long-term association with the college. These individuals typically work flexibly with NCI and maintain profiles in industry, bringing expertise and currency of perspective into the college.

Modifications proposed to the programme include up to seven specialisations being available to learners via electives offered at the third and fourth stages. During the site visit the panel queried whether the existing staff profiles would support this. NCI confirmed that additional positions had been established to support the new specialisations. At the time of the site visit NCI had recently recruited new faculty with expertise in Artificial Intelligence, and an additional four offers had been made.

Quality assurance processes are in place for managing the performance of teaching staff at NCI. A number of measures inform the ongoing monitoring of staff performance, including meetings of class representatives with programme directors, anonymously completed module surveys and the student complaints policy. Further, NCI actively supports the professional development of its faculty through its Learning, Teaching and Assessment Strategy, a Teaching Enhancement site in Moodle and a programme of workshops, seminars and accredited learning options. An illustrative calendar of workshops conducted in the 2018/2019 academic year was included in the programme documentation. Topics were practically

oriented and spanned areas of practice including use of educational technologies, assessment, diversity and interculturalism, reflective practice and general teacher development. During the site visit, NCI confirmed that a high proportion of staff are research active, and that the college also offers supports for faculty maintaining currency in their disciplines through conference attendance, publication and associated activities or through PhD studies.

Embedded programme

As per commentary in relation to the principal programme, the panel is satisfied that NCI has met Criterion 6.

Criterion 7

There are sufficient physical resources to implement the programme as planned

    a)   The specification of the programme's physical resource requirements (physical resources required as part of the programme and intrinsic to it) is precise, and rigorous and consistent with the programme, its defined purpose and its resource/learner-ratio requirements. See also criterion 12 d).

    b)   The programme has an identified complement of supported physical resources (or potential supported physical resources) that are available in the context of existing commitments on these e.g. availability of:

        (i)   suitable premises and accommodation for the learning and human needs (comfort, safety, health, wellbeing) of learners (this applies to all of the programme's learning environments including the workplace learning environment)

        (ii)   suitable information technology and resources (including educational technology and any virtual learning environments provided)

        (iii)   printed and electronic material (including software) for teaching, learning and assessment

        (iv)   suitable specialist equipment (e.g. kitchen, laboratory, workshop, studio) – if applicable

        (v)   technical support

        (vi)   administrative support

        (vii)   company placements/internships – if applicable

    c)   If versions of the programme are provided in parallel at more than one location each independently meets the location-sensitive validation criteria for each location (for example staffing, resources and the learning environment).

    d)   There is a five-year plan for the programme. It should address

        (i)   Planned intake (first five years) and

        (ii)   The total costs and income over the five years based on the planned intake.

    e)   The programme includes controls to ensure entitlement to use the property (including intellectual property, premises, materials and equipment) required.

Satisfactory (yes, no, partially)	Comment
Yes	

Principal programme

The panel is satisfied that NCI's application meets this criterion. NCI has clearly specified the programme's physical resource requirements in Section 7 of the programme document. This includes software tools, cloud resources and administrative support provided by a dedicated Programme Coordinator. The programme will be offered at NCI's campus, located within the International Financial Services Centre (IFSC) of Dublin. As the programme proposed is a revalidation, the required learning spaces (inclusive of traditional classrooms, studios and collaborative learning spaces) are in existence, and funds have been committed to additional refurbishment in 2020 to augment these. NCI representatives have further assured the panel that there is sufficient capacity to accommodate all seven potential specialisations running concurrently at the third and fourth stage of the programme in the event they are equally well-subscribed. This is due to the relatively high number of smaller learning spaces and classrooms on site. Learners at NCI also have access to recreation and dining facilities, and personal study spaces.

Resources to facilitate company placements are also are identified, with an Academic Work Placement Coordinator interacting with the careers coordinator, academic supervisor, students and companies to manage this aspect of the programme.

NCI has provided a five-year financial plan for the programme based on the proposed intake. The figures within this plan take into account transfers from FET colleges into year 2 and transfers from NCI's Higher Certificate in Computing in year 3.

Embedded programme

As per commentary in relation to the principal programme, the panel is satisfied that NCI has met Criterion 7.

Criterion 8

The learning environment is consistent with the needs of the programme's learners
a) The programme's physical, social, cultural and intellectual environment (recognising that the environment may, for example, be partly virtual or involve the workplace) including resources and support systems are consistent with the intended programme learning outcomes.
b) Learners can interact with, and are supported by, others in the programme's learning environments including peer learners, teachers, and where applicable supervisors, practitioners and mentors.
c) The programme includes arrangements to ensure that the parts of the programme that occur in the workplace are subject to the same rigours as any other part of the programme while having regard to the different nature of the workplace.

Satisfactory (yes, no, partially)	Comment
Yes	

Principal programme

The panel is satisfied that NCI's application meets this criterion.

