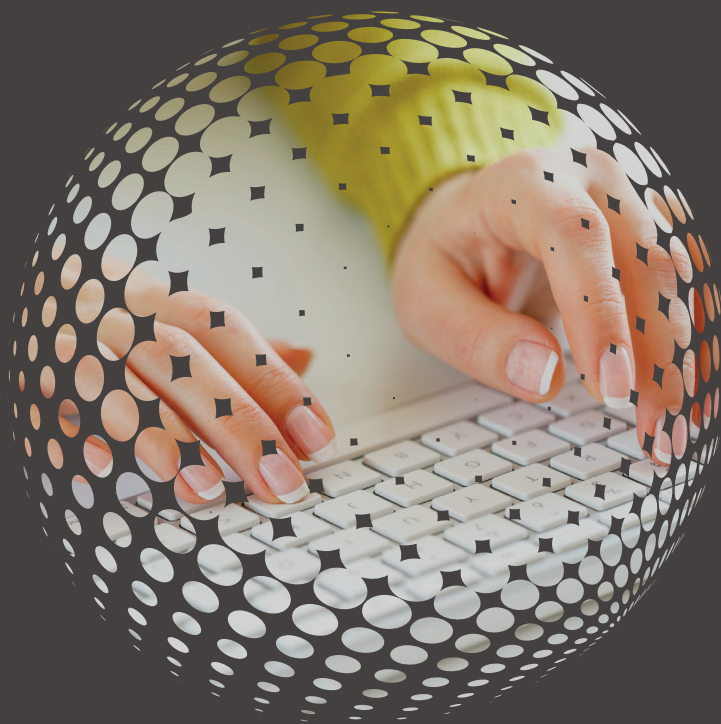




Digital and Technical Skills

Digital and Technology Solutions Professional Degree Apprenticeship

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Introduction

The Open University's Digital and Technology Solutions Professional Degree Apprenticeship programme develops the higher level skills and behaviours required to create confident and capable digital and technology professionals. Graduates from the programme will be competent to operate in a range of related digital roles, supporting their organisations to develop new products and services and increase productivity using digital technologies.

The Digital and Technology Solutions Professional Degree Apprenticeship is a work-based higher education programme that integrates academic and work-based learning in a way that can be delivered flexibly around the demands of your organisation.

The Open University's apprenticeship has been awarded Tech Industry Gold Accreditation by the Tech Partnership, a consortium of leading employers collaborating to develop a highly-skilled and professional digital workforce throughout the UK.

The programme is based on a core set of outcomes that are supplemented by one of the following four specialisms:



Cyber Security Analyst



Data Analyst



Software Engineer



Network Engineer

Key areas covered are:

- Career development and employability
- Introduction to computing and information technology
- Computing technologies
- Change, strategy and projects at work
- Web technologies

- Object-oriented programming (OOP) with Java
- Service, project and requirements management
- IT systems: planning for success

Topics featured in the chosen specialisms are:



Cyber Security Analyst: Information security; Web, cloud and mobile technologies



Data Analyst: Data structures, algorithms and computability; Data management and analysis



Software Engineer: Software engineering; Web, cloud and mobile technologies



Network Engineer: CCNA (Cisco Certified Network Associate)

Level

This degree apprenticeship standard is at Level 6.

Programme Duration

The typical duration for this apprenticeship is 4-4.5 years.

