



# **OTHM LEVEL 6 DIPLOMA IN INFORMATION TECHNOLOGY**

Qualification Number: 603/3789/8

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Specification | April 2024

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## QUALIFICATION OBJECTIVES

The objective of the OTHM Level 6 Diploma in Information Technology is to provide learners with the knowledge and skills to further their career in a range of organisations. It is designed to ensure that each learner is a confident, independent thinker with a detailed knowledge of Information Technology, and equipped with the skills to adapt rapidly to change at a junior or middle management level, and aspiring into higher management within their organisation or industry.

The qualification is ideal for those who have started, or are planning to move into, a career in private or public sector business. Successful completion of the Level 6 Diploma in Information Technology will provide learners with the opportunity to progress to further study or employment.

## QUALITY, STANDARDS AND RECOGNITIONS

OTHM Qualifications are approved and regulated by Ofqual (Office of Qualifications and Examinations Regulation). Visit register of [Regulated Qualifications](#).

OTHM has progression arrangement 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 6 Diploma in Information Technology
Ofqual Ref. No.	603/3789/8
Regulation Start Date	29/10/2018
Operational Start Date	31/10/2018
Duration	1 Year
Total Credit Value	120 Credits
Total Qualification Time (TQT)	1200 Hours
Guided Learning Hours (GLH)	480 Hours
Sector Subject Area (SSA)	06.1 ICT practitioners
Overall Grading Type	Pass / Fail
Assessment Methods	Coursework
Language of Assessment	English

## EQUIVALENCES

OTHM qualifications at RQF Level 6 represent practical knowledge, skills, capabilities and competences that are assessed in academic terms as being equivalent to Bachelor's Degrees with Honours, Bachelor's Degrees, Professional Graduate Certificate in Education (PGCE), Graduate Diplomas and Graduate Certificates.

## QUALIFICATION STRUCTURE

The OTHM Level 6 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
R/617/3034	Advanced Computer Networks	20	80	200
Y/617/3035	Advanced Data Analytics	20	80	200
D/617/3036	Advanced Database Management Systems	20	80	200
H/617/3037	Management Information Systems	20	80	200
K/617/3038	Computers, Society and Law	20	80	200
M/617/3039	Computing Projects	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

For entry onto the OTHM Level 6 Diploma in Information Technology qualification, learners must possess:

- Relevant NQF/QCF/RQF Level 5 diploma or equivalent recognised qualification
- Learner must be 18 years or older at the beginning of the course
- **English requirements:** If a learner is not from a majority English-speaking country must provide evidence of English language competency. For more information visit [English Language Expectations](#) page.

## PROGRESSIONS

Successful completion of Level 6 Diploma in Information Technology qualification provides learners the opportunity for a wide range of academic progressions including progression to relevant OTHM Level 7 Diplomas. The Level 6 Diploma in Information Technology has been

developed with career progression and professional recognition in mind. As this qualification is approved and regulated by Ofqual (Office of the Qualifications and Examinations Regulation), learners are eligible to gain direct entry into relevant Master's degree programmes. For more information visit 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 the 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.

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.

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.

## **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**

## ADVANCED COMPUTER NETWORKS

Unit Reference Number	R/617/3034
Unit Title	Advanced Computer Networks
Unit Level	6
Number of Credits	20
Total Qualification Time	200
Guided Learning Hours (GLH)	80
Mandatory / Optional	Mandatory
Sector Subject Area (SSA)	06.1 ICT practitioners
Unit Grading Structure	Pass/Fail

### Unit Aims

This unit supports learners to develop a critical understanding of relevant and modern concepts in networking technologies within the IT industry. This unit also introduces learners to the detection of threats and vulnerabilities in physical and IT security, and how to manage risks relating to organisational security.

### Learning Outcomes and Assessment Criteria

Learning Outcomes- The learner will:	Assessment Criteria- The learner can:
1. Understand the concepts of servers, clients, and processes.	1.1 Explain client and server environment and the communication between clients and servers. 1.2 Define the terms: Process ID (PID), Parent process ID (PPID) and 'init'. 1.3 Compare the operation of parent processes and child processes.
2. Be able to create a client/server model in a Linux system with User Datagram Protocol (UDP), Transmission Control Protocol (TCP) and Application Layer protocols.	2.1 Explain the features of Linux server configurations. 2.2 Explain the concepts of UDP and TCP systems. 2.3 Build and implement DNS server in Linux using UDP and TCP.
3. Be able to design and configure a secure network for a corporate environment.	3.1 Critically evaluate Network Security protocols. 3.2 Critically analyse the purpose and requirements of a secure network in a given scenario. 3.3 Design a secure network for a corporate environment. 3.4 Configure Network Security for a secure network in a corporate environment.

