Digital4Business Course Curriculum Design

WP2.2

30/10/23 | CARMEL SOMERS & MICHAEL BRADFORD

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Document Control Information

Project	Digital4Business (EC Grant Agreement 101084013)
Document Title	Digital4Business Course Curriculum Design
Work Package Number	02
Deliverable Number	D2.2
Lead Beneficiary	DTSL
Project Coordinator:	National College of Ireland
Dissemination Level	**Sensitive** — limited under the conditions of the Grant Agreement
Authors	Carmel Somers, Digital Technology Skills Limited (DTSL) Ireland Michael Bedford, National College of Ireland
Reviewers	Professor Fredrik Heintz, Linköping University (LiU) Sweden Roberto Henriques, NOVA IMS
Description	Course curriculum design defining learning objectives, target audience, course modules and transdisciplinary courses. [Electronic, EN + national languages of partners involved]
Status	**Draft**
Delivery Date	31.10.2023
Due date	31.10.2023
Approval Date:	DD.MM.YYY

Revision History			
Version	**Date**	**Modified by**	**Comments**
1.0	25/10/2023	Matteo Martignoni (Akkodis)	(DT and D4B Module Linkages and associated graphics)
1.0	25/10/2023	Matteo Adamoli (University of Bologne)	(DT and D4B Module Linkages)
1.0	25/10/2023	Michael Bradford (NCI) Carmel Somers (DTSL)	Initial Draft
1.1	18/09/2023	Carmel Somers	Updates on a review by Fredrik Heintz (Linköping University)
1.2	03/10/2023	Carmel Somers	Updates based on Academic Partner's review of PLOs, MLOs and Module Descriptions (Nedra Mellouli (Pasis8), Adriana Chis (NCI) & Maria Christina Garbui (Unibo))

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Introduction

D4B Project Overview

Introducing Digital4Business, an innovative European master's program with a strong emphasis on the practical application of advanced digital skills in European SMEs and companies. Our mission is to empower businesses to achieve lasting competitiveness and growth through digital transformation and innovation.

The DIGITAL4Business European Masters Programme is dedicated to crafting a cutting-edge, sustainable educational experience in Advanced Digital Skills. It plays a pivotal role in advancing the objectives of the DIGITAL Europe Programme by expediting the training of a large number of graduates within a dynamic pan-European stakeholder network. This network involves Higher Education Institutions, Research Centres, Employment Services, and Industry experts collaborating to design, promote, deliver, and enhance this innovative Master's Program. This program is uniquely market-driven, tailored to address the current and future upskilling requirements of SMEs and Companies.

Our Master's Course will place a strong focus on the practical application of advanced Digital Skills in the business landscape, covering essential areas such as AI, cybersecurity, and Cloud technologies. Competencies in these areas are vital for ensuring the ongoing competitiveness and growth of European businesses. Our programme integrate academic and industry content to ensure that graduates are not only well-versed in theory but also job-ready with digital skills that are aimed at a successful career path. Graduates will receive academic accreditation and valuable industry certifications from leading IT sector partners. The DIGITAL4Business master's emphasises the importance of industry-recognised certifications as a crucial component of the learning journey.

D4B Consortium

The DIGITAL4Business consortium is a collaboration of 15 partners representing 7 EU countries. This diverse group includes Higher Education Institutes, Research Centres, Training Providers, and Industry partners. The project officially began in December 2022, with our goal being to introduce part-time and full-time MSc (Master of Science) programs in 2024.

D4B Course Curriculum & Design

1. **Industry Advisory Board and Private Sector Engagement:** We have established an Industry Advisory Board to actively participate in the design phase of the program. This ensures that

the program is tailored to meet the evolving needs of the market. We will also engage private companies in the delivery of select courses, fostering real-world relevance.

2. **Curriculum Objectives:** We have defined the core Curriculum Objectives, which are:

   - Teaching skills directly applicable in the marketplace.

   - Providing an international learning experience.

   - Emphasising innovation.

   - Offering high-quality teaching and learning resources.

   - Employing a flexible and practical, challenge-based approach.

3. **Online Master's Program Structure:** We are meticulously designing both a part-time and full-time online master's program that will be delivered by six esteemed Higher Education Institutions. This includes module locations, the transferability of learning objectives across countries, core semesters dedicated to major technologies, elective courses, and ECTS credit allocation. We have identifying existing curriculum content within our consortium, and will define new course content to fill any gaps.

4. **Course Development and Pedagogical Design:** Our course development includes a blend of online and offline activities, featuring electives, and a range of activities for example projects, challenges and hackathons.

5. **Online Learning Platform:** We are establishing the requirements for a common online learning platform that will host content from both academic and industry partners, enhancing the learning experience.

6. **Student Support Program:** To ensure high retention rates, we will define a comprehensive student support program that will guide and assist learners throughout their educational journey.

These strategic initiatives are integral to the success of the D4B project, ensuring that the program aligns with market demands, offers a world-class educational experience, and equips students with the skills and knowledge needed for the digital business landscape.

Basic Information

Full name of the programme: **Master's in Advanced Digital Skills**

EQF level: **7**   Degrees awarded: **Master**

Number of ECTS points: **60**

Institutions Delivering the Programme:

Name of the Institution	Higher Education Institution (Yes/No)	Degree Awarding Institution (Yes/No)	Role in the Consortium (i.e. coordinator etc.)
National College of Ireland (Ireland)	Yes		Coordinator
University of Bologne (Italy)	Yes		Beneficiary
Université Paris8 (France)	Yes		Beneficiary
University of Digital Science (Germany)	Yes		Beneficiary
University Nova de Lisboa (Portugal)	Yes		Beneficiary
Linköping University (Sweden)	Yes		Beneficiary

Please Note:

Please note that modifications to module descriptors, reading materials, and other elements may be necessary to align with the requirements of the Master's accreditation process. These adjustments are essential to ensure that our programme maintains the highest quality and meets the accreditation standards, providing students with an education of the utmost excellence.

Joint Design and Delivery

In the collaborative endeavour of creating and delivering the D4B master's programme, the unique contributions of each partner involved are outlined below. The success of this programme hinges on a cohesive and coordinated effort from all parties. To ensure clarity and transparency in our partnership the roles and responsibilities are delineated in the design and delivery of the program. The following provides a blueprint for our collective contributions on our journey towards programme excellence.

Partners Involved: *NCI, Adecco, Akkodis, LHH, Linköping University, UNIBO, UDS, Paris8, NOVA IMS, DTSL, CINI, Terawe, Skillnet Ireland*

Market Needs Analysis

Each academic institution is involved in the Market Needs Analysis, identifying current and emerging advanced digital skills for hybrid IT / Business roles and capturing the specific needs of industry and especially SMEs and Start Ups. The Market Needs Analysis forms the basis of the curriculum framework design.

Each partner nominated an industry advisory board member from their country to participate in the design phase to ensure the programme will address the needs of industry.

Partners Involved*: LHH, Adecco Training, DTSL, Skillnet Ireland, UDS, NCI, UNIBO*

Course Curriculum Design

All academic partners are contributing to the structure of both a part time and full-time online Master's programme delivered by the 6 Higher Education Institutions including: transferability of learning objectives from one country to another, core semesters for each main technology, elective courses and ECTs. The partners are identifying and mapping existing curriculum content from consortium partners, Microsoft and other providers and engaging in the definition of new course content to fill identified gaps. Course Development and pedagogical design, with online and offline activities, including electives, projects, challenges, hackathons, research methods module are also included in the remit of the academic and industry partners. Defining the requirements for a common online learning platform, which will also include content from industry partners and creating a support programme for students to ensure high completion rates are all within part of the academic and industry partners key objectives for the D4B programme.

Partners Involved: *Partners: AKKODIS, UDS, LHH, Mylia (Adecco Training), NOVA IMS, Paris8, UNIBO, DTSL, CINI, NCI, Skillnet Ireland, Schuman, Linköping University*

Industry Certification and EU Recognised Accreditation

Collaboratively the academic and industry partners will define Certification, Accreditation and Evaluation Processes that will provide EU recognised qualifications.

The Microsoft certification partners will set up test centres in each Higher Education Institution and online and design and provide access to practice tests.

Acceptance criteria for the programme's students and self-assessment tests will also be defined and implemented.

A central registration/onboarding platform for students to be designed and implemented for delivery of the programme across the EU academic partners.

Partners Involved: *Partners: Akkodis, LHH, UDS, Adecco Training, Linköping University, UNIBO, DTSL, CINI, Terawe, NCI, Skillnet Ireland, NOVA IMS, Paris 8*

Delivery of the Master's Programme Online Modules & Lectures

The academic partners will deliver:

(1) A part-time programme that will deliver 60 ECTS-CPs across 6 Trimesters.

(2) A full-time programme that will deliver 60 ECTS-CPs across 3 core Trimesters.

The first part time and fulltime programmes will be developed as pilot courses, with a review and improvement cycle after each year. The course modules, lectures and workshops will be delivered mostly online via the central digital learning platform with all HEIs involved in the delivery of different modules and courses depending on their specific areas of expertise.

Partners Involved: *National College of Ireland (NCI), Adecco Training, Modis, LHH, Linköping University, UNIBO, UDS, Paris8, NOVA IWS, DTSL, CINI, Skillnet Ireland, LIU*

Industry Certifications & Micro-Credentials

Micro-credentials / degrees will also be provided for individual modules and courses. Taking micro-credential modules allows students to build a portfolio of certifications significantly increasing their job prospects and supporting their ongoing commitment to lifelong learning. Micro-credential modules that add to 60 ECTs credits result in the attainment of the Master's programme.

Partners Involved: *NCI, UNIBO, UDS, Paris8, NOVA IWS.*

Faculty Training Resources and Support to Deliver the Programme

Faculty Training & Proactive Support will be provided before and during the programme rollout to ensure consistency and high-quality course delivery. This will include a repository of online learning content on the Digital Learning Platform and online and in person workshops for faculty.

Partners Involved: *National College of Ireland (NCI), Adecco Training, UDS, Akkodis, UNIBO, NOVA IMS, Paris 8*

Partnership Development Programme

The partnership development strategy to build a pan-European ecosystem of Industry and Education partners, strengthening the network of content contributors, industry experts and host companies year on year will be defined and implemented. As previously noted, the partners will liaise closely with the Digital Skills & Jobs Platform (DSJP) project team to facilitate partnerships with National Coalitions and ensure alignment with Directorate General Communications, Networks, Content and Technology (DG CNECT) communication activities. We will also seek to work closely with the new contractors who will be coordinating the Digital Transformation Accelerator project to maximise the involvement of the Eur0pean Digital Innovation Hubs (EDIH)s and synergies with SMEs.

Partners Involved: *Matrix Internet, Schuman Associates, Adecco Training, Skillnet Ireland, Terawe, DTSL, LHH, UNIBO, Akkodis, NCI, UDS*

Developing Case Studies & Good Practice Examples

Surveys and interviews will be conducted with industry partners, host companies, and students to determine how effective the D4B project has been at strengthening competitiveness and delivering benefits for individuals and society. Aggregation of feedback pertaining to the delivery of the programme and suggestions for ongoing improvement will be captured. These findings will be presented to the Industry Advisory Board for consideration and to assist us in the formulation of ongoing improvements.

Analysis will be conducted to establish the impact of the programme in helping to increase gender equality and ethnic diversity and create new educational opportunities helping reduce unemployment among disadvantaged and vulnerable groups. Case studies, good practice guidelines and examples, and video / multimedia content will be generated for promotion purposes.

Partners Involved: *Matrix Internet, Schuman Associates, Adecco Training, UDS, NCI, DTSL, Skillnet Ireland, Akkodis, UNIBO, NOVA IMS, Paris8, CINI, Terawe.*

Module Development

It is important to highlight that some programs within our academic partner institutions may feature modules that exhibit synergies with modules in the D4B Master's program. These shared modules will be subject to a comprehensive review process, with the intention of potentially modifying and incorporating them into the D4B program's module offerings. This collaborative approach ensures that we harness the best educational content available and continually enhance the D4B programme to meet the evolving needs of our students.

Partners Involved: *National College of Ireland (NCI), Adecco Training, UDS, Akkodis, UNIBO, NOVA IMS, Paris 8, DTSL.*

Learning Outcomes

Level

The minimum intended programme learning outcomes (MIPLOs) in terms of knowledge, skill, and competence for the programme are presented in Table 1.