Entry Requirements

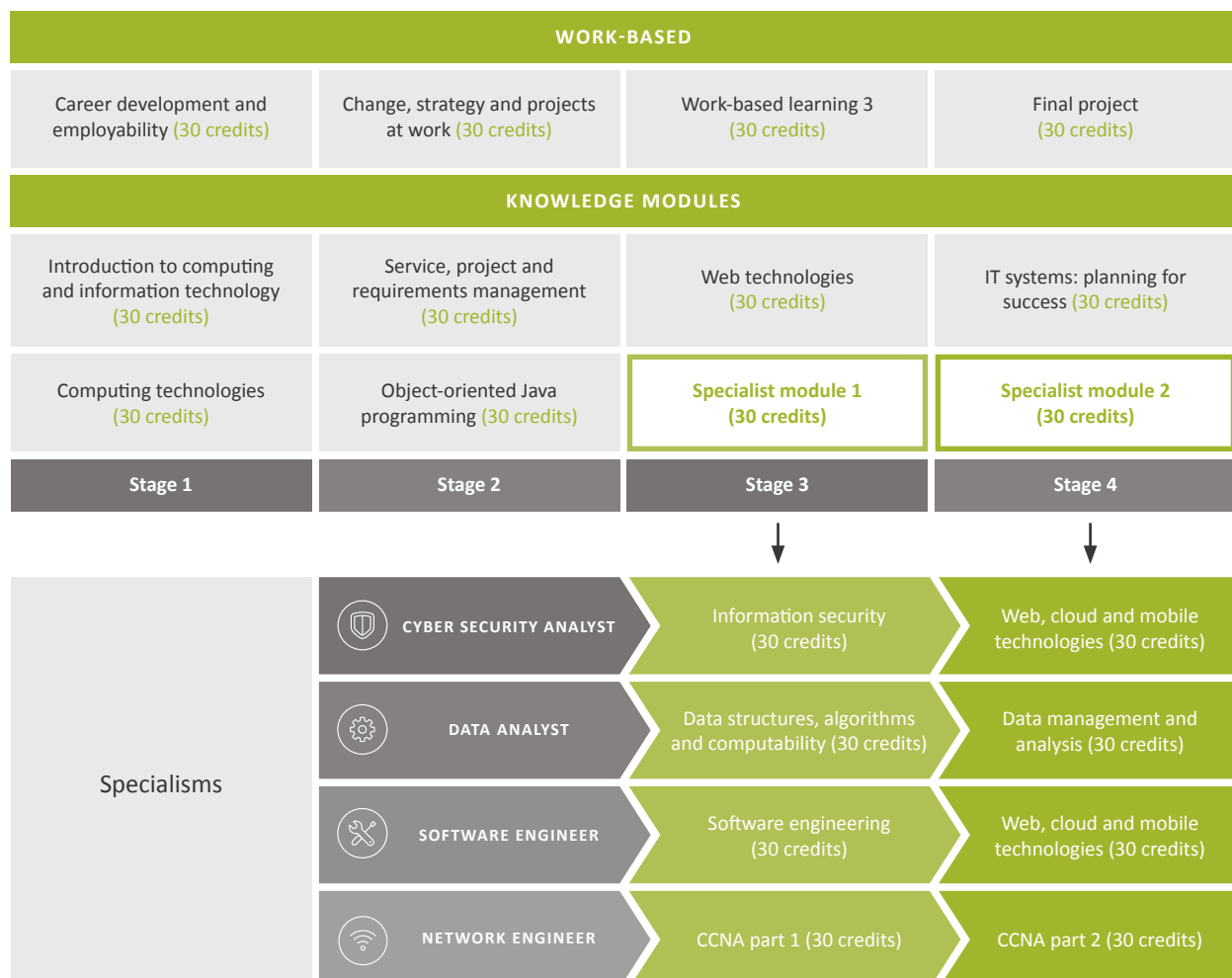
The Open University has no formal entry requirements for the programme, although the employer may have their own selection criteria.

Apprentices are required to have gained functional skills in English and maths Level 2 upon completion of the programme.

What qualifications are included within the apprenticeship?

How is the apprenticeship programme structured?

The programme is delivered over four stages, with a combination of study modules and work-based learning modules. In stage 3, apprentices move onto a chosen specialism.



Gained knowledge, skills and behaviours

The aim of the programme is to equip apprentices with the knowledge, skills and behavioural characteristics they will need to perform in their role and underpin their careers as Digital and Technology Solutions professionals. As well as developing a broad foundation in the fundamental technologies and techniques of computing and the issues involved in their application, the apprenticeship will also:

- Enable apprentices to keep ahead in a rapidly changing subject area by helping them to develop as an independent learner
- Contextualise their learning within the workplace to prepare them for their role
- Develop relevant skills in communication, numeracy, and collaborative working

- Imbue the qualities that come with being a graduate in any discipline: specialist knowledge, intellectual self-confidence and independence, analytical ability and the life-long learning skills needed to keep up with fast-changing technologies

And, depending on the chosen specialism, the apprentice will gain practical experience of:



Identifying and mitigating cyber security risks and challenges



Applying data management and analysis techniques



Designing, building and evaluating software components and systems



Analysing, operating and managing computer networks



The learning outcomes of the Digital and Technology Solutions Professional Degree Apprenticeship fall within four important categories.