### Indicative content

#### Learning Outcome 1

- Introduction to the structure of Open Systems Interconnection model (OSI model) and the operation of Transmission Control Protocol/Internet Protocol (TCP/IP).



- Basic concepts of client, server, Processes (init, client, server)
- Introduction to the concept and function of Sockets Interface.
- The communication process between client and server (e.g. echo server process).
- Real life functions using Application Layer protocol.

## Learning Outcome 2

- Introduction of Linux
- Introduction to the Linux operating system: concept, History of Linux, Interacting with Linux, advantages and disadvantages.
- How to install Linux, GUI of Linux, Basics–Linux command, the way to compile, the debugging method.
- Programming of client/server program: Socket Programming in Linux using C Language, including socket operation, byte order operation, address formats conversion, socket option, name and address operation, secure coding.
- Elements of Linux server configuration
  - Automating Installation with Kickstart
  - Using Regular Expressions with grep
  - Creating and Editing Text Files with vim
  - Scheduling Future Linux Tasks
  - Managing Priority of Linux Processes
  - Controlling Access to Files with Access Control Lists (ACLs)
  - Managing SELinux Security
  - Connecting to Network-defined Users and Groups
  - Adding Disks, Partitions, and File Systems to a Linux System
  - Managing Logical Volume Management (LVM) Storage
  - Accessing Network Storage with Network File System (NFS)
  - Accessing Network Storage with SMB
  - Limiting Network Communication with firewall
- Simple UDP client / server program: UDP-based socket API, UDP-based client, UDP-based server.
- Simple TCP client / server program: TCP-based socket API, TCP-based client, TCP-based server.
- Application programming, such as a DNS server/client system
- Build a system with DNS
  - Controlling Services and Daemons
  - Managing IPv6 Networking
  - Configuring Link Aggregation and Bridging
  - Network Port Security
  - Managing DNS for Servers
  - Email Transmission
  - Providing Remote Block Storage
  - Providing File-Based Storage

- Providing Apache HTTPD Web Service
- Writing Bash Scripts

### Learning Outcome 3

Network Security devices: The historical Network Security (NS) principles and associated aspects such as Firewalls, Routers, Switches.

Network Security protocols: MD5, SSL, TLS, VPN, AES, SHA-1/2, RSA, DES, 3DES, IPSec, DNS, DHCP, HTTP, HTTPs, FTP, FTPs, POP3, SMTP, IMAP.

Network Security cryptographic types: Different types of public and private key cryptography such as Caesar Cipher, Vigenere cipher, Hash.

Planning a network: purpose

Configure Network Security: measures such as Firewalls, Routers, Switches, Gateways, SSL, IPSec, HTTPs, FTPs, passwords and backup devices.

### 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, and AC s 2.1 and 2.2 and AC s 3.1 and 3.2	Coursework	3000 words
LO2, LO3	All ACs under LO2 AC 3.3 and 3.4 under LO3	Lab Demonstration	Lab Demonstration

### Indicative Reading list

Burgess, M. (2003) *Principles of Systems and Network Administration*. Chichester: John Wiley.

Comer, D. (2000) *Internetworking with TCP/IP, Vol. III: Client-Server Programming and Applications*. Linux/Posix Sockets Version. 1st Ed. Pearson.

Comer, D. (2013) *Internetworking with TCP/IP Volume I Principles, Protocols and Architecture*. 6th Ed. Pearson.

Edwards, J. and Bramante, R. (2009) *Networking Self-Teaching Guide: OSI, TCP/IP, LANs, MANs, WANs, Implementation, Management, and Maintenance*. 1st Ed. Wiley.

Johansen, A. (2015) *LINUX: The Ultimate Beginner's Guide!* CreateSpace Independent Publishing Platform.

Reese, R. (2008) *Network Security Fundamentals: Project Manual*. John Wiley & Sons, Inc.

Stallings, W. (2005) *Cryptography and Network Security*. Rockland, Ma: Syngress Publishing.