Minimum Intended Programme Learning Outcomes (MIPLOs)

MIPLO1	Critically appraise, select, and employ existing and emerging technologies to address complex business problems and support innovation and digital transformation in business
MIPLO2	Critically assess and evaluate sustainability, governance and ethical risks and impacts associated with digital transformation.
MIPLO3	Synthesise and communicate the opportunities, risks and critical challenges of digital transformation practices to underpin strategic decisions to key stakeholders.
MIPLO4	Critically appraise the fundamental concepts and demonstrate techniques of advanced digital skills from a business perspective.
MIPLO5	Cultivate transversal skills and practices, evaluating their application in various contexts, and exploring techniques to foster creativity at individual, team, and organizational levels.

Table 1. Minimum Intended Programme Learning Outcomes (MIPLOs)

These learning outcomes have been developed to align with industry feedback and the analysis of related programmes internationally.

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Disciplinary Field

Each module's minimum intended learning outcomes are outlined in the module descriptors in Table 2.

Minimum Intended Module Learning Outcomes (MIMLOs)

Module Title (ECTS)	LO1	LO2	LO3	LO4	LO5
Digital Transformation (10)	Identify the concepts and enablers that motivate the digital transformation	Critically evaluate how the paradigms of digital transformation influence new business models powered by digital solutions	Explore the strategic resources needed to implement digital transformation	Develop and apply strategies for the digital transformation of the business	
Artificial Intelligence 4Business (10)	Illustrate knowledge of fundamental concepts, challenges, and techniques within the fields of	Apply machine learning models to solve fundamental problems while elucidating the significance of data	Utilise appropriate methods for evaluating the effectiveness of machine learning models and analyse	Analyse the role of AI and machine learning in applications, choose suitable methods for the application, and	Critically examine the ethical, societal, and environmental implications of AI and machine learning applications

Module Title (ECTS)	LO1	LO2	LO3	LO4	LO5
	artificial intelligence and machine learning	utilization and optimization techniques within this specific context	the outcomes for interpretation	critically evaluate these applications.	
Data Science 4Business (10)	Describe the key concepts of Data Science and apply appropriate data science techniques to analyse real-world problems, extracting meaningful insights from data.	Explain and apply the processes, methods, algorithms, tools and applications used in data science.	Perform exploratory analysis using statistical and machine learning tools.	Implement and evaluate data science models including machine learning and statistical algorithms.	Create visualizations, dashboards and other business intelligence outputs to communicate data insights.
Cloud Computing 4Business (10)	Assess core principles, frameworks, development methodologies and	Critically analyse the governance and security challenges associated with cloud-based	Critically appraise the wide range of existing and emerging cloud services (e.g., storage, machine learning,		

Module Title (ECTS)	LO1	LO2	LO3	LO4	LO5
	tools for the adoption of Cloud Computing solutions to support and enable digital business transformation	systems to identify and evaluate candidate cloud security architectures and deployment strategies	compute, analytics, quantum computing, etc.) and develop strategies to leverage such services for digital business transformation		
Cyber Security 4Business (10)	Identify and protect personal and organizational data from vulnerabilities	Analyse cyber-attack concepts and implement techniques to mitigate cyber attacks	Assess and implement personal and organisational data protection	Apply tools for cyber incident prevention and detection	Evaluate legal and ethical procedures and apply them within the realm of cybersecurity.
Blockchain 4Business (5)	Evaluate Blockchain Technologies, core components and current state-of-the-art use cases of Blockchain and	Distinguish between the variations in protocols, challenges, and ongoing disruptive nature of	Compose and build a blockchain based application while critically evaluating blockchain	Identify opportunities and develop strategic plans for Blockchain adoption in Enterprise whilst considering key	

Module Title (ECTS)	LO1	LO2	LO3	LO4	LO5
	distributed ledger technologies and their impacts on existing financial processes and industries.	Blockchain and distributed ledger technologies, including ethical issues, legal attributes, and adoption.	applications and infrastructure.	technological and regulatory developments in the Blockchain domain.	
Internet of Things 4Business (5)	Analyse the fundamentals of IoT, its applications across diverse industries, and its influence on business model development, all the while acquiring knowledge about IoT architecture, communication protocols, devices, sensors, and data	Comprehend IoT connectivity options, networking technologies, and their challenges and solutions in the context of business applications.	Evaluate the importance of IoT security, privacy, and risk management in business environments.	Explore IoT data analytics, cloud computing, and edge computing, and their roles in business model development, while developing skills in IoT project management for business applications.	Analyse and apply real-world IoT case studies in business model development and discuss future trends and challenges in IoT business model development.

Module Title (ECTS)	LO1	LO2	LO3	LO4	LO5
	management techniques.				
Programming 4Business (5)	Analyse the fundamentals of programming, its applications in various industries, and its impact on business model development, while learning about different programming paradigms and languages.	Demonstrate skills in web development, low-code and no-code development, mobile app development, business automation, and business analytics for business model development	Apply knowledge of software development methodologies, project management techniques, debugging, testing, and version control systems in the context of business environments.	Implement data science and machine learning, in business model development using programming techniques.	Analyse real-world programming case studies in business model development and discuss future trends and challenges in programming for business model development
Quantum Computing 4Business (5)	Interpret and apply mathematical and quantum mechanical principles to qubit systems.	Critically assess the differences and similarities between quantum and	Solve computational problems through the implementation of algorithms for quantum computers.	Apply the circuit model of quantum gates when analysing problems and	Research and evaluate the impact and potential of quantum computing.

Module Title (ECTS)	LO1	LO2	LO3	LO4	LO5
		classical computation.		formulating solutions.	
Data Governance & Ethics (5)	Analyse the governance mechanisms and regulatory frameworks related to data management, considering aspects such as data acquisition, storage, and transformation.	Demonstrate the ability to elaborate a thorough data mapping with clarity and precision, while evaluating access rights, usage rights, and manipulation considerations.	Measure the quality of a data management solution in terms of its security, confidentiality and durability.	Analyse and assess the ethical criticality of data in a business context and identify and propose appropriate solutions.	Assess the transparency and explicability of data generated by Artificial Intelligence and Machine Learning systems.
Generative AI (5)	Comprehend the foundational principles of generative AI, including text, image, video, and code generation.	Evaluate cutting-edge techniques and research driving recent innovations in generative AI models and applications.	Recognize the significance of employing efficient engineering techniques when engaging with generative AI models.	Integrate and use generative AI models to solve business challenges in different sectors and activity domains	Develop and test strategies for communicating and implementing generative AI outcomes in business, while considering user engagement,

Module Title (ECTS)	LO1	LO2	LO3	LO4	LO5
					scalability, ethics, and suitability for specific objectives.
Innovation (5)	Demonstrate a critical awareness of the creative process and the application of creative and innovative strategies in a variety of contexts.	Evaluate and explore various case studies and innovation techniques to help understand creative and innovative practices.	Discern, critique and apply the various techniques to foster creative talent environments at an individual, team, and organisational level.	Demonstrate impacts and return on investment at an individual and organisational level.	Create and explore strategies to deliver the results of creative work in business.
Risk & Change Management (5)	Demonstrate comprehension of the fundamental principles of risk and change management, and analyse their repercussions on digital ecosystems,	Investigate strategies for overseeing change within digital transformation and critically assess by exploring case studies showcasing effective digital	Analyse the role of digital technologies in shaping the future of work and develop strategies for managing a digital workforce.	Recognise the significance of agile and adaptive leadership in digital transformation and apply competencies in guiding teams through the process of digital change.	

Module Title (ECTS)	LO1	LO2	LO3	LO4	LO5
	corporate operations, and the workforce	transformation endeavours.			

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Achievement

There are no integrated assessments involving multiple modules, but there are strong links between the constituent modules with learning and assessment in modules serving to advance the general development and proficiency of students in related and subsequent modules.

Demonstrating that the intended learning outcomes (ILOs) are achieved in the Master's in Advanced Digital Skills programme typically involves a combination of assessment strategies, ongoing evaluation, and feedback mechanisms. The following strategies will be used to demonstrate the achievement of the ILOs in a Master's course:

1. **Curriculum Design**: The course curriculum is aligned with the stated ILOs. Each course module has its own set of specific learning outcomes that contribute to the broader programme outcomes.

2. **Assessment Alignment**: Assessments are aligned with the ILOs. Various types of assessments (e.g., exams, assignments, projects, presentations) that directly measure the knowledge, skills, and competencies outlined in the ILOs will be implemented.

3. **Rubrics and Grading Criteria**: Clear rubrics and grading criteria are created for each assessment, indicating how students will be evaluated against the ILOs. This provides transparency and consistency in assessment.

4. **Formative and Summative Assessment**: The programme will implement both formative assessments (ongoing, for learning) and summative assessments (final, of learning) to gauge students' progress. Formative assessments can provide feedback to help students improve.

5. **Feedback Loop**: A feedback loop that includes regular assessments, timely feedback to students, and opportunities for them to reflect on their performance will be implemented. Self-assessment and peer assessment will be encouraged when relevant.

6. **Assessment Tools**: The programme will utilise various assessment tools, such as quizzes, exams, essays, presentations, group projects, and portfolios, to measure different aspects of the ILOs, including knowledge, critical thinking, communication skills, and practical application.

7. **Direct and Indirect Measures**: Both direct measures (assessments explicitly designed to evaluate specific ILOs) and indirect measures (surveys, focus groups, interviews) may be used to gain a holistic understanding of student learning.

8. **Continuous Improvement**: Regularly reviewing and analysing assessment data to identify areas where students are excelling and where they may need additional support will be conducted. Using this information adjustments can be made to the curriculum, teaching methods, or assessments.

9. **External Benchmarking**: Comparing the program's outcomes with external benchmarks or similar programs at other institutions may be undertaken to ensure that the ILOs are in line with industry or disciplinary standards.

    10. **Accreditation and Certification***:* The programme will be submitted for accreditation with a relevant professional body.

    11. **Student Portfolios***:* Students will be encouraged to create portfolios that showcase their work and achievements related to the ILOs. Portfolios can serve as evidence of learning outcomes.

    12. **Exit Surveys**: Exit surveys will be offered to graduating students to gather their perceptions of their achievement of ILOs and their overall learning experience.

    13. **Documentation**: Thorough records of assessment data, results, and actions taken to improve the programme based on the assessment findings will be catalogued.

By implementing these strategies and continuously monitoring and evaluating student performance, you can effectively demonstrate that the intended learning outcomes are achieved in a Master's course.

Regulated Professions

Adhering to the European Union Directive 2005/36/EC, which governs the recognition of professional qualifications across EU member states requires the Master's in Advanced Digital Skills to comply with the following:

1. **Understand the Directive**: We commenced with a thoroughly understanding the content and provisions of Directive 2005/36/EC. This directive outlines the minimum requirements for the recognition of professional qualifications and includes specific provisions for different regulated professions.

2. **Identify Regulated Professions**: Determine which regulated professions are relevant to your Master's program. The directive covers a wide range of professions, including doctors, lawyers, engineers, pharmacists, architects, and many more. Depending on the focus of your program, you may need to consider the requirements for one or more of these professions.

3. **Align Curriculum**: Ensure that your program's curriculum aligns with the minimum training requirements specified in the directive for the relevant professions. This may involve reviewing and revising course content, learning outcomes, and programme structure to meet the established standards.

4. **Accreditation and Recognition**: Seek accreditation or recognition from relevant professional bodies or authorities in the EU member states where your graduates may seek to practice. Different professions may have their own accrediting bodies, and compliance with their standards is essential.

5. **Language Proficiency**: Ensure that language requirements are met. The directive may specify language proficiency requirements for professionals seeking recognition in other EU member states. Your programme should offer language support or assessments if necessary.

6. **Clinical Training and Practical Experience**: For professions that require clinical training or practical experience (e.g., medical doctors, nurses), establish partnerships with institutions or facilities where students can gain the necessary hands-on experience.

7. **Transparency and Information**: Provide clear and accurate information to prospective students about the program's alignment with the directive and the professions it prepares students for. This information should include potential recognition challenges and additional requirements in other member states.

8. **Student Mobility**: Facilitate student mobility by ensuring that your programme supports recognition and credit transfer mechanisms. Graduates should be able to seamlessly move between member states if they choose to practice in different countries.