1. Knowledge and understanding

By completion, apprentices will have:

- A broad critical understanding of the fundamental principles, concepts and techniques underlying digital and technology solutions
- An understanding of a range of models, languages and approaches to support the analysis, design and evaluation of digital systems
- An understanding of the range of situations in which digital systems are used, particularly within their work environment, the ways in which people interact with them, and the possibilities and limitations of such systems
- A critical awareness of the professional, ethical, social and legal issues that can be associated with the development and deployment of digital systems, and how these are managed in general and within their own work environment
- An awareness of major trends in digital technologies and the implications of these trends

2. Cognitive skills

By completion, apprentices will be able to:

- Apply and critically evaluate key computing concepts in a range of contexts including their work environment
- Select and apply appropriate techniques and tools for abstracting, modelling, problem-solving, designing and testing digital systems in the context of their work, and be aware of the limitations involved
- Compare, contrast, critically analyse and refine specifications and implementations of digital systems
- Use a relevant competence framework, such as SFIA (Skills Framework for the Information Age), to assess and improve their professional performance
- Devise and carry out a project in their workplace that applies and extends their knowledge, understanding and competence, and reflect critically on the processes involved and the outcomes of their work



3. Practical and professional skills

By completion, apprentices will be able to:

- Demonstrate an appropriate level of competence in the skills related to their chosen specialism
- Analyse, design, evaluate and/or test digital systems, using appropriate simulation and modelling tools where appropriate
- Plan and organise work appropriately, including keeping systematic records of work in progress and outcomes
- Assess their own competence against relevant skills frameworks, such as SFIA, by identifying their own strengths, weaknesses and any gaps in their experience, followed by investigating appropriate opportunities for personal development
- Demonstrate the ability to undertake ongoing learning in order to keep up to date with digital technologies
- Identify and address the professional, ethical, social and legal issues that may arise during the development and use of digital systems
- Use appropriate professional tools to support their work

4. Key skills

By completion, apprentices will be able to:

- Communicate information, arguments, ideas and issues clearly and in appropriate ways; bearing in mind the audience for and the purpose of the communication
- Work in a group, communicating effectively both using digital communication and in face-to-face contexts
- Work independently, planning, monitoring, reflecting on and improving their learning
- Find, assess and apply information from a variety of sources, using information technology as necessary
- Select and accurately use, appropriate numerical and analytical techniques to solve problems
- Recognise and understand a range of technological problems and select suitable techniques for solving them

Programme components

The apprenticeship is made up of six components:

1. The **Initial assessment** will be undertaken by a Programme Delivery Manager. They will review apprentices' current level of knowledge, work experience and job competencies as well as previous qualifications and maths and English skills. This is used to tailor individual learning plans to help apprentices make the most of the apprenticeship.
2. **Study modules** will build understanding of the key theories, skills and competencies in taking apprentices' digital skills to a higher level. Academic Tutors will facilitate study, support learning and feedback, and mark module assessments.
3. **Work-based learning modules** guide apprentices in applying and evidencing their academic knowledge to their working practices. This often involves apprentices reflecting on their role and learning within the workplace. The Work-based Learning Tutor helps the student to synergise and integrate their work-based and academic learning.
4. The **portfolio** records work-based learning evidence, demonstrating apprentices' application of the knowledge, skills and behaviours they have learnt. Apprentices will record how they have practically applied their newly acquired knowledge and skills in the workplace, as well as the feedback they receive from line managers, peers and direct reports.
5. The **integrated final synoptic assessment**, consisting of a work-based project and panel interview, determines whether apprentices have successfully met the learning requirements of the Digital and Technology Solutions Professional Degree Apprenticeship programme. The work-based project demonstrates the application of the skills and knowledge learnt during their apprenticeship, and is derived from the apprentice's role and work practice. The employer is expected to work with the practice tutor and apprentice to ensure that the project proposal is feasible and relevant. The employer is also encouraged to complete an evaluation of the final project report to inform the assessment and grading and will need to provide a representative to sit on the interview panel that follows submission of the project report. The integrated final synoptic assessment will be subject to an independent quality assurance process.
6. The **BSc (Honours) Degree in Digital and Technology Solutions** is awarded by The Open University and the apprentice has successfully completed the programme. Apprentices will also receive an Apprenticeship Certificate from the Institute for Apprenticeships.



