



Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David

MODULE DIRECTORY

LEVEL 4 ,5 & 6

**ACADEMIC DISCIPLINE OF
BSc CLOUD COMPUTING
LONDON AND BIRMINGHAM CAMPUS**

INSTITUTE OF INNER-CITY LEARNING

2021-2022

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Introduction

This Module Directory includes all the modules for level 4, 5 and 6 within the Academic Discipline of Applied Computing in the academic year 2021-2022.

This directory accompanies the Programme of Study Handbook, which will provide you with details of which modules you will be studying for your programme this year in the 'Programme of Study' section. This directory may include modules that are running on other programmes of study within your Academic Discipline/Institute. If you require assistance in identifying the modules for your programme of study, please contact the Programme Manager (whose name and contact details are provided in the accompanying Programme of Study Handbook), or the London Student Services at londonstudentservices@uwtsd.ac.uk or Birmingham Student Services at birminghamstudentservices@uwtsd.ac.uk

The University has made every effort to make the information as full and as accurate as possible, but you should note that minor changes in the organisation of modules between the planning stage and the actual teaching are inevitable. We shall try to keep any such changes to a minimum, and you will receive plenty of advance warning in the event of any alteration. We would also be grateful if you would let us know about any changes that you think might be helpful if introduced into future handbooks.

Cloud Computing Modules

Module Code	Module Title	Module type (Core, Compulsory, Optional)	Credits
Year 1	Level 4	Semester 1/2	Sept. to May
ACCA4022	Computer Architecture and Operating Systems	Compulsory	20
ACCB4002	Data Analysis and Visualisation	Compulsory	20
ACCA4023	Introduction to Web and Database Concepts	Compulsory	20
ACCA4025	Learning in the Digital Era	Compulsory	20
ACCA4024	Networks and Cyber Security Essentials	Compulsory	20
ACCB4017	Software Development	Compulsory	20
Year 2	Level 5	Semester 1/2	Sept. to May
ACCA5024	Advanced Networking	Compulsory	20
ACCA5033	Changemakers: Creativity and Value Creation	Compulsory	20
ACCA5025	Cloud Computing Architecture	Compulsory	20
ACCA5034	Data Security and Compliance	Compulsory	20
ACCA5023	Network Operating Systems and Services	Compulsory	20
ACCA5029	Network Programmability	Compulsory	20
Year 3	Level 6	Semester 1/2	Sept. to May
ACCB6000	Advanced Cyber Security	Compulsory	20
ACCA6025	Cloud Computing Administration	Compulsory	20
ACCA6019	Emerging Trends	Compulsory	20
ACCA6020	Independent Project	Compulsory	40
ACCA6022	Switching, Routing and Wireless	Compulsory	20

BSC Level 4 module details

Module Code	ACCB4002
Title	Data Analysis and Visualisation
Date	09/09/2020
Level	4
Credits	20
Pre-Requisites	None

AIM(S)

- To develop the knowledge and skills required to perform basic statistical analysis of experimental data.
- To introduce students to a wide variety of techniques used to display different types of data effectively. The student will learn to design data presentations for both static and interactive displays, both individual and team scenarios.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- Select and apply appropriate statistical methods for the analysis of well-defined problems.
- Demonstrate an ability to present nominal, ordinal, categorical and network data in forms that enable the easy understanding of the data
- Demonstrate an ability to rearrange data in order to extract hidden information
- Apply colour, position, size, shape and icons to encode information creatively and effectively to solve well-defined problems in information visualisation.

INDICATIVE CONTENT

- Frequency distributions, descriptive statistics, the normal curve, percentiles and standard scores, hypothesis development, confidence limits
- Correlation coefficients, the t test, chi-square test
- Software for statistical analysis and data visualisation
- Different types of data; nominal, ordinal, categorical, network data; univariate, bivariate, trivariate, hypervariate data
- Appropriate display methods for differing data types; graphs, tables, icons.

- Histograms, boxplots, scatterplots, barcharts, parallel coordinate plots, maps
- Rearranging data to extract meaning from it; introducing distortion to provide clarity
- Identifying problems with visualisations

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Report	2000 words	50%

Assessment Component 2

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Report	2000 words	50%

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	100%
Practical	0%
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACCB4002	
Module Title	Data Analysis and Visualisation	
Classification	Reading List entry	Electronic*
Essential	Kranzler, J.H. (2017) <i>Statistics for the Terrified</i> , Rowman & Littlefield.	☒
Essential	Few, S. (2012), <i>Show Me The Numbers</i> , Analytics Press, Burlingame, CA.	☒

Further	Schmuller, J. (2016), <i>Statistical Analysis With Excel For Dummies (4th Ed.)</i> , John Wiley and Sons	☒
Further	MacInnes, J. (2018), <i>Little Quick Fix: Know Your Numbers</i> , Sage,	☒
Further	Spiegel, M.R (2014) <i>Shaum's Outline of Statistics, fifth ed.</i> , McGraw Hill Education Limited	☒
Further	Gonick, L & Smith, W. (2000) <i>Cartoon Guide to Statistics</i> , William Morrow Paperbacks	☒
Further	Spence, R. (2014), <i>Information Visualization: An Introduction</i> Prentice Hall	☐
Further	Tufte, E. (2001) <i>The Visual Display of Quantitative Information (2nd Ed.)</i> Graphics Press USA	☐
Further	Tufte, E. (1997), <i>Visual Explanations, Images and Quantities, Evidence and Narrative</i> . Graphics Press	☐
Further	Tufte, E. (1990) <i>Envisioning Information</i> , Graphics Press USA	☐

Module Code	ACCA4025
Title	Learning in the Digital Era
Date	25/06/2020
Level	4
Credits	20
Pre-Requisites	None

AIM(S)

- To develop student's skills for independent study and life-long learning, which will form the foundations for successful completion of their degree programme and support future employment opportunities.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- Demonstrate the foundational skills required to be a resilient and healthy independent learner.
- Practise the principles of learning agility
- Use suitable technology to support and enhance their learning experience within the discipline area

INDICATIVE CONTENT

- Time management, reading, writing, referencing and plagiarism, searching for and evaluating sources of information, working online.
- Critical thinking: issues concerning knowledge, belief, and doubt.
- Critical writing: synthesis, paraphrasing and creating an informed argument, avoiding plagiarism.
- Reflection and self-reflection.
- Identity and sense of place; including values, culture and intercultural awareness, heritage, diversity and inclusion and, multilingualism.
- Skills for a range of assessment modes, including blogs, vlogs, video, presentations, performances, posters, exams and written coursework.
- Skills and attitudes which underpin resilience, health, wellbeing and learning agility; the role of spirit, mind, emotions and body.
- Physical literacy: Consideration of the role of physical activity to the support of physical, mental health, well-being and resilience.
- Digital literacy: using appropriate technology; staying safe online, cyber security, digital identity.

- Team working.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
E-portfolio	Equivalent to 2,000 words	50%

Assessment Component 2

☐ Written exam ☐ Coursework ☒ Practical

Mode of assessment	Volume	Weighting
Video and Supporting Materials	Individual 3 minute video which incorporates supporting materials	50%

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	50%
Practical	50%
TOTAL	100%

INDICATIVE READING LIST

This will be guided by the student's subject area.

Module Code	ACCA4025	
Module Title	Learning in the Digital Era	
Classification	Reading List entry	Electronic*
Essential	Cottrell, S (2019) <i>The Study Skills Handbook</i> . 5th edn. London: Macmillan International Higher Education.	☒
Essential	Pears, R. and Shields, G.J. (2019) <i>Cite Them Right: the essential referencing guide</i> . 11th edn. London: Macmillan International Higher Education.	☒
Essential	Library Info Skills Sessions	☒

Further	Hopkins, D. and Reid, T., 2018. <i>The Academic Skills Handbook: Your Guide to Success in Writing, Thinking and Communicating at University</i> . London: Sage	☐
Further	Osmond, A., 2016. <i>Academic Writing and Grammar for Students</i> 2 nd edn. London: SAGE.	☐
Further	Singh, K. (2011) <i>Engineering Mathematics through applications</i> , Palgrave	☐

Module Code	ACCA4024
Title	Networks and Cyber Security Essentials
Date	09/09/2020
Level	4
Credits	20
Pre-Requisites	None

AIM(S)

- To provide the students with an understanding of the key concepts and fundamentals of data communications, computer networks and security of data and devices in a network.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- Develop fundamental understanding of network basics in terms of architecture, devices, application and protocols.
- Demonstrate systematic understanding of security policies and measures to mitigate internal and external attacks and threats in a network.

