# OTHM LEVEL 4 DIPLOMA IN INFORMATION TECHNOLOGY

Qualification Number: 610/1191/5

Specification | April 2024

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## QUALIFICATION OBJECTIVES

The objective of the OTHM Level 4 Diploma in Information Technology is to provide a career path for learners who wish to develop a broad base of knowledge and skills that will enable them to work in a variety of roles in the IT industry.

The programme will focus on topics such as cyber security, computer programming, web and mobile applications, computer and network technology, systems analysis and design and managing digital information.

Successful completion of the OTHM Level 4 Diploma in Information Technology will support learners progressing to university, and to provide learners with the requisite skills and knowledge to enter the world of work in their chosen sector.

## QUALITY, STANDARDS AND RECOGNITIONS

OTHM Qualifications are approved and regulated by Ofqual (Office of Qualifications and Examinations Regulation). Visit the Register of Regulated Qualifications.

OTHM has progression arrangements with several UK universities that acknowledges the ability of learners after studying Level 3-7 qualifications to be considered for advanced entry into corresponding degree year/top up and Master's/top-up programmes.

## REGULATORY INFORMATION

| | |
|---|---|
| Qualification Title | OTHM Level 4 Diploma in Information Technology |
| Ofqual Reference Number | 610/1191/5 |
| Regulation Start Date | 07/07/2022 |
| Operational Start Date | 07/07/2022 |
| Duration | 1 Year |
| Total Credit Value | 120 |
| Total Qualification Time (TQT) | 1200 Hours |
| Guided Learning Hours (GLH) | 480 Hours |
| Sector Subject Area (SSA) | 6.1 ICT practitioners |
| Overall Grading Type | Pass/Fail |
| Assessment Methods | Coursework |
| Language of Assessment | English |

## EQUIVALENCES

OTHM qualifications at Level 4 represent practical knowledge, skills, capabilities and competences that are assessed in academic terms as being equivalent to Higher National Certificates (HNC) and Year 1 of a three-year UK Bachelor's degree programme.

## QUALIFICATION STRUCTURE

The OTHM Level 4 Diploma in Information Technology consists of 6 mandatory units for a combined total of 120 credits, 1200 hours Total Qualification Time (TQT) and 480 Guided Learning Hours (GLH) for the completed qualification.

| Unit Ref. No. | Unit title | Credit | GLH | TQT |
|---|---|---|---|---|
| D/650/3383 | Cyber Security | 20 | 80 | 200 |
| F/650/3384 | Principles of Computer Programming | 20 | 80 | 200 |
| F/617/2266 | Systems Analysis and Design | 20 | 80 | 200 |
| H/650/3385 | Web and Mobile Applications | 20 | 80 | 200 |
| L/617/2268 | Computer and Network Technology | 20 | 80 | 200 |
| J/650/3386 | Managing Digital Information | 20 | 80 | 200 |

## DEFINITIONS

**Total Qualification Time (TQT)** is the number of notional hours which represents an estimate of the total amount of time that could reasonably be expected to be required in order for a Learner to achieve and demonstrate the achievement of the level of attainment necessary for the award of a qualification.

*Total Qualification Time is comprised of the following two elements –*
  a) *the number of hours which an awarding organisation has assigned to a qualification for Guided Learning, and*
  b) *an estimate of the number of hours a Learner will reasonably be likely to spend in preparation, study or any other form of participation in education or training, including assessment, which takes place as directed by – but, unlike Guided Learning, not under the Immediate Guidance or Supervision of – a lecturer, supervisor, tutor or other appropriate provider of education or training.*

*(Ofqual 15/5775 September 2015)*

**Guided Learning Hours (GLH)** is defined as the hours that a teacher, lecturer or other member of staff is available to provide immediate teaching support or supervision to a student working towards a qualification.

**Credit value** is defined as being the number of credits that may be awarded to a Learner for the successful achievement of the learning outcomes of a unit. One credit is equal to 10 hours of TQT.

## ENTRY REQUIREMENTS

These qualifications are designed for learners who are typically aged 18 and above.
The entry profile for learners is likely to include at least one of the following:
  ● Relevant Level 3 Diploma or equivalent qualification
  ● GCE Advanced level in 2 subjects or equivalent qualification
  ● Mature learners (over 21) with relevant management experience (learners must check with the delivery centre regarding this experience prior to registering for the programme)

**English requirements:** If a learner is not from a majority English-speaking country, they must provide evidence of English language competency. For more information visit the English Language Expectations page on the OTHM website.

# PROGRESSIONS

Successful completion of the OTHM Level 4 Diploma in Information Technology provides learners the opportunity for a wide range of academic progressions including the OTHM Level 5 Diploma in Information Technology.

As this qualification is approved and regulated by Ofqual (Office of the Qualifications and Examinations Regulation), learners are eligible to gain direct entry into the second year of a three-year UK Bachelor's degree. For more information visit the University Progressions page.

# DELIVERY OF OTHM QUALIFICATIONS

OTHM do not specify the mode of delivery for its qualifications, therefore OTHM centres are free to deliver this qualification using any mode of delivery that meets the needs of their learners. However, OTHM centres should consider the learners' complete learning experience when designing the delivery of programmes.

OTHM Centres must ensure that the chosen mode of delivery does not unlawfully or unfairly discriminate, whether directly or indirectly, and that equality of opportunity is promoted. Where it is reasonable and practicable to do so, it will take steps to address identified inequalities or barriers that may arise.

Guided Learning Hours (GLH) which are listed in each unit gives centres the number of hours of teacher-supervised or direct study time likely to be required to teach that unit.

# ASSESSMENT AND VERIFICATION

All units within this qualification are internally assessed by the centre and externally verified by OTHM. The qualifications are criterion referenced, based on the achievement of all the specified learning outcomes.