9. **Continuous Monitoring and Adaptation**: Stay updated on any revisions or amendments to the directive and related regulations. Continuously assess and adapt your programme to ensure ongoing compliance.

10. **Collaborate with Authorities:** Collaborate with relevant national authorities, professional bodies, and competent authorities in EU member states to facilitate the recognition process for your graduates.

11. **Support Services**: Offer support services to help graduates navigate the recognition process, which may include guidance on the necessary paperwork and documentation required for professional recognition.

12. **Quality Assurance**: Implement robust quality assurance mechanisms to ensure that your programme consistently meets the standards required by the directive.

13. **Documentation and Records**: Keep comprehensive records of your program's compliance efforts, including curriculum updates, accreditation status, and recognition outcomes.

14. **Seek Legal Counsel**: Consult with legal experts or advisors who specialize in EU law and educational compliance to ensure that your program's practices align with the directive.

Adhering to Directive 2005/36/EC is essential to ensure that graduates of the Master's programme are eligible for professional recognition and practice in the European Union.

Study Programme

Curriculum

The structure and content of the curriculum will enable students to achieve the intended learning outcomes. See Table 3 below.

Outline of the Curriculum

Stage	Stage Synopsis
Award	The programme aims to provide learners with essential knowledge, skills, and competence to understand the impacts of, design, application, and operationalisation of Digital Transformation Technology solutions in business contexts. The curriculum focuses on the following advanced digital technologies: • Digital Transformation • AI 4Business • Data Science 4Business • Cloud Computing 4Business • Cybersecurity 4Business • Blockchain 4Business • IoT 4Business • Programming 4Business • Quantum Computing 4Business • Governance & Ethics • Innovation • Risk and Compliance • Generative AI

Table 3: Curriculum Outline

The curriculum framework of the 60 credit Master's in Advanced Digital Skills, comprising the core mandatory Digital Transformation module and the 12 elective modules is outlined in Figure 1 below.

Digital4Business Curriculum Framework – 60 Credits

DIGITAL TRANSFORMATION (10 ECTs) – MANDATORY CORE MODULE			
ELECTIVES			
AI 4Business (10 ECTS)	**Data Science 4Business** (10 ECTS)	**Cloud Computing 4Business** (10 ECTS)	**Cybersecurity 4Business** (10 ECTS)
Blockchain 4Business (5 ECTS)	**IoT 4Business** (5 ECTS)	**Programming 4Business** (5 ECTS)	**Quantum 4Business** (5 ECTS)
Governance & Ethics (5 ECTS)	Innovation (5 ECTS)	Risk & Change Management (5 ECTS)	Generative AI (5 ECTS)

A mandatory module on **Digital Transformation** serves as the cornerstone of our Master's programme, establishing essential knowledge and skills that underpin various specialized fields. This core module is designed to ensure that students develop a comprehensive understanding of the rapidly evolving digital landscape. Its learning outcomes directly link with other modules across the curriculum, creating a holistic learning experience.

The module on **AI and Data Science 4Business** benefits from its linkage with Digital Transformation, as it provides a real-world context for the applications in organizations. Likewise, Cloud Computing 4Business gains significance as students learn to implement cloud solutions effectively within the context of digital transformation.

Cybersecurity 4Business knowledge becomes more practical and strategic when seen through the lens of Digital Transformation, as it helps students navigate the complex digital security landscape. Blockchain 4Business is important in reshaping digital infrastructures and is highlighted when studied in the context of digital transformation.

IoT 4Business's close connection with digital transformation is emphasised, helping students harness the full potential of IoT technologies. Digital Transformation provides students with insights into the potential impact of Quantum Computing 4Business on digital ecosystems.

Data Governance & Ethics module benefits from a strong foundation in Digital Transformation, aligning data policies and ethical guidelines with technological advancements. Understanding Digital Transformation is vital for using generative AI applications strategically and responsibly.

Innovation, a critical focus of our program, thrives on the environment created by Digital Transformation. Understanding the intricacies of digital transformation is instrumental in managing risks and changes associated with digital disruptions and opportunities.

The linkages (based on learning outcomes in the Digital Transformation Module having related learning outcomes in other D4B modules creates the linkages) corresponding between these modules provide students with a well-rounded education that equips them with multidisciplinary skills and insights. This prepares them for the dynamic digital landscape, where these areas often intersect, complement, and influence each other, fostering well-rounded, versatile professionals ready to adapt to the evolving needs of the digital economy.

The learning outcome links between Digital Transformation and the other modules are outlined in Figure 3 & 4 below.
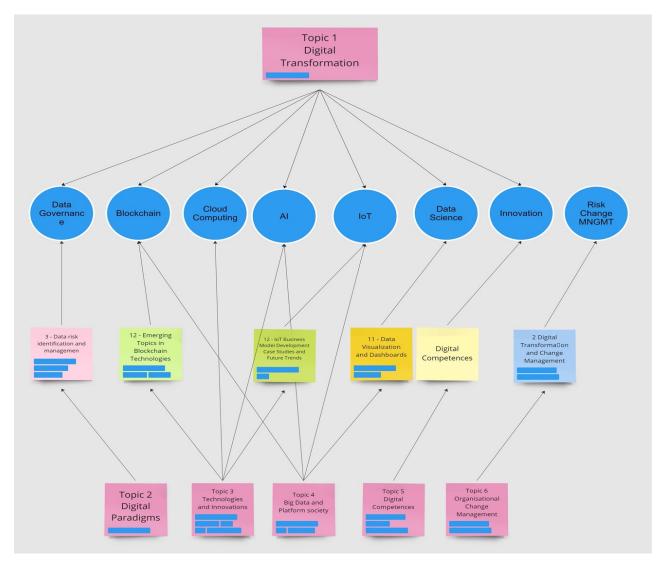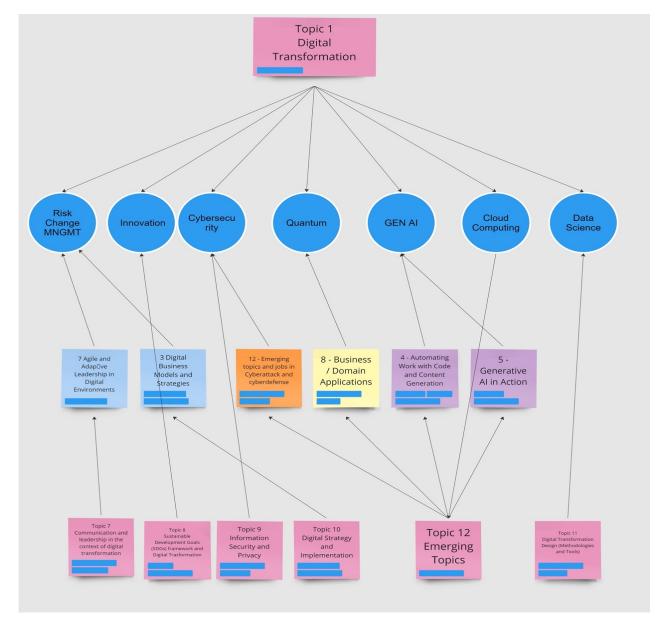
Figure 3: Learning outcome linkages

Figure 4: Learning outcome linkages

Click this **LINK** to review the learning outcome linkages in Miro

Module Level Outline

Module Title (ECTS)	Module Synopsis
Digital Transformation (10)	The Digital Transformation learning module is a comprehensive course designed to equip learners with the knowledge and skills necessary to navigate the rapidly evolving digital landscape. The module begins by introducing the key concepts and enablers that drive digital transformation, providing a solid foundation for understanding the motivations behind this shift. Learners are then encouraged to critically evaluate how these paradigms influence the development of new business models powered by digital solutions, fostering a deeper understanding of the impact of digital transformation on various industries. The course also explores the strategic resources required for successful digital transformation, including technological infrastructure, human capital, and organizational culture. Finally, learners are guided through the process of developing and applying effective strategies for digital transformation within their own businesses. This hands-on approach ensures that learners are not only able to understand the theory behind digital transformation but also apply it in a practical context.
AI 4BUSINESS (10)	AI 4Business is a learning module that introduces the fundamental concepts, challenges, and techniques of artificial intelligence and machine learning. Learners will learn how to apply machine learning models to solve real-world problems, such as customer segmentation, sentiment analysis, and recommendation systems. Learners will also learn how to use data effectively and efficiently, and how to optimise models using various methods. Moreover, learners will learn how to evaluate the performance of their models and how to interpret the results. Furthermore, learners will explore the role of AI and machine learning in various applications, such as healthcare, finance, and education. Learners will be able to select appropriate methods for their application and critically evaluate their strengths and limitations. Finally, learners will examine the ethical, societal, and environmental implications of AI and machine learning applications, including aspects such as privacy, fairness, and sustainability.
Data Science 4BUSINESS (10)	Data Science 4Business is a learning module that introduces the fundamental concepts and techniques of data science and how they can be applied to solve real-world problems. In this module, students will learn how to define a data science problem, collect and prepare data, perform exploratory analysis using statistical and machine learning tools,

Module Title (ECTS)	Module Synopsis
	implement and evaluate data science models such as machine learning and statistical algorithms, and create visualisations, dashboards and other business intelligence outputs to communicate their data insights. By the end of this module, students' will be able to use data science methods and tools to analyse data and generate actionable insights for business decision making.
Cloud Computing 4BUSINESS (10)	Cloud Computing 4Business is a learning module that aims to equip learners with the knowledge and skills to adopt and leverage cloud computing solutions for digital business transformation. Students will learn about the core principles, frameworks, development methodologies and tools that enable you to design, implement, and manage cloud-based systems. Students will also explore the governance and security challenges associated with cloud computing, and how to identify and evaluate candidate cloud security architectures and deployment strategies. Moreover, students will discover the wide range of existing and emerging cloud services (e.g., storage, machine learning, compute, analytics, quantum computing, etc.) and how to use them effectively for your business needs. By the end of this module, students will be able to critically appraise the benefits and challenges of cloud computing, and to develop strategies to harness its potential for digital business transformation.
Cyber Security 4BUSINESS (10)	Cybersecurity 4Business is a learning module that teaches students how to protect their personal and organizational data from cyber threats. Students will learn how to identify the common vulnerabilities that hackers exploit, and how to implement effective techniques to prevent and mitigate cyber-attacks. Students will also learn how to assess and comply with the data protection laws and regulations, and how to apply ethical principles in cybersecurity. Additionally, students will learn how to use and integrate various tools to monitor and detect cyber incidents, and how to respond appropriately. By completing this module, students' will gain the essential skills and knowledge to protect sensitive data.
Blockchain 4BUSINESS (5)	Blockchain 4Business is a learning module that equips students with a broad understanding of blockchain technologies. Students will evaluate the core components and explore current, cutting-edge use cases of blockchain and distributed ledger technologies, including their transformative impact on financial processes and various industries. This module also emphasises the ability to distinguish between various protocols, challenges, and the continuously disruptive nature of

Module Title (ECTS)	Module Synopsis
	blockchain and distributed ledger technologies, addressing ethical, legal, and adoption concerns. Furthermore, students will gain practical skills by composing and building a blockchain-based application while critically assessing blockchain applications and infrastructure. This module also enables students to identify opportunities and create strategic plans for blockchain adoption within enterprise settings, all while considering key technological and regulatory developments in the ever-evolving blockchain domain.
Internet of Things 4BUSINESS (5)	The IoT 4Business module provides explores IoT's impact on business. It covers IoT fundamentals, applications, and their influence on business models. Students learn about IoT architecture, communication protocols, devices, sensors, and data management. The module also includes IoT connectivity, networking, security, privacy, and risk management considerations. Students explore IoT data analytics, cloud computing, and edge computing in business contexts and develop IoT project management skills. Real-world IoT case studies will be analysed for business model development, and future trends and challenges discussed. This module equips students to leverage IoT's potential in diverse business applications.
Programming (5)	The Programming module explores programming's importance in various industries and its impact on business models. It covers programming fundamentals, different paradigms, and languages. Students gain practical skills in web development, mobile apps, business automation, and analytics for business models. They also learn software development methodologies and project management. Additionally, students apply data science and machine learning techniques to business model development. Real-world case studies are analysed, and future programming trends and challenges are discussed. This module equips students to address diverse business needs through programming.
Quantum Computing (5)	The Quantum Computing module explores quantum computing and its business applications. Students will interpret and apply mathematical and quantum mechanical principles to qubit systems, gaining a strong foundation in quantum concepts. The module fosters critical thinking by encouraging students to assess the distinctions and commonalities between quantum and classical computation. They will acquire practical skills in solving computational problems using algorithms tailored for