How is the apprenticeship programme delivered?

Using The Open University's innovative educational technology, the programme is delivered flexibly around apprentices' personal lives and the demands of the organisation.

The tutor-supported online learning is both varied and interactive, with rich media formats that engage and enthuse apprentices on their journey. Learning can be accessed 24/7 on computers, tablets and mobile devices, so apprentices can study at home, work and on the move. Online forums and discussion groups allow apprentices to learn from different industries and backgrounds.

As part of an apprentice's study schedule, the government requires that at least 20 per cent of an apprentice's working week is dedicated to off-the-job learning.

The Open University's flexible learning approach makes it a lot easier for employers to effectively manage this, while

minimising the impact on productivity in the workplace. It doesn't have to be a set day a week. For example, you may allow the learner the first hour of each day or a couple of afternoons per week – whatever works best for them and your organisation.

For each study module, there will be a number of face-to-face tutorials that all apprentices are recommended to attend. For those who are unable to make it, there will be a flexible online alternative. Apprentices and their line managers will have face-to-face or virtual meetings with their practice tutor at least four times a year.

In this blended learning approach, travel costs and expenses are also minimised, as apprentices attend fewer classroom workshops.

What support will you and your apprentices receive?

A degree apprenticeship can be hard work and takes a lot of commitment, but The Open University has the experience and support to help apprentices succeed and positively impact on your organisation.

The Open University has nearly 50 years' experience in making sure knowledge sticks in the minds of busy working adults. Currently 4 in 10 of all UK part-time undergraduate students are studying with The Open University and 76 per cent of Open University students are learning while in employment.

Apprentices and the employer will be supported by the following key people from The Open University:

- **Practice Tutor** – Helps to integrate learning into the workplace across the entire programme. Apprentices and their line managers will have face-to-face or virtual meetings with their practice tutor at least four times a year.
- The practice tutor will review and support the apprentice's portfolio, workplace project and the final assessment.

- **Academic Tutor** – Subject-matter experts who facilitate learning within each of the modules, through personalised tuition, support and feedback.
- **Programme Delivery Manager** – Supports the employer to deliver apprenticeship programmes, that meet business needs and are to agreed financial and performance targets. Also provides the employer with regular management information.

On top of the above, The Open University also provides the following support:

- Access to the Student Support team, with a dedicated apprenticeships advice line
- Disability and accessibility support (21,000 people with disabilities studied with The Open University in 2014/15)
- Access to an online library, containing a world-class collection of high quality academic and professional resources

Introducing the Individual Learning Plan

The Open University will help apprentices produce and maintain an individual learning plan, tailored to their specific needs and career goals.

The individual learning plan is a useful way for apprentices to collate and track information, including details of all their learning and relevant workplace training, and helps them plan their workload to complete tasks in line with their development goals.

Modules overview

Apprentices will undertake eight study modules (six standard and two chosen specialist modules) and four work-based learning modules (including the final work-based project) during the apprenticeship programme.

Note: Module titles, content and assessments are subject to change.

Stage 1				
Module	Type	Credits	Summary	Assessment
Career development and employability	Work-based learning module	30	Apprentices will: - Develop an understanding of the work context and their role within it - Develop an ability to learn from the workplace through reflective practice - Apply skills, understanding and knowledge within the workplace - Understand the concept of professionalism - Gain the skills necessary to carry out research at work - Construct a research proposal that could improve performance and/or add value to the organisation - Be able to map their existing skills and knowledge against relevant occupational standards and frameworks - Evaluate, plan and develop their personal, academic, professional and employability skills and align their own development needs with the business objectives of their organisation	3 tutor-marked assignments 1 end of module assessment
Introduction to computing technologies	Study module	30	Apprentices will study the following topics: - Security essentials (Cisco) - Maths for computing and algorithmics - Network essentials (Cisco) The Security and Network topics will address issues associated with security risk assessment for a simple IT system; computer networks, with a focus on services and capabilities that are enabled by network infrastructure solutions; and common vulnerabilities in computer networks. Maths for computing and algorithmics will address issues associated with number representations; algebra and equations; functions and growth; modular arithmetic; dealing with data; and the basics of graphics.	3 tutor-marked assignments and quizzes that contribute to the assignments
Introduction to computing and information technology	Study module	30	Apprentices will: - Learn how computers store and process data – and why they use binary - Learn about the hardware components of computers - Explore different types of cloud - Explore the design of mobile phone networks - Learn how to use latitude and longitude to look up locations on online maps - Understand what happens under the bonnet when a file is deleted from a computer - Develop numeracy skills – from using scientific notation and percentages to calculating with binary representations - Learn to use the Python programming language	3 tutor-marked assignments 5 interactive computer-marked assignments

