Overview of Belfast Met IT Higher Level Apprenticeships

Higher Level Apprenticeship offers the opportunity to gain quality training and a recognised higher qualification while in paid employment. Higher Level Apprenticeships allow employers to train staff to the level needed so they have strong technical and good employability skills. The HLA programme is free to private sector companies and there are no course or exam fees for the apprentices.

An apprenticeship can:

- fill higher level skills gap
- attract higher calibre staff
- increase productivity
- develop existing staff

Belfast Met has been offering HLA IT apprenticeships in Computing Infrastructure and Software Engineering since 2015. Belfast Met are now offering two IT HLAs for 2019-2020. These are Cyber Security & Networking Infrastructure and Cloud & Application Development. The Open University will validate these foundation degrees.

The HLA will be two and a half years in duration starting in November 2020 and ending May 2023. Apprentices will spend one day on the programme for 30 weeks and the remaining 4 days in employment each year.
Background to IT HLA Programmes

The Northern Ireland Digital Matrix Report of 2016 (http://matrixni.org/reports/2016-digital-ict/) proposed the following opportunities for Northern Ireland within the digital arena.

### Opportunities for Northern Ireland

- **Advanced networking**: the increased capability to move large amounts of data anywhere, quickly and reliably changes where economic activity is located.
- **Applications**: more sophisticated applications are replacing human activity in lower-skilled ICT work.
- **Data analytics**: understanding of transactional data can lead to changes in the location of business functions, from manufacturing to provision of IT services; and automation of data analysis changes the pattern and location of business processes.
- **Cyber security**: as organisations rely increasingly on networks and cloud-based services running on virtualised infrastructure, securing data becomes harder.
- **New ICT service models**: the rise of cloud-based applications mean that IT services are no longer delivered from data centres close to the point of use, and sometimes from unknown locations.

The Northern Ireland Skills Barometer June 2017 has also indicated that there could a shortfall of up to 10,000 skilled IT workers in Northern Ireland by 2026. With this in mind, Belfast Metropolitan College has created two Higher Level Apprenticeship programmes that addresses the need for a skilled workforce in the areas of Cyber Security, Networking, Data Analytics and Application/Cloud development.

The qualification titles for these HLAs are as follows.

- Foundation Degree in Cyber Security & Networking Infrastructure
- Foundation Degree in Software, Cloud & Application Development
Apprentice Recruitment Process and Roadmap

Campaign starts 26th June and ends 31st August 2020.

Interested parties apply to advert and undertake Mindmill Psychometric online test.

2nd Mindmill Psychometric Test will run 1st week of Sept and be invigilated remotely.

2 week bootcamps begin Wednesday 18th Nov 2020.

Applicant interviews with employer start during September 2020

Results out by 7th September.

1 Day Release starting 30th Nov to June 2021

Sept 2021 to June 2022 College 1Day Release

Sept 2022 to May 2023 College 1 Day Release

Graduation November 2023

Course completed

College 1 Day Release Sept 2022 to May 2023
Example of some employers involved in the programme

2019 Advert

IT Apprenticeship
Applications open from 28th June - 26th August

Gain IT skills and experience with excellent employer opportunities and training delivered by Northern Ireland's designated Digital IT Curriculum Hub

Level 3
A-Level Equivalent:
- Digital Forensics
- Networking & Infrastructure
- Software Development

Level 5
Higher Level:
- Cyber Security & Networking Infrastructure
- Cloud & Application Development

For further information and to apply go to www.belfastmet.ac.uk/ITAapprentice
make it at the met
Foundation Degree in Cyber Security & Networking Infrastructure

Higher Level Apprenticeship (HLA) Part Time 3-Year Programme

Year 1 Semester 1
- Introduction to Networks (L4 20 credits)
- Programming (L4 20 credits)

Year 1 Semester 2
- Cyber Security Fundamentals (L4 20 Credits)
- Host Security (L4 20 Credits)

Year 2 Semester 1
- Mathematics for Computing (L4 20 Credits)
- Ethical Hacking (L4 20 Credits)