INDICATIVE CONTENT

- Fundamentals of networks, circuit and packet switching
- Communication on a network
- Client server model
- OSI and TCP/IP Models
- Types of Networks – LAN, WAN, MAN, SAN, etc
- Physical and logical addressing
- Wireless networks and standards
- Cyber Security – attacks, access control, encryption, cryptography
- Importance of data security
- System security – firewalls, threats, intruders and malicious software

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Portfolio	2000 words equivalent	50%

Assessment Component 2

☒ Written exam ☐ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Exam (or in-class test)	2 hrs	50%

Assessment Summary

Activity type	Percentage
Written exam	50%
Coursework	50%
Practical	0%
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACCA4024	
Module Title	Networks and Cyber Security Essentials	
Classification	Reading List entry	Electronic*
Essential	William Stallings (2014) Data and Computer Communications, 10th Edition, Pearson	☒
Essential	www.netacad.com Username and password required	☒
Essential	William Stallings (2017) Network Security Essentials: Applications and Standards, 6th Edition, Pearson	☒
Further	J. S. Beasley & P. Nilkaew (2018) Networking Essentials: A CompTIA Network+ N10-007 Textbook, 5th Edition, Pearson IT Certification	☒

Further	IEEE/ACM, IEEE/ACM Transactions on Networking	☒
Further	IEEE, IEEE Network Magazine	☒
Further	Science Direct	☒
Further	Scopus	☒

Module Code	ACCB4017
Title	Software Development
Date	09/09/2020
Level	4
Credits	20
Pre-Requisites	None

AIM(S)

- To introduce students to software constructs and to the development of software using a high level programming language. Simple design concepts and good programming practice will be adopted.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- Understand the syntax and semantics of a high-level programming language and develop programs using good programming practices.
- Select and deploy basic software constructs using simple algorithms in the development of solutions to programming problems

INDICATIVE CONTENT

- The software life cycle – analysis, design, implementation and maintenance.
- Algorithm design – flow charts and pseudo-code.
- The programming environment – editor, compiler, debugger.
- High level language programming syntax and semantics e.g. C, C++, C#, etc.
- Data types, variables, operators, control structures, data structures, functions.
- Software testing and debugging.
- Documentation including user guides, technical guides, etc.
- Introduction to problem solving techniques for well-defined problems e.g. interpreting natural language problem definitions, variable identification techniques, divide and conquer, etc.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Programming assignment with associated documentation	2800 words equivalent	70%

Assessment Component 2

☐ Written exam ☐ Coursework ☒ Practical

Mode of assessment	Volume	Weighting
In-class practical	2 hours	30%

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	70%
Practical	30%
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACCB4017	
Module Title	Software Development	
Classification	Reading List entry	Electronic*
Essential	Davenport, K. & Vine, M. (2014) <i>C Programming for the Absolute Beginner, 3rd Edition</i> , Cengage Learning PTR	☐
Essential	McGrath, M. (2012) <i>C Programming In Easy Steps 4th Edition</i> , In Easy Steps Limited Or 5 th edition (2018) Electronic only: http://ineasysteps.com/products-page/all_books/c-programming-easy-steps-5th-edition-ebook-pdf-2/	☐
Further	Greene, J. (2013) <i>Head First C#</i> , O'Reilly Media	☐

Module Code	ACCA4022
Title	Computer Architecture and Operating Systems
Date	09/09/2020
Level	4
Credits	20
Pre-Requisites	None

AIM(S)

- To provide the student with a fundamental grounding in the key concepts behind typical computer architectures, hardware, networks and operating systems.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- Determine the essential characteristics and concepts behind computer systems and components, number systems, data capacities and transfer speeds, in the context of typical PC hardware and networking environments.
- Demonstrate an understanding of general Operating System concepts.

INDICATIVE CONTENT

- Fundamentals of number systems. Binary, Dec and Hex notation, representation and conversion.
- Computer systems: major components and peripherals.
- Storage devices. Optical, HDD, SSD, RAID configurations etc.
- Nomenclature and specification of typical data capacities and transfer speeds
- Processor characteristics: RISC, CISC, multi-core etc.
- Computer architecture: system block diagram, CPU, memory, input/output unit, system clock, data bus, address bus, control bus, Harvard vs Von-Neumann etc.
- Memory Organisation: Main RAM, cache, virtual memory etc
- Input/output including polled, interrupts and direct memory access.
- Networking hardware and introduction to networking principles.
- OS fundamentals
- Privileges and permissions
- File system structures, navigation, viewing and editing files and scripts

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

☒ Written exam ☐ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Exam or In class test	2 hours	50%

Assessment Component 2

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Assignment	2500 words	50%

Assessment Summary

Activity type	Percentage
Written exam	50%
Coursework	50%
Practical	0%
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACCA4022	
Module Title	Computer Architecture and Operating Systems	
Classification	Reading List entry	Electronic*
Essential	W Stallings, Computer Organization and Architecture (10th Ed), Pearson, 2016	☐
Essential	I Englander, The architecture of Computer Hardware, Systems Software & Networking – An Information Technology Approach, John Wiley & sons, 2014	☐
Essential	E Siever, Linux in a nutshell, O'Reilly 2009	☒
Further	https://www.tomshardware.com/uk	☒
Further	https://www.anandtech.com/	☒
Further	J O’Gorman, Operating systems with Linux, Palgrave 2001	☐
Further	S Mueller, Upgrading and repairing PCs, Que 2015	☐

Module Code	ACCA4023
Title	Introduction to Web and Database Concepts
Date	09/09/2020
Level	4
Credits	20
Pre-Requisites	None

AIM(S)

- To provide students with an understanding of the underlying concepts and principles needed to design and implement relational databases and build and render web pages.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- Demonstrate a systematic understanding and application of the fundamental concepts, technologies, and standards required for building and rendering web pages.
- Demonstrate a systematic understanding of the underlying concepts of data and databases, and the methodology of database design. Apply appropriate systems investigation and analysis techniques to design and implement relational database solutions.

INDICATIVE CONTENT

- Data, Databases and Database Management Systems (DBMS).
- Conceptual, logical and physical database design. Database design and entity analysis techniques.
- Entity-relationship models: entities, relationships, attributes and integrity constraints.
- Relational database implementation using DBMS software and Structured Query Language (SQL).
- Core technologies for building and rendering web pages i.e. HTML, CSS.
- Web content, including text, graphics, media content, hypertext and hypermedia, web forms, etc.
- Fundamental standards and principles of web design and applications i.e. interface and layout design principles, mobile web and device-independent web practices, web accessibility, etc.
- Web evaluation techniques and tools e.g. standards validation, browser evaluation tools, accessibility evaluation, and performance assessment.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Portfolio	2 - 3 elements	50%

Assessment Component 2

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Portfolio	2 - 3 elements	50%

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	100%
Practical	0%
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACCA4023	
Module Title	Introduction to Web and Database Concepts	
Classification	Reading List entry	Electronic*
Essential	Connolly, T., Begg, C., 2015, <i>Database Systems: A Practical Approach to Design, Implementation and Management</i> , 6th Edition, Addison Wesley	☒
Essential	Viescas, J. L., 2018, <i>SQL Queries for Mere Mortals: A Hands-On Guide to Data Manipulation in SQL</i> , 4 th Edition, Addison-Wesley Professional	☒
Essential	Robbins, J., 2018, <i>Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics</i> , O'Reilly Media	☒
Further	Duckett, J., 2014, <i>Web Design with HTML, CSS, JavaScript and jQuery Set</i> , Wiley	☒

Level 5 modules

Module Code	ACCA5024
Title	Advanced Networking
Date	09/09/2020
Level	5
Credits	20
Pre-Requisites	None

AIM(S)

- To provide the student with a systematic knowledge of OSI reference model and TCP/IP protocol model. Students will gain a detailed understanding of the various hardware devices used in modern network design and will understand the essential technical principles of protocols used in various layers of OSI model and IP Addressing.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- Demonstrate a knowledge and understanding of network principles and protocols used in OSI and TCP/IP model.
- Implement simple LANs, perform basic configurations for routers and switches, and implement IP addressing schemes.

INDICATIVE CONTENT

- Networking today
- Understanding devices used to implement networks
- Protocols and standards
- OSI and TCP/IP models and layers
- IPv4 and v6 addressing
- Design and implementing networks using routers and switches
- Testing and troubleshooting
- Fundamentals of network security

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

☐ Written exam ☐ Coursework ☒ Practical

Mode of assessment	Volume	Weighting
Practical portfolio	Students will complete practical work as in-class tests or as a workshop journal.	75%

Assessment Component 2

☒ Written exam ☐ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Online exam	1 hour	25%

Assessment Summary

Activity type	Percentage
Written exam	25%
Coursework	0%
Practical	75%
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACCA5024	
Module Title	Advanced Networking	
Classification	Reading List entry	Electronic*
Essential	Introduction to Networks v6 Companion Guide by Cisco Networking Academy (2016), Cisco Press	☒
Essential	www.netacad.com username and password required	☒
Further	W Odom (2019) CCNA 200-301 Official Cert Guide Library, Cisco Press part of the Official Cert Guide series	☒

Module Code	ACCA5033
Title	Changemakers: Creativity and Value Creation
Date	25/06/2020
Level	5
Credits	20
Pre-Requisites	None

AIM(S)

- To develop the concepts and practice of creativity and value creation for the development of innovative, aspiring and progressive solutions.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- Demonstrate knowledge and critical understanding of innovation, creativity and enterprising mindset, recognising the values and the contribution creativity makes to the common good.
- Conceive, articulate and apply creative thinking within a work-based or academic context to develop novel solutions and/or value creation.

INDICATIVE CONTENT

- Creativity in theory and practice.
- Value creation in theory and practice.
- Creative and ethical leadership: skills and challenges.
- Driving innovation and change, the intra and entrepreneurial individual.
- Critical thinking, troubleshooting and problem solving, developing novel solutions.
- Information gathering for inspiration, vision creation and ideation.
- Developing the enterprising and data driven mindset.
- Contemporary technologies: virtual and augmented reality and artificial intelligence to enhance creativity and innovation.
- Time management practices for an entrepreneurial mindset.
- Being resourceful, in the context of making do with less.
- Reflection and self-reflection.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Online portfolio of set exercises	2,000 words or equivalent	50%

Assessment Component 2

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Assignment	2,000 words or equivalent	50%

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	100%
Practical	0%
TOTAL	100%

INDICATIVE READING LIST

This will be guided by the student's subject area.

