Programme Validation Report

Bachelor of Science (Honours) in Data Science and Artificial Intelligence

Version of Report	*Author*	*Date*
1.0	Gráinne Hurley	10/11/2023
		Click or tap to enter a date.
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Approval	*Date*
Programme Proposal approved by Faculty Board	04/05/2023
Programme Proposal approved by University Programmes Board	16/05/2023
Programme approved by Faculty Board	28/11/2023
Programme approved by University Programmes Board	Click or tap to enter a date.

Section A - Programme Details

Title	Bachelor of Science (Honours) in Data Science and Artificial Intelligence
NFQ Level	8
ECTS Credits	240
Mode of delivery	Part-time ☐ Full-time ✓
Duration	Part-time: Full-time:
Mode of provision	Face-to-Face ✓ Blended ☐ Online ☐
Classification of award	
Discipline Programmes Board	Computer Science
Faculty Board	Faculty of Computing
Schools involved in delivery	School of Computer Science
Delivery location	City Campus
Collaborative Partner (where applicable)	
Date of Commencement	September 2024

Section B - Awards

Award Title	Bachelor of Science (Honours)
NFQ Level	8
Award Class	Major
ECTS Credits	240
Classification of award	First Class Honours 70% plus Second Class Honours, First Division (2.1) 60-69% Second Class Honours, Second Division (2.2) 50-59% Pass 40-49%
Award (1) Title	Bachelor of Science (Ordinary)
Exit/Embedded	Exit ☒ Embedded ☐
NFQ Level	7
Award Class	Major
ECTS Credits	180
Classification of award	Distinction 70% plus Merit, Grade One 60-69% Merit, Grade Two 50-59% Pass 40-49
Exit Award (2)	Higher Certificate
Exit/Embedded	Exit ☒ Embedded ☐
NFQ Level	6
Award Class	Major
ECTS Credits	120
Classification of award	Distinction 70% plus Merit, Grade One 60-69% Merit, Grade Two 50-59% Pass 40-49

Section C - Programme Derogations (if required)

Derogations from Assessment Regulations/Marks and Standards already approved by University Programmes Board	
Date of University Programmes Board Approval	Click or tap to enter a date.

Section D Validation Process

Please tick the process that was followed:

Validation Panel ☐	AQEC Meeting ☐	AQEC Sub-Group ☐
Date:	Date:	Date:

Panel Members

Name	Role	Affiliation
Dr Ciarán O'Leary	Chair	Head of Learning Development
Mr Barry Chadwick	External Panel Member	DXC Technology
Ms Róisín Faherty	Internal Panel Member	Head of Information Systems, School of Enterprise Computing and Digital Transformation
Dr Stephen Sheridan	Internal Panel Member	Lecturer, School of Informatics and Cybersecurity
Dr Gráinne Hurley	Internal Panel Member	Academic Quality Advisor, Quality Framework, Academic Affairs

Section E - Programme Evaluation

Governance & Management		
Is the programme designed in accordance with the University's Strategic Plan, Educational Model and Quality Framework?	Yes ✓	No ☐

Comment:
This new programme aligns with the three pillars (People, Planet and Partnership) of the university's *Strategic Intent 2030*, as reflected in the School's commitment to fostering relationships with industry and various external stakeholders and taking a sustainable, technological, innovative and ethical approach to the formulation of the programme, as evidenced by the provision of flexible learning pathways; the inclusion of real-life datasets/case studies and modules (e.g. Sustainable Data Science and AI, and Digital Ethics), work placements, Erasmus opportunities and capstone projects, all of which demonstrate the holistic approach taken.

The programme also supports the University Education Model's intention to provide 'a dynamic new model of education producing the most sought after digitally literate graduates'. The seven fundamentals of the UEM are embedded in the programme design, notably;

- the streamlining of existing modules, where appropriate, and to avoid duplication of existing modules;
- the face-to-face delivery in order to bolster student engagement and an enhanced experience;
- the broadening of access opportunities (advanced entry and bridging from FETAC) and following best practices on accessibility, arising from the School's 'Include' project;
- the flexibility of learning pathways (via exit points at Levels 6,7 and 8);
- the opportunity for students to choose industry or taught pathways at Stage 3 and 4 and option modules at Stage 4 of the programme.
- the learner experience is addressed through group projects, real-world engagement, authentic assessments and case-studies;
- the aim to produce graduates who are prepared for the demands of working in the 'real world';
- the sustainable Data Science and AI module holds potential for wider university usage.