Year 2 Semester 2
- Network Switching and Routing (L5 20 Credits)
- Cloud & Mobile Security (L5 20 Credits)
  OR
- Networking and Server Management (L5 20 Credits)
- Blockchain Architecture (L5 20 Credits)

Year 3 Semester 1
- Incident Management (L5 20 Credits)
- Implementation of Security (L5 20 Credits)

Year 3 Semester 2
- Work Based Learning (L5 40 Credits)
Foundation Degree in Cyber Security & Networking
Infrastructure – Modules Overview

Bootcamp

Apprentices will attend a 3 day per week bootcamp for two weeks. The apprentices will study towards Cisco Cybersecurity Essentials. The Cybersecurity Essentials course develops foundational understanding of cybersecurity and how it relates to information and network security. The course introduces students to characteristics of cyber-crime, security principles, technologies, and procedures to defend networks.

Introduction to Networks

This module is an introduction to computer networking. Students will become familiar with computer networks; configuring network devices and simulating networks using software. They will also analyse network design and device configuration to resolve problems in a simple computer network and learn to utilise fault-finding techniques to diagnose faults. This module is aligned to Cisco CCNA 1.

Cyber Security Fundamentals

This module provides an introduction to the core Cyber security concepts and skills, covering a wide range of relevant legislation and application to industry. The module will look at how Cyber Security affects an organisation and what measures are used to prevent such incidents from occurring.

Programming

This module will provide students with a basic knowledge of the techniques used in program development. Students will learn the concepts of good program design and subsequent successful implementation. This module will make students aware of the
basic building blocks used in developing and testing simple maintainable programs. This module will provide an introduction to programme scripting.

**Host Security**

This module will provide students with a basic knowledge of computer security. Students will learn about the major challenges to computer security and subsequent ways of protecting systems and data against various types of vulnerabilities, threats and attacks and the legal, privacy and ethical issues in computer security.

**Cloud and Mobile Security**

The aim of this module is to provide students with a critical understanding of security threats against mobile and cloud computing systems and the security measures designed to protect such systems. The module will explicitly develop students’ knowledge and experience in the design and application of mobile and cloud security solutions. The module will also equip students with the knowledge and skills required for further academic study and future employability in the area of computer security.

**Mathematics for Computing**

This module provides students with a mathematical background to support and enhance material presented in computer science modules. Students will develop proficiency in the use of fundamental mathematical concepts in the areas of discrete structures, algorithms and complexity. Students will also develop an ability to absorb further specific mathematical knowledge as required for given specialised areas. The analytic skills and conceptual thinking required for competence in areas such as programming, database analysis, formal specification, encryption and systems design are developed in the module.
Network Infrastructure 2nd Year Pathway

Network Switching and Routing

In modern day computer networks, many different components are used to create the end system. It is important for students to understand what these components are and how they are used both individually and as a part of a networked computer system. This module expands on student understanding of switching and introduces VLANs and routing protocols along with advanced configuration of switches and configuration of routers. This module follows on from the “Introduction to Networks” module.

Networking and Server Management

This module will provide learners the knowledge and skills required to needed for the configuration, maintenance, and implementation of networked server architectures. In addition, learners will learn how to apply, implement, and manage security controls for a server.

Cyber Security 2nd Year Pathway

Ethical Hacking

This module will provide students with an understanding of both theory and practical techniques in the field of ethical hacking and will underline the importance of adhering to UK and international regulations whilst carrying out ethical hacking.

Blockchain Architecture

This module provides an in-depth understanding of Blockchain and its architecture and compare some typical consensus algorithms used in different blockchains. The module will also will compare and analysis various network infrastructure architecture
technologies and the impact on various networking operating systems. Technical challenges and recent advances will also be discussed. The module will also lay out possible future trends for blockchain. In this module students will also look at how blockchain affects business infrastructure and job roles.

Incident Management

The module will cover incident management from a tactical/regional and national/strategic perspective using the four-stage model: Identification, preparation, mitigation, and recovery.

A range of actual and potential incidents will be covered with primary focus within Cyber-attacks as well as including an understanding of other types of attacks that could be used in association with a cyber-attack such as air accidents, marine accidents, rail accidents, terrorist attacks, and industrial, nuclear and chemical incidents.