## ADVANCED DATA ANALYTICS

Unit Reference Number	Y/617/3035
Unit Title	Advanced Data Analytics
Unit Level	6
Number of Credits	20
Total Qualification Time	200
Guided Learning Hours (GLH)	80
Mandatory / Optional	Mandatory
Sector Subject Area (SSA)	06.1 ICT practitioners
Unit Grading Structure	Pass/Fail

### Unit Aims

The aim of this unit is to provide learners with the knowledge and skills for advanced data analytics. This unit introduces learners to applied analytical models used in business to discover, interpret and communicate meaningful patterns of data held in silos or data warehouses, and to derive knowledge for competitive advantage. Learners are assumed to have some programming knowledge.

### Learning Outcomes and Assessment Criteria

Learning Outcomes- The learner will:	Assessment Criteria- The learner can:
1. Understand the theoretical foundation of data analytics used in business decision-making.	1.1 Explain common terminology in 'data analytics'. 1.2 Critically evaluate the use of data analytic methods. 1.3 Summarise the importance of data analytics for businesses.
2. Understand issues in preparing a large data set for use in an applied analytical model.	2.1 Evaluate analytical model data preparation processes. 2.2 Critically evaluate potential issues in the preparation of data for use in an applied analytical model.
3. Be able to apply a range of descriptive analytic and/or statistical techniques to convert data into actionable insight.	3.1 Critically evaluate methods to visualise the output from an applied analytical model. 3.2 Apply an appropriate programming language or tool to demonstrate how descriptive analytic techniques contribute to decision-making. 3.3 Apply an appropriate programming language or tool to demonstrate how predictive analytic techniques are used in forecasting future events. 3.4 Apply an appropriate programming language or tool to demonstrate how prescriptive analytic techniques are used to find the best course of action in a situation.

### Indicative contents

#### Learning Outcome 1

Data analytics terminologies: Population, sample, categorical data, nominal data, ordinal data, continuous data, discrete data etc.

Methods of data analytics: Descriptive data analytics, predictive data analytics and prescriptive data analytics.

Exploratory data analysis (EDA): Variable identification, univariate and bi-variate analysis, missing values treatment, etc.

## Learning Outcome 2

Data preparation: Data requirements; data collection, data processing; semi structured/unstructured metadata processing, cleaning; aggregation; exploratory data analysis (EDA); data product; discretisation, data reduction stages.

Data visualisation: Interactive data visualization, Descriptive statistics, Inferential statistics, Statistical graphics, Plot, Data analysis, Infographic Data science

Issues: Value leak, compromising trackability of data, forgetting the data prep end users, Data governance

## Learning Outcome 3

Descriptive analytic techniques

- Descriptive statistics: Measures of central tendency, the measure of position and measures of dispersion.
- Probability distribution: Cumulate distribution, discrete distribution, continuous distribution.
- Sampling and estimation: Random sampling, systematic sampling, point estimate, interval estimate and so forth.
- Statistical inferences: Models and assumptions.

Predictive analytic techniques

- Regression analytics: Linear regression, multiple linear regression and logistic regression.
- Forecasting techniques: Qualitative, average approach, naïve approach, time series methods, causal relationship and so forth.

Prescriptive analytic techniques

- Optimisation: Classical optimisation, linear programming techniques, nonlinear programming techniques, dynamic programming.
- Decision analysis: Models, justifiable decisions and defensible decisions.

## 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
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LO1, LO2	All ACs under LO1	Presentation	Presentation and 1000 words of speaker notes
LO2, LO3	AC 2.1, 2.2, 3.1	Coursework	2000 words
LO3	AC 3.2, 3.3, 3.4	Lab Demonstration	Lab Demonstration

### Indicative Reading list

Evans, J. (2016) *Business Analytics*. 2nd Ed. Pearson.

Runkler, T. (2016) *Data Analytics: Models and Algorithms for Intelligent Data Analysis*. 2nd Ed. Vieweg+ Teubner Verlag.

Carlberg, C. (2012) *Predictive Analytics: Microsoft Excel*. QUE.

Marr, B. (2015) *Big Data: Using SMART Big Data, Analytics and Metrics to Make Better Decisions and Improve Performance*. Wiley.

## ADVANCED DATABASE MANAGEMENT SYSTEMS

Unit Reference Number	D/617/3036
Unit Title	Advanced Database Management Systems
Unit Level	6
Number of Credits	20
Total Qualification Time	200
Guided Learning Hours (GLH)	80
Mandatory / Optional	Mandatory
Sector Subject Area (SSA)	06.1 ICT practitioners
Unit Grading Structure	Pass/Fail

### Unit Aims

The aim of this unit is to develop learners' knowledge and skills of advanced database systems and how these systems are managed within a business or corporate environment. Learners will be able to make informed choices between vendor and open source platforms for database management systems, and design and develop a relational DBMS for a client using an open source platform.