Module Title (ECTS)	Module Synopsis
	quantum computers and applying the circuit model of quantum gates to analyse problems and devise solutions. Furthermore, the course guides students in researching and evaluating the impact and potential of quantum computing, ensuring they are well-prepared to leverage this transformative technology in a business context.
Data Governance & Ethics (5)	The Data Governance and Ethics learning module delves into the intricacies of data management and its ethical implications. Students learn to analyse governance mechanisms and regulatory frameworks concerning data, encompassing data acquisition, storage, and transformation. The module equips students with the skills to create meticulous data mappings, ensuring clarity and precision, while evaluating access and usage rights, as well as data manipulation considerations to maintain data integrity and compliance. In addition students assess the quality of data management solutions in terms of security, confidentiality, and durability. They also critically examine the ethical importance of data in business contexts and propose appropriate solutions. Students will evaluate the transparency and explicability of data generated by Artificial Intelligence and Machine Learning systems, facilitating ethical and transparent data-driven decision-making in various business settings. This module prepares students to effectively navigate the complexities of data governance and ethics in contemporary business environments.
Generative AI (5)	The Generative AI learning module offers a comprehensive understanding of generative AI and its practical applications. Students will grasp foundational principles that cover text, image, video, and code generation. The course explores cutting-edge techniques and research underpinning recent innovations in generative AI models and their applications. Students will also learn the significance of employing efficient engineering techniques when working with generative AI models. Additionally, students will acquire hands-on experience by integrating generative AI models to address business challenges across various sectors and activity domains. The module culminates with students developing and testing strategies for effectively communicating and implementing generative AI outcomes in a business context. These strategies take into account user engagement, scalability, ethics, and suitability for specific business

Module Title (ECTS)	Module Synopsis
	objectives. This module equips students with the knowledge and skills to harness the potential of generative AI in diverse business applications.
Innovation (5)	The Innovation learning module is designed to foster critical awareness of the creative process and the application of innovative strategies across diverse contexts. Students will explore various case studies and innovation techniques to gain a profound understanding of creative and innovative practices. This module equips students to discern, critique, and apply techniques that cultivate creative talent environments at individual, team, and organisational levels, driving innovation and creativity within a business context. Furthermore, students will develop the skills to demonstrate the impacts and return on investment of innovation at both individual and organisational levels. They will also learn to create and explore strategies for effectively delivering the results of creative work in a business setting, ensuring that innovation becomes a valuable asset in driving business success and growth.
Risk & Change Management (5)	The Risk & Change Management learning module provides a comprehensive understanding of the fundamental principles of risk and change management, emphasising their impacts on digital ecosystems, corporate operations, and the workforce. Students will explore strategies for overseeing change within digital transformation, critically assessing these approaches through case studies showcasing effective digital transformation endeavours. This module also delves into the role of digital technologies in shaping the future of work, equipping students with the skills to develop strategies for managing a digital workforce. Additionally, students recognize the significance of agile and adaptive leadership in digital transformation, applying their competencies to guide teams through the process of digital change. By the end of this module, students are well-prepared to navigate and lead in an evolving digital landscape.

Module Syllabus Content

Digital Transformation

Digital Transformation is a 10-credit module delivered over 4 hours per week for 12 weeks. An indicative schedule of topics to be addressed each week is outlined below:

Week No.	Lecture Topic	Lecture Detail
1	Digital Transformation	The basic concepts of digital transformation; The different stages of digital transformation evolution; economic and social impacts.
2	Digital Paradigms	Digital paradigms Platform economy and the role of digital platforms ethical issues in digital transformation.
3	Technologies and Innovations	Emerging Digital Technologies (es. AI; Blockchain; IoT) the strengths and weaknesses of the main digital technologies The evolution of AI (deep neural networks, advanced machine learning, etc)
4	Big Data and Platform society	Different platform-based business strategies case studies based on the platform economy Digital literacy and data literacy
5	Digital Competences	Framework digital competences skills, resources and capabilities in digital communication upskilling and reskilling
6	Organisational Change Management	Theories of organisational change Effective management of organisational change Impact at organisational level
7	Communication and leadership in the context of digital transformation	Methods and phases of communication Digital transformation project management Leadership in a digital context
8	Sustainable Development Goals (SDGs) framework and Digital Transformation	Ethic and sustainability in the digital age; 17 UN SDGs; Digital projects and initiatives that support the SDGs; circular economy; Key Performance Indicators (KPIs) for Digital Sustainability; Corporate social responsibility (CSR) and social impact

Week No.	Lecture Topic	Lecture Detail
9	Information Security and Privacy	Key concepts of information security Information Security Risk and Assessment Data protection and privacy
10	Digital Strategy and Implementation	Digital business models Digital strategy Case study of existing digital projects
11	Digital Transformation Design: Methodologies and Tools	Modern industry trends in Digital Transformation Tools for working on organisational culture, growth mindset, Innovation models and change management SWOT analysis on tools and methodologies
12	Emerging Topics	Definition of emerging topics in digital transformation Approaches to monitor and identify emerging trends Strategies for the transition to an automated future

Artificial Intelligence

Artificial Intelligence is a 10-credit module delivered over 5 hours per week for 12 weeks. An indicative schedule of topics to be addressed each week is outlined below:

Week No.	Lecture Topic	Lecture Detail
1	Introduction to AI and its history.	Explain what AI is and its importance in the modern world as an introduction to the topic. Examine the history and development of AI, including key innovations and turning moments.
2	Foundational Knowledge for AI	An introduction to the fundamental concepts like: Problem Solving, State-Space Search, Search Algorithms, Heuristics, Adversarial Search, and Optimisation.
3	Automated Planning	How automated planning contributes to AI: Goal Achievement, Decision Making, Resource Allocation, Simulation and Prediction, Learning and Adaptation and Autonomous systems.
4	Introduction to Machine Learning	General overview of Machine Learning (ML), including supervised, unsupervised, and reinforcement learning with less complex algorithms, and introduce deep learning as a subfield of ML.
5	Deep Learning	Introduction to Deep Learning, Neural Networks Fundamentals, Training Neural Networks, Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs), Deep Learning in Practice.

Week No.	Lecture Topic	Lecture Detail
6	Data and Datasets	Explain the importance of data in AI, data types, data quality and pre-processing and the importance of quality datasets.
7	Reinforcement Learning	Introduction to Reinforcement Learning, Markov Decision Processes, Exploration vs. Exploitation, Reinforcement Learning Algorithms, Real-world Applications and Future Trends.
8	Natural Language Processing (NLP)	Define NLP and its application, text pre-processing and tokenization, NLP models and techniques, Challenges and Future of NLP.
9	Computer Vision	Introduction to Computer Vision, Image Processing and Feature Extraction, Object detection and image classification, Image Segmentation and Deep Learning Applications, Challenges and Future Trends in Computer Vision.
10	AI Tools and Platforms	Types of AI Tools and Platforms, AI Platforms for Practical Applications, Deep Learning and Neural Networks, Practical assignment.
11	AI and creativity	Introduction to AI and Creativity, Creative AI Applications, AI in Design and Innovation, Future of AI and Creativity, *invite a speaker from industry to discuss the potential impact of AI on the creative industries.*
12	Ethical and Social implications in AI	Discuss the ethical challenges and societal impacts associated with AI, explain ethics and importance of ethical consideration in AI development, AI Bias and Fairness, privacy, and security issues, critical thinking, and open discussions about the ethical and social implications of AI.

Data Science

Data Science is a 10-credit module delivered over 5 hours per week for 12 weeks. An indicative schedule of topics to be addressed each week is outlined below:

Week No.	Lecture Topic	Lecture Detail
1	Introduction to Data Science	Overview of data science processes, methods, tools, and real-world applications

Week No.	Lecture Topic	Lecture Detail
2	Python for Data Science	Python programming basics, data structures, packages for data analysis
3	Data Collection and APIs	APIs, web scraping, working with unstructured data sources
4	Databases and Data Warehousing	Relational databases, SQL, ETL processes, data warehousing principles
5	Data Pre-processing and Cleaning	Handling missing data, outliers, feature encoding, normalization
6	Exploratory Data Analysis	Summary statistics, visualizations, identifying patterns
7	Statistical Analysis and Modelling	Regression, classification, forecasting methods
8	Machine Learning	Supervised learning models like classification and regression
9	Advanced Machine Learning Methods	Neural networks, deep learning, reinforcement learning
10	Business Intelligence and Analytics	BI process, dashboards, data storytelling, predictive analytics
11	Data Visualization and Dashboards	Visual encodings, interactive reports, communicating insights
12	Ethics, Bias and Privacy in Data Science and major trends in ML and DS	Responsible AI, transparency, ethical use of data Major Trends in ML and DS

Cloud Computing

Cloud Computing is a 10-credit module delivered over 4 hours per week for 12 weeks. An indicative schedule of topics to be addressed each week is outlined below:

Week No.	Lecture Topic	Lecture Detail
1	Cloud Computing Introduction	Foundations Defining Cloud Computing Service Models Deployment Models Cloud Technologies
2	Enterprise Digital Architecture & Digital Transformation	Enterprise Systems Architecture Functional/Non-functional architectural requirements Information & Applications Opportunities/Challenges Business Model Innovation Digital Transformation as a staged process Business Readiness Digital Transformation design AI & Digital Intellectualization
3	Cloud Strategy for Digital Transformation	Alignment with Business Goals KPIs SLAs Innovation Enterprise Architecture on the Cloud Performance Interoperability Scalability Availability Mobility Analyticity Usability
4	Cloud Adoption	Cloud Adoption Frameworks Organisational Change Management Migration Scenarios Hybrid Model DevOpsSec
5	Cloud Security I	Cloud Security Concepts IaaS/PaaS/SaaS Security IAM
6	Cloud Security II	Intrusion Detection/Incident Response Encryption/KMS Disaster Recovery/Business Continuity

Week No.	Lecture Topic	Lecture Detail
7	Cloud Native	Cloud Native concepts Architectural Considerations Microservices/Events/Streams/APIs/Data Impact on dev / deployment Impact on organisational structures / processes Context-specific Patterns Automation & Orchestration
8	Capacity Assessment & Optimisation	Resource Utilisation Information Lifecycle Management Elasticity Economic Considerations
9	Scope of Cloud Services	Scope of Cloud Service Offerings Data Services Big Data Analytics AI & ML Services IoT Services Quantum Computing Services
10	Fog & Edge Computing	Architectural approaches to IoT and Edge Computing Fog and Edge Architectures, (e.g., OpenFog Reference Architecture) Network Function Virtualization (NFV) SDN (Software Defined Networking) Recommendations of the National Institute of Standards and Technology (NIST)
11	Cloud Governance	Data Protection & Privacy on the cloud Regulatory Compliance & Legal Aspects
12	Emerging Topics in Cloud Computing	State-of-the-art research Contemporary focus on Cloud Computing

Cyber Security

Cyber Security is a 10-credit module delivered over 5 hours per week for 12 weeks. An indicative schedule of topics to be addressed each week is outlined below:

Week No.	Lecture Topic	Lecture Detail
1	Introduction to Cybersecurity: This Topic explains what cybersecurity is and why the demand for cybersecurity professionals is growing. It explains what online identity and data is, where it is, and why it is of interest to cyber criminals.	Cybersecurity definition Cyber Security Threat and scale Types of Cyber Threats Threats use cases and security challenges Seminar
2	Identity / organizational data protection: discusses what Identity and organizational data are, and why they must be protected. It discusses who the cyber attackers are and what they want.	The connected electronic information network Offline and Inline identity data Organizational data Internet of Things and Big Data Confidentiality, Integrity, and Availability Lab: Security Breach Examples
3	Application security	Software vulnerabilities Hardware vulnerabilities Device security Network security Cloud security Lab: Application landscape and security
4	Attacks, Concepts and Techniques	Cyberattack Analysis Securities Vulnerabilities identification Security Vulnerabilities classification Seminar