**Specific assessment guidance and relevant marking criteria for each unit are made available in the Assignment Brief document.** These are made available to centres immediately after registration of one or more learners

To achieve a 'pass' for a unit, learners must provide evidence to demonstrate that they have fulfilled all the learning outcomes and meet the standards specified by all assessment criteria. Judgement that the learners have successfully fulfilled the assessment criteria is made by the Assessor.

The Assessor should provide an audit trail showing how the judgement of the learners' overall achievement has been arrived at.

# OPPORTUNITIES FOR LEARNERS TO PASS

Centres are responsible for managing learners who have not achieved a Pass for the qualification having completed the assessment. However, OTHM expects at a minimum, that centres must have in place a clear feedback mechanism to learners by which they can effectively retrain the learner in all the areas required before re-assessing the learner.

# RECOGNITION OF PRIOR LEARNING AND ACHIEVEMENT

Recognition of Prior Learning (RPL) is a method of assessment that considers whether learners can demonstrate that they can meet the assessment requirements for a unit through knowledge, understanding or skills they already possess and do not need to develop through a course of learning.

RPL policies and procedures have been developed over time, which has led to the use of a number of terms to describe the process. Among the most common are:
- Accreditation of Prior Learning (APL)
- Accreditation of Prior Experiential Learning (APEL)
- Accreditation of Prior Achievement (APA)
- Accreditation of Prior Learning and Achievement (APLA)

All evidence must be evaluated with reference to the stipulated learning outcomes and assessment criteria against the respective unit(s). The assessor must be satisfied that the evidence produced by the learner meets the assessment standard established by the learning outcome and its related assessment criteria at that particular level.

Most often RPL will be used for units. It is not acceptable to claim for an entire qualification through RPL. Where evidence is assessed to be only sufficient to cover one or more learning outcomes, or to partly meet the need of a learning outcome, then additional assessment methods should be used to generate sufficient evidence to be able to award the learning outcome(s) for the whole unit. This may include a combination of units where applicable.

# EQUALITY AND DIVERSITY

OTHM provides equality and diversity training to staff and consultants. This makes clear that staff and consultants must comply with the requirements of the Equality Act 2010, and all other related equality and diversity legislation, in relation to our qualifications.

We develop and revise our qualifications to avoid, where possible, any feature that might disadvantage learners because of their age, disability, gender, pregnancy or maternity, race, religion or belief, and sexual orientation.

If a specific qualification requires a feature that might disadvantage a particular group (e.g. a legal requirement regarding health and safety in the workplace), we will clarify this explicitly in the qualification specification.

# UNIT SPECIFICATIONS

# CYBER SECURITY

| Unit Reference Number | D/650/3383 |
|---|---|
| Unit Title | Cyber Security |
| Unit Level | 4 |
| Number of Credits | 20 |
| Total Qualification Time (TQT) | 200 hours |
| Guided Learning Hours (GLH) | 80 hours |
| Mandatory / Optional | Mandatory |
| SSAs | 6.1 ICT practitioners |
| Unit Grading Structure | Pass/Fail |

## Unit Aims

In this unit, learners will learn the fundamentals of cyber security, including its historical development, laws and regulations, risk management and the impact it has on individuals and organisations. Learners will also gain knowledge and understanding about cyber security protection methods and how to manage a cyber security attack.

## Learning Outcomes, Assessment Criteria and Indicative Content

| Learning Outcomes-<br>The learner will: | Assessment Criteria-<br>The learner can: | Indicative Content |
|---|---|---|
| 1. Understand the fundamentals of cyber security. | 1.1 Define the term 'cyber security'.<br>1.2 Explain how cyber security risks are managed in an organisation.<br>1.3 Describe the laws and regulations associated with cyber security<br>1.4 Summarise the historical development of cyber security.<br>1.5 Explain the impact cyber security has on individuals and organisations.<br>1.6 Explain how to keep up to date with the latest cyber security information. | ● Definition: the application of technologies, processes, and controls to protect systems, networks, programs, devices and data from cyber-attacks,<br>● Aims: reduce the risk of cyber-attacks and protect against the unauthorised exploitation of systems, networks, and technologies.<br>● Risk management<br>   ○ Physical and virtual controls<br>   ○ Processes<br>   ○ Procedures<br>   ○ Policies |

<table>
<tr><td></td><td></td><td>
<ul>
<li><ul><li>Risk Management</li><li>Incident Management</li><li>Frameworks</li></ul></li>
<li>Laws and regulations
<ul>
<li>General Data Protection Regulation (EU) (GDPR)</li>
<li>Information Commissioner's Office (ICO) Purpose and Responsibilities</li>
<li>Information Security Act</li>
<li>Telecommunications Security Act</li>
</ul>
</li>
<li>Historical development
<ul>
<li>Increase in use of cloud technologies and platforms</li>
<li>Increase of cyber-attacks in line with increased use in digital technologies</li>
</ul>
</li>
<li>Impact
<ul>
<li>Financial</li>
<li>Reputational</li>
<li>Operational</li>
</ul>
</li>
<li>Updates
<ul>
<li>ISACA</li>
<li>National Cyber Security Centre Newsletters</li>
<li>Joining security groups online</li>
<li>Research</li>
<li>Networking</li>
</ul>
</li>
</ul>
</td></tr>
<tr><td>2. Understand cyber security protection methods.</td>
<td>2.1 Describe network security protection methods.<br>2.2 Evaluate the impact of penetration and vulnerability testing has to an organisation.<br>2.3 Describe end user device protection methods.<br>2.4 Describe the importance of implementing and reviewing access controls in an organisation.</td>
<td>
<ul>
<li>Network security protection methods
<ul>
<li>Firewalls</li>
<li>VPN</li>
<li>Access logs</li>
<li>Firmware updates</li>
</ul>
</li>
<li>Impact
<ul>
<li>Baselines</li>
<li>Assurance</li>
<li>Identifies areas of weakness or focus</li>
</ul>
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</ul>
</td></tr>
</table>