Module Code	ACCA5033	
Module Title	Changemakers: Creativity and Value Creation	
Classification	Reading List entry	Electronic*
Essential	Hargreaves, J., and Page, L. (2013) <i>Reflective Practice</i> . (Key Themes in Health and Social Care Series). Polity Press.	☒
Essential	Nardi, P.M. (2017) <i>Critical Thinking : Tools for Evaluating Research</i> . University of California Press	☒
Essential	Westerman, G., Bonnet, D. and McAfee, A., <i>Leading Digital: Turning Technology Into Business Transformation</i> . (Audiobook) Recorded Books. 2017.	☒

Further	Schiama, G. (2011) <i>Managing Knowledge Assets and Business Value Creation in Organizations : Measures and Dynamics</i> Hershey, Pa.: Business Reference Service.	☒
Further	Rescher, N. (2014). <i>A System of Pragmatic Idealism, Volume II The Validity of Values, A Normative Theory of Evaluative Rationality</i> (Princeton Legacy Library). Princeton: Princeton University Press.	☒
Further	Turner, E. (2020) <i>Be Less Zombie: How great companies create dynamic innovation, fearless leadership and passionate people</i> . John Wiley & Sons.	☒

Module Code	ACCA5029
Title	Network Programmability
Date	09/09/2020
Level	5
Credits	20
Pre-Requisites	None

AIM(S)

- To give students the ability to work with network programmability and automation tools, with a further focus on software devops.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- Demonstrate a robust understanding of the key principles of network programmability tools and languages to solve specific problems.
- Apply appropriate analysis, design, implementation and testing techniques for programming and automation of network devices.

INDICATIVE CONTENT

- Configuration management and orchestration tools, e.g. Chef, Puppet, Ansible, Saltstack, Terraform, Pulumi.
- Principles and practice of Infrastructure as Code (IaC).
- Key scripting languages for network programmability, e.g. Python, JavaScript, Bash, PowerShell.
- Software design principles for network engineers: devops, continuous integration, source control, etc.
- Necessary auxiliary technologies for network programmability, e.g. Linux, Mako, Ruby, XML, JSON, YAML.
- Data modelling languages, e.g. YANG.
- API programming for networking and automation, e.g. the NAPALM library.
- Programming for IoT implementation

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Implementation + report	2500 words equivalent	50%

Assessment Component 2

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Essay	2500 words	50%

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	100%
Practical	0%
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACCA5029	
Module Title	Network Programmability	
Classification	Reading List entry	Electronic*
Essential	Jason Edelman, Scott S. Lowe, Matt Oswalt. Network Programmability and Automation: Skills for the Next-Generation Network Engineer. 2018, O'Reilly Media	☐
Essential	Kief Morris. Infrastructure as Code: Managing Servers in the Cloud. 2016, O'Reilly Media	☐
Further	Betsy Beyer, Jennifer Petoff, Chris Jones, Niall Richard Murphy. Site Reliability Engineering. 2016, O'Reilly	☐
Further	Sam Washington & M.O Faruque Sarker. Learning Python Network Programming 2015, Packt Publishing	☐
Further	ACM	☒
Further	IEEE	☒
Further	Computer Networking	☒
Further	Data Communications	☒

Module Code	ACCA5025
Title	Cloud Computing Architecture
Date	09/09/2020
Level	5
Credits	20
Pre-Requisites	None

AIM(S)

- To provide students with a systematic understanding of the principles underlying the architecture of cloud computing infrastructure and the deployment of applications within that infrastructure.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- Demonstrate an understanding of virtualisation for the deployment of applications.
- Critically evaluate a cloud computing infrastructure, within the context of “as a Service” applications.

INDICATIVE CONTENT

- Virtualisation principles and best practice.
- Virtual machines and virtual networks.
- Type 1 hypervisors, e.g. Hyper-V.
- “as a Service” cloud-based models, e.g.:
 - Infrastructure as a Service
 - Platform as a Service
 - Software as a Service
- Introductory containerisation.
- Web Service design and deployment.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Essay	2500 words	50%

Assessment Component 2

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Practical + Report	2500 words equivalent	50%

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	100%
Practical	0%
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACCA5025	
Module Title	Cloud Computing Architecture	
Classification	Reading List entry	Electronic*
Essential	Stephen Orban. Ahead in the Cloud: Best Practices for Navigating the Future of Enterprise IT. 2018, CreateSpace	☒
Essential	Thomas Erl, Robert Cope, Amin Naserpour. Cloud Computing Design Patterns. 2017, Prentice Hall	☐
Further	ACM	☒
Further	IEEE	☒
Further	Computer Networking	☒
Further	Data Communications	☒

Module Code	ACCA5034
Title	Data Security and Compliance
Date	09/09/2020
Level	5
Credits	20
Pre-Requisites	None

AIM(S)

- To provide students with the basic concepts and understanding about threats and vulnerabilities present in systems. They must learn how to use the information assets securely to support the goals and objectives of organisations through information security governance, risk management and regulatory compliance.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- Understand the key issues associated with inspection, protection, detection of and reaction to threats to information assets.
- Provide an overview of the field of information security assurance, governance, policies, risk management and regulatory compliance.

INDICATIVE CONTENT

- Introduction to Information Security
- The Need for Security
- Legal, Ethical, and Professional Issues in Information Security
- Planning for Security
- Risk Management
- Regulatory Acts
- Security Governance Concepts, Principles, and Policies
- How does security governance interact with risk management?
- Security Technology: Access Controls, Firewalls, and VPNs
- Security Technology: Intrusion Detection and Prevention Systems and Other Security Tools
- Cryptography
- Physical Security
- Implementing Information Security
- Security and Personnel
- Information Security Maintenance

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Portfolio	5,000 words equivalent	100%

Assessment Summary

Activity type	Percentage
Written exam	
Coursework	100%
Practical	
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACCA5034	
Module Title	Data Security and Compliance	
Classification	Reading List entry	Electronic*
Essential	Principles of Information Security, 6th Edition Michael E. Whitman Herbert J. Mattord Copyright 2018	☐
Essential	Ladley, J. (2012), Data Governance: How to Design, Deploy and Sustain an Effective Data Governance Program, Morgan Kaufmann, MA, USA.	☒
Essential	Plotkin, D. (2013), Data Stewardship: An Actionable Guide to Effective Data Management and Data Governance, Morgan Kaufmann, MA, USA.	☒
Further	CISSP Guide to Security Essentials, 2nd Edition. Peter H. Gregory, Copyright 2015. ISBN-10: 130584601X ISBN-13: 9781305846012	☒

Further	Information Security Governance: A Practical Development and Implementation Approach by Krag Brotby. ISBN: 978-1-118-58551-1. August 2017	☒
Further	Gregory, P.H. (2015) CISSP Guide to Security Essentials, 2nd Edition. Course Technology.	☒
Further	Quinn, M. J. (2015), Ethics for the Information Age: International Edition, Pearson: NY, 2015	☒
Further	Brotby, K. (2017), Information Security Governance: A Practical Development and Implementation Approach, Wiley.	☒
Further	IEEE/ACM, IEEE/ACM Transactions on Networking	☒
Further	IEEE, IEEE Network Magazine	☒
Further	Science Direct	☒
Further	Scopus	☒
Further	ACM Transactions on Database Systems	☒
Further	ACM Transactions on Information Systems	☒
Further	CISCO Academy Website, cisco.netacad.net (password access only)	☒

Module Code	ACCA5023
Title	Network Operating Systems and Services
Date	09/09/2020
Level	5
Credits	20
Pre-Requisites	None

AIM(S)

- To provide students with a sound understanding of the concepts, principles, skills and techniques required to manage and deploy network resources in a Network Operating Systems environment, e.g. Windows, or Linux.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- Apply a systematic understanding of network operating system environments to deploy, manage and maintain critical network services and resources.
- Analyse a given network to produce suitable security audit/disaster recovery strategy, working individually and as part of a team.

INDICATIVE CONTENT

- Overview of Directory Services.
- Directory Services administration, e.g. user, computer accounts, group accounts.
- The name resolution process.
- Deployment, configuration and testing of a Domain Name System (DNS) server.
- Dynamic Host Configuration Protocol (DHCP) and its relevance to network deployment.
- Deployment, configuration and testing of a Dynamic Host Configuration Protocol (DHCP) server.
- Identification of the risks and threats to the security of resources and data (digital and physical).
- Disaster prevention and recovery methods.
- Principles and common levels of Redundant Array of Inexpensive Disk (RAID) arrays, e.g. 0, 1, 5, 6, 10.
- Virtualisation.