			- Analyse, with Python, health and well-being data from the Office for National Statistics - Be introduced to a range of problem solving strategies - Complete a small programming project - Learn how hackers pose a threat beyond the digital world - Understand how to secure their data - Explore how the Internet is enabling crime, surveillance, and digital freedom - Develop analytical and communication skills – including collecting and using evidence to argue a point	
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Stage 2

Module	Type	Credits	Summary	Assessment
Service, project and requirements management	Study module	30	Apprentices will: - Learn about service management, with an emphasis on the relating of associated concepts to real world activity - Develop an understanding of IT project management at foundation level - Explore requirements management through the database development lifecycle, with an introduction to database security and integrity - Learn about teamworking, including underlying theories, roles and success criteria	3 tutor-marked assignments 1 examination
Object-oriented Java programming	Study module	30	Apprentices will use BlueJ, an integrated development environment (IDE) specifically developed for teaching and learning object-oriented programming, to investigate: - Inheritance hierarchies - Overriding methods - Abstract classes - Interfaces - Polymorphism - Re-use of code - Static methods and variables	3 tutor-marked assignments 5 interactive computer-marked assignments 1 examination
Change, strategy and projects at work	Work-based learning	30	Apprentices will: - Identify, analyse and explain the factors driving change in the workplace and the opportunities for introducing change, along with the associated challenges and consequences in terms of human and other factors - Understand and explain the processes involved in designing, planning, monitoring, implementing and reviewing work-based projects - Make effective use of appropriate information and communication technologies, and understand and explain their role in planning and communicating information relating to a work-based project designed to implement some aspect of workplace change - Apply knowledge and understanding effectively to a range of issues, questions and problems arising from the planning of a work-based project - Explore, analyse and evaluate practical ways of improving workplace practices using appropriate information and communication technologies to develop components of a personal work-based project	3 tutor-marked assignments 1 end of module assessment

Stage 3

Module	Type	Credits	Summary	Assessment
Web technologies	Study module	30	Apprentices will: - Describe how the development of the Web has enabled the creation of new forms of information systems and impacted commerce and public services - Explain different architectural approaches to application design and contrast traditional approaches with the underlying client–server model of Web applications - Describe the roles of the range of protocols and standards associated with Web applications and their communications - Explain the operation and properties of service, distributed and mobile approaches to web architecture - Critically evaluate the role of standardisation bodies, and their published recommendations and standards, for the development of web applications - Demonstrate knowledge of a range of different programming languages and explain their differing roles and properties for web applications - Discuss issues of web design including accessibility, usability, localisation and globalisation - Explain the role of the open source movement in the development of applications including collaborative development, licensing and reuse of resources - Explain a range of security issues including secure protocols, use of certificates, authentication, authorisation, and firewalls - Discuss the nature of static and dynamic content and different content delivery approaches - Analyse requirements to produce a design for a simple web application, applying an understanding of requirements for aspects such as usability and accessibility - Describe a suitable architecture, components and standards as the basis for implementation of a web application for a public or business organisation - Construct, using appropriate code, a simple web application selecting and reusing code etc. where appropriate - Produce an application which, as appropriate, transforms content and integrates services to produce a mobile application - Evaluate the suitability of a range of design tools and techniques for the development of an application - Find, select and use information from a range of sources to support analysis, design and implementation tasks - Plan and produce a well-structured and researched quality report as part of a project - Plan and manage effort and progress whilst undertaking a substantial project - Outline the importance of standards and standardisation bodies - Maintain an up-to-date view of ongoing developments in web technology including standards and techniques - Produce, design and development plans for a specific technical solution to a challenge in Web application development - Produce simple project plans for management of time and resources	3 tutor-marked assignments 1 end of module assessment