Week No.	Lecture Topic	Lecture Detail
5	Data and privacy protection	Computer devices protection Wireless Networks safe Online accounts and Authentication practices Data encrypting Data Backup Lab: Online privacy safeguarding
6	Organisation protection	Firewall configuration Port scanning Certificates updating Lab: tools for security monitoring
7	Cyber-attack detection and Cyber-defence	Attack detection in Real Time Security best practices BotNet Kill chain Behaviour-based security
8	Tools for incident prevention and detection	CSIRT Security playbook IDS and IPS
9	Cybersecurity Legal	Personal legal issues Corporate Legal Issues International Law and Cybersecurity
10	Cybersecurity Ethical Issues	The Cybersecurity Institute, CSI The Information Systems Security Association, ISSA The Association of Information Technology Professionals, AITP
11	Extension: Cyberwarfare	What is Cyberwarfare Purpose of Cyberwarfare
12	Emerging topics and jobs in Cyberattack and cyber-defence	AI Cyberattack, AI cybersecurity Geopolitical issue of Cyber Space Blockchain

Blockchain Technologies

Blockchain Technologies is a 5-credit module delivered over 4 hours per week for 12 weeks. An indicative schedule of topics to be addressed each week is outlined below:

Week No.	Lecture Topic	Lecture Detail
1	Introduction / Overview	Introduction to the World of Blockchain and Crypto Currency The History of Blockchain and Cryptocurrencies. Types of Blockchain. Foundational Academic Literature - White Papers (BTC/ETH). Overview of Blockchain Stack and Core Components
2	Blockchain Stack and Core Components	Web3 -Technological Fundamentals Block Composition - Cross Section of Components. Consensus Mechanisms: Proof of Elapsed Time / Burn / Stake / Work (POET/POB/POS/POW). etc. Distributed Systems DLT - Distributed Ledger Technology. Cryptographic Underpinnings. Hashing - Merkle Tree.
3	Blockchain Management	Decentralization. Brewer's CAP. Public, Private & Enterprise Blockchain. Business Case for Blockchain Applications.
4	Blockchain & Cryptocurrencies	Storing and Using Cryptocurrencies. Alt-coins. Wallets. Mining. Recent Trends and Developments: Libre / BitCash / LiteCoin / ETH / BTC
5	Evolution of Blockchain	A Thorough Study: Evolution & Revolution. Evolution Thus Far (BitCoin/HyperLedger/Ethereum/Monero/Tor) Enterprise Blockchain / DLT. Digital Identities. Existing Enterprise Use Cases.
6	Security, Identity & Cryptography in Blockchain	The CIA Triad: Confidentiality, Integrity & Authentication. Symmetric & Asymmetric Encryption. Non-Repudiation. Public & Private Keys Merkle, Back, Chaum & CypherPunks. Hash Functions (e.g., SHA256). Digital Signatures vs Anonymity Self-Sovereign Identity (SSI)

Week No.	Lecture Topic	Lecture Detail
7	Blockchain Applications I	Overview of Bitcoin System. Bitcoin Stack. Transactions / P2P Network / Blocks. Consensus Algorithm: POW. Mining Nodes. Difficulty. BTC Perceptions.
8	Blockchain Applications II	Overview of Ethereum System. Consensus Alternatives. The World Computer. EVM. Smart Contracts and DApps. Tokenization of Assets. NFT. DAO. Decentralized Financial Services. Yield and Staking. Decentralized Exchanges.
9	DApp Development I	DApp Development Environments. Web3 Stack. NodeJS/Express.
10	DApp Development II	Development Tools (e.g., Infura, RemixIDE). Architectures ERC Smart Contracts. Ganache/Truffle. Blockchain APIs.
11	Legal & Ethical Aspects of Blockchain	Rules and Regulations in Crypto. Changing Environments. Cryptocurrencies and Tokens: Securities or Commodities? Hacks. AML/CTF - KYC/KYT. Ethics. Ongoing Dynamics,
12	Emerging Topics in Blockchain Technologies	Research Directions. Emerging Topics (e.g., CBDC, Privacy, Metaverse, Impact of Quantum Computing, etc.)

Internet of Things (IoT)

Internet of Things is a 5-credit module delivered over 3 hours per week for 12 weeks. An indicative schedule of topics to be addressed each week is outlined below:

Week No.	Topic	Lecture Detail
1	IoT Fundamentals for Business	Introduction to the Internet of Things, exploring its historical development, key concepts, and various applications across industries such as healthcare, agriculture, and smart cities, with a focus on business model development.
2	IoT Business Models and Strategies	In-depth study of IoT business models and strategies, including value creation, monetization, and competitive advantage. Exploration of successful IoT business models and their impact on industries.
3	IoT Architecture and Protocols	Comprehensive overview of IoT architecture, including its components such as devices, gateways, and cloud services. Examination of communication protocols like MQTT, CoAP, and Zigbee, as well as data management techniques.
4	IoT Devices and Sensors	In-depth study of IoT devices, sensors, and actuators, covering their functions, applications, and integration into IoT systems. Discussion of various types of sensors, such as temperature, humidity, and motion sensors.
5	IoT Connectivity and Networking	Detailed examination of IoT connectivity options, such as Wi-Fi, Bluetooth, and cellular networks. Exploration of networking technologies like LPWAN and mesh networks, as well as challenges in IoT networking, including scalability and interoperability.
6	IoT Security and Privacy in Business	Thorough exploration of security and privacy concerns in IoT systems, including potential threats, vulnerabilities, and mitigation strategies. Discussion of encryption, authentication, and best practices for securing IoT devices and networks, with a focus on business implications.
7	IoT Data Analytics for Business	Introduction to IoT data analytics, covering data processing, storage, and analysis techniques such as stream processing, time-series databases, and machine learning algorithms. Exploration of tools and platforms for IoT data analytics, including Apache Kafka and TensorFlow, with a focus on business applications.

Week No.	Topic	Lecture Detail
8	IoT Cloud Computing for Business	Comprehensive overview of cloud computing in IoT, including cloud based IoT platforms like AWS IoT and Microsoft Azure IoT, as well as services such as device management, data storage, and analytics. Discussion of benefits and challenges of using cloud computing in IoT projects, with a focus on business implications.
9	IoT Edge Computing for Business	Introduction to edge computing in IoT, covering its benefits, challenges, and use cases. Discussion of edge devices, fog computing, and the balance between edge and cloud computing in IoT systems, with a focus on business implications.
10	IoT Project Management for Business	In-depth study of project management principles and practices in IoT projects, including planning, execution, and monitoring. Exploration of agile methodologies, risk management, and stakeholder communication in the context of IoT projects, with a focus on business model development.

Programming

Programming is a 10-credit module delivered over 5 hours per week for 12 weeks. An indicative schedule of topics to be addressed each week is outlined below:

Week No.	Topic	Lecture Detail
1	Programming Fundamentals for Business Part I	Introduction to programming concepts, including algorithms, data structures, and problem-solving techniques.
2	Programming Fundamentals for Business Part II	Exploration of various programming paradigms and languages, with a focus on their application in business model development.
		In-depth study of business model development using programming skills, including the creation of custom

Week No.	Topic	Lecture Detail
3	Business Model Development with Programming	software solutions, automation, and data-driven decision-making.
4	Web Development for Business	Overview of web development, including HTML, CSS, and JavaScript. Exploration of front-end and back-end development, as well as web frameworks and libraries, with a focus on their application in business model development.
5	Software Development Methodologies (à I & II)	Overview of software development methodologies, including Agile, Scrum, and Waterfall. Examination of project management techniques and best practices for software development, with a focus on their application in business model development.
6	Low-Code and No-Code Development Part I	Introduction to low-code and no-code development platforms, their benefits, and use cases.
7	Low-Code and No-Code Development Part II	Exploration of visual development environments and application building without extensive coding, with a focus on their application in business model development.
8	Debugging and Testing for Business Applications	Introduction to debugging and testing techniques, including unit testing, integration testing, and test-driven development. Exploration of debugging tools and strategies, with a focus on their application in business model development.
9	Version Control and Collaboration	Overview of version control systems, such as Git, and their role in software development. Exploration of collaboration tools and techniques for working in teams, with a focus on their application in business model development.
		Overview of mobile app development, including native, hybrid, and cross-platform approaches. Exploration of

Week No.	Topic	Lecture Detail
10	Mobile App Development for Business	mobile app development frameworks and tools, such as React Native and Flutter, with a focus on their application in business model development.
11	Programming for Business Automation	Examination of programming techniques for automating business processes, including the use of APIs, web scraping, and robotic process automation (RPA).
12	Programming in Business Model Development Case Studies and Future Trends	Examination of real-world programming case studies in business model development from various industries and applications. Discussion of future trends and challenges in programming for business model development, including the impact of emerging technologies like artificial intelligence and quantum computing.

Quantum Computing

Quantum Computing is a 5-credit module delivered over 4 hours per week for 12 weeks. An indicative schedule of topics to be addressed each week is outlined below:

Week No.	Topic	Lecture Detail
1	Introduction	Results from the theory of quantum mechanics. Spin and polarization. Measurements/Observables. Randomness and probability. Bits and Qubits. Quantum parallelism and interference.
2	Linear Vector Spaces, Hilbert Spaces, and Matrix Representations	Review of linear spaces. Hilbert spaces. Dirac <bra|ket> notation. Operations and operators. The Bloch Sphere. Pauli Matrices. Orthogonal and unitary matrices. Operations and operators. Eigenvectors and eigenvalues.
3	Quantum Circuits	Logic Gates. Reversibility. Multi-qubit Gates. Diagrammatic representation. Deutsch's Algorithm.

Week No.	Topic	Lecture Detail
4	Programming for Quantum Computing	Programming environments. Language support. Simulation. Quantum Computing cloud services. Coprocessor.
5	Entanglement	Entangled states. Bell's Inequalities. Using the CNOT gate. No Cloning Theorem. Quantum Teleportation.
6	Quantum Information Theory	Elements from the Classical Information Theory. Information and Entropy. Quantum Information Processing & Error-Correcting Codes Quantum Communications Channels.
7	Applications	Quantum Cryptography. Quantum Key Distribution. Ekert Protocol. BB84 Protocol. Dense coding.
8	Business / Domain Applications	Applications of QC in Pharma, Finance, Cybersecurity, Machine Learning, Chemistry, etc. Business Strategy & Innovation with QC.
9	Quantum Fourier Transform	Fourier Series. Discrete Fourier Transform. Quantum Fourier Transform.
10	Quantum Algorithms	Deutsch-Josza Algorithm. Simon's Algorithm.
11	Quantum Algorithms	Grover's Search Algorithm. Schor's Algorithm.
12	Emerging Topics in Quantum Computing	E.g., Quantum Hardware. Quantum Supremacy. Data Security. Quantum ML.