NCI learners can avail of well-equipped learning and recreation facilities at the IFSC campus, and access a range of support services. These include a disability support service, through which any learner at NCI can register to have an educational needs assessment and receive dedicated learning support. Counselling services are available free to full-time students, and are subsidised for part-time students. NCI's international office provides additional support sessions targeted at the specific needs of the international cohort (e.g. orientation to personal safety in Ireland, where to shop, access medical services or contact the Gardaí).

Academic support that is both programme and module specific is offered via NCI's Computing Support Team. This service delivers workshops timed to align to the curriculum, and also provides individual and online support to learners. During the site visit, the panel had the opportunity to interact with learners at NCI in the early and late stages of the current programme, and also with recent graduates. Although these learners indicated changes they would like to see within the written curriculum, they were unanimous in praising the support provided to them by the teaching and support staff at NCI, and reflected positively on the learning environment.

The workplace learning component of the programme is carefully managed by NCI. Job descriptions are reviewed by careers staff and by discipline experts (where appropriate) to ensure that the role is challenging enough. Learners are visited while on placement, and academic staff also monitor the type of work they are undertaking in the workplace through discussions with learners during those visits. Work placements can be sourced by learners, or they can be assisted by the careers department. A high proportion (85 – 90%) of NCI's learners are successful in securing a work placement opportunity. For learners who do not, or who experience complications in the workplace, an academic internship is provided at NCI and closely supervised to ensure achievement of learning outcomes.

Embedded programme

As per commentary in relation to the principal programme, the panel is satisfied that NCI has met Criterion 8.

Criterion 9

There are sound teaching and learning strategies	
a) The teaching strategies support achievement of the intended programme/module learning outcomes. b) The programme provides authentic learning opportunities to enable learners to achieve the intended programme learning outcomes. c) The programme enables enrolled learners to attain (if reasonably diligent) the minimum intended programme learning outcomes reliably and efficiently (in terms of overall learner effort and a reasonably balanced workload). **d)** Learning is monitored/supervised. **e)** Individualised guidance, support and timely formative feedback is regularly provided to enrolled learners as they progress within the programme.	
Satisfactory (yes, no, partially)	**Comment**
Yes	

Principal programme

The panel is satisfied that NCI's application meets this criterion. All NCI programmes are underpinned by the three pillars of the institution's Learning, Teaching and Assessment strategy (developing the learner experience, developing the learning curriculum and developing the learning community). These dimensions are interpreted specifically to the programme within the programme documentation.

The programme delivery incorporates a range of learning, teaching and assessment strategies. These are specified for individual modules within the programme documentation, and are appropriately aligned to achievement of the MIPLOs and MIMLOs. Across the programme, learners will experience a range of teaching modalities including direct instruction, in-class group work, interactive workshops, guest speakers, practical laboratory exercises and discussions. In addition to in-class learning and teaching activities, learners will be able to access a range of supplementary learning materials, such as video resources, on Moodle. A diversity of contemporary approaches to learning and teaching, for example, the Flipped Classroom, Blended Learning and Problem-based learning are also utilised to achieve the objectives of different modules.

Embedded programme

As per commentary in relation to the principal programme, the panel is satisfied that NCI has met Criterion 9.

Criterion 10

There are sound assessment strategies
a) All assessment is undertaken consistently with *Assessment Guidelines, Conventions and Protocols for Programmes Leading to QQI Awards*
b) The programme's assessment procedures interface effectively with the provider's QQI approved quality assurance procedures.
c) The programme includes specific procedures that are fair and consistent for the assessment of enrolled learners to ensure the minimum intended programme/module learning outcomes are acquired by all who successfully complete the programme.
d) The programme includes formative assessment to support learning.
e) There is a satisfactory written **programme assessment strategy** for the programme as a whole and there are satisfactory module assessment strategies for any of its constituent modules.
f) Sample assessment instruments, tasks, marking schemes and related evidence have been provided for each award-stage assessment and indicate that the assessment is likely to be valid and reliable.
g) There are sound procedures for the moderation of summative assessment results.
h) The provider only puts forward an enrolled learner for certification for a particular award for which a programme has been validated if they have been specifically assessed against the standard for that award.

Satisfactory (yes, no, partially)	Comment
Yes	

Principal programme

The panel is satisfied that NCI's application meets this criterion. NCI's programme documentation includes a programme assessment strategy and a schedule of formative and summative assessment. The panel also reviewed the assessment strategies for individual modules contained within the module documentation. Assessment methods are under continuous review by the programme team, and are renewed as necessary.