| | | |
|---|---|---|
| | 2.5 Explain how end users can be educated and aware of cyber security. | <ul><li>○ Ethical hacking</li><li>○ Externally vs internally completed tests</li></ul><ul><li>End user device protection methods.<ul><li>○ Anti-virus protection</li><li>○ Patch management</li><li>○ Malware protection</li><li>○ End-point protection</li><li>○ Mobile Device Management</li></ul></li><li>Implementation and review<ul><li>○ Increased security</li><li>○ Identify weaknesses</li><li>○ Identify areas of focus</li></ul></li><li>Education<ul><li>○ Cyber security awareness training</li><li>○ Speaking about cyber security at company events</li><li>○ Company updates on number of incidents</li><li>○ Internal promotion via posters, email reminders etc</li><li>○ Phishing simulations</li></ul></li></ul> |
| 3.  Understand how to manage a cyber security attack. | 3.1 Evaluate the impact a cyber-attack has to an organisation.<br>3.2 Describe the content of an organisational incident management plan.<br>3.3 Explain the importance of internal and external communication when managing a cyber-attack.<br>3.4 Describe the roles and responsibilities for incident management.<br>3.5 Analyse the actions to take when responding to an incident.<br>3.6 Explain the importance of post cyber-attack reviews. | <ul><li>Impact on organisations<ul><li>○ Financial loss</li><li>○ Reputation damage</li><li>○ Fines</li><li>○ Incident management</li></ul></li><li>Organisational incident management plan<ul><li>○ Notification procedure</li><li>○ Incident Management Team</li><li>○ Responsibilities</li><li>○ Timescales</li><li>○ Incident classification</li><li>○ Process</li></ul></li><li>Communication</li></ul> |

<table>
<tr><td></td><td></td><td>
<ul>
<li>o   Stakeholder management</li>
<li>o   Media engagement</li>
<li>o   Damage mitigation</li>
<li>o   Reduce risk of re-occurrence</li>
</ul>
<ul>
<li>● Roles and responsibilities
<ul>
<li>o   Support teams</li>
<li>o   Consultants</li>
<li>o   Incident Management Team</li>
<li>o   ICT security teams</li>
<li>o   Senior Management Team</li>
<li>o   Suppliers</li>
<li>o   Third Parties</li>
</ul>
</li>
<li>● Evaluation
<ul>
<li>o   Steps involved</li>
<li>o   Who is involved?</li>
<li>o   How an incident is managed and documented</li>
<li>o   Mitigation methods</li>
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</li>
<li>● Reviews
<ul>
<li>o   Root cause analysis</li>
<li>o   Learning</li>
<li>o   Areas for improvement</li>
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## Assessment

To achieve a 'pass' for this unit, learners must provide evidence to demonstrate that they have fulfilled all the learning outcomes and meet the standards specified by all assessment criteria.

| Learning Outcomes to be met | Assessment criteria to be covered | Type of assessment | Word count (approx. length) |
|---|---|---|---|
| LO1, LO2, LO3 | All ACs under LO1, LO2, LO3 | Coursework | 2500 words |

## Indicative Reading List

Ozkaya E (2019) *Cybersecurity: The Beginner's Guide*. Packt Publishing

Amoroso, E. and Amoroso, M. (2017) *From CIA to APT: An Introduction to Cyber Security*. New York: Independently published.

Gillespie, A. A. (2015) *Cybercrime.* Oxon: Routledge.

Grabosky, G. (2015) *Cybercrime* (Keynotes Criminology Criminal Justice series). New York: Oxford University Press.

## Additional Resources

National Cyber Security Centre https://www.ncsc.gov.uk/

IT Governance https://www.itgovernance.co.uk/

National Crime Agency (crime threats, cybercrime) https://nationalcrimeagency.gov.uk/

Interpol crime areas, cybercrime https://www.interpol.int/

# PRINCIPLES OF COMPUTER PROGRAMMING

| Unit Reference Number | F/650/3384 |
|---|---|
| Unit Title | Principles of Computer Programming |
| Unit Level | 4 |
| Number of Credits | 20 |
| Total Qualification Time (TQT) | 200 hours |
| Guided Learning Hours (GLH) | 80 hours |
| Mandatory / Optional | Mandatory |
| SSAs | 6.1 ICT practitioners |
| Unit Grading Structure | Pass/Fail |

## Unit Aims

The aim of this unit is to give learners a basic understanding of object-oriented programming languages and how to produce effective code. It also enables learners to gain a perspective of software development and the basic principles of algorithms.

## Learning Outcomes, Assessment Criteria and Indicative Content

| Learning Outcomes-<br>The learner will: | Assessment Criteria-<br>The learner can: | Indicative Content |
|---|---|---|
| 1. Understand the principles of computer programming. | 1.1 Describe the benefits of computer programming in society and in business.<br>1.2 Describe the principles of computer programming.<br>1.3 Summarise the historical development of computer programming.<br>1.4 Explain the fundamental components of a programming language.<br>1.5 Compare the strengths and limitations of modern computer programming languages. | • Benefits<br>   o Solve problems<br>   o Automate tasks<br>• Sectors<br>   o Healthcare<br>   o Education<br>   o Manufacturing<br>   o Transport<br>• Definition, principles of programming<br>   o Abstraction<br>   o KISS<br>   o Open/Closed entities<br>   o Coupling |