Specialist module 1	Study module	30	See specialist modules overview table.	
Work-based learning 3	Work-based learning	30	Apprentices will: - Develop key change and project working skills and competences such as planning and organising, problem solving, showing initiative, adaptability, and flexibility - Improve their insight, knowledge and understanding of the workplace - Build their personal confidence - Develop their ability to learn from their work and to apply learning in the workplace - Develop and demonstrate knowledge, skills and behaviours appropriate to their chosen specialism	3 tutor-marked assignments 1 end of module assessment

Stage 4

Module	Type	Credits	Summary	Assessment
IT systems: planning for success	Study module	30	Apprentices will learn about the: - Nature of success and failure in IT systems - Sociotechnical nature of IT systems - Legal, social, ethical and professional contexts in which IT systems exist - Issues around IT systems reliability, dependability, security and privacy The module will give apprentices the skills to: - Analyse IT systems in a complex socio-technical context - Observe and analyse features relating to IS failures in a given situation - Work with effective IT development and project management methodologies - Successfully enable the maintenance and evolution of IT systems - Future proof IT systems, including the use of scenario planning and disaster recovery	3 tutor-marked assignments 1 exam
Specialist module 2	Study module	30	See specialist modules overview table.	
The Digital and Technology Solutions project	Work-based learning	30	Apprentices will address a real issue in the workplace related to their chosen specialism. The module offers practical experience of independent learning and reflective practice. Apprentices will: - Choose a project topic based on the specialist modules that they have previously studied - Gather information and find out about developments in your specialist area - Produce a detailed proposal and project plan – this will include choosing suitable methods, setting realistic goals and deciding what resources they will need - Carry out the project itself – it could take many forms: a software system, a critical analysis and report, or an investigation and set of recommendations are just a few examples - Write up and evaluate the project – this will include a reflective evaluation of their approach to the project and its completion	1 tutor marked assignment Project report Presentation on findings to panel

Specialist modules overview

The following are all study modules, which apprentices will take depending on their chosen specialism.

Specialism	Module	Stage	Credits	Summary	Assessment
Cyber security analyst 	Information security	3	30	Apprentices will: • Apply the principles of information security in various contexts • Design and evaluate an information security management system appropriate to a particular organisational context • Understand the provenance of threats and their impact, and design appropriate countermeasures to protect information assets against threats • Assess the strengths and weaknesses of different types of information security mechanisms in various contexts • Understand the role of technology in Information Security in various contexts and be able to assess, using technology, the deficiencies of a simple information system and design solutions for its protection • Describe the management roles in defining, enforcing and validating information security • Critically evaluate the information security management system of an organisation • Integrate knowledge and skills from a range of approaches to information security and its management • Discuss competently a variety of topics related to information security • Provide appropriate, effective documentation throughout the information security life-cycle • Critically evaluate information about the development of information security management systems from a variety of sources. • Support management roles in defining, enforcing and validating information security	3 tutor-marked assignments End of module assessment
Cyber security analyst 	Web, mobile and cloud technologies	4	30	Apprentices will: • Understand the different approaches to providing network and mobile applications and services including the architectures and protocols involved • Understand the security and legal issues related to the adoption and use of cloud and mobile data, services and applications • Understand the risks and benefits of adopting cloud and mobile technology for a range of business models • Analyse and critique an organisation's approach to IT infrastructure and delivery of applications and services	3 tutor-marked assignments 1 end of module assessment