NCI has processes in place to ensure fair and consistent assessment of enrolled learners within its institutional QA, and the programme's assessment strategy interfaces with those. During the panel's site visit, NCI representatives responded to queries from the panel regarding the relative percentages of Continuous Assessment within modules, the timing of assessments across modules and the management of instances of plagiarism. Following this discussion, the panel was satisfied that the programme team take a proactive approach to scheduling assessment to avoid overloading learners, and monitoring the effectiveness of assessment tasks on an ongoing basis.

Embedded programme

As per commentary in relation to the principal programme, the panel is satisfied that NCI has met Criterion 10.

Criterion 11

Learners enrolled on the programme are well informed, guided and cared for
a) There are arrangements to ensure that each enrolled learner is fully informed in a timely manner about the programme including the schedule of activities and assessments.
b) Information is provided about learner supports that are available to learners enrolled on the programme.
c) Specific information is provided to learners enrolled on the programme about any programme-specific appeals and complaints procedures.
d) If the programme is modular, it includes arrangements for the provision of effective guidance services for learners on the selection of appropriate learning pathways.
e) The programme takes into account and accommodates to the differences between enrolled learners, for example, in terms of their prior learning, maturity, and capabilities.
f) There are arrangements to ensure that learners enrolled on the programme are supervised and individualised support and due care is targeted at those who need it.
g) The programme provides supports for enrolled learners who have special education and training needs.
h) The programme makes reasonable accommodations for learners with disabilities.
i) If the programme aims to enrol international students it complies with the *Code of Practice for Provision of Programmes to International Students* and there are appropriate in-service supports in areas such as English language, learning skills, information technology skills and such like, to address the particular needs of international learners and enable such learners to successfully participate in the programme.
j) The programme's learners will be well cared for and safe while participating in the programme, (e.g. while at the provider's premises or those of any collaborators involved in provision, the programme's locations of provision including any workplace locations or practice-placement locations).

Satisfactory (yes, no, partially)	Comment
Yes	

Principal programme

The panel is satisfied that NCI's application meets this criterion. At the outset of their studies, new learners at NCI are provided with an orientation. This can be undertaken on campus, or online for learners who are part-time or participating in a blended programme. In discussions at the site visit, NCI representatives indicated that during the on campus orientation, emphasis is placed on both settling learners socially through icebreaking activities and signposting available services. As the information provided during orientation is also available online, all learners have ongoing self-service access to information about resources and supports via Moodle. Information pertaining to procedures for appeals and complaints is provided in the programme handbook and online in the school Moodle page. Additionally, information is provided to learners via the student handbook.

NCI has a range of learner support services in place, which support the diversity of needs and preferences among its different cohorts. Academic supports are available through workshops and on a 1-1 basis as required, including programme specific support. These include learning support, mathematics support and computing support services. Importantly, learners who are unable to access those supports on campus can do so online. A disability support service is in place, and learners can utilise this to have their educational needs assessed and to be supported in negotiating reasonable accommodations as well as other learning supports. Careers support services are available to assist learners in locating appropriate work placements and preparing for employment, and an international office provides targeted supports to enrolled learners who are living abroad from their countries of origin while studying at NCI.

During the site visit, current learners at NCI and recent graduates spoke to the panel about their experiences at the college. They reflected positively on their experiences at NCI, and spoke highly of the college's staff. It was evident that they felt supported within the college environment. Consequently, the panel is of the view that learners at NCI will be well-informed in a timely manner, and also cared for and guided during their studies.

Embedded programme

As per commentary in relation to the principal programme, the panel is satisfied that NCI has met Criterion 11.

Criterion 12

The programme is well managed

a) The programme includes intrinsic governance, quality assurance, learner assessment, and access, transfer and progression procedures that functionally interface with the provider's general or institutional procedures.

b) The programme interfaces effectively with the provider's QQI approved quality assurance procedures. Any proposed incremental changes to the provider's QA procedures required by the programme or programme-specific QA procedures have been developed having regard to QQI's statutory QA guidelines. If the QA procedures allow the provider to approve the centres within the provider that may provide the programme, the procedures and criteria for this should be fit-for-the-purpose of identifying which centres are suited to provide the programme and which are not.

c) There are explicit and suitable programme-specific criteria for selecting persons who meet the programme's staffing requirements and can be added to the programme's complement of staff.

d) There are explicit and suitable programme-specific criteria for selecting physical resources that meet the programmes physical resource requirements, and can be added to the programme's complement of supported physical resources.

e) Quality assurance is intrinsic to the programme's maintenance arrangements and addresses all aspects highlighted by the validation criteria.

f) The programme-specific quality assurance arrangements are consistent with QQI's statutory QA guidelines and use continually monitored completion rates and other sources of information that may provide insight into the quality and standards achieved.

g) The programme operation and management arrangements are coherently documented and suitable.

h) There are sound procedures for interface with QQI certification.