| | | o Cohesion<br>● Programming history<br>  o Charles Babbage's Analytical Engine<br>  o the concept of storing data in machine-readable form<br>  o low & high-level languages (COBOL, FORTRAN, and Lisp)<br>  o Moore's law<br>  o Procedural<br>  o OO<br>Languages<br>  o COBOL, FORTRAN, Java, JavaScript, C#, C++, Python, PHP, Ruby on Rails)<br>  o The main () Function<br>  o The #include and #define directives<br>  o The Variable Definition<br>  o The Function Prototype<br>  o Program Statements<br>  o The Function Definition<br>  o Program Comments<br>  o SQL, Java, JavaScript, C#, C++, Python, PHP, Ruby on Rails.<br>● Compare; use, error handling, ease of use. |
|---|---|---|
| 2. Understand the principles of algorithms. | 2.1 Explain the concept of an algorithm.<br>2.2 Describe common algorithmic techniques and solutions.<br>2.3 Demonstrate how to create a flowchart from an algorithm. | ● History of Algorithms.<br>● Definition of algorithms<br>  o Input<br>  o Output<br>  o Definiteness<br>  o Finiteness<br>  o Effectiveness<br>  o Brute Force<br>  o Greedy Algorithms: "take what you can get now" strategy<br>  o Divide-and-Conquer |

| | | |
|---|---|---|
| | | <ul><li>o Decrease-and-Conquer</li><li>o Dynamic Programming</li><li>o Transform-and-Conquer</li></ul><ul><li>Flowchart<ul><li>o Backtracking and branch-and-bound generate and test methods.</li><li>o Flowchart symbols.</li><li>o Information flow</li><li>o Purpose and benefits</li></ul></li></ul> |
| 3. Understand the object-oriented Programming language. | 3.1 Explain the benefits of object-oriented design.<br>3.2 Evaluate when to use object-oriented design methodology.<br>3.3 Explain how objects are used in object-oriented programming.<br>3.4 Explain the steps in creating an object-oriented program.<br>3.5 Explain how to compile a program and debug codes. | <ul><li>Benefits<ul><li>o Code Reuse and Recycling</li><li>o Encapsulation</li><li>o Design Benefits</li><li>o Software Maintenance</li></ul></li><li>Evaluate<ul><li>o Situation</li><li>o Volume of code</li><li>o Multiple workstreams</li><li>o Project size</li><li>o Change cycle</li></ul></li><li>Use<ul><li>o Classes and objects</li><li>o Arrays</li><li>o Lists</li><li>o Stacks</li><li>o Queues</li><li>o Trees</li></ul></li><li>Steps<ul><li>o Intermediate representations and their purpose.</li><li>o Arrays (1- and 2-dimensions)</li><li>o Implementation of queues</li><li>o Stacks and lists</li></ul></li><li>Compile and debug codes<ul><li>o Debugger</li></ul></li></ul> |

| | | |
|---|---|---|
| | | o Breakpoints<br>o commands<br>o Use of IDEs and the IDE environments (benefits and examples of IDEs)<br>o data structure display/verification<br>o Use of debugging tools |
| 4. Understand the tools and techniques used for software development. | 4.1 Explain different types of software development techniques.<br>4.2 Evaluate the use of different software development tools.<br>4.3 Evaluate software testing methodologies.<br>4.4 Describe software deployment techniques.<br>4.5 Evaluate methods of reviewing system performance. | • Different software development tools<br>• Research and consider possible solutions and predict the overall success of the application.<br>• Research and use information relating to software testing to create a suitable test plan for your business application.<br>• Methods of reviewing system performance.<br>  o Focus group<br>  o Testing<br>  o User feedback<br>  o Reviews |
| 5. Be able to create a software programme to solve a problem using object-oriented programming. | 5.1 Identify a problem which can be solved using object-oriented programming.<br>5.2 Create a flowchart to illustrate the problem and solution.<br>5.3 Create a defined user requirements document.<br>5.4 Produce a software development plan from a system design.<br>5.5 Develop and deploy a software solution to solve a problem.<br>5.6 Evaluate the software against business and user requirements. | • Clear problem and resolution<br>• Solution will be focused on object-oriented programming solution<br>• Mapping of solution into a flowchart<br>• Information flow<br>• Symbols<br>• Number reference<br>• Defined requirements<br>• Business need<br>• Evaluation methods<br>• Goals<br>• Timescales and deadlines<br>• Resources and requirements<br>• Constraints and risks<br>• Business process<br>• Design using either SQL, Java, JavaScript, |

| | | C#, C++, Python, PHP, Ruby on Rails.<br>● Code writing standards, comments, documentation<br>● Use Debugger, breakpoints, commands in the chosen language, C ++/JAVA/Python/or similar an OOPL.<br>● Key components of an Integrated Development Environment (IDE)<br>● Use of IDEs, test plan<br>● Test plan referenced to use requirements, expected result and end result |
|---|---|---|

## Assessment

To achieve a 'pass' for this unit, learners must provide evidence to demonstrate that they have fulfilled all the learning outcomes and meet the standards specified by all assessment criteria.

| Learning Outcomes to be met | Assessment criteria to be covered | Type of assessment | Word count (approx. length) |
|---|---|---|---|
| LO1, LO2, LO3, LO4 | All ACs under LO1, LO2, LO3, LO4 | Coursework | 2500 words |
| LO5 | All ACs under LO5 | Project | N/A |

## Indicative Reading List

Harper R (2016) *Practical Foundations for Programming Languages*. New York Cambridge University Press

Stroustrup B (2013) *The C++ Programming Language*.  Michigan. Pearson.

Robert M (2018) *Python Programming: An Easy Guide to Learn Python Programming*.  Python.

Dooley J F (2017) *Language for Absolute Beginners - by Software Development, Design and Coding: With Patterns, Debugging, Unit Testing, and Refactoring*. APress.

Richard Murch R *The Software Development Lifecycle - A Complete Guide*

Dooley J F (2017) *Software Development, Design and Coding: With Patterns, Debugging, Unit Testing, and Refactoring*. A Press.