In addition, this new programme embraces the principles underpinning the university's Academic Quality Framework, including taking an inclusive and student-centred approach and being innovative, agile and responsive to the needs of external stakeholders.

Will the proposed strategies for programme management and quality assurance ensure that the programme is well managed and continuously enhanced and is in accordance with the University's Quality Framework?	Yes ✓	No ☐
Comment: The Quality Framework is designed to support all of the university's academic programmes and provide robust processes to assure the quality of its awards and nurture the essential graduate attributes. TU Dublin has developed Quality Assurance and Enhancement Processes that supports staff to continuously improve the TU Dublin Student Experience and enhance the University's Quality Culture. This processes are underpinned by the University's Academic Quality Framework Principles		

Awards Standards		
Are the programme aims and learning outcomes clearly written using appropriate terminology? (See TU Dublin Guidelines)	Yes ✓	No ☐
Comment: There needs to be consistency across the Programme & Module Catalogue (Akari) and the Student Handbook.		
Are the programme aims and learning outcomes aligned to the proposed level of the award on the NFQ in accordance with applicable Award Standards?	Yes ✓	No ☐
Comment: The School has aligned Programme Learning Outcomes to the NFQ award descriptors and mapped Module Learning Outcomes to NFQ Award descriptor fields.		
Will the curricula, teaching, learning and assessment methods enable students to reach the appropriate standard to qualify for the award(s)?	Yes ✓	No ☐
Comment: The School also offers a wide range of Learning, Teaching and Assessment approaches and activities including the Implementation of the First Year Framework for Success and consideration of EDI matters. Students can also make use of the Maths Learning Centre, the Computing Learning Centre and the Academic Writing and Learning Centre. The Faculty launched the Computing Learning Centre in June 2023 as an initiative to offer support to students who are finding some aspect of their Computing studies challenging and feel that they need some extra support. The Centre primarily offers one-to-one online tutoring sessions, where a student, in particular students at the early stages of their programme, is tutored by another student at a later stage of their studies. Students from year 2 onwards who have strong programming skills can apply to be a computing tutor offering 1:1 assistance to students via the Computing Learning Centre and are paid for their time. The Academic Writing & Learning Centre (AWLC) at TU Dublin provides a free support to all students (undergraduate and postgraduate).		
Was the programme development appropriately informed by internal and external stakeholder input (including industry/practice, professional/regulatory bodies, and community organisations)?	Yes ✓	No ☐
Comment: The School's impressive and meaningful engagement with both internal and external stakeholders including staff, students, industry partners and further education institutions, informed the design of this programme. With regard to internal stakeholders, a programme design team from the School of Computer Science, supplemented by input from the other three Schools of the Faculty, was established in April 2023 and a series of workshops were then conducted until September 2023. Letters of support from external industry stakeholders highlight the strong demand for such an innovative and timely programme. Irish-grown SME, DOCOsoft, which has been collaborating		

with TU Dublin for over 10 years, specified the need for 'graduates with leading-edge technology, software and data skills to develop and expand our technical team. We also value graduates who are pragmatic, and who have worked on and can get to grips with real-world problems.' SAP, which has established a strong collaborative relationship with TU Dublin School of Computer Science, was 'delighted to see the development of the new undergraduate Data Science and Artificial Intelligence programme. Education in the tech sector needs to continuously innovate to meet the rapidly changing requirements in the sector and this programme is a strong example of this.' Enterprise Ireland noted the 'talent shortage at the moment for all our software client companies, and there will be a ready market for graduates from this course.' In addition, Dundrum FETAC, which has an ongoing arrangement for access pathways to TU Dublin undergraduate programmes, championed the programme: 'We support the development of a new degree programme in the area of Data Science and Artificial Intelligence in TU Dublin. It further expands the progression route for our computing students and will offer our students a pathway to a high value career path, in a sector that is rapidly growing in demand. Demand for the programme will be both from Level 5 for first year, and Level 6 for second year advanced entry'. Common themes emanating from the support letters included the need for graduates in the field of data science and artificial intelligence who are grounded in 'real-life' scenarios and also the necessity for innovation and responsiveness in a rapidly changing environment.		
Has the programme been benchmarked against similar programmes nationally and internationally?	Yes ✓	No ☐
Comment: The School conducted research on other similar programmes available nationally and internationally to examine programme focus, naming, curricula, approach and general benchmarking.		
Did the programme development take account of relevant external discipline benchmarks and Professional Statutory and Regulatory Body requirements?	Yes ☐	No ☐
Comment: N/A		