				- Design an effective approach to IT infrastructure for an organisation utilising mobile and cloud technology appropriately - Create prototypes of cloud services and mobile applications - Research and analyse an organisation's IT infrastructure and identify opportunities for cloud and mobile technology adoption - Plan and produce a structured technical report detailing an approach for an organisation which is adopting cloud and mobile technologies - Produce a presentation to convey the means, risks and benefits for an organisation to adopt cloud and mobile technologies - Discuss legal, ethical and security issues related to cloud based resources and mobile access to data, applications and services - Deploy, demonstrate and utilise a cloud infrastructure - Create a mobile application and adapt this to utilise cloud based resources	
Data analyst 	Algorithms, data structures and computability	3	30	Apprentices will: - Demonstrate an understanding of sets, functions, logic and their application in the design, implementation and analysis of computer-based systems - Discuss the question "What is computation?" and "What are its limits?", and explain how the answers to these questions have important implications for the practical use of computer-based systems - Analyse, construct and use algorithms and data structures to solve computational problems - Assess the difficulty of computational problems - Apply computational thinking skills to solve problems across a range of applications areas - Write a short report which is based on one or more sources and which has a well-argued conclusion - Use the Python language to implement algorithms	2 tutor-marked assignments 7 interactive computer-marked assignments 1 examination
Data analyst 	Data management and analysis	4	30	Apprentices will: - Understand the similarities and differences between at least two different database models, and how they are used to manage data collections - Understand the legal issues surrounding data collection, usage and retention - Be able to select an appropriate database model for a data collection - Use data to answer a practical question - Write a report detailing a systematic approach to analysing a data set - Use a query language to extract information from a database - Use a statistical package to explore a data set - Be able to present an analysis of a dataset to a variety of audiences	2 tutor-marked assignments 7 interactive computer-marked assignments 1 end of module assessment

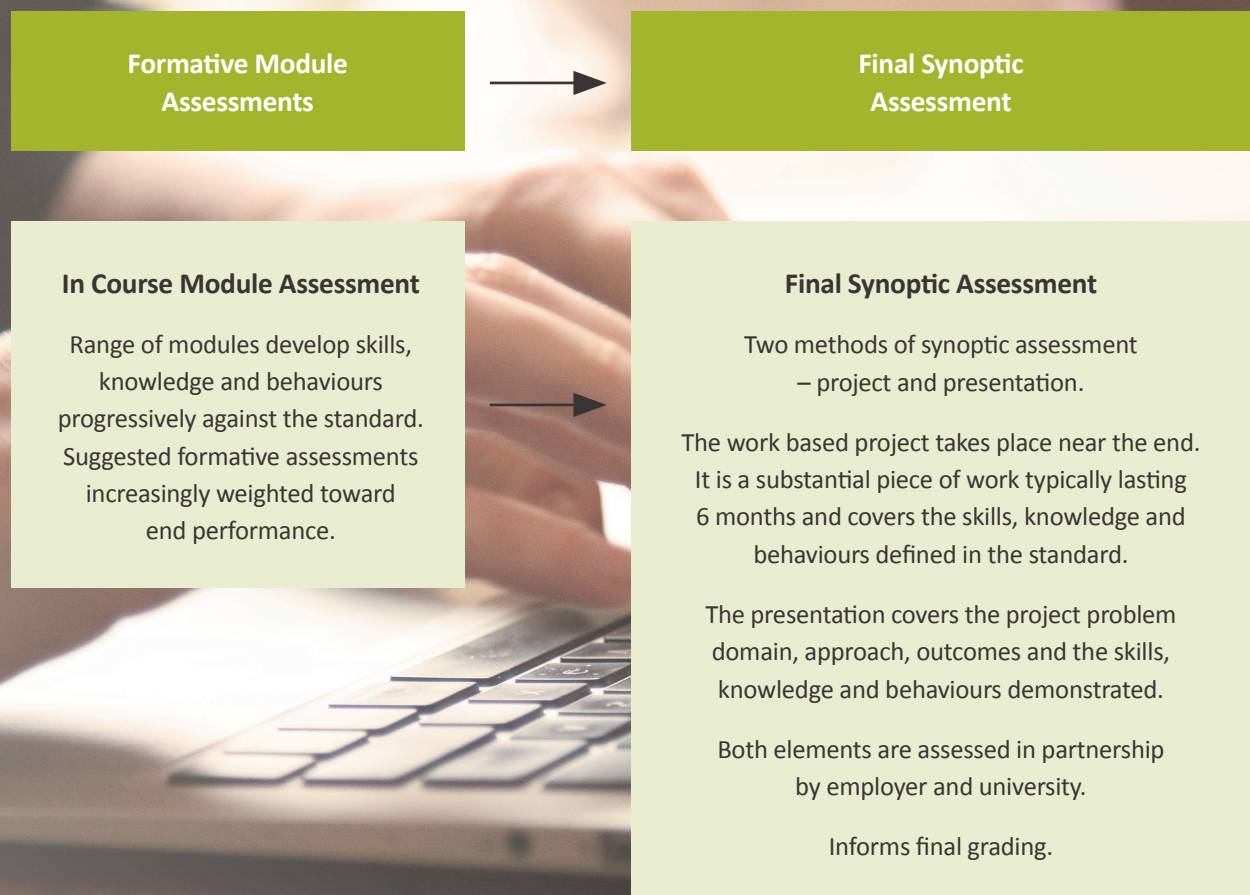
Specialism	Module	Stage	Credits	Summary	Assessment
Software engineer 	Software engineering	3	30	Apprentices will: - Understand the business domain for a problem requiring a software solution or a change to an existing solution - Acquire the tools and knowledge to analyse and design such a solution or change - Understand how any chosen software architecture will impact on the satisfaction of all users, requirements and expectations - Be able to apply and reuse design expertise from a set of design patterns - Develop the skills for testing outputs of all activities throughout the development process - Be equipped to apply their knowledge to the design of a wide range of software systems; from small systems in a single organisation (which still need to interact with a range of other services online) to those working in large-scale distributed environments based on coalitions of systems	3 tutor-marked assignments 1 exam
Software engineer 	Web, mobile and cloud technologies	4	30	Apprentices will: - Understand the different approaches to providing network and mobile applications and services including the architectures and protocols involved - Understand the security and legal issues related to the adoption and use of cloud and mobile data, services and applications - Understand the risks and benefits of adopting cloud and mobile technology for a range of business models - Analyse and critique an organisation's approach to IT infrastructure and delivery of applications and services - Design an effective approach to IT infrastructure for an organisation utilising mobile and cloud technology appropriately - Create prototypes of cloud services and mobile applications - Research and analyse an organisation's IT infrastructure and identify opportunities for cloud and mobile technology adoption - Plan and produce a structured technical report detailing an approach for an organisation which is adopting cloud and mobile technologies - Produce a presentation to convey the means, risks and benefits for an organisation to adopt cloud and mobile technologies - Discuss legal, ethical and security issues related to cloud based resources and mobile access to data, applications and services - Deploy, demonstrate and utilise a cloud infrastructure - Create a mobile application and adapt this to utilise cloud based resources	3 tutor-marked assignments 1 end of module assessment