# SYSTEMS ANALYSIS AND DESIGN

| | |
|---|---|
| Unit Reference Number | F/617/2266 |
| Unit Title | Systems Analysis and Design |
| Unit Level | 4 |
| Number of Credits | 20 |
| Total Qualification Time (TQT) | 200 hours |
| Guided Learning Hours (GLH) | 80 hours |
| Mandatory / Optional | Mandatory |
| SSAs | 6.1 ICT practitioners |
| Unit Grading Structure | Pass/Fail |

## Unit Aims

The aim of this unit is to develop learners' awareness of system analysis and design in an organisational context. The unit introduces various techniques used within systems analysis and design and the methodologies used in the system development process.

## Learning Outcomes, Assessment Criteria and Indicative Content

| Learning Outcomes-<br>The learner will: | Assessment Criteria-<br>The learner can: | Indicative Content |
|---|---|---|
| 1. Understand the principles of systems analysis and design. | 1.1 Explain how systems analysis and design contributes to the software development life cycle.<br>1.2 Describe the components of systems analysis.<br>1.3 Analyse different approaches to system analysis and design.<br>1.4 Evaluate system design requirements.<br>1.5 Explain the importance of each stage in traditional software lifecycle approaches.<br>1.6 Evaluate software development lifecycle models.<br>1.7 Explain hard and soft system methodologies. | • Basic definitions and motivations of HCI, including history, theories, interaction paradigms, design principles and models.<br>• User centred design methods comprising user studies<br>• Input<br>• Processing<br>• Output<br>• Design approaches for interfaces and interaction<br>• Quality factors<br>• Evaluation methods<br>• Techniques for data analysis. |

|  |  | <ul><li>Research frontiers of HCI, including accessibility, universal design, and pervasive computing (ubiquitous, mobile and wearable applications).</li><li>Lifecycle stage and connectivity: feasibility study, analysis, design, implementation, testing, review or analysis, design, implementation, maintenance, planning; requirements traceability.</li><li>Lifecycle models: understanding and use of predictive (Waterfall, Prototyping, RAD) and adaptive (Spiral, Agile, DSDM) software development models.</li><li>Test and integration: building test environments; developing test harnesses; black box/white box testing; incremental testing; acceptance test and integration approaches; changeover strategies, trials and Go-Live prerequisites.</li><li>Prototyping methodology</li><li>End user categorisations, classifications and behaviour modelling techniques.</li><li>Agile, Cleanroom, Incremental, Prototyping, Spiral V model, Waterfall.</li><li>Hard and soft system methodologies in Object-oriented modelling.</li></ul> |
|---|---|---|
| 2. Understand system design methodologies and modelling. | 2.1 Explain types of information systems.<br>2.2 Evaluate how the functionality of information systems varies between different information systems.<br>2.3 Explain system design concepts.<br>2.4 Evaluate different system design methodologies. | <ul><li>Information system types: Business information systems, decision support systems, management information systems, strategic/executive information systems, office information systems, transaction processing systems, expert systems, global information systems, data warehouse systems, enterprise systems, enterprise resource planning systems,</li></ul> |

| | | |
|---|---|---|
| | | • integrated information systems.<br>• Categories of information systems: operational, tactical and strategic information systems<br>• Agile development methodology.<br>• DevOps deployment methodology<br>• Waterfall development method<br>• Rapid application development |
| 3. Understand human computer interface (HCI). | 3.1 Explain the principles of HCI.<br>3.2 Explain how HCI improves the user experience of a system<br>3.3 Explain the considerations to make in relation to HCI when designing a system<br>3.4 Evaluate HCI methodologies. | • Definition of information and data, sources of information, information requirements and the needs for information at different levels within an organisation; storing information and its importance regarding security, accuracy and relevance; outputs e.g., payroll, invoicing, ordering, bookings, stock control, personnel records, goods tracking, decision-making, marketing, customer service.<br>• Management information: Reports e.g., sales report, college enrolment statistics, marketing analysis (brick v click), trends in the market, competition and market share, - management of computer systems, staffing, maintenance, project management and scheduling.<br>• Selecting information: Analysis of information in terms of validity, accuracy, currency and relevancy; identifying and rationalising meaningful information from data sets.<br>• Uses: Proficiency in terms of accessing quality information that can be used for decision-making, problem-solving, predictions, trending and forecasting. |

| | | <ul><li>Accessibility</li><li>Functionality</li><li>Useability</li><li>Icons</li><li>Colours</li><li>Layout</li><li>Speed</li><li>Security</li><li>Flowcharts; Pseudocode; Formal specification Methods; Event/State/Data Driven; Finite State. Machines (extended-FSM)/FSP; problem of e-FSM state explosion; reachability analysis.</li><li>Docker, CoreOS, Cloud Foundry, Kubernetes and OpenStack.</li><li>DevOps and continuous integration practices, as well as the deployment tools available to architects to meet and exceed their business goals.</li></ul> |
|---|---|---|
| 4. Be able to produce a system design using modelling techniques. | 4.1 Create a system design document. <br> 4.2 Produce a model of a software system. <br> 4.3 Produce a security and control design. | <ul><li>System design document : purpose, design ideas, aim, audience</li><li>Software Determinations : The usefulness of the product and imperatives on its activity should be characterized.</li><li>Software Turn Of Events : The product to meet the prerequisite should be created.</li><li>Software Approval : The product should be approved to guarantee that it does what the client needs.</li><li>Software Development : The product should advance to meet changing customer needs.</li><li>The model should illustrate how a real-life system would work</li></ul> |

## Assessment

To achieve a 'pass' for this unit, learners must provide evidence to demonstrate that they have fulfilled all the learning outcomes and meet the standards specified by all assessment criteria.

| Learning Outcomes to be met | Assessment criteria to be covered | Type of assessment | Word count (approx. length) |
|---|---|---|---|
| LO1, LO2, LO3 | All ACs under LO1, LO2, LO3 | Coursework | 2500 words |
| LO4 | All ACs under LO4 | Project | N/A |

## Indicative Reading list

J., Preece, J., Rogers, Y., & Sharp, H. (2015) *Interaction design: Beyond human-computer interaction* (4th ed.)  Bentham. London.