- Failover clustering and associated principles, e.g. quorum-based decision-making.
- Network load balanced clustering.
- Monitoring programs: use of network monitoring and management tools/protocols.
- Network penetration testing as pertains to the services explored.
- Legal, social and ethical issues.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Coursework	2500 words	50%

Assessment Component 2

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Coursework	2500 words	50%

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	100%
Practical	0%
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACCA5023	
Module Title	Network Operating Systems and Services	
Classification	Reading List entry	Electronic*

Essential	Bekim Dauti (2019) Windows Server 2019 Administration Fundamentals: A beginner's guide to managing and administering Windows Server environments, 2nd Edition. Packt Publishing	☐
Essential	Evi Nemeth et al. (2017) UNIX and Linux System Administration Handbook. Addison Wesley	☐
Further	ACM	☒
Further	IEEE	☒
Further	Computer Networking	☒
Further	Data Communications	☒

Level 6 modules

Module Code	ACCB6000
Title	Advanced Cyber Security
Date	09/09/2020
Level	6
Credits	20
Pre-Requisites	None

AIM(S)

- To provide students with Cyber Security concepts and a deep understanding of how they are applied using Internet technologies. Students will gain a thorough understanding of up-to-date security threats and vulnerabilities posed to the Internet and an understanding of the legal, policy and technical approaches that are necessary to mitigate such risks.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- Demonstrate a systematic understanding of a wide range of current research and technological advances in Cyber Security.
- Consistently apply the principles and practices of Cyber Security for mitigating the key technical internet security vulnerabilities and threats that organisations face.

INDICATIVE CONTENT

- Fundamentals of Computer Security.
- Networking Concepts.
- Cryptography.
- Internet Security Technologies.
- Security of Computer Communications.
- Wireless Security.
- Windows Security.
- Linux Security.
- Web Applications and Security.
- Defensive Network Infrastructure – Intrusion Detection/Firewalls.
- Malware, Virus and Worms.

- Network Traffic Analysis and Forensics using Wireshark.
- Data Loss Prevention.
- Penetration Testing.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Implementation	5000 words equivalent	100%

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	100%
Practical	0%
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACCB6000	
Module Title	Advanced Cyber Security	
Classification	Reading List entry	Electronic*
Essential	The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws, 2ed. Author: D. Stuttard.	☒
Essential	Cracking the Coding Interview: 189 Programming Questions and Solutions 6th Edition. Author: Gayle Laakmann.	☒
Essential	Basic Security, Penetration Testing and How to Hack. Author: Isaac Sharpe.	☐
Essential	Cyber Insecurity: Navigating the Perils of the Next Information Age. Author: Richard Harrison.	☒
Essential	Counter Hack Reloaded: A Step-by-Step Guide to Computer Attacks and Effective Defenses (2nd Edition) 2nd Edition. Authors: Edward Skoudis, and Tom Liston.	☒
Further	Applied Cryptography: Protocols, Algorithms and Source Code in C. Author: Bruce Schneir. (2015)	☒
Further	The Art of Exploitation, 2nd Edition. Author: Jon Erickson.	☐

Further	Beginner to Expert Guide to Computer Hacking, Basic Security, and Penetration Testing (Computer Science Series) Kindle Edition. Author: James Patterson.	☐
Further	Hacking for Beginners – Computer Virus, Cracking, Malware, IT Security (Cyber Crime, Computer Hacking, How to Hack, Hacker, Computer Crime, Network Security, Software Security), Author: Joseph Connor.	☐
Further	Journals IEEE/ACM, IEEE/ACM Transactions on Networking IEEE, IEEE Network Magazine Science Direct Scopus ACM Transactions on Database Systems ACM Transactions on Information Systems	☒
Further	Websites http://www.veracode.com/directory/owasp-top-10 http://www.vulnerabilityassessment.co.uk/Penetration%20Test.html http://www.softwaretestinghelp.com/penetration-testing-tools/ https://www.owasp.org/index.php/Main_Page DoD Cyber Crime Center (http://www.dc3.mil) http://www.digitalforensicsmagazine.com/ www.dvwa.co.uk	☒

Module Code	ACCA6025
Title	Cloud Computing Administration
Date	09/09/2020
Level	6
Credits	20
Pre-Requisites	None

AIM(S)

- To provide students with a systematic understanding of the major concepts and technologies upon which service-level cloud computing is built. The module will expose students to some of the more advanced cloud computing concepts that underpin more sophisticated cloud computing implementations.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- Demonstrate a systematic understanding of cloud computing concepts, principles and practice in the analysis and design of a robust solution from end user perspective.
- Exercise effective judgment in the analysis, planning, deployment and evaluation of core cloud design principles with respect to best practice

INDICATIVE CONTENT

- Design, deployment, and operation of cloud services and distributed systems
- Understanding roles, access requirements and availability
- Application and Server management, server OS – Windows, Linux & Unix, Virtual Machines
- Application architecture and services, load balancing, resiliency and scalability
 - Amazon web services, MS Azure, Google Cloud, IBM Cloud Services
- Cloud security management
- Financial planning, costing metrics and pricing models
- Quality of service and service level agreements
- Disaster recovery strategy, redundancy

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Portfolio	6000 words equivalent Students will produce a portfolio of work appropriate to the nature of their area of study. Portfolio elements may include a selection of the following: • Written Report • Presentation slides • Software/hardware implementation • Demonstration of work	100%

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	100%
Practical	0%
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACCA6025	
Module Title	Cloud Computing Administration	
Classification	Reading List entry	Electronic*
Essential	Thomas Erl, Ricardo Puttini, Zaigham Mahmood (2013) Cloud Computing: Concepts, Technology & Architecture Prentice Hall	☒
Essential	Christina J. Hogan, Strata R. Chalup, Thomas A. Limoncelli (2015) Practice of Cloud System Administration, The: DevOps and SRE Practices for Web Services, Volume 2, Addison-Wesley Professional ISBN: 9780133478549	☒
Further	Ray Rafaels (2015) Cloud Computing: From Beginning to End, CreateSpace Independent Publishing Platform	☒
Further	IEEE Transactions on Cloud Computing	☒
Further	IEEE, IEEE Cloud Magazine	☒
Further	Science Direct	☒

Further	Scopus	☒
Further	ACM Transactions on Internet Technology (TOIT) Systems	☒

Module Code	ACCA6019
Title	Emerging Trends
Date	07/07/2020
Level	6
Credits	20
Pre-Requisites	None

AIM(S)

- To enable students to demonstrate a theoretical or practical understanding of current technologies, concepts or practices.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- Analyse the principles and concepts associated with an emerging field of computing such as the professional practices being adopted in industry, a novel technology or a new application of an existing technology.
- Evaluate the effectiveness, benefits, drawbacks or suitability of deploying appropriate technologies or approaches to the solution of a problem.

INDICATIVE CONTENT

- Current or emerging technologies within fields such as networking, web development, software applications, data analytics
- Software or network design methodologies
- Testing approaches within programming, network implementations, usability, etc.
- Software tools and libraries such as network simulation tools, rootkits, graphics SDKs, game engines, software libraries, software development tools, testing tools, etc.
- Critical, analytical thinking and writing

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Portfolio	May take the form of an essay, a presentation and/or an implementation 4000 words equivalent	100%

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	100%
Practical	0%
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACCA6019	
Module Title	Emerging Trends	
Classification	Reading List entry	Electronic*
Essential	The nature of this module requires up to date sources. These will be provided to the students during the module. Essential texts will change during the course of the module.	
Further	Bejtlich, R. (2015) The Tao of Network Security Monitoring: Beyond Intrusion Detection, Boston: Addison-Wesley	☒
Further	Stallings, W. (2017) Cryptography and Network Security: Principles and Practice (7th Edition), Pearson Education Limited	☒
Further	Sommerville, I. (2015), Software Engineering, , Pearson	☒

Module Code	ACCA6020
Title	Independent Project
Date	25/06/2020
Level	6
Credits	40
Pre-Requisites	None

AIM(S)

- To develop the ability of students to engage critically and innovatively with theory and/or practice relevant to their studied subject areas in order to produce a discipline specific in-depth project.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- Demonstrate intellectual skills in the identification of an appropriate topic, problem or challenge for investigation pertinent to their field of study and formulate a suitable plan for further research utilising relevant investigative methods in order to produce a response.
- Evidence in-depth knowledge and critical understanding of principles necessary to underpin their education within their chosen field of study and problem solving techniques applicable to this.
- Evidence independence of thought and critical evaluation in the production of an independent piece of work, demonstrating transferable skills through exercising initiative and personal responsibility in planning own learning and self-management.
- Organise their knowledge and learning through use of a range of media, and present their work appropriately in a manner that can be understood by specialist and non-specialist audiences.

INDICATIVE CONTENT

- Research paradigms, methods, and techniques of research and enquiry.
- Conducting and writing literature reviews.
- Ethical concerns and the research process.
- Resource, project, and skills management processes and techniques.
- Presenting and illustrating data and information.
- Communication of general, specialist, technical ideas and results.

- Problem solving, creative, entrepreneurial thinking and approaches.
- Collaboration, adaptability and reflection.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	36	9%
Independent learning	364	91%
Placement learning	0	0%
TOTAL	400	100%

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Portfolio	Minimum of 3 elements (equivalent to 10,000 words)	100%

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	100%
Practical	0%
TOTAL	100%

INDICATIVE READING LIST

This will be guided by the student's individual project.