Data Governance & Ethics

Data Governance & Ethics is a 5-credit module delivered over 4 hours per week for 12 weeks. An indicative schedule of topics to be addressed each week is outlined below:

Week No.	Topic	Lecture Detail
1 - 2	Big Data management	Data management principles; Data lifecycle; Data quality; Data provenance; Data integrity and security
3 - 4	Data governance operating models and tools	Data governance frameworks; Policies, principles, rules, procedures, and standards;
5 - 6	Data risk identification and management	Roles and responsibilities; Maturity levels; implementation process for data governance
7 - 8	Introduction to ethical concepts and frameworks	Ethical principles, standards and practice, privacy and analytics
9 - 10	Ethics and AI	Ethics and data management including AI.
11 - 12	Business Data Ethics	Emerging Trends in the Governance of Advanced Analytics and AI

Generative AI

Generative AI is a 5-credit module delivered over 5 hours per week for 6 weeks. An indicative schedule of topics to be addressed each week is outlined below:

Week No.	Topic	Lecture Detail
1 - 2	The Generative Revolution	History and recent advances in generative models like GANs, VAEs, diffusion models Applications across different industries and domains

Week No.	Topic	Lecture Detail
3 - 4	Unleashing the Power of Language Models	Architectures like Transformers, BERT, GPT-3 Leveraging LLMs for content generation with prompt engineering
5	The Creative Potential of Generative Art	Generating images, music, and videos with models like DALL-E, MuseNet, GPT-3 Enabling new forms of human-AI creativity and collaboration
6 - 7	Automating Work with Code and Content Generation	Assisting software development with GitHub Co-pilot and other systems Creating business content like reports, emails, and presentations with GPT-3
8 - 9	Generative AI in Action	Real-world case studies across industries like healthcare, finance, transportation Hands-on exploration of leading generative AI systems
10 - 11	Developing Responsibly with Generative AI	Examining sources of bias, ethical implications of synthesised content Transparency, accountability and regulation considerations
12	New Trends and Advances in Generative AI	Cutting-edge generative research areas and innovations Emerging techniques like diffusion models, adversarial learning, multimodal models Novel applications and domains for generative models

Innovation

Innovation is a 5-credit module delivered over 2 hours per week for 12 weeks. An indicative schedule of topics to be addressed each week is outlined below:

Week No.	Topic	Lecture Detail
1 - 2	Fundamentals of Innovation	Lecture 1: Creativity and Innovation Introduction to creativity and its role in innovation. Discussion on the creative process and techniques to foster creativity. Examples of how creativity has driven significant technological advancements. Lecture 2: Emotional Intelligence and Entrepreneurship Definition and importance of emotional intelligence in entrepreneurship. The role of emotional intelligence in decision-making leadership. Practical exercises to develop emotional intelligence.
3 - 4	Innovation and Business Models	Lecture 1: Innovation Management in Business Introduction to innovation management principles and its role in businesses. Identifying innovation drivers and their relationship with entrepreneurship. Case studies of companies that have successfully implemented innovative business models. Lecture 2: Designing Innovative Business Models Developing innovative business models for emerging technologies such as blockchain and 3D printing. Assessing the financial and strategic implications of new business models.

Week No.	Topic	Lecture Detail
		Group exercises for creating and evaluating innovative business models.
5 - 6	Strategic Innovation and Entrepreneurial Leadership	Lecture 1: Data-Driven Innovation and Product Design Using data analysis and product design to drive innovation in entrepreneurship. Practical examples of data-driven decision-making in business. Case studies showcasing successful entrepreneurial ventures based on data and design. Lecture 2: Leading Collaborative Innovation Projects Leading collaborative innovation projects and the role of entrepreneurial leadership. Effective team dynamics and communication in innovation. Learning from both successful and failed collaborative innovation projects.
7 - 8	Entrepreneurial Communication Strategies	Lecture 1: Effective Communication for Technology Developing persuasive communication strategies for technology-based ventures. Using corporate storytelling and design thinking in technology-related communication. Practical exercises on creating impactful communication plans. Lecture 2: Engaging Stakeholders through Corporate Stories The power of corporate storytelling in engaging stakeholders. Examples of successful corporate story-driven communication.

Week No.	Topic	Lecture Detail
		Group discussions on how to apply corporate stories to technology-driven ventures.
9 - 10	Solving Complex Problems	Lecture 1: Problem-Solving in Technology Applying problem-solving concepts to technological challenges, including machine learning and robotics. Case studies demonstrating effective problem-solving strategies in the tech industry. Group exercises for hands-on problem-solving in technology. Lecture 2: Leveraging Data Analysis and Simulations Using data analysis and simulations to address complex technological problems. Practical application of data-driven decision-making in technology. Case studies on how data-driven solutions have driven innovation.
11 -12	Between Innovation, Ethics, and Sustainability	Lecture 1: Ethical Innovation and Sustainability Exploring the intersection of innovation, ethics, and sustainability in technologies like renewable energy and sustainable mobility. Identifying ethical and environmental challenges in technological solutions. Examples of innovations that promote ethical and sustainable practices. Lecture 2: Assessing Environmental and Social Impact Methods for assessing the environmental and social impact of technologies. Practical exercises in evaluating the sustainability of tech-driven solutions.

Week No.	Topic	Lecture Detail
		Case studies of technology initiatives that have positively impacted the environment and society.

Risk & Change Management

Risk & Change Management is a 5-credit module delivered over 4 hours per week for 12 weeks. An indicative schedule of topics to be addressed each week is outlined below

Week No.	Topic	Lecture Detail
1	Introduction to Risk and Change Management	Overview of risk and change management concepts in the context of digital environments, digital society, and digital technology trends, focusing on the challenges and opportunities presented by digital transformation.
2	Digital Transformation and Change Management	Examination of digital transformation initiatives and the role of change management in ensuring their success, including the importance of effective communication, stakeholder engagement, and organizational culture.
3	Digital Business Models and Strategies	In-depth analysis of popular digital business models and strategies, their impact on organizations and industries, and the role of innovation in driving digital transformation.
4	Digital Workforce and Workplace Transformation	Exploration of the impact of digital technologies on the workforce and workplace, including remote work, automation, collaboration tools, and the challenges and opportunities associated with managing a digital workforce.
5	Risk Management in Digital Transformation	Study of risk management in the context of digital transformation, including the identification, assessment, and mitigation of digital risks, as well as the development of risk management plans and strategies.

Week No.	Topic	Lecture Detail
6	Digital Disruption and Innovation	Examination of digital disruption and its impact on industries, as well as the role of innovation in driving digital transformation and creating new business models and opportunities.
7	Agile and Adaptive Leadership in Digital Environments	Overview of agile and adaptive leadership styles in the context of digital transformation and change management, focusing on the importance of flexibility, resilience, and continuous learning.
8	Data-Driven Decision Making in Digital Environments	Introduction to data-driven decision making and its role in managing risks and changes in digital environments, including the use of data analytics, visualization, and reporting tools.
9	Digital Ethics, Privacy, and Compliance	Exploration of ethical considerations, privacy concerns, and compliance requirements in digital environments, including data protection, responsible technology use, and the development of ethical guidelines and policies.
10	Building a Digital Culture and Fostering Innovation	Overview of the elements of a digital culture and strategies for fostering a digital mindset within an organization, including the promotion of collaboration, innovation, and continuous learning.
11	Digital Talent Management and Workforce Development	Examination of talent management strategies in the context of digital transformation, including a racting, retaining, and developing digital talent, as well as the role of upskilling and reskilling initiatives.
12	Risk and Change Management Case Studies and Future Trends	Analysis of real-world risk and change management case studies in digital environments from various industries and applications. Discussion of future trends and challenges in risk and change management, including the impact of emerging technologies like artificial intelligence and quantum computing.

Credits

In the context of the Master's programme in Advanced Digital Skills, Digital Transformation is a foundational module that carries 10 credits (ECTs) and is mandatory for all students. This module serves as the cornerstone of the program, equipping students with essential knowledge and skills to navigate the evolving digital landscape. It is strategically positioned as the first module to provide students with a solid understanding of digital transformation principles. Following the completion of the Digital Transformation module, students have the flexibility to tailor their learning experience by choosing from a selection of four elective modules, each worth 10 credits. These elective modules—AI for Business, Data Science for Business, Cloud Computing for Business, and Cybersecurity for Business—allow students to specialise in areas that align with their career goals and interests. Additionally, students can further broaden their knowledge base by selecting from eight 5-credit modules across various domains, including Blockchain for Business, IoT for Business, Programming for Business, Quantum Computing for Business, Governance and Ethics, Innovation, Risk and Change Management, and Generative AI. This curriculum structure spans three semesters of 12 weeks each, ensuring a comprehensive and adaptable learning experience that prepares students for the multifaceted challenges and opportunities presented by the digital age.

Workload

The MSc in Advanced Digital Skills uses the ECTS credit system. Credits are calculated using a ratio of 25 notional effort hours to 1 credit. Module credits are typically calculated as follows:

- A 5-credit module requires a minimum of 125 effort hours
- A 10-credit module requires a minimum of 250 effort hours
- A 15-credit module requires a minimum of 375 effort hours
- A 25-credit module requires a minimum of 625 effort hours

Allowances may also be made for the nature of the audience. Part-time more mature students tend to require less contact time that full-time students who may have recently graduated with a primary degree.

Student Profiles

Several roles were chosen as representative of general business roles that will need to develop advanced digital skills as digital transformation continues to evolve across organizations, from small and medium-sized enterprises (SMEs) to multinational corporations (MNCs). Each of these roles plays a crucial part in the overall functioning of an organisation, and their adaptation to

advanced digital skills is essential for their career development and the success of their organisations.

Procurement Managers need to embrace digital tools for efficient vendor management and cost optimization. Small Business Owners must adapt to digital marketing, e-commerce, and financial technologies to remain competitive. HR Professionals are tasked with managing digital talent acquisition and employee engagement tools. Business Operations Managers require digital analytics and process optimization skills. Salespersons benefit from customer relationship management software and online sales platforms. Junior Software Engineers must keep pace with rapidly evolving programming languages and technologies. Legal Professionals need to understand digital compliance and intellectual property laws in the digital era. Facilities Management Professionals can leverage IoT and smart building technologies. Supply Chain Management Professionals must navigate complex digital supply chains and logistics. Engineering Professionals in SMEs must integrate digital design and manufacturing processes. Office Administrators in SMEs should use digital tools for efficient office management. Finance Professionals need advanced data analysis and financial software skills. Product Managers rely on digital product development and market analysis tools. Marketing Professionals require digital marketing strategies and data analytics. Project Managers benefit from project management software and collaboration tools. Customer Services Professionals must utilize digital communication and support platforms to meet customer expectations.

In this rapidly evolving digital landscape, these roles encompass a wide spectrum of business operations, making them integral in the digital transformation journey for organizations of all sizes.

Each role was assessed, and the most relevant advanced digital skills modules were chosen to prepare students for their specific career needs. The aim is to assist students in choosing the right modules tailored to their discipline. Once a student completes the mandatory Digital Transformation Module, they are free to select modules that align with their interests. The mapping of modules to roles serves as a guide for students planning to enrol in the Master's programme and are unsure what modules to take.

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Mapping Master's Modules to the Role Profiles of Potential Students

Module ECTs / Role Profile	Digital Transformation (10 ECTs)	AI 4 Business (10 ECTs)	Data Science 4 Business (10 ECTs)	Cloud Computing 4 Business (10 ECTs)	Cyber security 4 Business (10 ECTs)	Blockchain 4 Business (5 ECTs)	IoT 4 Business (5 ECTs)	Programming 4 Business (5 ECTs)	Quantum 4 Business (5 ECTs)	Ethics & Governance (5 ECTs)	Innovation (5 ECTs)	Risk & Change Management (5 ECTs)	Generative AI (5 ECTs)	Total Credits
1 Procurement Manager	X	X	X	X	X					X		X		60
2 Small Business Owner	X	X	X	X	X					X		X		60
3 HR Professional	X	X	X	X	X					X	X			60
4 Business Operations Manager	X	X	X	X	X					X	X			60
5 Salesperson	X	X	X	X				X		X	X	X		60
6 Junior Software Engineer	X	X	X	X	X			X			X			60
7 Legal Professional	X	X	X	X	X	X				X				60
8 Facilities Management Professional	X	X	X	X	X		X				X			60

| Module ECTs | 10 ECTs | 10 ECTs | 10 ECTs | 10 ECTs | 10 ECTs | 5 ECTs | 5 ECTs | 5 ECTs | 5 ECTs | 5 ECTs | 5 ECTs | 5 ECTs | 5 ECTs | |
Role Profile	Digital Transformation	AI 4 Business	Data Science 4 Business	Cloud Computing 4 Business	Cyber security 4 Business	Blockchain 4 Business	IoT 4 Business	Programming 4 Business	Quantum 4 Business	Ethics & Governance	Innovation	Risk & Change Management	Generative AI	Total Credits
9 Supply Chain Management Professional	X	X	X	X	X					X		X		60
10 Engineering Professional in SME	X	X	X	X	X		X	X						60
11 Office Administrator in SME	X	X	X	X	X			X				X		60
12 Finance Professional	X	X	X	X	X					X		X		60
13 Product Manager	X	X	X	X	X					X	X			60
14 Marketing Professional	X	X	X	X	X					X	X			60
15 Project Manager	X	X	X	X	X					X		X		60
16 Customer Services Professional	X	X	X	X	X					X		X		60

Aligning of Learning Modules with Business Roles

| 1 | **PROCUREMENT PROFESSIONAL** | For a procurement professional, the modules to prioritise in an advanced digital skills Master's course are Cybersecurity, Ethics and Governance, Risk and Compliance, Data Science, Cloud Computing, and AI. Cybersecurity is important for protecting sensitive financial data, while Ethics and Governance and Risk & Change Management ensure compliance with regulations and ethical standards. Data Science is useful for analysing financial data, and Cloud Computing provides storage and accessibility. AI is relevant for automating financial processes. Other modules like Blockchain, IoT, Programming, Quantum, Innovation, and Generative AI may have less direct relevance and can be considered optional based on career goals and interests. |

2 **SMALL BUSINESS OWNER**

As a small business owner, your priority in an advanced digital skills Master's course should be modules that directly impact your business. Based on a small business owner role, the following modules should be taken in order of priority: Data Science: Understanding and analysing data is crucial for making informed business decisions and identifying patterns and trends. Cloud Computing: Cloud technology enables cost-effective storage, seamless collaboration, and scalability for your business operations. AI: Artificial Intelligence can automate tasks, enhance customer experiences, and improve decision-making processes. Cybersecurity: Protecting your business and customer data from cyber threats is essential to maintain trust and avoid potential financial losses. Ethics and Governance: Understanding ethical considerations and legal requirements in the digital landscape is vital for responsible business practices. Risk and Change Management: Being able to identify, assess, and manage risks associated with digital transformations and change initiatives is crucial for business success. Innovation: Learning about innovative technologies and strategies can help you stay ahead of the competition and identify new business opportunities.