Fix, A., Finlay, J., Abowd, G.D., & Beale, R (2004) *Human computer interaction* (3rd ed.) Pearson. London.

Ahmed T; Cox J; (2014) *Developing Information Systems: Practical Guidance for IT Professionals* BCS Learning & Development

Bocij P; Greasley A; Hickie S; (2015) *Business Information Systems*, 5th edn: Technology, Development and Management for the E-Business. Pearson. London.

# WEB AND MOBILE APPLICATIONS

| Unit Reference Number | H/650/3385 |
|---|---|
| Unit Title | Web and Mobile Applications |
| Unit Level | 4 |
| Number of Credits | 20 |
| Total Qualification Time (TQT) | 200 hours |
| Guided Learning Hours (GLH) | 80 hours |
| Mandatory / Optional | Mandatory |
| SSAs | 6.1 ICT practitioners |
| Unit Grading Structure | Pass/Fail |

## Unit Aims

The aim of this unit is to provide learners with an understanding of current web and mobile application design technology and the practices and tools used. The learner will learn to create websites or mobile applications to given design specifications.

## Learning Outcomes, Assessment Criteria and Indicative Content

| Learning Outcomes- The learner will: | Assessment Criteria- The learner can: | Indicative Content |
|---|---|---|
| 1. Understand web and mobile application design technology. | 1.1 Explain modern web and mobile development technologies and frameworks.<br>1.2 Evaluate the impact of common development technologies and frameworks on design, functionality and management.<br>1.3 Review the impact of website design on search engine results.<br>1.4 Explain how to improve website ranking using search engine optimization (SEO) techniques. | • Hosting and website management: Investigate relationships between domain names, DNS services and communication protocols used to access a website.<br>• Overview of publishing and managing secure websites, including search engine indexing and ranking.<br>• Development of mobile applications in an IDE environment<br>• Evolution of mobile applications<br>• Mobile application stores including Apple App store and Google Play store |

| | | |
|---|---|---|
| | | <ul><li>Interaction between browser and server: HTML forms, GET and POST data</li><li>Different server technologies: Differences between web server hardware, software and host operating systems.</li><li>Advantages of an integrated database system with regards to expanding website capability.</li><li>Common web development technologies and frameworks.</li><li>Aesthetics</li><li>Speed</li><li>Databases</li><li>Integrations and API dependencies</li></ul>SEO techniques<ul><li>Backlinks</li><li>URL</li><li>Speed</li><li>Search engine algorithms</li><li>Keywords</li><li>Page scores</li><li>Paid advertising</li><li>Future developments and advancements:</li></ul> |
| 2. Understand website technologies, tools and software used to develop websites. | 2.1 Explain the concepts of design flexibility, performance, functionality, User Experience (UX) and User Interface (UI).<br>2.2 Evaluate a range of tools, techniques and languages used to design and develop a custom-built website.<br>2.3 Evaluate the use of a content management system (CMS) for designing and managing a website. | <ul><li>Developing schemes of user interaction influenced by characteristics of good design, such as: learnability, robustness, flexibility, usability, performance, accessibility, adaptability, customisation</li><li>Developing dynamic content using PHP (The use of JSP, ASP or Perl is acceptable): Interfacing with a database (limited knowledge of SQL syntax is</li></ul> |

| | | |
|---|---|---|
| | 2.4 Explain the considerations, limitations and benefits of website design platforms . | required to allow iterating over a data set)<br>• Joomla, WordPress, Drupal, etc.<br>• Standards & conformance: W3C, WAI, CSS.<br>• Public & Private key encryption, On the fly encryption, hashes, the uses and limitations of RSA, DES and AES.<br>• ISO 9126 characteristics of quality.<br>• File sharing & distribution mechanisms: Traditional downloading/uploading, FTP, Bit torrent, P2P networks.<br>• Streaming media, RSS, IRC, Wiki, Blog, Web Forum, Portals. |
| 3. Understand multimedia content creation tools and software. | 3.1 Describe tools available to create multimedia content for websites.<br>3.2 Explain regulatory and ethical considerations in creating multimedia content for websites. | • InDesign, Adobe Illustrator, Photoshop, Dreamweaver & CorelDRAW.<br>• Lab hours demonstrating InDesign, Adobe Illustrator, Photoshop, Dreamweaver & CorelDRAW use.<br>• CMS such as WordPress<br>• IDE's such as Xcode and Android Studio<br>• Disability Discrimination Act 1995 (DDA) and the related Special Educational Needs and Disability Act 2001 (SENDA)<br>• Web Accessibility Initiative (WAI) from the World Wide Web Consortium (W3C) |
| 4. Be able to create a website or mobile application to fulfil a set of client and user requirements. | 4.1 Design a wireframe document for a website or mobile application to fulfil a set of client and user requirements.<br>4.2 Create a website or mobile application to fulfil a set of client and user requirements.<br>4.3 Identify key performance areas and create a suitable test plan of your website or mobile application. | • Website wireframe is a visual representation or outline of a website.<br>• Creation of website / mobile application<br>• Website should include:<br>   o Navigation / menu<br>   o Pages<br>   o Accessibility |

| | 4.4 Evaluate the results of the test plan and overall success of your multipage website or mobile application. | ● Review how intuitive interfaces and actions, user-friendly designs, appropriate graphics, effective navigation and good quality content can help establish user trust and deliver an improved User Experience (UX).<br>● Evaluate: explain any areas of success and provide justified recommendations for areas that require improvement |
|---|---|---|