Programme Design		
Is the programme design informed by current development in the discipline and associated subject areas, having taken into consideration current trends, stakeholder feedback and market analysis?	Yes ✓	No ☐
Comment: The creation of this programme was driven by the growing demand for a 'from the ground up' programme and employable graduates in the field of Data Science and Artificial Intelligence which emerged from market research, competitive analysis and internal and external stakeholder discussions. The Government's Digital Ireland Framework seeks to have 75% of business using AI by 2030. As noted in the Government report "AI - Here for Good, the National Artificial Intelligence Strategy for Ireland2 "Ireland is well-placed to be at the forefront of that change. As a country we have invested heavily in developing IT talent, entrepreneurship and connectivity. We're also home to many of the world's largest ICT businesses". The School invited input and feedback to the programme concept and design from its top recruiting companies and other interested stakeholders including a College of Further Education representative, Enterprise Ireland, Irish Computer Society. The School also conducted a study of national and international related programmes.		
Will there be opportunities for students to input into curriculum design decisions in the future?	Yes ✓	No ☐
Comment:		

The TU Dublin Quality Assurance & Enhancement policies and procedures for all TU Dublin programmes include both a student feedback mechanism for individual modules and a requirement for student representation at all boards and committees governing the programme. Supports are also made available to both staff and students regarding ways in which the Student Voice can be used at all stages of programme design. https://www.tudublin.ie/explore/about-the-university/academic-affairs/our-student-voice/.

The programme team believe that assessment and its associated feedback is an essential part of the student learning experience. Assessment and feedback help students to take control of their learning and become self-regulated learners. In the programme, numerous feedback strategies are designed for both group and individual work so the feedback should be provided timely, with clarity and consistency with appropriate guidelines for future action, for example:
• Written feedback: VLE enabled feedback in the form of written comments and notes on students' work.
• Oral feedback: usually given for presentation or related assessment.
• In-class feedback: common feedback to the entire class.
• Low-stakes assessment gives the opportunity to provide in-person feedback.
• Use of grading rubric, as provided through the VLE.

The panel recommended that feedback from students on their experience on the programme is actively sought on a regular basis to help inform the development and marketing of the programme.

Is there a mechanism to ensure the input of external stakeholders in the ongoing development of the programme?	Yes ✓	No ☐

Comment:
The School has forged strong and successful university-industry relationships and regularly consults with various external stakeholders and is actively responsive to the desired skills of future graduates. The School emphasised that regular engagement with external stakeholders for their input will play a vital role in the ongoing design, evolution and success of this programme. The panel recommended that there should be regular consultation with external stakeholders to keep existing modules current and to formulate new ones if needed, in order to be responsive to a rapidly changing sector. In particular, the panel noted that the final year of the programme will not be delivered until 2027-28. The panel also recommended early engagement with Industry in order to flag and secure work placement for students in advance of Year 3.

Is the programme curriculum well-structured with a logical progression of learning and development across the modules and stages?	Yes ✓	No ☐

Comment:
However, the School needs to clarify the semesters in which all modules are intended to be offered, as this affects the sequencing of the student pathway. Clarification is also required on the learning hours for all modules (See Condition 1).

Are there appropriate opportunities for students to undertake work-based learning, through work placements or work-based projects or assignments?	Yes ✓	No ☐
Comment: In Year 3, Semester 2, students will have the option to avail of a work placement. The panel recommended that it be made explicit in the programme documentation that work placements will not necessarily be within the area of data science and artificial intelligence.		
If applicable, have the relevant Blended Learning Checklists (i.e. Learning Experience Context & Programme Context) been fully completed and submitted to the Panel?	Yes ☐	No ☐
Comment: N/A		
Is the required programme and module information provided in the correct format?	Yes ✓	No ☐
Comment: The format is correct but there are some corrections and edits required in the programme documentation.		