Implementation of Cyber Security

This module will teach learners the knowledge and skills necessary to identify risk, to perform risk mitigation activities, provide infrastructure, application, information, and operational security. Learners will learn to apply security controls to maintain confidentiality, integrity, and availability. Learners will identify appropriate technologies and products, troubleshoot security events and incidents, and operate with an awareness of relevant policies, laws, and regulations.

Worked Based Learning

This module will enable students to apply their Cyber Security and Networking Infrastructure knowledge and skills in their working environment where as employees they will have been exposed to a range of the practices and tools used by the Computing Infrastructure sector. As they are based in a relevant and supervised employment this
will allow them, the opportunity to apply and develop their skills and knowledge gained throughout the course. While working as a Computing Infrastructure engineer they will also have the opportunity to enhance their personal development and interpersonal skills.
Foundation Degree in Cyber Security & Networking Infrastructure – Linked Vendor Qualifications

CompTIA Security+

CompTIA Security+ is a global certification that validates the baseline skills you need to perform core security functions and pursue an IT security career.

CompTIA Network+

CompTIA Network+ is a performance-based certification that helps you develop a career in IT infrastructure by validating the hands-on skills needed to troubleshoot, configure, and manage both wired and wireless networks.

CompTIA PenTest+

The purpose of the CompTIA Pentest+ certification is to validate knowledge and ability to plan/scope an assessment, understand the legal/compliance requirements, perform vulnerability scanning/penetration test, and analyze/report findings.

Cisco CCNA Cyber Ops

The CCNA Cyber Ops certification prepares candidates to begin a career working with associate-level cybersecurity analysts within security operations centres.

PI Linux Essentials

This course teaches the basic concepts of processes, programs and the components of the Linux operating system. You learn the basic knowledge of computer hardware, gain
an understanding of open source applications in the workplace, and learn to navigate systems on Linux desktop and rudimentary commands to navigate the Linux command line.

**Cisco Cyber Essentials**

The Cybersecurity Essentials course develops foundational understanding of cybersecurity and how it relates to information and network security. The course introduces students to characteristics of cyber-crime, security principles, technologies, and procedures to defend networks.

**Certified Blockchain Architect**

Certified Blockchain Architect training and certification enables you to gain expert understanding and exposure of the blockchain domain. CBA training entitles you to utilize your expertise to make important decisions related to the blockchain project and craft the guidelines and structure of the whole blockchain system, considering the requirement of the system.

**Azure AZ-500 Microsoft Azure Security Technologies**

The exam covers the implementation of security controls, maintaining the security posture, managing identity and access, and protect data, applications, and networks. Students identify and remediate vulnerabilities by using a variety of security tools, implement threat protection, and respond to security incident escalations. As a Microsoft Azure security engineer, students often serve as part of a larger team dedicated to cloud-based management and security and may also secure hybrid environments as part of an end-to-end infrastructure.
Foundation Degree in Software, Cloud & Application Development

Higher Level Apprenticeship (HLA) 3 Year Part Time Programme

Year 1 Semester 1
- Systems Design (L4 10 Credits)
- Cloud Fundamentals (L4 10 Credits)
- Programming (L4 20 credits)

Year 1 Semester 2
- Database Design and Development (L4 20 Credits)
- Mathematics for Computing (L4 20 Credits)

Year 2 Semester 1
- Machine Learning Fundamentals (Bots and AI) (L4 20 Credits)
- Cloud Development (L4 20 Credits)

Year 2 Semester 2
- Data Analytics (L5 20 Credits)
- Software Testing (L5 20 Credits)
- Data Visualisation (L5 20 Credits)
- Mobile Development (L5 20 Credits)

Year 3 Semester 1
- Distributed Apps (DApps) (L5 20 Credits)
- Secure Programming (L5 20 Credits)

Year 3 Semester 2
- Work Based Learning (L5 40 Credits)
Foundation Degree in Software, Cloud & Application Development – Modules Overview

Bootcamp

Apprentices will attend a 3 day per week bootcamp for two weeks. The apprentices will study towards the AZ-900 Azure Fundamentals certification. This certification measures students’ ability to accomplish the following technical tasks: develop Azure Infrastructure as a Service compute solutions; develop Azure Platform as a Service compute solutions; develop for Azure storage; implement Azure security; monitor, troubleshoot, and optimize solutions; and connect to and consume Azure services and third-party services.