## Assessment

To achieve a 'pass' for this unit, learners must provide evidence to demonstrate that they have fulfilled all the learning outcomes and meet the standards specified by all assessment criteria.

| Learning Outcomes to be met | Assessment criteria to be covered | Type of Assessment | Summary of quantity/quality |
|---|---|---|---|
| LO1, LO2, LO3 | All ACs under LO1, LO2, LO3 | Coursework | 2500 words |
| LO4 | All ACs under LO4 | Project | NA |

## Indicative Reading List

*HTML and CSS: Design and Build Websites Paperback by* Jon Duckett (Author)

*Responsive Web Design with HTML5 and CSS3 - Second Edition: Build responsive and future-proof websites to meet the demands of modern web users* by Ben Frain

*Adobe Photoshop CC Classroom in a Book (2018 release) (Classroom in a Book (Adobe))* by Andrew Faulkner and Conrad Chavez

## Additional Resources

Android Studio http://developer.android.com

Apple Xcode http://developer.apple.com

# COMPUTER AND NETWORK TECHNOLOGY

| Unit Reference Number | L/617/2268 |
|---|---|
| Unit Title | Computer and Network Technology |
| Unit Level | 4 |
| Number of Credits | 20 |
| Total Qualification Time (TQT) | 200 hours |
| Guided Learning Hours (GLH) | 80 hours |
| Mandatory / Optional | Mandatory |
| SSAs | 6.1 ICT practitioners |
| Unit Grading Structure | Pass/Fail |

## Unit Aims

This unit provides learners with an understanding of computer networking essentials and cloud technologies, their operating principles, protocols, standards, security considerations, and prototypes associated with this field. Learners will explore different hardware and software options as well as how to configure and install them.

A wide range of networking technologies will be also examined including Local Area Networks (LAN) and Wide Area Networks (WAN) and how they evolved to create large-scale networks. Protocol methodologies related to IP data networks will also be explored.

## Learning Outcomes, Assessment Criteria and Indicative Content

| Learning Outcomes-<br>The learner will: | Assessment Criteria-<br>The learner can: | Indicative Content |
|---|---|---|
| 1. Understand the fundamentals of cloud computing. | 1.1 Summarise the historical development of cloud computing technologies.<br>1.2 Evaluate cloud computing models.<br>1.3 Assess cloud computing platforms.<br>1.4 Differentiate client and server environments.<br>1.5 Evaluate the benefits of serverless computing. | • Cloud technologies and platforms such as Cloud Applications and Cloud Infrastructure<br>• Increase in use of cloud technology<br>• Benefits of cloud computing<br>• Models: SaaS, PaaS, IaaS, NaaS<br>• Benefits<br>• Cost considerations<br>• Configurations<br>• Hybrid solutions |

| | | | |
|---|---|---|---|
| | | | ● Difference in needs<br>● Difference in costs<br>● Difference in functionality<br>● Azure<br>● Amazon web services<br>● Reduced need for physical infrastructure<br>● Cost reduction in areas such as electric<br>● Speed of implementation<br>● Accessibility<br>● Integrations<br>● Saleability<br>● Availability |
| 2. Understand networking principles and their protocols. | 2.1 Describe network standards and protocols.<br>2.2 Assess different network topologies.<br>2.3 Evaluate the impact of different network standards.<br>2.4 Identify and explain various network hardware and software available for an intranet setup. | | ● Topology: Logical e.g., Ethernet, Token Ring; physical e.g., star, ring, bus, mesh, tree, ring.<br>● Protocols: Purpose of protocols; routed protocols e.g., IPv4, IPv6, IPv6 addressing, Global unicast, Multicast, Link local, Unique local, EUI 64, Auto configuration, FTP, HTTP, SMTP, POP3, SSL; management of protocols for addressing.<br>● Network layer<br>● Physical layer<br>● Data layer<br>● Transport layer<br>● Switches<br>● Routers<br>● Gateways<br>● Firewalls<br>● Network storage<br>● Servers<br>● Virtual server management systems |

| 3. Be able to support and troubleshoot computing problems. | 3.1 Carry out PC assembling and basic troubleshooting without supervision.<br>3.2 Carry out installation of client and server operating systems without supervision.<br>3.3 Configure client systems to meet organisational policies without supervision. | • Basic Numbering Systems<br>• Networking Fundamentals<br>• Transmission Media and Networking Topologies<br>• Network Reference Models<br>• Networking Protocols<br>• 3.2Physical installation including hardware i.e., RAM, Hard Drives etc<br>• Software installation with operating system setup and configuration<br>• Access controls<br>• Restrictions<br>• Group policies<br>• Reviewing default settings |
|---|---|---|
| 4. Be able to demonstrate routing and switching techniques. | 4.1 Configure a network using routing and switching techniques.<br>4.2 Demonstrate how to setup a secure network interface.<br>4.3 Explain how to backup and restore a router. | • Transmission Media and Networking Topologies.<br>• Networking Protocols.<br>• IP Addressing.<br>• Subnetting.<br>• Variable Length Subnet Mask (VLSM).<br>• Basic Router Configuration.<br>• Router Boot Sequence.<br>• IP Routing.<br>• Cloud network such as Azure<br>• Virtual Local Area Network (VLAN).<br>• Inter-VLAN Routing and VLAN Trunking Protocol.<br>• Enabling Network Security.<br>• Access list, Extended Access List, Named Access. List.<br>• IPv6 Routing Protocols.<br>• Back Up and Restoring of Router Configuration.<br>• Managing Switches. |

## Assessment

To achieve a 'pass' for this unit, learners must provide evidence to demonstrate that they have fulfilled all the learning outcomes and meet the standards specified by all assessment criteria.

| Learning Outcomes to be met | Assessment criteria to be covered | Type of assessment | Word count (approx. length) |
|---|---|---|---|
| LO1, LO2 | All ACs under LO1, LO2 | Coursework | 2500 words |
| LO3, LO4 | All ACs under LO3, LO4 | Project | NA |

## Indicative Reading List

Wempen F (2014) *Computing Fundamentals.* Willy. London

Tanenbaum A S; Wetherall J (2010) *Computer Networks and Internets.* Pearson. London.