Satisfactory (yes, no, partially)	Comment
Yes	

Principal programme

The panel is satisfied that the provider's application meets this criterion. NCI has an established governance structure and recently approved institutional quality assurance procedures in place. The management structure and procedures outlined for the proposed programme interface effectively with these. NCI's programme documentation also includes programme-specific criteria pertaining to staffing and physical resources. The panel is therefore of the view that the programme's operation and management arrangements are appropriate. Finally, NCI is an established provider and has a track record of interacting successfully with QQI to validate programmes of education and training and certify learners.

Embedded programme

As per commentary in relation to the principal programme, the panel is satisfied that NCI has met Criterion 12.

Overall recommendation to QQI

Principal programme

Select one	
X	Satisfactory (meaning that it recommends that QQI can be satisfied in the context of unit 2.3) of Core policies and criteria for the validation by QQI of programmes of education and training;
	Satisfactory subject to proposed special conditions (specified with timescale for compliance for each condition; these may include proposed pre-validation conditions i.e. proposed (**minor**) things to be done to a programme that almost fully meets the validation criteria before QQI makes a determination);
	Not satisfactory.

Reasons for the overall recommendation

During the site visit the panel explored the programme teams' rationales for a number of specific decisions that had been made in relation to the programme proposed for revalidation. For example, the panel queried the development of learners' programming skills across the programmes and the relative breadth and depth of 3rd year modules within specialisations. It was evident to the panel that the team at NCI engage in processes of internal reflection and critique that are conducive to continuous improvement and this to be commended.

The panel offers a further commendation to NCI on its well-developed and holistic learner support systems. NCI has a well-considered orientation process for new students. This avoids overloading them with information, and incorporates a set of online self-access resources for learners who cannot attend in person. The learners the panel engaged with during the site visit clearly felt well-supported by the staff and systems in place at the College.

The panel would like to highlight the important role the computing support team plays in delivering comprehensive support. This support is available in multiple formats, including workshops that are timed to align to the curriculum, online and 1-1. Given the diversity of NCI's target cohorts, this is clearly an important resource for learners, and highly commendable.

Notably, NCI has taken some steps to address the gender imbalance of the cohorts in its computing programmes. The College is encouraged to continue its efforts in this regard.

Embedded programme

Select one	
X	Satisfactory (meaning that it recommends that QQI can be satisfied in the context of unit 2.3) of Core policies and criteria for the validation by QQI of programmes of education and training;
	Satisfactory subject to proposed special conditions (specified with timescale for compliance for each condition; these may include proposed pre-validation conditions i.e. proposed (**minor**) things to be done to a programme that almost fully meets the validation criteria before QQI makes a determination);
	Not satisfactory.

Reasons for the overall recommendation

As per Principal Programme.

Summary of recommended special conditions of validation

Principal programme

There are no recommended special conditions of validation

Principal & Embedded programmes

There are no recommended special conditions of validation

Summary of recommendations to the provider

There are no recommendations to the provider

Declarations of Evaluators' Interests
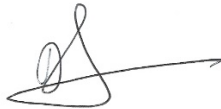
No interests have been declared by members of the revalidation panel that would affect the impartiality of the panel and its ability to make a recommendation to QQI regarding the revalidation of the primary programme and the two embedded programmes.

This report has been agreed by the evaluation panel and is signed on their behalf by the chairperson.

Panel chairperson: Danny Brennan   Date: 23rd April 2020

Signed:

Disclaimer

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.

Name of Provider:	National College of Ireland
Programme Title	Bachelor of Science (Hons) in Computing
Award Title	Bachelor of Science (Hons) in Computing
Stage Exit Award Title³	N/A
Modes of Delivery (FT/PT):	Full Time, Online and Blended
Teaching and learning modalities	Direct contact via lectures and demonstrations and Blended e-learning

Award Class⁴	Award NFQ level	Award EQF Level	Stage (1, 2, 3, 4, …, or Award Stage):	Stage NFQ Level²	Stage EQF Level²	Stage Credit (ECTS)	Date Effective	ISCED Subject code
Major	8	6	1	6	5	60	Sept 2020	0613

Module Title (Up to 70 characters including spaces)	Semester no where applicable. (Semester 1 or Semester2)	Module Status	NFQ Level¹ where specified	Credit Number 5 Credit Units ECTS	Total Hours	Class(orequiv) Contact Hours	Directed e-learning	Hours of Independent Learning	Work-based learning effort	C.A. %	Supervised Project %	Proctored practical demonstration %	Proctored written exam
Computational Thinking	1	M	6	5	125	24		101		100			
Web Design & Development	1	M	6	10	250	72		178		100			
Discrete Mathematics	1	M	6	5	125	60		65		40			60
Problem Solving & Programming Concepts	1	M	6	5	125	36		89		100			
The Computing Industry	1	M	6	5	125	36		89		100			
Computer Architecture	2	M	6	5	125	36		89		50			50
Introduction to Programming	2	M	6	5	125	48		77		50		50	
Digital Multimedia	2	M	6	5	125	48		77		100			
Introduction to Data Modelling and Databases	2	M	6	10	250	48		202		40			60