### Learning Outcomes and Assessment Criteria

Learning Outcomes- The learner will:	Assessment Criteria- The learner can:
1. Understand different types of database management systems.	1.1 Assess how relational database models and normalisation provide reliable and efficient databases. 1.2 Critically compare a range of Database Modelling languages. 1.3 Critically evaluate different database management systems available in relation to open source and vendor-specific platforms.
2. Be able to apply data analysis and database design techniques.	2.1 Apply data modelling techniques to refine logical data requirements and normalize. 2.2 Use a standard unified modelling language (UML) notation to document logical data requirements.
3. Be able to develop a secured and functional database to meet client and system requirements.	3.1 Design and build a database structure. 3.2 Extract data from tables. 3.3 Apply table and field-level security to the database. 3.4 Test the system for functionality and performance 3.5 Evaluate security risks to the database.

### Indicative contents

#### Learning Outcome 1

- Database management systems (DBMS): MySQL, Oracle.
- Data models: Entity-Relationship, relational, hierarchical, network, object-oriented, object-relational.

- Relational data structures, including: relations, attributes, domain, tuple, cardinality.
- Constraints: key, domain, referential integrity.
- Normalisation in developing efficient data structures.
- Modelling languages: query language, data definition language (DDL), data, manipulative language (DML), relational languages.
- Transaction and concurrency in DBMS.
- Investigation of open source and vendor-specific systems.
- Multiple platform approaches to database management.

## Learning Outcome 2

Up to Third normal form (1NF, 2NF and 3NF), Boyce Codd Normal Form (BCNF), Query language ERROL, three schema approach, Relationships, roles and cardinalities

### UML

- UML Drawing tools such as Edraw, Dia etc.
- DTD and XML Schema
- Using CSS with XML

## Learning Outcome 3

Building a physical database structure

- Using normalization decompose tables to eliminate redundancy
- Designing and implementing Tables
- Writing SELECT Queries
- Querying Multiple Tables
- Sorting and Filtering Data
- Using DML to Modify Data
- Using Built-In Functions
- Designing and Implementing User-Defined Functions

Security: Encrypt stored files and backups, Web Application Firewall (WAF)

- Using an open source language (with an application software e.g. MySQL with front-end Microsoft Access).
- Using an appropriate database management system and Structured Query Language (SQL) to produce a secure solution to meet client's requirements.
- Creating, setting up and maintaining data tables.



- Applying data validation rules.
- Generating outputs e.g. user-generated queries, automated queries, reports.
- Application and user interface e.g. navigation, data entry forms and subforms, automated functions.
- Populating the database.
- SQL statements to extract, manipulate and modify data.
- Applying security measures to control access to data, e.g. user access levels.
- Testing the database solution using different types of testing: referential integrity, functionality, security, stability.
- Selection and use of appropriate test data.
- Selecting suitable test users and gathering feedback from users.
- Making use of testing outcomes to improve and/or refine the solution.
- Reviewing the solution, criteria for use when reviewing the solution against the quality of the database, fitness for purpose, suitability against the original requirements, technology constraints, strengths and improvements, platforms and compatibility.
- Optimising the solution: data types, data sizes e.g. size on disk, many tables e.g. overheads for many tables, query optimising.

## 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, LO3	All ACs from LO1 AC 2.1, 2.2	Coursework	2500 words
LO2, LO3	All ACs from LO3	Lab Demonstration	Lab Demonstration

## Indicative Reading list

Connolly, T. and Begg, C. (2014) *Database systems: A practical guide to design, implementation and management*. 3rd Ed. Addison-Wesley.

Elmasri, R. and Navathe, S. (2011) *Fundamentals of Database Systems*. 6th Ed. Addison-Wesley.

Hoffer, J. (2008) *Modern Database Management*. Pearson Education.

Jeffrey A., Ramesh, V. and Topi Heikki, T. (2012) *Modern Database Management*. Pearson Education.

Silberschatz, A., Korth, H.F. and Sudarshan, S. (2011) *Database System Concepts*. 6th Ed. McGraw-Hill Edition.

Tillmann, G. 2017, *Usage-Driven Database Design: From Logical Data Modeling Through Physical Schema Definition*. 1st edn, Apress L. P, Berkeley, CA.

