

Year 1: Trimester 1

Digital Technology in Organisations & Society (15 credits)

Brief Summary: Businesses today operate in a dynamic, complex and highly integrated digital environment. This unit will challenge students to critically evaluate the impact of digital technology on contemporary businesses and their wider community. The unit will cover issues from the perspective of a simple business to the global business community touching on topics such as ethics and legal issues.

Indicative Content: The topics of the unit will include the following: Overview of contemporary digital technologies and their integration into business processes, business-technology alignment, phenomenon of digital transformation and its implications for businesses, organisation's culture and digital technologies, societal and environmental implications of digital technologies, Freeman's Stakeholder theory, Elkington's Triple Bottom Line, etc. and ethical and legal issues of digital technologies.

Introduction to Programming (30 credits)

Brief Summary: This unit introduces computer programming in a high-level programming language, developing your skills in problem-solving, program design, solution implementation and testing. You will learn fundamental programming principles, and how you can combine standard techniques to solve simple problems using computer software. You will gain practical experience in developing software using industry-standard programming tools in a variety of scenarios.

Indicative Content: The unit will introduce the basics of computer programming, using a contemporary programming language (e.g., Java/Python/C#). Students will use an industry-standard development environment and associated tools to create programs that help solve simple problems. The unit will introduce students to fundamental programming techniques (e.g., use of variables, data types, sequencing, selection, and iteration), along with basic techniques for structuring programmes (e.g., functions, classes, object orientation). Students will complete a variety of practical exercises providing experience of problem solving, software design, implementation, testing and debugging.

Year 1: Trimester 2

Database Fundamentals (15 credits)

Brief Summary: This unit introduces learners to the use of the relational model to structure data for efficient storage and retrieval. Learners will gain practical experience in the construction and usage of databases in an industry-standard database management system.

Indicative Content: Understanding the relational model and the client/server model for databases; interacting with relational databases using SQL DML and DDL; designing relational databases and communicating designs using techniques such as ERDs and normalisation.

Introduction to Business Systems (30 credits)

Brief Summary: The unit introduces the role of information systems in organisations, giving students the opportunity to analyse organisational requirements and develop suitable information system solutions.

Indicative Content: Organisational design and the role information systems play in managing common organisational issues. The principles of information systems and the need for good systems design. Systems development: identifying the need for a new or enhanced system; analysing the requirements of the system and generating initial designs to match requirements; justifying suitable methodologies to aid in the development and implementation of an information system.

Year 1: Trimester 3

Tailored off-the-job activity such as core masterclasses, enrichment activities, carbon literacy, EDI, PREVENT, careers, etc.

Year 2: Trimester 1

IT Project Management (30 Credits)

Brief Summary: This unit examines the management of technology projects, looking in depth at the various processes which constitute technology development lifecycles. You will learn how the analysis, modelling, specification, design, implementation, testing, and maintenance of systems are commonly shaped into specialised project management methodologies. You will gain experience in managing projects using recognised methodologies, whilst presenting your work to both technical and non-technical audiences.

Indicative Content: In addition to taught content on a selection of contemporary project management methodologies and the techniques of which they comprise, a sizeable portion of the unit will be dedicated to practical project work. Students will be provided with a brief and will be invited to complete their project using their choice of project management methodology and reflecting the theory of the taught sessions. The unit will also dedicate taught session time to providing individual support and formative feedback to students as they work through their chosen project. Upon completion, students will report on how they applied chosen project management theory and methodologies to a scenario, and this will form the basis of their assessment.

Computer Networks and Security (15 credits)

Brief Summary: This unit introduces the core principles underpinning the design of both internal corporate computer networks and the wider internet. You will study the architecture of wired and wireless computer networks, how network traffic is directed from its source to its destination, and how the internet is structured and managed. You will also learn the core principles of computer security including common risks and threats, along with ways to mitigate them.

Indicative Content: The unit will cover physical network topology for both wired and wireless networks, introducing TCP/IP networking, IP addresses, routing, and the Domain Name System. Students will undertake practical tasks working with sockets and connections, IP addresses and DNS records.

Students will learn of common security properties (e.g., Confidentiality, Integrity, Availability) and risks (e.g., Disclosure, Alteration, Denial). Using case studies of computer security incidents, students will learn common classes of security threat (e.g., Insider Attack, Malware), common classes of security vulnerability (e.g., Injection, Overflow) and common approaches to mitigating them (e.g., Access Control, Encryption, Firewalls).

Year 2: Trimester 2

Introduction to Web Development (15 credits)

Brief Summary: The unit provides a robust introduction to client-side web development. You will design and create semantic, standards-based, accessible and valid websites using industry standard technologies.

Indicative Content: Web development (HTML, web accessibility, semantic mark-up, standards-based mark-up, CSS) and web design (accessibility, layout, navigation, the information architecture).

Advanced Programming (30 credits)

Brief Summary: This unit tasks you with working on industry-inspired problems involving the creation of moderately complex software solutions. You will gain practical experience of documenting and testing existing code, as well as creating applications using a variety of libraries, tools, design patterns and techniques.

Indicative Content: Students will study a range of programming techniques that build upon their previous experience to allow them to develop more substantial and more complex software. The unit will emphasize coding to specification, both written and modelled, and the use of modern testing techniques to verify correctness. Students will use prevalent code documentation techniques to communicate their code's design and operation to other developers.