Operating Systems	2	M	6	5	125	36		89		50			50

Special Regulations (Up to 280 characters)

Name of Provider:	National College of Ireland
Programme Title	Bachelor of Science (Hons) in Computing
Award Title	Bachelor of Science (Hons) in Computing
Stage Exit Award Title[3]	Higher Certificate in Science in Computing
Modes of Delivery (FT/PT):	Full Time, Online and Blended
Teaching and learning modalities	Direct contact via lectures and demonstrations and Blended e-learning

Award Class[4]	Award NFQ level	Award EQF Level	Stage (1, 2, 3, 4, …, or Award Stage):	Stage NFQ Level[2]	Stage EQF Level[2]	Stage Credit (ECTS)	Date Effective	ISCED Subject code
Major	8	6	2	6	5	60	September 2020	0613

Module Title (Up to 70 characters including spaces)	Semester no where applicable. (Semester 1 or Semester2)	Module Status	NFQ Level[1] where specified	Credit Number[5] Credit Units ECTS	Total Hours	Class (or equiv) Contact Hours	Directed e-learning	Hours of Independent Learning	Work-based learning effort	C.A. %	Supervised Project %	Proctored practical demonstration %	Proctored written exam %
Data Communications and Networking	1	M	6	5	125	36		89		40			60
Object Oriented Programming	1	M	6	5	125	48		77		50		50	
Web Application Development	1	M	6	10	250	72		178		100			
Advanced Databases	1	M	6	10	250	48		202		40			60
Innovation and Business Entrepreneurship	2	M	6	5	125	36		89		100			
Data Structures and Algorithms	2	M	6	10	250	72		178		50		50	
Team Project	2	M	6	5	125	48		77		100			
Software Engineering	2	M	6	5	125	36		89		100			
Software Quality and Testing	2	M	6	5	125	36		89		100			

Special Regulations (Up to 280 characters)

Name of Provider:	National College of Ireland					
Programme Title	Bachelor of Science (Hons) in Computing					
Award Title	Bachelor of Science (Hons) in Computing					
Stage Exit Award Title[3]	Bachelor of Science (Ord) in Computing					
Modes of Delivery (FT/PT):	Full Time, Online and Blended					
Teaching and learning modalities	Direct contact via lectures and demonstrations and Blended e-learning					

Award Class[4]	Award NFQ level	Award EQF Level	Stage (1, 2, 3, 4, …, or Award Stage):	Stage NFQ Level[2]	Stage EQF Level[2]	Stage Credit (ECTS)	Date Effective	ISCED Subject code
Major	8	6	3	7	6	60	2020	0613

Module Title (Up to 70 characters including spaces)	Semester no where applicable. (Semester 1 or Semester2)	Module Status	NFQ Level[1] where specified	Credit Number[5] Credit Units ECTS	Total Hours	Class (or equiv) Contact Hours	Directed e-learning	Hours of Independent Learning	Work-based learning effort	C.A. %	Supervised Project %	Proctored practical demonstration %	Proctored written exam %
Advanced Computer Networks	1	M	7	5	125	36		89		40			60
Security Fundamentals and Development	1	M	7	10	250	48		202		50			50
Introduction to Artificial Intelligence and Machine Learning	1	EA	7	5	125	36		89		50			50
Business and Artificial Intelligence	1	EA	7	5	125	36		89		50			50
Project Management	1	EB	7	10	250	48		202		50			50
Advanced Programming	1	EB	7	10	250	72		178		50			50
Work Placement	2	EC	7	30	750	0			750	100			0
Academic Internship	2	EC	7	30	750	168		582		100			0

Special Regulations (Up to 280 characters)

Students will have to choose an elective module from Electives A (EA).

Students will have to choose an elective module from Electives B (EB).

Students will have to do an elective module from Electives C (EC), either Work Placement or Academic Internship if they won't secure a work placement in the industry.

Learners may specialise in one of 6 areas in their final year: Software Development; Gaming Programming; Blockchain; Artificial Intelligence/Machine Learning/Data Analytics; Internet of Things; Cybersecurity; and Digital Business Transformation. The choice of the above electives will condition the specialisations that a student can follow afterwards in year 4. As such, the following rules apply:

For all the other specialisations except Digital Business Transformation, students must choose from EB, Advanced Programming module.

Students wishing to specialise in Artificial Intelligence/Machine Learning/Data Analytics or Internet of Things must choose from EA Introduction to Artificial Intelligence and Machine Learning module.