## MANAGEMENT INFORMATION SYSTEMS

Unit Reference Number	H/617/3037
Unit Title	Management Information Systems
Unit Level	6
Number of Credits	20
Total Qualification Time	200
Guided Learning Hours (GLH)	80
Mandatory / Optional	Mandatory
Sector Subject Area (SSA)	06.1 ICT practitioners
Unit Grading Structure	Pass/Fail

### Unit Aims

This aim of this unit is to develop learners' knowledge and skills in managing information systems for organisations. Learners will examine how systems can be used to support core business functions, to drive business improvement, and to enable organisations to be more productive and competitive within the global marketplace.

### Learning Outcomes and Assessment Criteria

Learning Outcomes- The learner will:	Assessment Criteria- The learner can:
1. Understand how IT systems support organisational functions.	1.1 Critically evaluate the role and purpose of IT systems for different organisational functions. 1.2 Analyse the different ways in which data is stored and processed for use in an organisation. 1.3 Critically evaluate the management of information systems in an organisation.
2. Understand the role of information systems in supporting value-added change within organisations.	2.1 Explain how information systems can be used to support value-added change. 2.2 Critically evaluate a specific information systems that supports value-added change. 2.3 Review the management of information systems in an organisation.
3. Understand the use of information systems to support organisational strategy.	3.1 Identify different models that can be applied to strategic information systems. 3.2 Evaluate how strategic information systems can contribute to the competitiveness of organisations. 3.3 Explain how an organisation can obtain a competitive advantage within a global market by successful management of its information systems.

### Indicative contents

#### Learning Outcome 1

- The role of IT in knowledge management, data management and customer service management.

- The impact of IT systems and their contribution to solving business problems.
- The impact of IT systems on the functions and structure of organisations to support meeting organisational objectives.
- Use of different types of IT systems (e.g. transaction processing, customer relationship, business intelligence, knowledge management) and their roles in relation to meeting business objectives and improving operational efficiency.
- Layers of information systems: services, integration, security and analytics.
- Corporate database management systems, data management and characteristics of data within organisations.
- Quality assurance and control measures used to ensure data quality on entry and after data collection.

## Learning Outcome 2

- Value creation strategy, competitive advantage, make or buy decisions.
- Cost and benefit analysis.
- New and existing approaches to improving IT position and impact on other business areas providing value-added services.
- System development tools and techniques.

## Learning Outcome 3

- Porter's Model of Generic Strategies for Competitive Advantage and Wiseman's Strategic Planning Process.
- Business model, Competitive advantage, Experience curve, Value chain, Core competency, Generic strategies.
- Delivering a differentiated product or service; delivering a product or service at a lower cost; specific segmentation of the market e.g. targeted marketing to specific target audiences; innovative product or service design and implementation.

## 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
LO2 and LO3	AC 2.1, 2.3, 3.1	Presentation	Presentation and 1000 words of speaker notes
LO1, LO2, LO3	All AC under LO1 AC 2.2, 3.2, 3.3	Coursework	3000 words

## Indicative Reading list

Benyon-Davies, P. (2013) *Business Information Systems*. 2nd Ed. London: Palgrave Macmillan.

Bocij, P. (2008) *Business Information Systems: Technology, Development and Management for the E-Business*. 4th Ed. London: Prentice Hall.

Laudon, J.P. & Laudon, K.C. 2017, *Management Information Systems*, 15th edn, Pearson Education Limited, Harlow, United Kingdom.

Turban, E. et al (2015) *Information Technology for Management: Advancing Sustainable, Profitable Growth*. 10th Ed. Oxford: Wiley.

## COMPUTERS, SOCIETY AND LAW

Unit Reference Number	K/617/3038
Unit Title	Computers, Society and Law
Unit Level	6
Number of Credits	20
Total Qualification Time	200
Guided Learning Hours (GLH)	80
Mandatory / Optional	Mandatory
Sector Subject Area (SSA)	06.1 ICT practitioners
Unit Grading Structure	Pass/Fail

### Unit Aims

The aim of this unit is to develop learners' ability to deal with work related IT issues that apply beyond the immediate tasks of the Information Technology practitioner, ie ethical, legal and societal considerations. Formal legal requirements and responsibilities of the profession are included, as are the relevant professional codes of conduct.