Cloud Fundamentals

To introduce the student to cloud technologies & computing by looking at technical aspects of networking, virtualization and software development, business processes and financial considerations, project management, as well as security and legal compliance.

System Design

This module aims to provide students with an understanding of how information systems are designed to support business needs. It provides students with the knowledge of different systems development approaches. This module introduces the student to tools and techniques used during requirements analysis and project management. The students can use these to define the to-be system. Emphasis is also placed on team roles and the role of the systems analyst. The module provides a foundation for the work-based modules by introducing students to determining problems and defining requirements.
Programming

This module will provide students with a basic knowledge of the techniques used in program development. Students will learn the concepts of good program design and subsequent successful implementation. This module will make students aware of the basic building blocks used in developing and testing simple maintainable programs.

Database Design and Development

This module provides an integrated practical approach to the development of relational database management systems and the application of system methodologies within a software engineering environment. This module evaluates the role of system methodologies, with emphasis on the role of design, in delivering usable and maintainable database systems. The practical nature of the subject material is supported through collaborative work using Rapid Applications Development (RAD) on several small systems development problems and reinforces technical skills taught elsewhere on the course.

Mathematics for computing

This module provides students with a mathematical background to support and enhance material presented in computer science modules. Students will develop proficiency in the use of fundamental mathematical concepts in the areas of discrete structures, algorithms and complexity. Students will also develop an ability to absorb further specific mathematical knowledge as required for given specialized areas. The analytic skills and conceptual thinking required for competence in areas such as programming, database analysis, formal specification, encryption and systems design are developed in the module.

Machine Learning Fundamentals (Bots and A1)
This module will equip students with essential knowledge and skills to become efficient machine learning/AI developers. The module will introduce students to machine learning concepts, tools and technologies. The module will also extend students’ knowledge and skills for them to be able to implement solutions that meet scalability and performance requirements. The module delivery will be conducted in a practical fashion through exposing the student to one exemplar of modern development platform/technologies in depth and then requiring them to develop a significant application using the exemplary toolset/development platform, and to reflect on the process and the solution. (Course work and practical exam).

Cloud Development

Throughout the course as a whole students gain experience in a variety of 'traditional' programming languages in procedural, functional and object-oriented flavours. This module addresses the design and use of tools and languages for cloud-based computing applications and the rationale for using these paradigms.

Data Analytics 2nd Year Pathway

Data Analytics

The aim of this module is to allow students to understand the foundational skills in data analytics, including preparing and working with data; abstracting and modelling an analytic question; and using tools from statistics, learning and mining to address these questions. Students will study techniques for how to go from raw data to a deeper understanding of the patterns and structures within the data, to support making predictions and decision-making.
Data Visualisation

The rationale of this module is to provide students with the key principles and techniques of data visualization. By completing this, module students will gain knowledge and skills on developing methods and techniques of data visualisation to improve comprehension, communication, and decision making in big data applications.

This module is linked with the Data Analytics module. These modules must both be taken in order to satisfy the Data Analytics pathway. The Data Analytics module must be completed before this module, as it is important that students understand how to extract, mine and analyze data before they learn how to visually represent large datasets.

Software Engineering 2nd Year Pathway

Software Testing

This module will provide learners with the knowledge, understanding and skills necessary for a systematic approach to testing including knowledge of software testing industrial standards (IEEE).

Mobile Development

The rationale for this module is to give students knowledge and skills of mobile device development across several platforms. Conceptual elements relating to the design and planning of a mobile application will be covered, alongside the programming language concepts needed to implement an end-to-end solution. Full training in mobile device programming will be given, notably in relation to interactive functionality, with the aim of producing a fully functional application by module end.
Distributed Apps (DApps)

Development of decentralised distributed blockchain applications is central to the concepts of user privacy with encrypted personal information and data being controlled by the user and the ability for users to audit their own data. Therefore the rationale of this module is to provide students with the key principles and techniques of distributed blockchain application (DApp) development. By completing this module students will gain knowledge and skills to build, run, modify and deploy a distributed application (DApp) using blockchain technology for authentication and data storage components of the application’s platform.
Secure Programming

There are software defects, which can be easily avoided that are a primary cause of commonly exploited software vulnerabilities. Most vulnerabilities arise from a relatively small number of common programming errors. By identifying insecure coding practices and developing secure alternatives, software developers can take practical steps to reduce or eliminate vulnerabilities before deployment. Employing secure programming techniques before the software is deployed can lead to significant cost savings.