Module Code	ACCA6020	
Module Title	Independent Project	
Classification	Reading List entry	Electronic*
Essential	Cottrell S, (2015) <i>Skills for Success Personal Development and Employability</i> , 3 rd edition, Palgrave. London.	☒
Essential	ASET, 2013 <i>Good Practice Guide for Workbased Learning and Placement Learning in Higher Education</i>	☒
Essential	Gray, D.E. (2018) <i>Doing Real World Research</i> , London: SAGE.	☐
Further	Gallagher K, (2016) <i>Essential Study and Employment Skills For Business and Management Students</i> , Oxford	☐
Further	Gottschall, Jonathan (2013), <i>The Storytelling Animal: How Stories Make Us Human</i> , Houghton Mifflin	☐
Further	Storr, Will (2020), <i>The Science of Storytelling</i> , William Collins	☐

Further	Cohen, L. Manion, L. and Morrison, K. (2017) <i>Research Methods in Education, 8th edition</i> London: Routledge.	☒
Further	Flick, U. (2014) <i>An Introduction to Qualitative Research</i> , London: SAGE.	☐
Further	Aubrey, K. & Riley, A. (2017) <i>Understanding and Using Challenging Education Theories</i> , London: SAGE.	☒
Further	Brinkmann, S. and Kvale, S. (2018) <i>Doing Interviews (Qualitative Research Kit)</i> . Sage	☐
Further	Gibbs, G. (2018) <i>Analysing Qualitative Data (Qualitative Research Kit)</i> . Sage	☒
Further	Creswell, J. W. (2012). <i>Qualitative inquiry and research design: Choosing among five approaches</i> . Sage	☐
Further	Obschonka, M., Hakkarainen, K., Lonka, K. <i>et al.</i> Entrepreneurship as a twenty-first century skill: entrepreneurial alertness and intention in the transition to adulthood. <i>Small Bus Econ</i> 48 , 487–501 (2017). https://doi.org/10.1007/s11187-016-9798-6	☒
Further	https://ec.europa.eu/jrc/en/entrecomp	☒

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Module Code	ACCA6022
Title	Switching, Routing and Wireless
Date	09/09/2020
Level	6
Credits	20
Pre-Requisites	None

AIM(S)

- To study the technical issues related to routing and switching techniques, to have an in-depth knowledge of architecture, components, and operations of routers and switches in a larger and more complex network.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- Demonstrate a detailed understanding of theoretical and practical knowledge relating to routing and switching concepts.
- Implement routing and switching techniques within a network infrastructure, configure routing protocols, VLANs and perform network maintenance.

INDICATIVE CONTENT

- Switching concepts – layer 2 & 3
- Routing concepts – Static and dynamic, implementation and troubleshooting
- Routing Information Protocol v1 & v2
- Virtual Local Area Networks (VLANs)
- Inter VLAN routing
- Spanning tree protocols
- VLAN Trunking protocols and Dynamic Trunking protocols
- LAN Security concepts and implementation
- Wireless LAN

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

☐ Written exam ☐ Coursework ☒ Practical

Mode of assessment	Volume	Weighting
Practical portfolio	Students will complete practical works as an in-class tests or as a workshop journal	75%

Assessment Component 2

☒ Written exam ☐ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Exam (eg online)	1 hours	25%

Assessment Summary

Activity type	Percentage
Written exam	25%
Coursework	0%
Practical	75%
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACCA6022	
Module Title	Switching, Routing and Wireless	
Classification	Reading List entry	Electronic*
Essential	www.netacad.com username and password is required	☒
Essential	Connecting Networks v6 Companion Guide by Cisco Networking Academy, Cisco Press. Published Sep 11 2017	☒
Essential	Scaling Networks Essentials v6 Companion Guide by Cisco Networking Academy, Cisco Press. Published Aug 3, 2017	☒
Further	W Odom (2019) CCNA 200-301 Official Cert Guide Library, Cisco Press part of the Official Cert Guide series	☐

Level 4 Old Cloud Computing Modules

MODULE CODE:	ACCC4003
TITLE:	Computer Architecture
LEVEL:	4
CREDITS:	10

AIM(S)

- To provide the student with an understanding of the key concepts and building blocks of current computer systems, components and architectures.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to demonstrate the ability to:

1. Demonstrate an understanding of number systems, data capacities and transfer speeds in the context of typical PC environments.
2. Demonstrate an understanding of the essential characteristics and concepts of computer systems and components
3. Identify, discuss and make recommendations regarding suitable hardware and/or software for computing related scenarios

INDICATIVE CONTENT

- Fundamentals of number systems. Binary, Dec and Hex notation, representation and conversion.
- Computer systems: major components and peripherals
- Fundamentals of Computer Networks
- Storage devices. Backup and archiving strategies.
- Nomenclature and specification of typical data capacities and transfer speeds
- Processor architecture: RISC, CISC and multi-core processors.
- Fundamentals of High Performance Computing architectures
- Computer architecture: system block diagram, CPU, memory, input/output unit, system clock, data bus, address bus, control bus, fetch-execute cycle. Harvard v Von-Neumann
- Memory Organisation: associative, cache, virtual memory (paged and segmented),
- Input/output including polled, interrupt driven and direct memory access.
- Introduction to Operating Systems.
- Fundamental Networking devices and principles for SOHO type use, e.g. requirements of a small network with shared facilities using DHCP.
- Mobile computer processors, i.e. ARM, Atom
- Mobile telephony including VoIP

LEARNING AND TEACHING STRATEGY

Formal lectures will be accompanied by handouts/VLE content to impart knowledge. Students will be required to perform their own personal research, which should consist of not only the more accessible web based resources, but also they should wherever possible, consult relevant academic publications, such as peer-reviewed journals, technical reports, and industry publications to assist their learning. Tutorials will be provided as required for sessions such as base conversion calculations or system design exercises.

The allocation of teaching to deliver the module is:

Activity type	Hours	Percentage
Scheduled learning	35	35%
Independent learning	65	65%
Placement learning	0	
TOTAL	100	100%

ASSESSMENT

Description of each assessment component and its weighting, together with an example for new forms of assessment:

Assessment Component 1 – Written - 100%

Formal examination - Explain the essential characteristics and concepts of computer systems and components.

Assessment Summary

Activity type	Percentage
Written	100%
Coursework	0%
Practical	0%
TOTAL	100%

BIBLIOGRAPHY

Essential

Stallings. W. (2012) *Computer Organization and Architecture: Designing for Performance (9th edition)* Pearson Education.

Englander, I. (2009) *The Architecture of Computer Hardware and System Software: An Information Technology Approach, (5th Edition)*, Wiley: New York

Background

Hennessy, J. and Patterson, D. A. (2011) *Computer Architecture : A Quantitative Approach, (5th Edition)*, Morgan Kaufmann: Amsterdam

Peterson, L. and Davie, B. (2011) *Computer Networks: A System Approach, (5th Edition)*, Elsevier: San Francisco

Rauber , T and Rünger, G. (2010) *Parallel Programming for Multicore and Cluster Systems, (1st Edition)*, Springer: Berlin

Ruffing, J.S. (2011) *Windows Server 2008 R2 and SQL Server 2008 R2 High Availability Clustering* , Scream Publications

Tanenbaum, A. (2013) *Computer Networks, (5th Edition)*, Prentice Hall: New Jersey

Tanenbaum, A. S. (2013) *Modern Operating Systems, (3rd Edition)*, Prentice Hall: Upper Saddle River

Hallihan, R. (2008) *Windows Home Server: Protect and Simplify Your Digital Life*, John Wiley: Hoboken

Journals

IEEE Computer Magazine

IEEE Network Magazine

IEEE Transactions on Networking

IEEE Communications Magazine

IEEE Internet Computing Magazine

IEEE Transactions on Communications

IEEE Transactions on Wireless Communications

Websites

<http://anandtec.com>

<http://tomshardware.com>

<http://storagereview.com>

<http://www.cisco.com>

<http://www.microsoft.com>

<http://www.ss64.com/nt>

<http://www.networktutorials.info>

MODULE CODE:	ACCC4004
TITLE:	Information Engineering
LEVEL:	4
CREDITS:	20

AIM(S)

- To introduce the student to the underlying concepts of systems analysis and design of computer-based systems with an emphasis on requirements analysis. This continues through to the analysis of data. Database design techniques are studied and used to translate theoretical skill into practical applications.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to demonstrate the ability to:

1. Apply appropriate systems investigation and analysis techniques to identify and translate user requirements into a requirements specification.
2. Produce systems specifications and use them appropriately in the development of a database design model.
3. Produce a database solution that involves problem solving techniques to create a prototype application.

INDICATIVE CONTENT

- Systems development lifecycle (SDLC) rational and stages, including alternative approaches to analysis and design.
- Systems investigation techniques, requirements gathering, reporting and investigation.
- Modeling and recording techniques appropriate the approach employed(e.g. use case diagrams or DFD, use case or process description, class diagrams or ERD)
- Database models (e.g. relational, Object-Oriented and Object relational)
- Database design and entity analysis techniques. Select suitable data types, entity and reverential constrains.
- Database implementation using suitable DBMS software.

LEARNING AND TEACHING STRATEGY

Key concepts and theoretical issues will be delivered through a formal mechanism such as lectures, which will allow the student to gain the knowledge applicable to the module. During weekly laboratory sessions, students will apply the theoretical concepts to practical situations

The allocation of teaching to deliver the module is:

Activity type	Hours	Percentage
Scheduled learning	70	35%
Independent learning	130	65%
Placement learning	0	
TOTAL	200	100%

ASSESSMENT

Description of each assessment component and its weighting, together with an example for new forms of assessment:

Assessment Component 1 – Practical - 30%

Computer laboratory based examination. This assessment will test theoretical understanding and application of concepts. Within the given time the student will be expected to produce a robust Logical Data Model for a given business scenario.