### Learning Outcomes and Assessment Criteria

Learning Outcomes- The learner will:	Assessment Criteria- The learner can:
1. Understand ethical concerns relating to Information Technology activities.	1.1 Analyse the types of conflicts of interest for IT professionals. 1.2 Critically evaluate various ethical issues for IT professionals. 1.3 Identify ethical issue(s) within an IT organisation and recommend solutions.
2. Understand the legislative environment relating to Information Technology activities.	2.1 Critically evaluate the implications of legislation for IT activities. 2.2 Critically evaluate the impact of related legislation on the IT sector.
3. Understand common types of computer-oriented crimes.	3.1 Define the main categories of cybercrime. 3.2 Critically evaluate the major categories of cybercrime.
4. Be able to review security risks in an organisation and design an IT security policy.	4.1 Evaluate various risk assessment procedures. 4.2 Summarise the BS ISO 31000:2009 risk management principles and guidelines. 4.3 Describe how IT security can be aligned with organisational policy. 4.4 Design and implement an IT security policy for an organisation.

### Indicative contents

#### Learning Outcome 1

Ethical and conflicts of interests

- Accepting benefits - Accepting a gift from a client is a conflict of interest, it is illegal under the anti-bribery legislation
- Using your employer's property for personal advantage
- Using confidential information
- Obtaining outside employment or moonlighting
- Taking advantage in post-employment by providing similar services
- Ethical and conflicts of interests in relation to using technology you know well or the latest technology that you may have little experience of, such as AR/VR, Microsoft HoloLens, Google Glass.

## Learning Outcome 2

Legislations:

- Communications Act 2003
- Computer Misuse Act 1990
- Data Protection Act 2003
- General Data Protection Regulation, 2018

Impact of legislations:

- Processing of financial transactions - penalty for not protecting financial data in terms of business loss and court punishments like sentences and fines for those that violate these laws
- Health and Safety - Companies will need policies for accident reporting, to include this and what other H&S policies are required
- Companies will need to give H & S training to ensure the safety of its employees, expand this to include what training your organisation gives in H & S
- Impact of not following H & S will mean business loss and court punishments like sentences and fines.
- Privacy, Confidentiality and Security- Data Protection Act from 1998 - The act applies when personal information is stored in a manual filing system or on a computer.
- Copyright and Intellectual Property Rights- When someone copies your business/software/music/videos/ideas what effect does that business loss have for your company.

## Learning Outcome 3

- The major categories of cybercrime:
  - Online harassment using hacking, copyright infringement, unwarranted mass-surveillance etc.
  - Financial fraud crimes: bank fraud, carding, identity theft, extortion, and theft of classified information.

- A variety of internet scams, many based on phishing and social engineering, target consumers and businesses.
- Cyberextortion: distributed denial-of-service attack, e.g. the attack on Sony Pictures of 2014.
- Offensive content: Explore reasons why the content of websites and other electronic communications may be distasteful or offensive.
- Online harassment: Cyberbullying, Online predator, Cyberstalking, and Internet trolling.

#### Learning Outcome 4

- Mechanisms to control organisational IT security:  
Risk assessment and integrated enterprise risk management: network change management, audit control, business continuance/disaster recovery plans, potential loss of data/business, intellectual property, hardware and software; probability of occurrence e.g. disaster, theft; staff responsibilities; Data Protection Act; Computer Misuse Act; ISO 27001 standards; BS3001:1999.
- Company regulations: site or system access criteria for personnel; physical security types e.g. biometrics, swipe cards, theft prevention.
- Policy areas: system access, access to internet email, access to the internet browser, development/use of software, physical access and protection, 3rd party access, business continuity, responsibility matrix.

#### 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 and LO4	All ACs under LO1, LO2, LO3 and AC 4.1, 4.2, 4.3	Coursework	3000 words
LO4	AC 4.4	Coursework	1000 words

#### Indicative Reading list

Alexander, D. et al. (2008) *Information Security Management Principles*. BSC.

Steinberg, R. (2011) *Governance, Risk Management, and Compliance: It Can't Happen to Us – Avoiding Corporate Disaster While Driving Success*.

Wiley. Tipton, H. (2010) *Information Security Management Handbook*. 4th Ed. Auerbach Pubs.



Harris, S., Harper, A., Eagle, C., Ness, J. and Lester, M. (2004) *Gray Hat Hacking: The Ethical Hacker's Handbook*. McGraw-Hill.

Lammle, T. and Graves, K. (2007) *CEH: Official Certified Ethical Hacker Review Guide*.