Students will develop software solutions using industry-standard architectures, where multiple systems or components communicate via published APIs or interfaces, using industry-standard methods for the transfer of data and/or storage. Students will synthesise documentation to be able to use standard libraries to aid in the completion of common tasks.

Year 2: Trimester 3

Tailored off-the-job activity such as core masterclasses, certifications such as AWS Cloud Practitioner Essentials, Green Software, etc..

Year 3: Trimester 1

Full Stack Web Development (15 credits)

Brief Summary: This unit furthers students' knowledge and skills for web development, tasking them with studying client-side and server-side web development languages, platforms, tools and technologies to create complete web applications.

Indicative Content: Students will build upon their knowledge of web technologies and the client-server architecture to develop a full-stack web application. The unit will teach industry recognised front-end and back-end frameworks, as well as communication through the use of APIs. Additionally, students will develop their knowledge of a range of tools and techniques required for working in industry. For example, version control systems (VCS) and writing clean, self-documenting code. Such skills will be highly relevant for students looking at placements, or life as a software developer after university.

Software Design and Architecture (30 credits)

Brief Summary: In this unit, students will study standard architectures and designs for solving common software problems. They will learn to make informed trade-offs between performance, readability, maintainability and reusability in their software. They will gain experience in engineering software for reliability when dealing with inputs from users or other systems.

Indicative Content: Students will examine the software design process considering factors such as readability, maintainability and reusability. A range of software design patterns will be examined to understand why they have become standard patterns and how to identify and use them in software designs. Existing code bases such as open-source projects will be used so students are exposed to real-world large-scale software architecture.

Year 3: Trimester 2

Operating Systems (15 credits)

Brief Summary: This unit introduces the theory and practice of computational operating systems, with emphasis on the fundamental aspects concerning the structure and organisation of operating systems and study of associated problems.

Indicative Content: Operating systems (OS) structure and organisation, process and threads, memory management, along with virtual memory concepts and computer architecture support for memory management. File systems concepts and aspects of structural and organisational choices. Overview of the most used Operating Systems and OS virtualisation. Examples of OS management and system calls through shell scripting or programming.

Enterprise Programming (30 credits)

Brief Summary: In this unit, students will build secure, robust, and maintainable enterprise-level applications using a variety of contemporary distributed programming techniques.

Indicative Content: Enterprise Design Patterns - Use of common enterprise type design patterns and implementation in a suitable language. Web services and related technologies, (e.g., WSDL, SOAP, XML/JSON). Cloud Computing Architectures, Models and Frameworks. Enterprise Frameworks (e.g., Spring, Hibernate).

Year 3: Trimester 3

Tailored off-the-job activity such as personal development and preparation for final year.

Year 4

Software Testing and Quality Assurance (30 credits)

Brief Summary: In this unit, students will study a variety of contemporary software verification and testing tools and techniques. Students will gain experience testing various aspects of systems behaviour using industry standard test automation tools and strategies.

Indicative Content: Students will study advanced automated testing tools for the large-scale testing of complex, interlinked software systems. Students will apply these techniques, alongside their existing testing experience, to design and implement multi-faceted software testing approaches to verify robustness in a delivered system. Students will learn to mock systems and services other than those under test during unit testing, use integration testing to verify that units work together as expected in a complete system, and use standard automation tools to conduct automated tests during development and/or deployment. Students will study industry standard measures of testing results and coverage. Students will study software development techniques that emphasize software testing at different points of development to produce correct and robust software.

SE Synoptic Project

Brief Summary: Apprentices will complete a work-based project, appropriate to their role and pathway, that has a significant, specified and quantifiable expected benefit for their employer organisation. This can be, for example, based on a specific problem, recurring issue, or a new idea or opportunity, leading to a new or improved product and/or process.

Indicative Content: Apprentices will scope a project in consultation with both their supervisor, employer and independent assessor that enables them to demonstrate the knowledge, skills and behaviours (KSBs) mapped to their pathway for this unit from the degree apprenticeship standard for the Digital and Technology Solutions Professional (DTSP) Integrated Degree.

The apprentice will then plan, undertake and manage the project process through to its completion and the deliverable of a new product and/or process (which may be recommendations for changes to an existing process where appropriate). They may work as part of a team to complete a project,

which could include external or internal support, but the project output must be their own work and reflective of their own role and contribution to this wider teamwork.

Apprentices will be expected to evaluate the significance and benefit of their project to their employer organisation, and hence demonstrate critical awareness of the role of their own work in achieving these benefits. They will therefore record how their achievement of KSBs is demonstrated in their project with a skills mapping to be included in the appendix of the written report.

Reflective Practice for Digital and Technology Solutions Professionals

Brief Summary: Within this unit, learners will reflect on their skills, knowledge and behaviour and identify a gap to address. A portfolio will provide a record of the specific skills and knowledge apprentices have developed and used throughout their degree and provide an opportunity to reflect on their professional development objectives within a report. Learner will complete a training activity to address a gap in their skills and/or knowledge.

Indicative Content: A portfolio will be developed over all 4 years of the degree but only contributions relating to level 6 will be formally assessed within this report. Personal Tutors (PTs) and work mentors will guide apprentices in the development of the portfolio. PTs will review the portfolio from the point of view of its assessment at level 6 and provide formative feedback at set times throughout the degree to guide the apprentice. They will offer advice about developing a well-documented account of the apprentice's development of skills and knowledge and appropriate reflections on their learning and its professional impact. Mentors at work will guide the students from the point of view of documenting their work experience and completion of Personal Development Review objectives.