Exemplar: 'Using the Kids Crèche Care - case study build and ERD'

Assessment Component 2 – Coursework - 70%

Design a computer-based solution in the format of a system. Analyse and specify the requirements for the proposed system. A practical implementation of a Physical Data Model (as a Microsoft Access Database), based upon an ER Diagram and Database Schema

Exemplar: 'Examine the final ERD for the Kids Crèche Care case study and build a database solution'

Assessment Summary

Activity type	Percentage
Written	0%
Coursework	70%
Practical	30%
TOTAL	100%

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MODULE CODE:	ACCC4007
TITLE:	IP Internetworking
LEVEL:	4
CREDITS:	20

AIM(S)

- To provide the student with an introductory knowledge of routing protocols and concepts. Students will gain a detailed understanding of the various routing protocols used in network design and will understand the fundamental technical principles of routing protocols and IP Addressing.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to demonstrate the ability to:

1. Demonstrate a thorough theoretical understanding of routing protocols and concepts.
2. Deploy static and dynamic routing protocols and troubleshoot common issues with in LAN and WAN infrastructures.

INDICATIVE CONTENT

- Routing concepts
- Classless and classful routing
- Static and default routing
- Dynamic routing – Distance vector and link-state routing protocols
- Routing Information protocol (RIP) version 1 and 2
- Single Area OSPF
- Configuring and testing networks

LEARNING AND TEACHING STRATEGY

The majority of factual material will be presented in lectures using handouts, guided reading and use of internet and intranet material as required.

Tutorial classes will concentrate on the technical design

Laboratories will be used to allow students to gain advanced routing and switching skills with the aid of lab equipment and appropriate software such as Packet tracer, GNS, etc.

The allocation of teaching to deliver the module is:

Activity type	Hours	Percentage
Scheduled learning	70	35%
Independent learning	130	65%
Placement learning	0	
TOTAL	200	100%

ASSESSMENT

Description of each assessment component and its weighting, together with an example for new forms of assessment:

Assessment Component 1 – Practical - 50%

This assessment will require students to implement and test routing protocols in a LAN and WAN in a lab based practical exam

Assessment Component 2 – Written – 50%

Complete a written exam to demonstrate theoretical knowledge on routing protocols.

Assessment Summary

Activity type	Percentage
Written	50%
Coursework	0%
Practical	50%
TOTAL	100%

BIBLIOGRAPHY

Essential

Routing and Switching Essentials Companion Guide by Cisco Networking Academy, 2013

R. Graziani and A. Johnson (2011) Routing Protocols and Concepts: CCAN Exploration Companion guide, Cisco Press.

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N. Olifer and V. Olifer (2006) Computer Networks Principles, Technologies and Protocol for Network Design, John Wiley and Sons, Ltd.

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Websites

<http://www.netacad.com> (username and password required)

MODULE CODE:	ACCC4006
TITLE:	Software Development
LEVEL:	4
CREDITS:	20

AIM(S)

To provide the student with the essential software concepts involved in the implementation, testing and debugging of programs. Simple design concepts and good programming practices will be adopted throughout the module.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to demonstrate the ability to:

1. Demonstrate an understanding of programming by analyzing and developing solutions to a variety of problems, using software libraries/frameworks if and where appropriate.
2. Determine appropriate fundamental concepts and techniques that can be deployed in the solution of problems/scenarios.

INDICATIVE CONTENT

- The software life-cycle including analysis, design, implementation and testing
- Programming constructs
- Applying software libraries/frameworks in application development Win32, MFC, Qt, VxWorks, .Net, etc.
- Problem solving approaches and techniques, interpreting natural language problems, subdividing problems, constraining problems, etc.
- Fundamental algorithms e.g. Big-O notation, searching, sorting, etc., and data structures e.g. lists, queues, trees, etc.
- A range of concepts appropriate to the pathway e.g. Create Read Update Delete (CRUD) operations, mathematical concepts, basic AI for games, etc.

LEARNING AND TEACHING STRATEGY

Essential concepts and principles will be delivered formally in tutorials supported by concurrent practical laboratory exercises, which will allow students to deploy appropriate theory, practices and tools. Seminars will be punctuated with examples designed to underpin the ideas and techniques introduced, reducing the conceptual leap from theory to practice.

The allocation of teaching to deliver the module is:

Activity type	Hours	Percentage
Scheduled learning	70	35%
Independent learning	130	65%
Placement learning	0	
TOTAL	200	100%

ASSESSMENT

Description of each assessment component and its weighting, together with an example for new forms of assessment:

Assessment Component 1 – Coursework - 50%

This may take the form of a number of worksheets including a number of tasks requiring problem solving. Alternatively, the assessment may take the form of scenario(s) for which the student will be required to describe, modify or implement an application that demonstrates the solution to a number of problems. Tasks may include understanding of programming principles, software constructs, reading and understanding code, modifying existing code to produce complete solutions or developing code to solve well constrained problems.

Exemplar: 'Explain the usage of software constructs and techniques in a written report with appropriate examples.'

Assessment Component 2 – Coursework - 50%

This may take the form of a number of worksheets including a number of tasks that address specific programming concepts. Alternatively, the assessment may take the form of scenario(s) for which the student will be required to describe, modify or implement an application that demonstrates the solution to a number of problems. Students may be required to apply problem solving techniques, subdividing problems, design using flow charts (or equivalent) and appropriate selection of algorithms or data structures.

Exemplar: 'Develop a simple text application for sorting and searching a list of words from a file.'

Assessment Summary

Activity type	Percentage
Written	0%

Coursework	100%
Practical	0%
TOTAL	100%

BIBLIOGRAPHY

Essential

Stellman, A., Greene, J. (2010) *Head First C#*, O'Reilly

Sharp, J. (2013) *Microsoft Visual C# 2013 Step by Step*, Microsoft Press

Background

Griffiths, I. (2012) *Programming C# 5.0*, O'Reilly

Watson, K., Hammer, J.V., Reid, J., Skinner, M., Kemper, D., Nagel, C. (2012) *C Beginning Visual C# 2012 Programming*, John Wiley and Sons

Albahari, J. (2012) *C# 5.0 in a Nutshell*, O'Reilly

Websites

<http://msdn.microsoft.com/en-us/library/67ef8sbd.aspx>

<http://www.homeandlearn.co.uk/csharp/csharp.html>

<http://www.tutorialspoint.com/csharp/>

MODULE CODE:	ACCC4001
TITLE:	Computational Thinking
DATED:	03/06/2014
LEVEL:	4
CREDITS:	10

AIM(S)

To provide the student with an understanding of the software constructs of a programming language, and the process of writing a computer program.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to demonstrate the ability to:

1. Demonstrate an understanding of programming constructs and the logical thinking required to program.

INDICATIVE CONTENT

- Programming language syntax and semantics
- Hierarchical task analysis, sequential execution.
- Variable declarations including types
- Branch constructs including if, else and switch
- Loop constructs including for and while loops
- Declaring functions, passing arguments, returning values, calling functions, etc.
- Using tools for implementing and executing applications
- Software design e.g. flow charts.

LEARNING AND TEACHING STRATEGY

Essential concepts and principles will be delivered formally in tutorials supported by concurrent practical laboratory exercises, which will allow students to deploy appropriate theory, practices and tools. Seminars will be punctuated with examples designed to underpin the ideas and techniques introduced, reducing the conceptual leap from theory to practice.

The allocation of teaching to deliver the module is:

Activity type	Hours	Percentage
Scheduled learning	35	35%
Independent learning	65	65%
Placement learning	0	
TOTAL	100	100%

ASSESSMENT

Description of each assessment component and its weighting, together with an example for new forms of assessment:

Assessment Component 1 – Practical - 100%

This may take the form of a practical exam or a number of multiple choice exams. In a practical test, it may require the student to use appropriate compilers, interpreters, IDEs, etc. Students will be required to recognize, explain, discuss, select and/or apply appropriate constructs and techniques. They should be able to write small programs using the constructs but various approaches may be used to assess this, such as requiring the student to write code for a given scenario, modify existing code to pass a particular test, select an appropriate solution from a number given code listings, etc

Assessment Summary

Activity type	Percentage
Written	0%
Coursework	0%
Practical	100%
TOTAL	100%

BIBLIOGRAPHY

Essential

Sebesta, R. (2012) *Concepts of Programming Languages*, Pearson Education

Guttag, J.V.. (2013) *Introduction to Computation and Programming Using Python*, MIT Press

Background

Farrell, I. (2010) *A Beginner's Guide to Programming Logic and Design*, Course Technology

Watson, K., Hammer, J.V., Reid, J., Skinner, M., Kemper, D., Nagel, C. (2012) *C Beginning Visual C# 2012 Programming*, John Wiley and Sons

Currie, E. (2006) *The Fundamentals of Programming Using Java*, Cengage Learning

Websites

<http://www.freenetpages.co.uk/hp/alan.gauld/>

<http://www.codecademy.com/>

<http://learnpythonthehardway.org/book/>

<http://www.tutorialspoint.com/csharp/>

MODULE CODE:	ACCC4002
TITLE:	Internet Protocols
DATED:	03/06/2014
LEVEL:	4
CREDITS:	10

AIM(S)

- To provide the student with a fundamental knowledge of Internet Protocol. Students will gain a detailed understanding of IP version 4 and 6. The various hardware devices used in modern network design and will understand the fundamental technical principles of protocols used in various layers of OSI model and IP Addressing.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to demonstrate the ability to:

1. Demonstrate a knowledge and understanding of Internet Protocol and to design an IP addressing scheme using IPv4/6, subnetting and VLSM.