Specialism	Module	Stage	Credits	Summary	Assessment
Network engineer 	CCNA part 1 and CCNA part 2 (two modules)	3 and 4	30 and 30	Apprentices will: - Understand some fundamental technological concepts, principles and techniques associated with computers and digital communication systems, as used in local (LAN) and wide area networks (WAN) - Understand how hubs, switches and routers are configured to provide network services - Understand how IP addresses are used by routers and how this facilitates network design - Be aware of some of the social, safety, commercial and organisational issues that need to be considered when planning communication networks - Be aware of some major trends in information and communication technologies and of the implications of these trends in future network developments - Apply appropriately the concepts and principles introduced in the course - Analyse available information to configure (program) network devices such as switches and routers - Develop a solution to a case study using the concepts learned in the course - Evaluate evidence relating to social, safety, commercial and organisational needs as they apply to LAN and WAN design - Communicate accurately and reliably, in a structured and coherent fashion, recognising purpose and audience - Work effectively with others in a distance setting where the collaboration is undertaken via computer-mediated communication - Work effectively with others in a lab setting when attending day schools - Use appropriate numerical and mathematical skills to analyse data - Find and select information for a specific purpose, including via the web - Learn to organise time, study methods and resources to suit the circumstances - Learn how to configure network devices such as switches and routers - Learn how to use specialist software tools - Gain first-hand experience of network equipment through attendance at day schools - Plan and organise themselves and their work appropriately when working in a group (at compulsory day schools)	For each module: 2 tutor-marked assignments 1 end of module assessment

Assessments

The apprenticeship is complete when all of the following assessments, undertaken by the employer and The Open University, have taken place.

The programme has an integrated approach to the assessment of knowledge, skills and behaviours. The modules, synoptic project and their assessments are clearly mapped to the outcomes in the standard.



Note: The end-point-assessment for the apprenticeship standard is under review following advice from the Department for Education and is therefore subject to change.

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