Sybex. Lockhart, A. (2007) *Network Security Hacks: Tips & Tools for Protecting your Privacy*, 2nd Ed. O'Reilly.

Vacca, J.R. 2017; 2012, *Computer and Information Security Handbook*, Third edn, Morgan Kaufmann Publishers Inc, US

## COMPUTING PROJECTS

Unit Reference Number	M/617/3039
Unit Title	Computing Projects
Unit Level	6
Number of Credits	20
Total Qualification Time	200
Guided Learning Hours (GLH)	80
Mandatory / Optional	Mandatory
Sector Subject Area (SSA)	06.1 ICT practitioners
Unit Grading Structure	Pass/Fail

### Unit Aims

The aim of the first part of this unit is to provide learners with an understanding of how and why businesses and organisations develop E-Commerce strategies and the elements and resources required to set up an E-Commerce site as an implementation of organisational strategies. The learner will develop the skills required to create such an e-commerce solution.

The aim of the second part of this unit is to develop learners' ability to identify and select relevant APIs to use within a mobile application of their own choice or from a given scenario, in addition to testing and documenting against the initial design requirement.

### Learning Outcomes and Assessment Criteria

Learning Outcomes- The learner will:	Assessment Criteria- The learner can:
1. Be able to plan an E-Commerce project.	1.1 Assess the technologies involved in setting up a secure E-Commerce site. 1.2 Evaluate payment systems that are integral to E-Commerce success. 1.3 Create the project specification. 1.4 Create the project plan.
2. Be able to design and implement an E-Commerce solution.	2.1 Design and implement an E-Commerce solution. 2.2 Test the functionality of the solution against the specification. 2.3 Critically evaluate the success of the E-Commerce solution.
3. Be able to develop a mobile application.	3.1 Develop a mobile application in a chosen platform (iOS/Android or similar) utilising multiple APIs. 3.2 Test the application. 3.3 Critically evaluate the success of the mobile solution.
4. Be able to implement API to a mobile application.	4.1 Create a design for an application that will utilise a range of APIs. 4.2 Test the mobile application after API implementation. 4.3 Critically evaluate the success of the API solution.

## Indicative contents

### Learning Outcome 1

Web architecture: Components e.g. server-side scripting, client/server/script interaction, operation of server-side web applications, accessing data on the web server, dynamic web pages, consistent navigational menu on all pages, browser cookies, embedding animation and video content in web pages, adding interactivity with plug-ins.

Hardware and software: Web servers, browsers, server software, web authoring tools, database system, shopping cart software, scripting software, browser and platform compatibility. Networking technology e.g. TCP/IP addresses, ports and protocols; domain names, multiple registration of domains (.com as well as .co.uk); setting up the server directory structure, deploying access configuration/security.

Communication technology: Uses e.g. email support, forum; search engine optimisation; additional hardware and software components required to support communications.

Data transmission: Features e.g. download speeds, transfer rates, bandwidth required for given applications including text, graphics, video, speech.

Electronic payment: Methods e.g. online transaction processing, Commercial Off the Shelf Software (COTS), other payment systems e.g. PayPal, WorldPay.

### Learning Outcome 2

Implementation: Demonstrate that the E-Commerce strategy devised has been implemented using suitable tools and applications. The strategy could be marketing, supply chain or payment based, for example designing an online ordering system or an online payment system.

User testing, white box, black box, etc.

Evaluation: Evaluate the success of the design and implementation of the E-Commerce strategy using a tool like SWOT analysis or platforms like <https://www.optimizely.com/>

### Learning Outcome 3

The development of an Android app on Java platform requires a Java Development Kit, for iOS apps the iOS SDK, and for Universal Windows Platform the .NET Framework SDK. There are also SDKs that are installed in apps to provide analytics and data about application activity; prominent creators of these types of SDKs include Google, InMobi, and Facebook.

Research existing APIs, their role and the need for an API. Identify types of API uses e.g. visual, social media, device manipulation.

- Develop the application based on AC3.3.
- Consider the use of a suitable development environment.
- Utilise best practices for implementing the application.

Black-box testing is a method of software testing that examines the functionality of an application without peering into its internal structures or workings. This method of test can be applied virtually to every level of software testing: unit, integration, system and acceptance.