Learning, Teaching & Assessment		
Is there an effective student-centred teaching and learning strategy that aligns with the University's strategies and Education Model?	Yes ✓	No ☐
Comment: This alignment is evidenced by the flexible learning pathways (Level 6,7,8) offered by the programme. A major thrust of the programme is for students to apply learning to real-world datasets and case studies. Work placement, Erasmus and capstone projects for Level 7 and 8 are also an important component to the holistic approach of this programme. The programme also supports the University Education Model's intention to provide 'a dynamic new model of education producing the most sought after digitally literate graduates' and the seven fundamentals of the UEM were considered and are reflected in the programme design.		
Does the assessment strategy provide an appropriate mix of assessment types that will enable students to demonstrate that they have met the module and programme learning outcomes?	Yes ✓	No ☐
Comment: The panel recommended that the School should keep its assessment strategies, including the need for and weighting of examinations, under ongoing consideration. Also, the panel recommended that the School should identify how the Software Engineering module relates to the Data Science and Artificial Intelligence disciplines and reflect this in the module descriptor. The School may also consider whether this module is needed on the programme or whether a module more focussed on Data Science and Artificial Intelligence would be a better fit at this stage of the programme.		

Do the learning outcomes and assessment strategy ensure that academic integrity can be maintained and attempted breaches of academic integrity are minimised/easily detected?	Yes ✓	No ☐
Comment: Specific assessment strategies include: • Ensuring that students are informed about academic integrity and clarity on the rules of using LLMs for CA work; • Providing clear rubrics; • Getting stage level submissions for assignments, as opposed to single large final submissions; • Use of live demos for assessing assignments, including live question and answers (e.g. how to change code); • Grading to reflect penalties for irrelevant or superfluous content in a submission; • Allowing for gathering of primary data that cannot be produced from an automated tool.		
Is there a comprehensive mapping of assessment methods and module learning outcomes and between module learning outcomes and programme learning outcomes?	Yes ☐	No ✓
Comment: The assessment strategies for all modules need to be finalised and appropriately mapped to the learning outcomes (See Condition 2). The module learning outcomes for new modules should be revisited to ensure that they are appropriate in number, noting that the guideline is 5-7 per module. The wording of module learning outcomes needs to be appropriate for their level and should be written according to the guidance available through Learning, Teaching and Assessment. For modules that are already in place on other programmes, the panel accepts that a detailed review and revision of those modules will be undertaken as part of the upcoming programme reviews (See Condition 3).		
Are there opportunities in all modules to provide students with timely and constructive feedback on their learning and development?	Yes ✓	No ☐
Comment: The programme team believe that assessment and its associated feedback is an essential part of the student learning experience. Assessment and feedback help students to take control of their learning and become self-regulated learners. In the programme, numerous feedback strategies are designed for both group and individual work so the feedback should be provided timely, with clarity and consistency with appropriate guidelines for future action. For example: • Written feedback: VLE enabled feedback in the form of written comments and notes on students' work. • Oral feedback: usually given for presentation or related assessment. • In-class feedback: common feedback to the entire class. • Low-stakes assessment gives the opportunity to provide in-person feedback. • Use of grading rubric, as provided through the VLE. In designing this programme, consideration was given to the student workload, as evidenced in the 3rd year project preparation and design stage, which allows for early formal feedback.		
Do the teaching and assessment methods consider the diversity of the student cohort?	Yes ✓	No ☐
Comment: The module mode of delivery will be face-to-face to offer an engaging student experience, fitting to a school leaver CAO base. To ensure that students understand the assignments they are asked to do, the School has produced an Assignment Specification template. Students are encouraged to meet deadlines, as they would in industry. Rubrics can be used to provide a framework that clearly articulates expectations by providing for different levels of quality accompanied by a list of key		

criteria identifying what counts in an activity. In addition to showing expectations, rubrics show students clearly where they can gain points and how they have lost them. The panel