INDICATIVE CONTENT

- IPv4 addressing
- Class A, B, C and D IP addressing
- Public and Private IP addressing
- Subnetting IP networks and variable length subnet mask.
- Unicast, multicast, and broadcast with IPv4
- IPv6 addressing
- Unicast, anycast and multicast with IPv6

LEARNING AND TEACHING STRATEGY

The majority of factual material will be presented in lectures using handouts, guided reading and use of internet and intranet material as required. Tutorial classes will concentrate on the technical design.

The allocation of teaching to deliver the module is:

Activity type	Hours	Percentage
Scheduled learning	35	35%
Independent learning	65	65%
Placement learning	0	
TOTAL	100	100%

ASSESSMENT

Description of each assessment component and its weighting, together with an example for new forms of assessment:

Assessment Component 1 – Coursework – 100%

The assignment will require students to design and implement IP addressing scheme to the given case study and document the full process of creating a solution to it.

Exemplar: Design and implement a suitable IPv4 addressing scheme to the given scenario.

Assessment Summary

Activity type	Percentage
Written	0%
Coursework	100%
Practical	0%
TOTAL	100%

BIBLIOGRAPHY

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R. Graziani, (2013) IPv6 Fundamentals: A straightforward approach to understanding IPv6, Cisco Press

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M. A. Dye, R. McDonald and A. W. Ruff, (2011) Network Fundamentals: CCNA exploration companion guide, Cisco Press.

M. Sportack, (2003) IP Addressing fundamentals, Cisco Press.

Websites

<http://www.netacad.com> (username and password required)

<http://www.iana.org/numbers>

MODULE CODE:	ACCC4000
TITLE:	Academic and Employability Skills
DATED:	03/06/2014
LEVEL:	4
CREDITS:	10

AIM(S)

- To provide students with the essential knowledge and techniques that underpin and enhance the learning process. Students will be encouraged to develop a positive and reflective approach to learning, and to take responsibility for their own learning. Such skills promote a deeper understanding of the topics studied throughout the Higher education programme; they support sustainable lifelong learning, and are the transferable skills desired in the employment context.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to demonstrate the ability to:

1. Demonstrate transferable skills in a learning environment.
2. Apply an academic, positive and professional approach to their studies.

INDICATIVE CONTENT

- Defining success, personal inspiration motivation goals and values.
- Understanding the learning process e.g. definitions, the learning process, learning styles, self-belief, confidence and positive engagement, reflection, life-long learning.
- Gathering relevant information e.g. note taking, using the library and online resources.
- Communicating and presenting information e.g. presentation techniques and styles.
- Academic and Professional writing e.g. planning and structuring reports, linking ideas, using facts, opinions, analytical thinking.
- Standard referencing systems e.g. Harvard and Numeric system.
- Revision and examination techniques e.g. preparation, organisation, memory aids.
- Identifying skills e.g. self-evaluation, skills needed for higher education, transferable skills, action plans for personal development.
- Employability skills and competencies, professional presentation and self-promotion, e-Portfolio, choosing the right jobs and employers.
- Successful Self-management e.g. time management, organising space and resources, positive attitude, emotional intelligence, managing change, stress management.
- Successful Problem-solving e.g. action-plans, solution-focused thinking, thinking outside the box, creative problem-solving techniques.
- People skills: evaluating people skills, intelligence types, collaboration and team-working, leadership.
- Professional, legal, ethical and sustainability issues related to Higher Education, Employment, and Professional Practice.

LEARNING AND TEACHING STRATEGY

The module aims to encourage and develop the student's academic personal and professional skills and attributes, student-centred learning strategies are necessary. As a result, for the exploration of these topics and their application within the students' studies, tutorials are the most appropriate strategy. The conceptual, theoretical issues will be introduced during weekly lectures and as the module progresses the Lecture hour will also be used to allow student groups to disseminate findings from their team-based research activity on academic and employability skills.

The allocation of teaching to deliver the module is:

Activity type	Hours	Percentage
Scheduled learning	35	35%
Independent learning	65	65%
Placement learning	0	
TOTAL	100	100%

ASSESSMENT

Description of each assessment component and its weighting, together with an example for new forms of assessment:

Assessment Component 1 – Coursework - 100%

Produce a written reflection upon the application of the academic and professional skills learned (e.g. team-working, presentation techniques, report writing, analytical techniques, referencing convention, exam revision technique, etc.) using examples to illustrate their use.

Exemplar: 'Write a report that documents the application of Academic Personal and Professional skills learned.'

Assessment Summary

Activity type	Percentage
Written	0%
Coursework	100%
Practical	0%
TOTAL	100%

BIBLIOGRAPHY

Essential

Cottrell, S. (2010) 2nd edition, *Skills for Success: Personal Development and Employability*, Palgrave Macmillan.

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Websites

<http://www.skills4study.com>

<http://www.palgrave.com/skills4study>

<http://www.cipd.co.uk>

<http://www.ltscotland.org.uk/studyskills>

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<http://www.employment-studies.co.uk>

MODULE CODE:	ACCC4005
TITLE:	Network Principles
DATED:	03/06/2014
LEVEL:	4
CREDITS:	20

AIM(S)

- To provide the student with a fundamental knowledge of OSI reference model and TCP/IP protocol model. Students will gain a detailed understanding of the various hardware devices used in modern network design and will understand the fundamental technical principles of protocols used in various layers of OSI model and IP Addressing.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to demonstrate the ability to:

1. Demonstrate a knowledge and understanding of network principles and protocols used in OSI and TCP/IP model.
2. Implement simple LANs, perform basic configurations for routers and switches, and implement IP addressing schemes.

INDICATIVE CONTENT

- Network principles and definition of a network
- Exploring of networks e.g. LAN, WAN, Internet, etc.
- ISO OSI reference model
- TCP/IP protocol model
- Network protocols and communications
- Networks access and configuring network operating system
- Ethernet, IEEE 802.3, LLC and MAC sub layers, CSMA/CD

LEARNING AND TEACHING STRATEGY

The majority of factual material will be presented in lectures using handouts, guided reading and use of internet and intranet material as required.

Tutorial classes will concentrate on the technical design. Laboratories will be used to allow students to gain advanced routing and switching skills with the aid of lab equipment and appropriate software such as Packet tracer, GNS, etc.

The allocation of teaching to deliver the module is:

Activity type	Hours	Percentage
Scheduled learning	70	35%
Independent learning	130	65%
Placement learning	0	
TOTAL	200	100%

ASSESSMENT

Description of each assessment component and its weighting, together with an example for new forms of assessment:

Assessment Component 1 – Written - 50%

Complete a written exam to demonstrate fundamental knowledge on theoretical principles of networking

Assessment Component 2 – Practical- 50%

This assessment will require students to implement and test a simple LAN and perform basic configuration on Cisco routers and switches. This will be assessed by a lab based practical exam.

Assessment Summary

Activity type	Percentage
Written	50%
Coursework	0%
Practical	50%
TOTAL	100%

BIBLIOGRAPHY

Essential

Introduction to Networks Companion Guide by Cisco Networking Academy (2013)

Introduction to Networks Course booklet by Cisco Networking Academy (2013)

M.A. Dye, R. McDonald and A. W. Rufi, (2011) *Network Fundamentals: CCNA exploration companion guide*, Cisco Press.

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H. Bidgoli, (2008) *Handbook of computer networks: key concepts, data transmission, and digital and optical networks*, Hoboken, N.J. Wiley.

Computer networks: the international journal of computer and telecommunications networking

Websites

<http://www.netacad.com> (username and password required)

Level 5 Old Cloud Computing Modules

MODULE CODE:	ACCC5000
TITLE:	Cloud Computing Technologies
DATED:	03/06/2014
LEVEL:	5
CREDITS:	20

AIM(S)

- To provide students with a systematic understanding of the major concepts and technologies upon which service-level cloud computing is built. The module will expose students to some of the more advanced cloud computing concepts that underpin more sophisticated cloud computing implementations.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to demonstrate the ability to:

1. Demonstrate a systematic understanding of cloud computing concepts, principles and practice in the analysis and design of a robust solution.
2. Exercise effective judgment in the analysis, planning, deployment and evaluation of core cloud design principles with respect to best practice.

INDICATIVE CONTENT

- Instantaneous resource provisioning.
- Cloud security, including handling of sensitive data.
- Exploiting Software as a Service (SaaS), including optimization, streamlining and collaboration with appropriate productivity tools.
- Deploying distributed web applications, including SOAP and RESTful web services.
- Delivering Platform as a Service (PaaS), including component analysis, architecture evaluation and use of service platform tools.
- Deploying Infrastructure as a Service (IaaS), including scalable clustering, platform-level virtualisation and on-demand provisioning.
- The Cloud migration process, encompassing both business and technical considerations.
- Virtualisation concepts, including type 2, but especially type 1 hypervisors.