Orban, S (2018) *Ahead in the Cloud: Best Practices for Navigating the Future of Enterprise IT.* CreateSpace Independent Publishing Platform

# MANAGING DIGITAL INFORMATION

| Unit Reference Number | J/650/3386 |
|---|---|
| Unit Title | Managing Digital Information |
| Unit Level | 4 |
| Number of Credits | 20 |
| Total Qualification Time (TQT) | 200 hours |
| Guided Learning Hours (GLH) | 80 hours |
| Mandatory / Optional | Mandatory |
| SSAs | 6.1 ICT practitioners |
| Unit Grading Structure | Pass/Fail |

## Unit Aims

The aim of this unit is to show how communications, knowledge and information can be improved within an organisation including making better use of IT systems. Learners will understand the interaction between communications, knowledge and information. The unit also explores how IT systems can be used as a management tool for collecting, storing, disseminating and providing access to knowledge and information.

## Learning Outcomes, Assessment Criteria and Indicative Content

| Learning Outcomes-<br>The learner will: | Assessment Criteria-<br>The learner can: | Indicative Content |
|---|---|---|
| 1. Understand how to assess the digital information needs of an organisation. | 1.1 Assess various digital information held by organisations.<br>1.2 Evaluate the information systems used for managing digital information<br>1.3 Assess internal and external sources of digital information. | • Sources: internal and external, primary and secondary, formal and informal, team workers, customers and other stakeholders.<br>• Types: qualitative and quantitative, tacit and explicit, official and unofficial, policy and opinion.<br>• Software systems<br>• Non digital systems<br>• Stakeholders<br>• Information flows<br>• Information asset register<br>• Third parties |

| 2. Understand information processes in an organisation. | 2.1 Describe existing information processes for a given department within an organisation.<br>2.2 Design a process map.<br>2.3 Determine benefits and limitations of existing processes.<br>2.4 Justify areas of improvement for processes in any areas of a business. | ● Information flow<br>● Documents used<br>● Linked processes<br>● Types: meetings and conferences, workshops and training events, internet and email, written, telephone, video conferencing, one-to-one meetings.<br>● Flow of data<br>● Symbols<br>● Related documents referenced<br>● Reliance of human processing<br>● Errors<br>● Bottlenecks<br>● Ease of use<br>● Duplication of work<br>● Clear justification of decisions based on evidence and facts<br>● Approaches: structured and coordinated, planned, formal and informal.<br>● Strategy: advantages, disadvantages; informal, face-to-face, formal in writing, emotional, intelligence.<br>● Mapping of current process to new process<br>● Identifying areas for improvement or automation<br>● Reducing human error |
|---|---|---|
| 3. Understand compliance and regulations associated with digital information. | 3.1 Explain the laws and regulations associated with managing digital information.<br>3.2 Assess how to ensure organisations are complaint when managing digital information.<br>3.3 Explain the impact of being non complaint with laws and regulations. | ● o  General Data Protection Regulation (EU) (GDPR)<br>● Fees from o         Information Commissioner's Office(ICO)<br>● Compliance and regulations when managing digital information such as GDPR and how long digital data can be kept for (retention periods)<br>● How to manage the retention of digital |

| | | information, <br> • An awareness of current national and international legislation including Data Protection Act 2018 , Computer Misuse Act 1990, equal opportunities, health and safety. <br> • Current approaches to tendering; copyright and licensing issues. <br> • Approaches to capturing information inside an organisation and its purpose i.e., information asset register, records of processing activities <br> • Financial <br> • Reputational <br> • Data breaches |
|---|---|---|
| 4. Be able to improve digital information systems for an organisation. | 4.1 Explain existing approaches to the collection, formatting, storage and dissemination of information and knowledge in an organisation. <br> 4.2 Recommend a strategy to improve the collection, formatting, storage and dissemination of information and knowledge. <br> 4.3 Implement an improvement to access of information and knowledge in an organisation. | • Type: hard and soft, websites and mailings, access and dissemination. <br> • Style: trends and patterns, diagrams and text, consistent and reliable, current and valid; legal and confidential. <br>    o Who <br>    o What <br>    o Where <br>    o When <br>    o Why <br> • SMART Goals <br> • Analyse current solution <br> • Recommend solution with justification |

## Assessment

To achieve a 'pass' for this unit, learners must provide evidence to demonstrate that they have fulfilled all the learning outcomes and meet the standards specified by all assessment criteria.

| Learning Outcomes to be met | Assessment criteria to be covered | Type of assessment | Word count (approx. length) |
|---|---|---|---|
| LO1, LO2, LO3, LO4 | All ACs under LO1, LO2, LO3, LO4 | Coursework | 2500 words |

## Indicative Reading List

McNurlin, Sprague & Bui (2009) *Information Systems Management in Practice*. Pearson. London.

Bott M. F. (2014) *Professional Issues in Information Technology*. CBS. London.

## Additional Resources

Information Commissioners Office (ICO) https://ico.org.uk
The UK's independent authority set up to uphold information rights in the public interest, promoting openness by public bodies and data privacy for individuals.

# IMPORTANT NOTE

Whilst we make every effort to keep the information contained in programme specification up to date, some changes to procedures, regulations, fees matter, timetables, etc may occur during the course of your studies. You should, therefore, recognise that this document serves only as a useful guide to your learning experience.

For updated information please visit our website www.othm.org.uk.