Student Supports & Learning Environment		
Are there sufficient and appropriate resources (e.g. human, financial and physical) to support the proposed programme aims and objectives, to deliver the programme as specified?	Yes ✓	No ☐
Comment:		
Are there sufficient staff that are appropriately qualified and capable to support the programme delivery, from both context and pedagogy perspectives?	Yes ✓	No ☐
Comment: The School has highly qualified staff with deep research and industry-based experience in the areas of Data Science and Artificial Intelligence. The School of Mathematics and Statistics will provide mathematics delivery skills.		
Are there appropriate arrangements in place to support the student experience and to monitor student performance?	Yes ✓	No ☐
Comment: Each year of the programme is assigned a year tutor. This role is chiefly a pastoral role, acting as an approachable point of contact for students in the year to discuss any issues or practical problems relating to the programme that student(s) need support on. In addition, TU Dublin's Pastoral Care and Chaplaincy provides an on-site safe and confidential setting where students can get support and advice in a safe, friendly environment. The TU Dublin peer mentoring programme delivers training to 2nd year peer mentor volunteers. The Role of the TU Dublin peer mentor is to give informal guidance and support to first year students; provide them with practical help and knowledge and ease their anxieties in the transition to third level		
Are the access, transfer and progression arrangements clearly defined and appropriate, and aligned to TU Dublin policy/strategy in this regard?	Yes ✓	No ☐
Comment:		
Do the student supports and learning environment cater for equality, diversity and inclusivity of students?	Yes ✓	No ☐
Comment: • TU Dublin is committed to actively fostering an inclusive, diverse, safe and respectful institutional culture. This commitment is embedded in TU Dublin Strategic Intent 2030, which is informed by Sustainable Development Goal 4 - 'ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.' • The School organises a 'meet and greet' event for female students during the first few weeks of term, and tours are arranged to familiarize students with the campus and surrounding areas and to give them a feeling of belonging. • The school has a strong history of supportive approaches to gender support and equality including highest female representation in Ireland on a computer science programme (TU858) in 2021 @ 42% , the founding of the Ingenic network (Irish Network for Gender Equality in Computing) which enables computing staff across the universities of Ireland to share best practice and collaborate, and the hosting of the ESTEEM initiative (which focus on bringing industry role models and female students together in a mentoring		

environment). The School continues to promote these initiatives and will be working towards an Athena Swan bronze award as part of the Faculty Athena Swan strategy. • An annual engagement survey is used to inform the School of good practice and anything that could be improved. The School has a strong ethos of engaging students through interactive lectures, low-stakes continuous assessment and team work		
Is the relevant programme information clearly communicated to the students to ensure they are informed, guided and cared for?	Yes ✓	No ☐
Comment: The Student Handbook contains all of the necessary information.		
Has the Checklist for First Year Student Success (where applicable) been fully completed and submitted to the Panel?	Yes ✓	No ☐
Comment: The School offers a wide range of Learning, Teaching and Assessment approaches and activities including the Implementation of the First Year Framework for Success and consideration of EDI matters. Students can also make use of the Maths Learning Centre, the Computing Learning Centre and the Academic Writing and Learning Centre.		

Collaborative Provision (if applicable)		
Are the roles and responsibilities of each partner clearly defined?	Yes ☐	No ☐
Comment: N/A		
In the case of Joint or Multiple Awards, has due diligence on capacity of partner institution meeting the QA-QE requirements for the programme been undertaken?	Yes ☐	No ☐
Comment: N/A		

Section F - Overall Recommendation

1.	**Recommend approval of programme as submitted, without amendment**	☐
2.	**Recommend approval of programme, subject to minor amendments/editorial changes to be completed as soon as possible and with recommendations for consideration.** **Note:** recommendations are attached where it is considered that the programme would benefit from particular changes, or from a review of certain aspects of the programme over a period of time, with changes made if required. While recommendations are advisory in nature, there is an expectation that all recommendations are responded to appropriately and acted upon as appropriate.	☐
3.	**Recommend approval of programme subject to the fulfilment of conditions. Recommendations for consideration may also be attached.** **Note:** conditions are attached where it is agreed that changes must be made to the programme/programme documentation prior to the commencement of the programme. Conditions must be set where issues are identified that relate directly to academic standards or to University regulations or procedures. It should be clear what is required in order to meet the conditions.	☒