Name of Provider:	National College of Ireland
Programme Title	Bachelor of Science (Hons) in Computing
Award Title	Bachelor of Science (Hons) in Computing
Stage Exit Award Title	N/A
Modes of Delivery (FT/PT):	Full Time, Online and Blended
Teaching and learning modalities	Direct contact via lectures and demonstrations and Blended e-learning

Award Class	Award NFQ level	Award EQF Level	Stage(1, 2, 3, 4, …, or Award Stage):	Stage NFQ Level	Stage EQF Level	Stage Credit (ECTS)	Date Effective	ISCED Subject code
Major	8	6	Award	8	6	60	September 2020	0613

Module Title(Up to 70 characters including spaces)	Semester no where applicable.(Semester 1 or Semester2)	Module		Credit Number	Total Student Effort Module (hours)					Allocation Of Marks (from the module assessment strategy)			
		Status	NFQ Level where specified	Credit Units	Total Hours	Class (or equiv) Contact Hours	Directed e-learning	Hours of Independent Learning	Work-based learning effort	C.A. %	Supervised Project %	Proctored practical demonstration %	Proctored written exam %
Cloud Application Development	1	M	8	10	250	60		190		100			0
IT Governance, Security and Ethics	1	M	8	5	125	36		89		40			60
Business Analysis	1	O	8	10	250	48		202		100			0
Blockchain Foundations	1	O	8	10	250	48		202		40			60

Secure Application Programming	1	O	8	10	250	48		202		100			0
Game Systems	1	O	8	10	250	48		202		100			0
IoT Fundamentals and Development	1	O	8	10	250	48		202		40			60
Artificial Intelligence	1	O	8	10	250	48		202		40			60
Computing Project	1&2	M	8	20	500	48		452			100		0
Data Application Development	2	O	8	5	125	48		77		100			0
Strategic Management	2	O	8	5	125	36		89		30			70
Digital Forensics	2	O	8	5	125	36		89		50			50
IoT Application Development	2	O	8	5	125	48		77		100			0
Machine Learning	2	O	8	10	250	48		202		40			60
Data Mining and Visualisation Principles	2	O	8	10	250	48		202		100			0
DevOpsSec	2	O	8	5	123	36		89		100			0
Penetration Testing	2	O	8	10	250	48		202		50			50
Games Programming	2	O	8	10	250	48		202		100			0

Module													
Blockchain Application Development 1	2	O	8	5	125	48		77		50			50
Blockchain Application Development 2	2	O	8	10	250	48		202		100			0
Digital Transformation	2	O	8	10	250	48		202		100			0
Mixed Reality	2	O	8	5	125	48		77		100			0

Special Regulations (Up to 280 characters)

The Computing Project module is assessed over both semesters in the final year and accounts for 5 credits in semester 1 and 15 credits in semester 2.

As aforementioned, learners may specialise in one of 7 areas in their final year: Software Development; Gaming Programming; Blockchain; Artificial Intelligence/Machine Learning/Data Analytics; Internet of Things; Cybersecurity; and Digital Business Transformation. The choice of specialisation is conditioned by the electives taken in the 3rd year as specified in the Stage 3 Special regulations.

Those wishing to specialise in Software Development must take the following modules: IoT Fundamentals and Development, DevOpsSec and Secure Application Programming. The latter will be a semester 2 module for the Software Development specialization and a semester 1 module for Cybersecurity.

Those wishing to specialise in Cybersecurity must take the following modules: Secure Application Programming, Penetration Testing and Digital Forensics.

Those wishing to specialise in Internet of Things must take the following modules: IoT Fundamentals and Development, IoT Application Development and Data Mining and Visualisation.

Those wishing to specialise in Gaming Programming must take the following modules: Game Systems, Games Programming and Mixed Reality.

Those wishing to specialise in Artificial Intelligence/Machine Learning/Data Analytics must take the following modules: Artificial Intelligence, Data Application Development and Machine Learning.

Those wishing to specialise in Blockchain must take the following modules: Blockchain Foundations, Blockchain Application Development 1 and Blockchain Application Development 2.

Those wishing to specialise in Digital Business Transformation must take the following modules: Business Analysis, Strategic Management and Digital Transformation.

Part-time Programme Schedule

Name of Provider:	National College of Ireland
Programme Title	Bachelor of Science (Hons) in Computing
Award Title	Bachelor of Science (Hons) in Computing
Stage Exit Award Title[3]	N/A
Modes of Delivery (FT/PT):	Part Time, Online and Blended
Teaching and learning modalities	Direct contact via lectures and demonstrations and Blended e-learning

Award Class[4]	Award NFQ level	Award EQF Level	Stage (1, 2, 3, 4, …, or Award Stage):	Stage NFQ Level[2]	Stage EQF Level[2]	Stage Credit (ECTS)	Date Effective	ISCED Subject code
Major	8	6	1	6	5	60	Sept 2020	0613