3 HR PROFESSIONAL

For an HR professional seeking to enhance their digital skills, the modules should be prioritized based on their specific role. The recommended order of priority for HR professionals is as follows: AI: Artificial Intelligence is increasingly being used in HR for tasks like talent acquisition, employee engagement, and performance management. It can help automate processes, improve decision-making, and enhance employee experiences. Data Science: HR professionals can benefit from data science skills to analyse and interpret data related to workforce planning, talent management, and employee engagement. It can enable data-driven decision-making and help identify trends and patterns. Cloud Computing: With the increasing adoption of cloud-based HR systems, understanding cloud computing is essential for HR professionals. It allows them to leverage cloud-based HR platforms for streamlined processes, data storage, and access to HR analytics. Cybersecurity: HR professionals deal with sensitive employee data, making cybersecurity knowledge crucial. Understanding cybersecurity principles and best practices can help protect employee information and maintain data privacy. Ethics and Governance: HR professionals play a vital role in upholding ethical practices and ensuring compliance within organizations. Knowledge of ethics and governance frameworks can assist in making fair and responsible decisions and maintaining employee trust. Risk and Change Management: HR professionals often deal with organizational change, and understanding risk and change management principles can help them navigate these processes effectively. Innovation: HR professionals need to stay updated with the latest HR technologies and practices to drive innovation within the HR function. This module can help them explore innovative HR strategies and tools.

4	**BUSINESS OPERATIONS MANAGER**	As a Business Operations Manager, the modules HR you should prioritise in an advanced digital skills Master's course are as follows: Data Science: This module will equip you with the skills to analyse and interpret large sets of data, enabling you to make data-driven decisions and optimize business operations. Cloud Computing: Understanding cloud computing will allow you to leverage scalable and cost-effective solutions for storage, processing, and data management, improving operational efficiency. Cybersecurity: With the increasing threat of cyber-attacks, having knowledge of cybersecurity will help you protect sensitive business data and maintain the integrity of your operations. AI (Artificial Intelligence): AI can automate processes, improve decision-making, and enhance operational efficiency. Understanding AI will enable you to leverage its potential in streamlining operations and optimizing resource allocation. Innovation: Developing skills in innovation will help you identify opportunities for improvement and drive continuous improvement in your business operations. Ethics and Governance: Understanding the ethical implications of digital technologies and having knowledge of governance frameworks will ensure that your operations comply with legal and ethical standards.

5 SALESPERSON

For a salesperson in an advanced digital skills Master's course, the priority modules based on their specific role would be as follows: AI: Understanding artificial intelligence will help salespersons leverage AI technologies to enhance sales processes, customer insights, and overall sales performance. Innovation: Developing innovation skills will enable salespersons to identify new opportunities, adapt to changing market trends, and create innovative sales strategies to stay competitive. Ethics and Governance: Salespersons should have a strong understanding of ethical practices and governance in digital environments to ensure they adhere to ethical standards while using customer data and engaging in online transactions. Risk and Change Management: Salespersons need to be equipped with skills in managing risks associated with digital transformations, such as cybersecurity threats, data breaches, and changes in customer preferences. Optional modules that can be considered based on individual interests and industry relevance include Data Science, Cloud Computing, Programming, and Cybersecurity. These modules can provide additional knowledge and skills that can enhance a salesperson's overall digital proficiency.

6	**JUNIOR SOFTWARE ENGINEER**	Programming: This module is essential for a software engineer as it will help you develop strong coding skills and understanding of programming languages. Data Science: This module will give you the necessary skills to analyse and interpret data, which is crucial in software development and decision-making. AI: Artificial Intelligence is a rapidly growing field, and learning about AI technologies and algorithms will help you develop intelligent software solutions. Cloud Computing: Understanding cloud computing will allow you to design and deploy scalable and reliable software applications on cloud platforms. Cybersecurity: As a software engineer, it's important to have a solid understanding of cybersecurity principles and practices to develop secure software systems. Innovation: This module will help you think creatively and develop innovative solutions to complex problems, which is a valuable skill in software engineering. Ethics and Governance: Understanding ethical considerations and governance frameworks in the digital world is essential for software engineers to ensure responsible and ethical software development. Risk & Change Management: Learning about risk management and change management will help you identify and mitigate potential risks and manage software development processes effectively.

7 LEGAL PROFESSIONAL

For a legal professional taking an advanced digital skills Master's course, the recommended modules in order of priority based on their specific role are as follows: Ethics and Governance: This module is crucial for legal professionals as it focuses on the ethical and legal aspects of digital technologies. It provides an understanding of the rules and regulations governing digital practices. Cybersecurity: As legal professionals deal with sensitive information, understanding cybersecurity is essential. This module will equip them with knowledge of protecting data and preventing cyber threats. AI: Artificial Intelligence is transforming the legal industry. This module will provide insights into how AI is used in legal research, contract analysis, and other applications. Data Science: Data analysis plays a significant role in the legal profession. Understanding data science will enable legal professionals to extract valuable insights from large datasets. Cloud Computing: Cloud computing offers flexibility and efficiency in managing legal documents and processes. Legal professionals should familiarize themselves with cloud-based technologies. Programming (optional): Basic programming skills can be beneficial for legal professionals, especially in automating repetitive tasks and analysing large amounts of data. Blockchain (optional): Blockchain technology has applications in areas like smart contracts and secure document management. Legal professionals can benefit from understanding its potential. IoT (optional): Internet of Things (IoT) has implications for the legal profession, particularly in areas like privacy, data protection, and liability. Familiarity with IoT concepts can be advantageous. Quantum Computing (optional): Quantum computing is an emerging technology with potential implications for cryptography and data security. Legal professionals may find it useful to have a basic understanding of quantum principles. Innovation (optional): Legal professionals should stay updated with emerging trends and innovative practices in the digital space. Risk & Change Management (optional): Understanding risk management and change processes will help legal professionals navigate digital transformations in their organization. Generative AI (optional): Generative AI involves creating new content using AI algorithms. While not essential, legal professionals may find it interesting to explore its applications in areas like contract drafting and legal writing.

8 **FACILITIES MANAGEMENT PROFESSIONAL**

IoT (Internet of Things): Facilities management often involves overseeing and optimizing building systems and operations. IoT knowledge is crucial for implementing smart technologies and remote monitoring to enhance efficiency and sustainability. AI (Artificial Intelligence): AI can be used to analyse data from various sources and predict maintenance needs, optimize energy consumption, and enhance occupant comfort. Understanding AI will enable facilities managers to leverage its potential in automating routine tasks and improving decision-making. Data Science: Data-driven decision-making is becoming increasingly important in facilities management. Knowledge of data science will enable professionals to collect, analyse, and interpret data to identify trends, optimize resource allocation, and improve operational efficiency. Cloud Computing: Cloud platforms offer scalable storage and computing power, enabling facilities professionals to access and process data from anywhere. Understanding cloud computing will help in implementing remote monitoring systems, managing data securely, and collaborating with stakeholders. Cybersecurity: As facilities become more connected, the risk of cyber threats increases. Knowledge of cybersecurity will help facilities professionals protect sensitive data, prevent unauthorized access, and mitigate potential vulnerabilities. Innovation: Facilities management requires continuous improvement and innovation to meet changing demands. Understanding innovation methodologies will enable professionals to identify opportunities, implement new technologies, and adapt to evolving trends. Ethics and Governance: Facilities professionals need to navigate ethical considerations and comply with regulatory requirements. Knowledge of ethics and governance will help ensure responsible and sustainable practices in areas such as data privacy, energy consumption, and waste management. Risk and Change Management: Facilities professionals must be adept at managing risks and leading organizational change. This module will provide skills in identifying and mitigating risks, as well as effectively managing change initiatives. Programming: While not as critical as the above modules, basic programming skills can be beneficial to automate tasks, analyse data, and customize software solutions.

| 9 | **SUPPLY CHAIN MANAGEMENT PROFESSIONAL** | AI: Artificial Intelligence plays a crucial role in optimizing supply chain operations by enabling predictive analytics, demand forecasting, and enhancing decision-making processes. Data Science: Data Science skills are essential for collecting, analysing, and interpreting large sets of supply chain data to identify patterns, optimize inventory management, and improve overall operational efficiency. Cloud computing: Cloud computing provides the foundation for scalable and flexible supply chain management systems, enabling real-time visibility, collaboration, and data sharing across the entire supply chain network. Cybersecurity: With the increasing digitization of supply chain processes, cybersecurity is vital to protect sensitive data, prevent cyber threats, and ensure the integrity of supply chain operations. Innovation: Supply chain professionals need to stay updated with the latest technological advancements and innovative practices to drive continuous improvement and optimize supply chain performance. Ethics and Governance: Understanding ethical considerations and governance principles in supply chain management is crucial for ensuring responsible and sustainable practices, mitigating risks, and maintaining compliance. Risk & Change Management: Supply chain professionals should develop expertise in identifying, assessing, and managing risks within the supply chain, as well as effectively managing change to adapt to evolving market dynamics and disruptions. |

10 ENGINEERING PROFESSIOINAL

AI: Artificial Intelligence is highly relevant for engineering professionals as it can enhance automation, decision-making, and problem-solving capabilities. Data Science: Data analysis and interpretation are crucial for engineering professionals to gain insights, optimize processes, and drive innovation. Cloud Computing: Understanding cloud infrastructure and services can enable engineers to leverage scalability, storage, and computing power for their projects. Cybersecurity: With the increasing threat of cyber-attacks, engineering professionals need to understand and implement measures to protect sensitive data and systems. IoT: Knowledge of the Internet of Things can enable engineers to design and develop interconnected systems, optimizing efficiency and enabling real-time monitoring. Programming: Proficiency in programming languages like Python, Java, or C++ is essential for engineering professionals to develop software and algorithms. Blockchain: Familiarity with blockchain technology can be advantageous for engineers working on secure and decentralized systems   Quantum Computing: While still emerging, understanding the basics of quantum computing can provide engineers with insights into future computing possibilities.

11 OFFICE ADMINISTRATOR

Cloud Computing: Office administrators can benefit from understanding cloud-based systems and how they can enhance productivity and efficiency in the workplace. Data Science: Knowledge of data analysis and interpretation can help administrators make informed decisions and optimize processes. Cybersecurity: With the increasing importance of digital security, office administrators should be equipped with cybersecurity skills to protect sensitive information and mitigate potential risks. Programming: Basic programming skills can be useful for office administrators to automate tasks and develop custom solutions. AI (Artificial Intelligence): Familiarity with AI technologies can enable administrators to leverage automation and intelligent systems in their daily operations. Risk & Change Management: Understanding risk assessment and change management methodologies can help office administrators navigate organizational transitions and adapt to evolving digital environments. Ethics and Governance: Knowledge of ethical considerations and governance frameworks is crucial for administrators in handling data, privacy, and compliance issues. Innovation: Exploring innovation strategies and techniques can empower office administrators to drive continuous improvement and creative problem-solving.