	A new programme cannot go forward to Faculty Board for consideration/approval unless a response to the Validation Report is submitted with revised programme documentation and the Academic Quality Enhancement Committee is satisfied that all conditions are met.	
4.	**Do not recommend approval of programme.**	☐

Areas for commendation	
1.	This programme fulfils a clear need that is well understood by the school. There is likely to be a substantial interest among employers in recruiting graduates from this programme.
2.	The panel commends the School's engagement with the sector as evidenced by the letters of support provided.
3.	The panel notes the strong research culture in the school in Data Science, Artificial Intelligence, Machine Learning, and other related areas that has directly informed the design of the programme.
4.	The panel was impressed by the supports that are in place in the school to assist students in progressing from year 1 to year 2, and onwards throughout the programme.
5.	The panel notes the efforts made by the school to implement the various aspects of the University Education Model, and also notes the capacity of the programme to adapt in future years to support the implementation of electives from other schools once the required systems are in place in the University.
6.	The panel welcomes the innovative approach to the redesign of the Final Year Project, addressing a clearly understood issue regarding student workload in final year.
7.	The panel welcomes the School's consideration of the development of a 'minor' in Data Science and Artificial Intelligence using modules from this programme.

Conditions of Approval	
1.	The School needs to clarify the semesters in which all modules are intended to be offered, as this affects the sequencing of the student pathway. Clarification is also required on the learning hours for all modules.
	Response: Semesters: The contact hours and module semester have been reviewed and where relevant, updated, for all modules in both Akari and in the programme document. Specifically: For every module on the programme, we have double-checked the correct semester – allowing for the optimal student pathway. The semester per module has then been checked in Akari and programme document so that both are correct and matching. Module semester: Year 1: Introduction to Computational Thinking confirmed as Semester 1 (year 1) and Maths in as Semester 2. Year 2: Maths for DS confirmed as Semester 1 and Statistics as Semester 2.

	The learning hours on all modules have been verified to ensure that the contact hours are appearing correctly in Akari, and that the breakdown of the contact hours is correct in the programme document. Changes applied as appropriate. Updated Programme and module downloads from Akari, and updated TU850 Programme Documentation have been included with the validation response.
2.	The assessment strategies for all modules need to be finalised and appropriately mapped to the learning outcomes.
	Response: Each module has been checked to ensure that assessment strategies are completed and that for each module, learning outcomes are selectively mapped to learning outcomes. This involved working through each module to verify that all assessments have completed fields in Akari, and that all learning outcomes are mapped to at least one assessment, but without mapping all learning outcomes to all assessments. Modules across all years 1 – 4 were verified and adjusted in Akari. Please note the following for a set of exisitng modules: There are a number of existing modules taught on other programmes that are linked to the TU850 programme, that are to be reviewed and updated by their existing programme (TU856/7/8) during Semester 2 of academic year 2022/23 - prior to the commencement of TU850. This applies to Web Development 1 (year 1) and Web Development 2 (Year 2), Year 3 Semester 2 elective modules for taught pathway, and the Year 4 Semester 2 elective module for the minor option.
3.	The module learning outcomes for new modules should be revisited to ensure that they are appropriate in number, noting that the guideline is 5-7 per module. The wording of module learning outcomes needs to be appropriate for their level and should be written according to the guidance available through Learning, Teaching and Assessment. For modules that are already in place on other programmes, the panel accepts that a detailed review and revision of those modules, including the updating of their indicative syllabus, will be undertaken as part of the upcoming programme reviews - the timeline for which should be provided to the panel.
	Response: Modules across all years has been checked to ensure that 1) The recommended number of learning outcomes from the validation panel has been implemented (using 5 – 7 as the overall panel guideline). This results in changes to 15 module definitions in Akari to reduce the number of learning outcomes. 2) Assessment strategies have been edited where appropriate such that each component of the continuous assessment is separated out to an individual assessment entry. In addition, the assessment components have been verified and