Module Title (Up to 70 characters including spaces)	Semester no where applicable. (Semester 1 or Semester2)	Module Status	NFQ Level[1] where specified	Credit Number[5] Credit Units ECTS	Total Hours	Class(orequiv) Contact Hours	Directed e-learning	Hours of Independent Learning	Work-based learning effort	C.A. %	Supervised Project %	Proctored practical demonstration %	Proctored written exam
Computational Thinking	1	M	6	5	125	24		101		100			
Web Design & Development	1	M	6	10	250	72		178		100			
Discrete Mathematics	1	M	6	5	125	60		65		40			60
Operating Systems	1	M	6	5	125	36		89		50			50
Computer Architecture	2	M	6	5	125	36		89		50			50
Introduction to Programming	2	M	6	5	125	48		77		50		50	
Introduction to Data Modelling and Databases	2	M	6	10	250	48		202		40			60
Digital Multimedia	3	M	6	5	125	48		77		100			

Problem Solving & Programming Concepts	3	M	6	5	125	36		89		100		
The Computing Industry	3	M	6	5	125	36		89		100		
Special Regulations (Up to 280 characters)												

Name of Provider:	National College of Ireland
Programme Title	Bachelor of Science (Hons) in Computing
Award Title	Bachelor of Science (Hons) in Computing
Stage Exit Award Title[3]	Higher Certificate in Science in Computing
Modes of Delivery (FT/PT):	Part Time, Online and Blended
Teaching and learning modalities	Direct contact via lectures and demonstrations and Blended e-learning

Award Class[4]	Award NFQ level	Award EQF Level	Stage (1, 2, 3, 4, …, or Award Stage):	Stage NFQ Level[2]	Stage EQF Level[2]	Stage Credit (ECTS)	Date Effective	ISCED Subject code
Major	8	6	2	6	5	60	September 2020	0613

Module Title (Up to 70 characters including spaces)	Semester no where applicable. (Semester 1 or Semester2)	Module Status	NFQ Level[1] where specified	Credit Number[5] Credit Units ECTS	Total Hours	Class (or equiv) Contact Hours	Directed e-learning	Hours of Independent Learning	Work-based learning effort	C.A. %	Supervised Project %	Proctored practical demonstration %	Proctored written exam %
Data Communications and Networking	1	M	6	5	125	36		89		40			60
Object Oriented Programming	1	M	6	5	125	48		77		50		50	
Advanced Databases	1	M	6	10	250	48		202		40			60
Innovation and Business Entrepreneurship	2	M	6	5	125	36		89		100			
Team Project	2	M	6	5	125	48		77		100			
Software Engineering	2	M	6	5	125	36		89		100			
Software Quality and Testing	2	M	6	5	125	36		89		100			
Web Application Development	3	M	6	10	250	72		178		100			

| Data Structures and Algorithms | 3 | M | 6 | 10 | 250 | 72 | | 178 | | 50 | | 50 | |

Special Regulations (Up to 280 characters)

Name of Provider:		National College of Ireland					
Programme Title		Bachelor of Science (Hons) in Computing					
Award Title		Bachelor of Science (Hons) in Computing					
Stage Exit Award Title³		Bachelor of Science (Ord) in Computing					
Modes of Delivery (FT/PT):		Part Time, Online and Blended					
Teaching and learning modalities		Direct contact via lectures and demonstrations and Blended e-learning					

Award Class⁴	Award NFQ level	Award EQF Level	Stage (1, 2, 3, 4, …, or Award Stage):	Stage NFQ Level²	Stage EQF Level²	Stage Credit (ECTS)	Date Effective	ISCED Subject code
Major	8	6	3	7	6	60	2020	0613

Module Title (Up to 70 characters including spaces)	Semester no where applicable. (Semester 1 or Semester2)	Module Status	NFQ Level¹ where specified	Credit Units ECTS	Total Hours	Class (or equiv) Contact Hours	Directed e-learning	Hours of Independent Learning	Work-based learning effort	C.A. %	Supervised Project %	Proctored practical demonstration %	Proctored written exam %
Advanced Computer Networks	1	M	7	5	125	36		89		40			60
Introduction to Artificial Intelligence and Machine Learning	1	EA	7	5	125	36		89		50			50
Business and Artificial Intelligence	1	EA	7	5	125	36		89		50			50
Project Management	1	EB	7	10	250	48		202		50			50
Advanced Programming	1	EB	7	10	250	72		178		50			50
Security Fundamentals and Development	2	M	7	10	250	48		202		50			50
Work Placement	2 & 3	EC	7	30	750	0			750	100			0
Academic Internship	2 & 3	EC	7	30	750	168		582		100			0

Special Regulations (Up to 280 characters)

Students will have to choose an elective module from Electives A (EA).

Students will have to choose an elective module from Electives B (EB).

Students will have to do an elective module from Electives C (EC), either Work Placement or Academic Internship if they won't secure a work placement in the industry.