Worked Based Learning

This module will enable students to apply their application development knowledge and skills in their working environment where as employees they will have been exposed to a range of the practices and tools used by the software & application development sector. As they are based in a relevant and supervised employment this will allow them, the opportunity to apply and develop their skills and knowledge gained throughout the course. While working as an application developer they will also have the opportunity to enhance their personal development and interpersonal skills.
Foundation Degree in Software, Cloud & Application Development – Linked Vendor Qualifications

MTA Programming in Python

This certification provides students with the knowledge to recognize and write syntactically correct Python code, recognize data types supported by Python, and be able to recognize and write Python code that will logically solve a given problem.

MTA Introduction to Programming Using JavaScript

This certification will provide students with the knowledge to recognize and write syntactically correct JavaScript code, use data types supported by JavaScript, and be able to recognize and write JavaScript code that will logically solve a given problem.

Analyzing and Visualizing Data with Microsoft Power BI

This Power BI certification (Exam 70-778) will guide students through Power BI end-to-end, starting from how to connect to and import data, author reports using Power BI Desktop, publish those reports to the Power BI service, create dashboards, and share to business users so that they can consume the dashboards through the web and their mobile devices.

Microsoft Azure Fundamentals (AZ900)

This exam measures students’ ability to accomplish the following technical tasks: develop Azure Infrastructure as a Service compute solutions; develop Azure Platform as a Service compute solutions; develop for Azure storage; implement Azure security; monitor,
troubleshoot, and optimize solutions; and connect to and consume Azure services and third-party services.

**Developing Solutions for Microsoft Azure**

This exam measures students’ ability to accomplish the following technical tasks: develop Azure Infrastructure as a Service compute solutions; develop Azure Platform as a Service compute solutions; develop for Azure storage; implement Azure security; monitor, troubleshoot, and optimize solutions; and connect to and consume Azure services and third-party services.

**Certified Tester Foundation Level in Software Testing**

This certification provides students with the knowledge to evaluate static testing, utilise test design techniques, incorporate test management practices within an organisation, and build testing methods to correctly design functional and maintainable products.

**AI-100 – Designing and Implementing an Azure AI Solution**

Students for this exam analyze the requirements for AI solutions, recommend appropriate tools and technologies, and implements solutions that meet scalability and performance requirements. Students translate the vision from solution architects and work with data scientists, data engineers, IoT specialists, and AI developers to build complete end-to-end solutions. Candidates design and implement AI apps and agents that use Microsoft Azure Cognitive Services and Azure Bot Service. Students can recommend solutions that use open source technologies. Students understand the components that make up the Azure AI portfolio and the available data storage options. Students implement AI solutions that use Cognitive Services, Azure bots, Azure Search,
and data storage in Azure. Candidates understand when a custom API should be developed to meet specific requirements.
Entry Requirements

Applicants must:

Hold 160 UCAS points or 64 tariff points, GCSEs at C or above in English and Mathematics, or equivalent qualifications, such as Level 2 Essential Skills in Numeracy and Literacy.

Specific requirements of the programme:

• Each apprentice either is a new employee or is taking on a new job role, with an existing employer, commensurate to the apprenticeship being pursued.
• An appropriate Apprenticeship Agreement is in place with the employer.

Contact Details

Cyber Security & Networking Infrastructure

Steven Barr sbarr@belfastmet.ac.uk

Telephone: 028 9053 3112

Cloud & Application Development

Geoff Ewart gewart@belfastmet.ac.uk

Telephone: 028 9053 3112

Higher Level Apprenticeships

Philip Allen pallen@belfastmet.ac.uk

Telephone: 028 9053 3119