

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

Data Visualisation and Dashboard Design (15 credits)

Brief Summary: This unit introduces students to the basics of data visualisation and the design of data dashboards. Students will learn the basics of human visual perception and understand how design decisions can impact on the perception of data. They will practice producing data visualisations and dashboards for realistic scenarios using industry standard tools.

Indicative Content: Understanding human visual perception; the fundamentals of data visualisation design; creating data dashboards with industry standard tools.

Maths for Data Science (30 credits)

Brief Summary: This unit teaches students the fundamental maths of data science and analytics.

Indicative Content: Descriptive statistics; inferential statistics and hypothesis testing; basic probability; linear algebra; vectors and matrices.

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

Advanced Relational Databases (15 credits)

Brief Summary: This unit extends students' knowledge and understanding of relational databases. Learners will study how to write more advanced SQL including creating non-table structures (e.g. indexes and views) and using advanced concepts in queries (e.g. windows, cases). Learners will gain an understanding of how relational database management systems work including transactions and query processing. They will gain a deeper understanding of database design with more advanced normalisation.

Indicative Content: Learners will study advanced SQL statements and queries and gain an understanding of the inner workings of database management systems including concurrent access

and transactions, query processing and performance and advanced database design techniques including advanced normalisation up to fifth normal form.

Python for Data Science (30 credits)

Brief Summary: This unit introduces students to Python programming and using notebooks for data science. Students will gain experience using various packages such as pandas, numpy, scipy and others. They will use real-world data sets to learn how to apply data wrangling and cleaning; calculate statistics and create data visualisations.

Indicative Content: Using Python notebooks; data wrangling with pandas; implementing statistics with numpy and scipy; data visualisation with matplotlib and seaborn; data cleaning with pandas and numpy.

Year 3: Trimester 2

Data Science Ethics (15 credits)

Brief Summary: This unit introduces learners to the ethical and legal issues relating to the analysis of data. They will gain an understanding of relevant national and international legislation governing the handling of data in the UK in data science and machine learning pipelines, including GDPR and upcoming regulations. They will also examine some of the ethical issues that can arise when gathering, storing and analysing data including issues such as informed consent, bias, anonymisation etc.

Indicative Content: Understanding relevant legislation including GDPR; ethical issues including informed consent, data protection, bias, anonymisation.

Machine Learning (30 credits)

Brief Summary: This unit introduces students to machine learning. Students will learn the different types of machine learning problems and some machine learning algorithms. They will gain experience applying those algorithms with python and also learn the basics of improving machine learning with techniques such as feature selection, feature engineering and (hyper-)parameter tuning.

Indicative Content: Understand labelled and unlabelled data; regression and classification algorithms; applying machine learning in python; feature selection and engineering; (hyper) parameter tuning

Year 3: Trimester 3

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

Year 4

Unstructured Data (30 credits)

Brief Summary: This unit introduces students to unstructured data and techniques for handling and learning from it. Students will gain experience with non-relational models and database management systems. They will also learn the fundamentals of Natural Language Processing (NLP) and computer vision, gaining experience in applying appropriate techniques in python.

Indicative Content: Non-relational databases; natural language processing; computer vision; deep learning

DA 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.