Learners may specialise in one of 6 areas in their final year: Software Development; Gaming Programming; Blockchain; Artificial Intelligence/Machine Learning/Data Analytics; Internet of Things; Cybersecurity; and Digital Business Transformation. The choice of the above electives will condition the specialisations that a student can follow afterwards in year 4. As such, the following rules apply:

For all the other specialisations except Digital Business Transformation, students must choose from EB, Advanced Programming module.

Students wishing to specialise in Artificial Intelligence/Machine Learning/Data Analytics or Internet of Things must choose from EA Introduction to Artificial Intelligence and Machine Learning module.

Name of Provider:	National College of Ireland
Programme Title	Bachelor of Science (Hons) in Computing
Award Title	Bachelor of Science (Hons) in Computing
Stage Exit Award Title	N/A
Modes of Delivery (FT/PT):	Part Time, Online and Blended
Teaching and learning modalities	Direct contact via lectures and demonstrations and Blended e-learning

Award Class	Award NFQ level	Award EQF Level	Stage(1, 2, 3, 4, …, or Award Stage):	Stage NFQ Level	Stage EQF Level	Stage Credit (ECTS)	Date Effective	ISCED Subject code
Major	8	6	Award	8	6	60	September 2020	0613

Module Title(Up to 70 characters including spaces)	Semester no where applicable.(Semester 1 or Semester2)	Module		Credit Number	Total Student Effort Module (hours)					Allocation Of Marks (from the module assessment strategy)			
		Status	NFQ Level where specified	Credit Units	Total Hours	Class (or equiv) Contact Hours	Directed e-learning	Hours of Independent Learning	Work-based learning effort	C.A. %	Supervised Project %	Proctored practical demonstration %	Proctored written exam %
Cloud Application Development	1	M	8	10	250	60		190		100			0
Business Analysis	1	O	8	10	250	48		202		100			0
Blockchain Foundations	1	O	8	10	250	48		202		40			60
Secure Application Programming	1	O	8	10	250	48		202		100			0
Game Systems	1	O	8	10	250	48		202		100			0

IoT Fundamentals and Development	1	O	8	10	250	48		202	40		60
Artificial Intelligence	1	O	8	10	250	48		202	40		60
Computing Project	1, 2 & 3	M	8	20	500	48		452		100	0
IT Governance, Security and Ethics	2	M	8	5	125	36		89	40		60
Data Application Development	2	O	8	5	125	48		77	100		0
Strategic Management	2	O	8	5	125	36		89	30		70
Digital Forensics	2	O	8	5	125	36		89	50		50
IoT Application Development	2	O	8	5	125	48		77	100		0
Machine Learning	2	O	8	10	250	48		202	40		60
Data Mining and Visualisation Principles	2	O	8	10	250	48		202	100		0
DevOpsSec	2	O	8	5	123	36		89	100		0
Penetration Testing	2	O	8	10	250	48		202	50		50
Games Programming	2	O	8	10	250	48		202	100		0

Module												
Blockchain Application Development 1	2	O	8	5	125	48		77		50			50
Blockchain Application Development 2	2	O	8	10	250	48		202		100			0
Digital Transformation	2	O	8	10	250	48		202		100			0
Mixed Reality	2	O	8	5	125	48		77		100			0

Special Regulations (Up to 280 characters)

The Computing Project module is assessed over both semesters in the final year and accounts for 5 credits in semester 1 and 15 credits in semester 2.

As aforementioned, learners may specialise in one of 7 areas in their final year: Software Development; Gaming Programming; Blockchain; Artificial Intelligence/Machine Learning/Data Analytics; Internet of Things; Cybersecurity; and Digital Business Transformation. The choice of specialisation is conditioned by the electives taken in the 3rd year as specified in the Stage 3 Special regulations.

Those wishing to specialise in Software Development must take the following modules: IoT Fundamentals and Development, DevOpsSec and Secure Application Programming. The latter will be a semester 2 module for the Software Development specialization and a semester 1 module for Cybersecurity.

Those wishing to specialise in Cybersecurity must take the following modules: Secure Application Programming, Penetration Testing and Digital Forensics.

Those wishing to specialise in Internet of Things must take the following modules: IoT Fundamentals and Development, IoT Application Development and Data Mining and Visualisation.

Those wishing to specialise in Gaming Programming must take the following modules: Game Systems, Games Programming and Mixed Reality.

Those wishing to specialise in Artificial Intelligence/Machine Learning/Data Analytics must take the following modules: Artificial Intelligence, Data Application Development and Machine Learning.

Those wishing to specialise in Blockchain must take the following modules: Blockchain Foundations, Blockchain Application Development 1 and Blockchain Application Development 2.

Those wishing to specialise in Digital Business Transformation must take the following modules: Business Analysis, Strategic Management and Digital Transformation.