	updated where appropriate with selective learning outcomes. 3) Learning outcome wording per module have been checked to ensure that they match the guidance of Learning, Teaching and Assessment. This mainly impacted Years 3 and 4 modules. There are a number of existing modules linked to other current programmes that are linked to the TU850 programme design, that are to be reviewed and updated by their existing programme links (TU856/7/8) during Semester 2 of academic year 2022/23 - prior to the commencement of TU850. This applies as follows: Web Development 1 (year 1) and Web Development 2 (Year 2), Year 3 Semester 2 elective modules for taught pathway, and the Year 4 Semester 2 elective module for the minor option. These are the existing module descriptors in Akari as used by at least one of our existing undergraduate programmes. They will be reviewed as part of the current programme using them (TU856) in Semester 2 2024.
4.	Reading lists are to be provided for all modules. Where reading lists are out of date, these should be updated.
	Response: Thank you for this recommendation. We checked all modules to confirm that sources included recent sources (published in the last three years), with lecturers adding more recent sources where there was a gap. Where a module included references that were old (greater than 10 years old), we verified whether they were classical references in the subject area that merit retention versus out-of-date references that were removed. We will continuously review all our modules at regular intervals.

Recommendations	
1.	The School explained their strategy for developing a clear identity for this and the other three CAO programmes in the School. The panel supports this strategy and recommends that feedback from students on their experience on the programme is actively sought on a regular basis to help inform the development and marketing of the programme.
	Response: We strongly agree with this recommendation and will ensure that students on the programme are a core part of the future development and marketing of the programme. In addition, in advance of the programme's first year, we will be working on student feedback (in the form of CAO mentions from February 24 and Open Day feedback Dec 23 onwards) to inform the crucial early-stage indicators to fine tune our marketing strategy.
2.	Noting that the final year of the programme will not be delivered until 2027-28 and that the field of Data Science and Artificial Intelligence is rapidly developing and evolving, the panel recommends that the School regularly reviews all modules on the programme, in consultation with external stakeholders, in order to ensure that they are current and fit for purpose and to update them if necessary.
	Response: This recommendation is fully supported and will form a core part of the programme team activity when the programme starts.
3.	The panel notes the School's strong track record of providing work placements for student at third year on their CAO programmes. The panel recommends that the School continues to expand the number of employers involved in placement, and that students are kept fully informed of the objectives of placement, in order to manage their expectations in cases where placements directly related to Data Science and Artificial Intelligence are not available to them.
	Response: This recommendation is very relevant to the programme. The work placement module offers other skills, beyond domain skills of data science and artificial intelligence. Nevertheless, we agree that it is important that students' expectations are set and this will be included in the work placement preparation sessions (non-credited) that will take place during Year 2. We have updated the work placement description in the programme document to state that work placements are not guaranteed to be in the Data Science and AI domain. We will continue to expand the number of companies we partner with for work placements.
4.	Given the importance of Mathematics and Statistics for this programme, the School of Computer Science and the School of Mathematics and Statistics should keep under review the entry requirements relating to Mathematics, as well as the contact hours for Mathematics and Statistics modules and the support available to students in Mathematics and Statistics.
	Response: Maths is an important sub-domain in this programme and it is important that students succeed. The entry requirement for Maths involved extensive discussion within the

	programme team. But we agree wholeheartedly with the panel that it is very important that the student cohort succeed in the Maths aspects of the programme. We will monitor the Maths modules performance during the first run of the programme for each year, taking action early if there is any evidence that students are struggling with those modules. This includes the option to increase the availability of tutorials, in addition to deeper changes around teaching methods and/or entry requirements level. Throughout the programme we will continuously promote the already existing and well-established Maths support services to our students.
5.	The School should consider how the visibility of ethics can be even further enhanced on modules from first to fourth year, including its application in the final year project.
	Response: We agree with the panel that ethics must permeate right through the programme and this topic was discussed during the programme design. Whilst ethics has a dedicated module and appears on multiple module syllabi, we agree that it should be mentioned explicitly within the scope of the FYP modules. We have added a specific planning step (within the guidelines) to mention ethics consideration within the proposal, and also adjusted the module syllabus for the FYP Planning module to include it.
6.	The School should reconsider the naming of the Final Year Project modules and the Application Domains module.
	Response: These modules have been renamed to be clearer, defined as: Final year project planning Final year project implementation AI for Real World Domains
7.	The School should identify whether Object Oriented concepts are required for this programme and if so, make clear within the documentation where these concepts they are dealt with in the programme.
	Response: Thank you for this recommendation. Object oriented concepts are an important programming paradigm and are relevant for this programme. Programming paradigms are part of the learning outcomes for the Programming With Data year 2. However, Object Oriented programming has been now explicitly mentioned in the learning outcomes and syllabus of the Programming with Data module in Year 2 of the programme in support of this recommendation.