12 FINANCE PROFESSIONAL

Cybersecurity: Cybersecurity is crucial for protecting financial data from cyber threats and ensuring the confidentiality, integrity, and availability of sensitive information. Ethics and Governance: Ethics and Governance modules provide an understanding of ethical standards and regulatory frameworks that govern the financial industry. This knowledge is essential for maintaining compliance and ethical practices in financial operations. Risk and Change Management: Risk and Change Management modules equip finance professionals with the skills to identify, assess, and mitigate risks associated with digital transformations and technological changes in the financial sector. Data Science: Data Science modules enable finance professionals to analyse and interpret vast amounts of financial data, identify patterns, and make data-driven decisions. This skill is valuable for financial analysis, risk assessment, and strategic planning. Cloud Computing: Cloud Computing modules provide knowledge of cloud-based platforms and services, which are increasingly adopted by financial institutions for data storage, scalability, and accessibility. Understanding cloud technology is essential for efficient data management and collaboration. AI (Artificial Intelligence): AI modules introduce finance professionals to the potential of AI applications in automating financial processes, fraud detection, predictive analytics, and customer service. This knowledge can enhance operational efficiency and decision-making in the finance industry.

13 PRODUCT MANAGER

AI: As a Product Manager, understanding artificial intelligence and its applications can help in developing innovative and intelligent products. Data Science: Knowledge of data science techniques and tools is essential for leveraging data-driven insights and making data-informed decisions. Cloud Computing: Familiarity with cloud computing platforms and services enables efficient product development, deployment, and scalability. Cybersecurity: Understanding cybersecurity principles and best practices is crucial for ensuring the security and protection of digital products and user data. Innovation: Developing skills in innovation methodologies and strategies can help Product Managers drive continuous improvement and create competitive advantages. Ethics and Governance: Knowledge of ethical considerations and governance frameworks is important for ensuring responsible and compliant product development and deployment. Risk & Change Management: Proficiency in managing risks and navigating organizational changes is valuable for Product Managers to mitigate potential issues and drive successful product launches. Optional Modules: Depending on specific interests and career goals, Product Managers may consider optional modules like Blockchain, IoT, Programming, Quantum Computing, and Generative AI to enhance their skillset and explore emerging technologies.

14 MARKETING PROFESSIONAL

Data Science: Data Science is crucial for analysing marketing data and extracting valuable insights for effective marketing strategies. Cloud Computing: Cloud Computing provides storage and accessibility to vast amounts of marketing data, facilitating collaboration and real-time decision-making. Cybersecurity: Cybersecurity is essential for protecting customer data and ensuring trust and privacy in digital marketing campaigns. AI (Artificial Intelligence): AI can automate marketing processes, optimize targeting, and personalize customer experiences, enhancing marketing effectiveness. Ethics and Governance: Ethics and Governance modules ensure ethical and legal compliance in digital marketing practices, maintaining brand reputation and customer trust. Risk and Change Management: Risk and Change Management modules equip marketing professionals with the skills to identify and mitigate potential risks and adapt to evolving market dynamics.

| 15 | **PROJECT MANAGER** | Risk & Change Management: As a Project Manager, it is crucial to have a deep understanding of managing risks and driving effective change within projects. Ethics and Governance: With the increasing use of AI and emerging technologies, having knowledge of ethical considerations and governance frameworks is essential for responsible project management. Data Science: Data plays a vital role in project management. Understanding data science concepts will enable Project Managers to make data-driven decisions and derive insights from project data. AI: Artificial Intelligence is transforming various industries, including project management. Having knowledge of AI concepts and applications will enhance a Project Manager's ability to leverage AI technologies in project planning and execution. Cloud Computing: With the growing adoption of cloud computing in project management, understanding cloud platforms and their capabilities will enable Project Managers to effectively manage project resources and collaborate with team members. Cybersecurity: In an increasingly digital world, Project Managers need to be aware of cybersecurity threats and best practices to protect project data and stakeholders. Programming: Basic programming skills can be valuable for Project Managers, allowing them to understand technical requirements, communicate effectively with developers, and troubleshoot project-related issues. Innovation: Project Managers should have a mindset for innovation to drive creativity and find new solutions to project challenges. |
| 16 | **CUSTOMER SERVICES PROFESSIONAL** | AI: Customer service professionals can benefit from understanding how artificial intelligence is transforming the industry. AI-powered chatbots and virtual assistants are becoming increasingly common in customer service interactions.

Data Science: Data plays a crucial role in customer service. By gaining expertise in data science, professionals can analyse customer behaviour, identify patterns, and make data-driven decisions to enhance the customer experience. |

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CUSTOMER SERVICES PROFESSIONAL

Cybersecurity: Customer data security is a top priority for any organization. Understanding cybersecurity concepts and best practices will enable professionals to protect customer information and ensure a secure environment for transactions and interactions.

Ethics and Governance: Customer service professionals often handle sensitive customer information. An understanding of ethics and governance will help them navigate privacy regulations, data handling practices, and maintain trust with customers.

Risk & Change Management: As digital technologies evolve, customer service professionals must adapt to new tools and processes. Knowledge of risk and change management will enable them to effectively manage transitions, minimize disruptions, and ensure a smooth customer experience.

Cloud Computing: Cloud-based solutions are increasingly utilized in customer service operations. Familiarity with cloud computing will enable professionals to leverage the scalability, flexibility, and cost-efficiency offered by cloud platforms.

Programming: While not as critical as the previous modules, basic programming skills can be beneficial for customer service professionals. Understanding programming concepts can help them customize and troubleshoot software tools used in their role.

Blockchain: Blockchain technology, while not directly applicable to customer service, is gaining traction in areas such as supply chain management and finance. It can be useful to have a basic understanding of blockchain's potential impact on related industries.

IoT: Internet of Things (IoT) is another emerging technology that may not have direct relevance to customer service. However, as IoT applications continue to grow, understanding its potential impact on customer interactions and service delivery can be beneficial.

Quantum: Quantum computing is an advanced area of study and may not have immediate relevance to customer service professionals. However, having a basic understanding of its principles can help professionals stay informed about potential future advancements.

Innovation: While innovation is important across all industries, it is not specific to the customer service profession. However, gaining knowledge of innovation frameworks and methodologies can contribute to a broader understanding of digital transformation.

Generative AI: Generative AI is a specialized field and may not be directly applicable to customer service professionals. It is a more advanced topic that can be explored once a solid foundation in other relevant modules has been established.

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Learning, Teaching, and Assessment

Learning and Teaching

The Learning and Teaching strategy for this programme has been defined by the Academic partners. The strategy outlines five themes upon which the strategy is based and the broad principles and aims for the interpretation of these themes. The Learning and Teaching Strategy for this programme seeks to address each of those themes while being mindful of the practical nature of the programme and its learners.

1. *Focus on the Learner*

At the heart of the Learning and Teaching strategy for this programme is the principle that learners actively engage in the learning process rather than passively receiving information. Consequently, teaching in this programme strives to connect course content with real-world applications and fosters opportunities for learners to engage with both their peers and faculty in a collaborative learning environment.

The teaching methodology emphasizes the creation of relevant and meaningful contexts for learners to apply the knowledge and skills they acquire. This is predominantly achieved through hands-on tutorials across most modules, exposing students to industry-relevant technologies and practices through practical laboratory exercises.

Our teaching styles and learning contexts prioritize flexibility, aiming to motivate and captivate learners. Assessments are viewed as valuable learning experiences, tailored to the level of study and designed to prepare learners for their academic progression.

Students will be afforded the chance to engage in workshops led by industry experts, actively participate in industry-related projects, explore opportunities for industry placements, and select modules from an academic institution of their preference that offers the programme or its specific modules.

The programme aims to cultivate an understanding of core disciplines within the field of Advance Digital Technologies through these teaching and learning strategies. It illustrates how these disciplines interconnect to equip graduates with the skills necessary to navigate the demands of digital transformation in their roles and in the dynamic and swiftly evolving business environment.

The program's design places significant emphasis on its practical nature, especially in the area of Advanced Digital Technologies and skills. In response to the need for asynchronous inquiry and continuous learning, each academic institution will support face-to-face and online formats. Furthermore, each academic institution will provide learning support services, including Learning

Support, Disability Support, Assistive Technology Support, and Computing Support, and are proficient in delivering their services online.

1. *Excellence in Teaching*

Each academic institution has a long-standing tradition of exploring new and innovative Learning and Teaching Strategies such as Problem Based Learning (PBL), Game Based Learning, Gamification, Flipped Classroom, Blended Learning, and Online Learning. In line with the theme of Excellence in Teaching, it is anticipated that such innovations will be put into practice on this programme as outlined above.

2. *Leveraging new technology to enhance and transform teaching, learning and assessment practices*

For asynchronous learning, which occurs through the projects centralised learning portal, the academic institutions continually pioneer innovative teaching methods harnessing emerging technologies to enrich the teaching and learning experience. A prime example of this innovation is the adoption of the Flipped Classroom approach mentioned earlier. This approach entails delivering lectures to students via pre-recorded videos prior to class, thereby optimizing in-class time for in-depth exploration of module content.

When it comes to synchronous online classes, cutting-edge Live Classroom tools are employed to ensure that the online learning environment is as engaging and functional as a traditional face-to-face classroom. These tools facilitate real-time discussions through voice and text chat, enable screen sharing and control, provide breakout rooms for group collaboration, support live polling, whiteboards, and more. Additionally, all online classes will be recorded, allowing students to revisit them at their own convenience. These tools play a pivotal role in creating dynamic and learner-cantered learning environments.

Assessments

1. *Quality Assessments*

From an operational standpoint, within this program, all these aspects will be encompassed by the established quality assurance (QA) guidelines of each academic institution delivering the programme, which have received approval through their national accreditation process. Consequently, all assessments will adhere to standard QA protocols for assessment processes, along with any additional supplementary procedures as required.

Assessments are planned at programme level to ensure that the workload is distributed throughout each semester/trimester.

The programme summative assessment strategy is designed to ensure that the module assessments have been devised to cumulatively build towards the evaluation of the module LOs, and by extension the programme's LOs. The choice of assessment mechanisms: continuous assessments; lab work; individual as well as team projects; presentations; peer review; and terminal examinations may be selected based upon their affordances to determine student knowledge acquisition and mastery appropriate to the programme.

The rationale of the assessment follows five principles:

1.   Students are responsible for demonstrating their learning achievement: A student who is enrolled on a programme should submit his or her assessment for the purpose of demonstrating attainment of the programme's intended learning outcomes.

2.   Assessment supports standards based on learning outcomes: Awards are made and classified exclusively on the basis of criterion referenced assessment of learning outcomes (knowledge, skill, and competence).

3.   Assessment promotes and supports effective learning and teaching: Effective assessment is intrinsic to effective teaching and learning, and is (i) consistent with, (ii) supportive of, and (iii) derived from the intended programme and module learning outcomes.

4.   Assessment methods are continuously reviewed: The programme team continuously review the assessment methods as necessary to adapt to evolving requirements.

5.   Students are well informed about how and why they are assessed: Students need to be (i) familiar with and understand the intended module and programme learning outcomes, relevant programme and module assessment strategies and (ii) regularly reminded of the assessments and their regulations.

A repeat assessment for a particular module shall assess all the learning outcomes of that module. Candidates repeat the assessment for the module if they do not successfully pass the module. Repeat assessments for a module cover all learning outcomes of that module.

Learners may build on prior work from the component assessments.

The minimum mark required for a pass in any module is 40% of the maximum marks available. In each module with component assessments, the marks awarded to each candidate shall be the combined total of the marks scored in the component assessments.

Additionally, formative assessments activities such as in-class individual or group activities are utilised to assess the learning progress of learners.

1. *Professional Development for all involved in teaching and learning*

It is imperative that all individuals engaged in lecturing, supporting, supervising, and guiding learners, whether in online or face-to-face settings, receive appropriate guidance and preparation for their roles. While fostering a nurturing live learning environment is crucial, it is equally vital to extend support beyond the classroom for academic pursuits. Therefore, prior to the program's commencement, lecturers, facilitators, lab assistants, and support staff will undergo a training programme that outlines their roles and assessment structures. They will also receive guidance on the most effective ways to assist students in achieving their learning objectives while delivering both synchronous and asynchronous content in both online and face-to-face context.

Digital

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4

Evolving your digital future