Black-box test techniques:

- Decision table testing
- All-pairs testing
- Equivalence partitioning
- Boundary value analysis
- Cause–effect graph
- Error guessing
- State transition testing
- Use case testing
- User story testing
- Domain analysis
- Syntax testing
- Combining technique

#### **Learning Outcome 4**

Critically evaluate suitable APIs for use in an application (web/mobile/desktop) for a given scenario or a substantial student chosen application.

An API specification can take many forms, but often includes specifications for routines, data structures, object classes, variables, or remote calls. POSIX, Windows API and ASPI are examples of different forms of APIs.

Following are common APIs.

- ASPI for SCSI device interfacing
- Cocoa and Carbon for the Mac
- DirectX for Microsoft Windows
- EHLLAPI
- Java APIs
- ODBC for Microsoft Windows
- OpenAL cross-platform sound API
- OpenCL cross-platform API for general-purpose computing for CPUs & GPUs
- OpenGL cross-platform graphics API

- OpenMP API that supports multi-platform shared memory multiprocessing programming in C, C++ and Fortran on many architectures, including Unix and Microsoft Windows platforms.
- Server Application Programming Interface (SAPI)
- Simple Direct Media Layer (SDL)
- Consider the APIs mentioned above.
- Consider the application design/its purpose.
- Consider the target platform (web/mobile/desktop).
- Identify the scope of the application.
- Justify the selection/relevancy/purpose of the chosen APIs for the application.
- Take the security of APIs into consideration.

Prototypes explore different aspects of an intended design:

- A Proof-of-Principle Prototype serves to verify some key functional aspects of the intended design but usually does not have all the functionality of the final product.
- A Working Prototype represents all or nearly all of the functionality of the final product.
- A Visual Prototype represents the size and appearance, but not the functionality, of the intended design. A Form Study Prototype is a preliminary type of visual prototype in which the geometric features of a design are emphasized, with less concern for colour, texture, or other aspects of the final appearance.
- A User Experience Prototype represents enough of the appearance and function of the product that it can be used for user research.
- A Functional Prototype captures both the function and appearance of the intended design, though it may be created with different techniques and even different scale from the final design.
- A Paper Prototype is a printed or hand-drawn representation of the user interface of a software product. Such prototypes are commonly used for early testing of a software design and can be part of a software walkthrough to confirm design decisions before more costly levels of design effort are expended.

Select an appropriate form of prototyping necessary to achieve desired results.

Utilise appropriate tools to develop multiple prototypes: Employ an appropriate set of tools to develop your plan into a prototype.

Run end user experiments and examine feedback.

Reconcile and evaluate end-user feedback and build a new iteration of your prototype modified with the most important feedback and enhancements.

Make multiple iterations of your prototype and modify each iteration with enhancements gathered from user feedback and experimentation.

## 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	All ACs in LO1	Coursework	1500 words
LO2	All ACs in LO2	Lab demonstration with report	Lab demonstration with 500 word report
LO3 and LO4	All ACs in LO3 and LO4	Lab demonstration with report	Lab demonstration with 2000 word report

## Indicative Reading list

Gerber, J., & Williams, H. (2009). *IT project management: the role of governance*. Newtown Square, PA: Project Management Institute.

Brewer, J. L., & Dittman, K. C. (2013). *Methods of IT project management*. West Lafayette, IN: Purdue Univ. Press.

Spencer, T. et al. (2015) *Securing the API Stronghold: The Ultimate Guide to API Security*. 1st Ed. Kindle. Amazon.

Lidwell, W. (2010) *Universal Principles of Design, Revised and Updated: 125 Ways to Enhance Usability, Influence Perception, Increase Appeal, Make Better Design Decisions, and Teach through Design*. 2nd Ed. Rockport Publishers.

Osterwalder, A. (2015) *Value Proposition Design: How to Create Products and Services Customers Want*. 1st Ed. Wiley.

Warfel, T. Z. (2009) *Prototyping a Practitioner's Guide*. 1st Ed. Rosenfield Media.

Bones, C. and Hammersley, J. (2015) *Leading Digital Strategy: Driving Business Growth Through Effective E-commerce*. 1st Ed. Kogan Page.

Chaffey, D. (2009) *E-Business and E-Commerce Management: Strategy, Implementation and Practice*. 4th Ed. Financial Times: Prentice Hall.

Laudon, K. and Traver, C. (2015) *E-Commerce*. 11th Ed. Pearson.

Philips, J. (2016) *Ecommerce Analytics: Analyse and Improve the Impact of Your Digital Strategy*. 1st Ed. Pearson FT Press.

## 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](http://www.othm.org.uk).

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