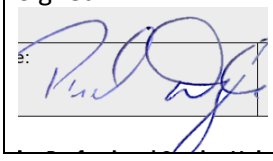
8.	The School should identify how the Software Engineering module relates to the Data Science and Artificial Intelligence disciplines and reflect this in the module descriptor. The School may also give consideration to whether this module is needed on the programme and whether a module more focussed on Data Science and Artificial Intelligence would be a better fit at this stage of the programme.
	Response: As per the ACM curriculum guidelines on Data Science and AI, Data scientists/AI specialists may be expected to build (or contribute to building) deployable systems either for the purposes of data science/AI or to put into practice the results of data science/AI. To this end, they should be familiar with fundamental software development principles and practices. We cover the fundamentals of software engineering in a single module to enable application of software engineering as part of the range of Data Science and AI skills required.
9.	The School should consider the need for a threshold on the Programming examination in first year, given that this is the only point in the programme where such a threshold is in place. While the panel understands the background to this programme rule, it is felt that its function may no longer be needed, given the evolution of the school's programmes since it was introduced.
	Response: We will continue to review this in line with the panel recommendation. This threshold was introduced in the three existing full time School undergraduate programmes as a way to ensure that students have grasped the theoretical underpinnings of programming, and not just the practical, shallower concepts of putting working code together. In the years prior to introducing the threshold, we had observed a pattern where students who succeeded well in the continuous assessment part were performing badly in the written exam or even not attempting the written exam at all – and were subsequently found to fail in later years. An alternative solution would be to increase the weighting of the exam, which we feel is inappropriate for the nature of the module.
10.	The School should keep its assessment strategies, including the need for and weighting of examinations, under ongoing consideration.
	Response: Thank you for this recommendation. Suitable assessment strategies are crucial to student learning. We will monitor and review our assessment strategies, including weightings, on an ongoing basis, and their fitness for purpose will be evaluated regularly as part of the regular programme team reviews, as per TU Dublin's QA policy.
11.	The School should give consideration to making use of common data sets across modules, and including the sources for these, where appropriate in module reading lists and/or student handbooks. The School should provide the panel with a sample assessment brief for one of the ten credit modules, using the Assessment Specification template referred to in the documentation. This would be helpful in illustrating how students are expected to apply learning to real-world datasets and case studies.
	Response:

	Thank you for this recommendation. The use of common datasets across modules was discussed at our programme design stage, as a good learning strategy for students. Indeed, this practice is used informally already in several of our existing undergraduate modules. To ensure that modules can exist standalone as per the University Education Model, we avoid prescribing shared assignment or datasets across module descriptors. However, the panel's recommendation for the student handbook is an excellent way to suggest common datasets, so that students are also aware of the expectation of sharing datasets across modules, and we will add this to our handbook. We have also added additional dataset links to reading lists. An illustrative assignment specification has been included for Programming With Data Year 2, showing how real-life datasets would be used for the creation of a data querying tool. In practice, the Databases 1 module could use the same datasets for learning about structured data and SQL.

Other matters to be brought to the attention of Faculty Board and/or University Programmes Board

Section G - Approvals

Validation Report	
This report has been agreed by the Validation Panel and is signed on their behalf by the chairperson.	
Chairperson: Dr Ciarán O'Leary	
Signed: 	Date: 28/11/2023

School Response	
The response to the conditions and recommendations has been agreed by the School and is signed by the Head of School.	
Head of School: Dr Paul Doyle	
Signed: 	Date: 22/11/2023

Faculty Board	
The report and response have been approved by Faculty Board	
~~Vice-Dean for Education~~. Dean	

Signed: 	Date: 29/11/2023

University Programmes Board (Programmes of 30 ECTS or great)	
The report and response have been approved by the University Programmes Board	
Registrar:	
Signed:	Date: Click or tap to enter a date.