LEARNING AND TEACHING STRATEGY

The conceptual, theoretical issues are suited to delivery during weekly lectures. These topics necessitate exploration and application to case studies pertaining to cluster computing, for which laboratory work is the most appropriate strategy. Students will be expected to read widely within the literature relevant to the subject area.

The allocation of teaching to deliver the module is:

Activity type	Hours	Percentage
Scheduled learning	60	30%
Independent learning	140	70%
Placement learning	0	
TOTAL	200	100%

ASSESSMENT

Description of each assessment component and its weighting, together with an example for new forms of assessment:

Assessment Component 1 –Written - 50%

Complete a written examination based on a provided enterprise-based case study which:

Explores analytical frameworks systematically as pertains to the provided study.

Evaluate theoretical material from practical case study-based information to generate critique.

Consider the application of analysis techniques and tools for this case.

Exemplar: 'Analyse a cluster-based solution to an enterprise problem'

Assessment Component 2 –Coursework - 50%

Deploy a suitable replete or partial cloud computing implementation based on the service architecture.

This will be assessed via written coursework in the form of a critical report to evaluate the implemented cluster architecture.

Exemplar: 'Commission a cluster-based implementation'

Assessment Summary

Activity type	Percentage
Written	50%
Coursework	50%
Practical	0%
TOTAL	100%

BIBLIOGRAPHY

Essential

Erl, T. and Puttini, R. and Mahmood, Z.,(2013) *Cloud Computing: Concepts, Technology and Architecture*, Pearson Education

Rhoton, J. and Haukioja, R. (2011) *Cloud Computing Architected*, Recursive, Limited

Background

Fox, A. and Patterson, D. (2013) *Engineering Software As a Service: An Agile Approach Using Cloud Computing*, Strawberry Canyon LLC

MODULE CODE:	ACCC5001
TITLE:	Database Management Systems
DATED:	03/06/2014
LEVEL:	5
CREDITS:	20

AIM(S)

- To provide the student with the essential concepts involved in the design, implementation, and testing of multi-user database applications. It will also expose students to some of the more advanced concepts that underpin multi-user access and more sophisticated database applications.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to demonstrate the ability to:

1. Apply well-established data analysis and design techniques to produce requirements and specifications for a database application showing a requisite understanding of the need for quality and data security.
2. Demonstrate a sound understanding of the knowledge and skills required to design, implement and manage multi-user database applications.

INDICATIVE CONTENT

- Data analysis and database design, e.g. entity relationship modelling, normalisation.
- Structured Query Language: data definition, data manipulation and data control languages.
- Triggers.
- Security measures to typically include: database security threats and counter measures, views, authorisation, backup and recovery, roles, constraints, and encryption.
- Multi-user concepts to typically include: transactions and transaction management, concurrency control, granting and revoking privileges, two phase commit, lost updates and inconsistent analysis.
- Object relational concepts to typically include: object creation, object querying and inheritance.

LEARNING AND TEACHING STRATEGY

Essentially this module will have a vocational focus that will give the students an appreciation of the theoretical concepts and principles for the design, development, security and quality assurance of multi-user database systems. The theoretical material will be delivered formally in lectures. Tutorials will be used to support the theory with practical laboratory based exercises to provide practical hands-on experience.

The allocation of teaching to deliver the module is:

Activity type	Hours	Percentage
Scheduled learning	60	30%
Independent learning	140	70%
Placement learning	0	
TOTAL	200	100%

ASSESSMENT

Description of each assessment component and its weighting, together with an example for new forms of assessment:

Assessment Component 1 –Written - 50%

Analyse and document database security threats. Design appropriate database server measures to counteract the threats. Suggest coping strategies to avoid loss of database integrity

Assessment Component 2 –Coursework - 50%

Create and document a database design for a given case study.

Exemplar: 'Create a database solution to a stock control case study for a small business'

Assessment Summary

Activity type	Percentage
Written	50%
Coursework	50%
Practical	0%
TOTAL	100%

BIBLIOGRAPHY

Essential

Connolly, T., Begg, C., (2014), *Database Systems: A Practical Approach to Design, Implementation and Management*, Addison Wesley

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Silberschatz, A., Korth, H., Sudarshan, S., (2010), *Database Systems Concepts 6th Edition*, McGraw Hill

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Faroult, S., (2013), *SQL Success: Database Programming Proficiency*, Roughsea

Rankins, R., Bertucci, P., Gallelli, C., Silverstein, A., (2013), *Microsoft SQL Server 2012 Unleashed*, Sams

Websites

Oracle SQL Developer

<http://www.oracle.com/technetwork/developer-tools/sql-developer/overview/index.html>

SQL Plus User Guide and Reference

<http://docs.oracle.com>

w3Schools.com

[w3Schools.com/sql](http://w3schools.com/sql)

Microsoft Developer Network

msdn.microsoft.com

Tutorialized.com

<http://www.tutorialized.com/tutorials/MsSQL/1>

MODULE CODE:	ACCC5002
TITLE:	Local Area Networks
DATED:	03/06/2014
LEVEL:	5
CREDITS:	20

AIM(S)

- To study in depth the technical issues related to switching techniques, to have an in depth knowledge of architecture, components, and operations of switches in a larger and more complex network.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to demonstrate the ability to:

1. Demonstrate a detailed understanding of theoretical knowledge relating to switching techniques.
2. Configure and troubleshoot routers and switches and resolve common issues with VLANs, STP, and VTP in IP networks.
3. Students will also develop the knowledge and skills needed to implement ACL, DHCP and NAT operations in a network.
4. Critically evaluate design and security measures implemented in LAN

INDICATIVE CONTENT

- Switched networks and hierarchical networks
- Switch configuration
- Virtual local area networks (VLAN)
- Inter-VLAN routing using routers and L3 switch
- LAN redundancy and link aggregation
- DHCP and NAT
- Access control lists and LAN security
- Wireless LANs

LEARNING AND TEACHING STRATEGY

The majority of factual material will be presented in lectures using handouts, guided reading and use of internet and intranet material as required.

Tutorial classes will concentrate on the technical design.

Laboratories will be used to allow students to gain advanced routing and switching skills with the aid of lab equipment and appropriate softwares such as OPNET, Packet tracer, GNS, etc.

The allocation of teaching to deliver the module is:

Activity type	Hours	Percentage
Scheduled learning	60	30%
Independent learning	140	70%
Placement learning	0	
TOTAL	200	100%

ASSESSMENT

Description of each assessment component and its weighting, together with an example for new forms of assessment:

Assessment Component 1 – Written -50%

Complete a written exam to demonstrate theoretical knowledge on switching techniques.

Assessment Component 2 – Practical -50%

This assessment will require students to implement and test switching techniques in a LAN infrastructure and this will be assessed by a lab based practical exam

Assessment Summary

Activity type	Percentage
Written	50%
Coursework	0%
Practical	50%
TOTAL	100%

BIBLIOGRAPHY

Essential

Routing and Switching Essentials Companion Guide by Cisco Networking Academy, 2013

Scaling Networks companion guide by Cisco Networking Academy, Cisco Press, 2013.

Background

W. Lewis (2011), LAN switching and wireless: CCNA exploration companion guide, Cisco press.

Routing and Switching Essentials course booklet by Cisco Networking Academy, 2013

J. E. Goldman and P. T. Rawles (2012), Local Area Networks A Business-oriented approach (2nd Ed), John Wiley and Sons Inc.

N. Olifer and V. Olifer (2006) Computer Networks Principles, Technologies and Protocol for Network Design, John Wiley and Sons, Ltd.

K. Pahlavan and P. Krishnamurthy (2009), Networking Fundamentals, John Wiley and Sons Inc.

Websites

<http://www.netacad.com> (password required)

MODULE CODE:	ACCC5003
TITLE:	Network Operating Systems and Security
LEVEL:	5
DATED:	03/06/2014
CREDITS:	20

AIM(S)

- To provide students with a sound understanding of the concepts, principles, skills and techniques required to manage/deploy network resources in a Network Operating System (NOS) environment e.g. Windows, Unix Novell.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to demonstrate the ability to:

1. Apply a systematic understanding of network operating system environments to Deploy, Manage and Maintain critical network services (DNS/DHCP) and resources.
2. Analyse a given network to produce suitable security audit/disaster recovery strategy.

INDICATIVE CONTENT

- Internetworking addressing systems
- Overview of Directory Services
- Principles of Network logins
- Modifying user and computer account properties; account templates
- Group membership; default groups, strategies for using groups
- Investigate, deploy and configure Dynamic Host Configuration Protocol (DHCP)
- The Name Resolution process
- Deploy, configure and test Domain Name Services (DNS) and structure of DNS protocol.
- Controlling access to resources; shared folders, NTFS permissions
- The organisational unit (OU) structure; modifying permissions to directory objects, delegating control of OUs, use of Group Policy
- The role of DNS in the network infrastructure and its configuration
- The role of DHCP in the network infrastructure and its configuration
- Identify the nature of network security in terms of integrity, reliability, accuracy of data
- Overview of core services towards facilitating network security models (e.g. Confidentiality, Integrity and Availability of Data)
- Identify the nature of threats to the security of data (Passive/Active attacks)
- Risk assessment and Security policies
- Intrusion detection systems
- Disaster prevention and recovery methods e.g. RAID 0, 1, 5 and 10, High Availability Failover Clusters
- Virtual Private Networking.
- Authentication and encryption
- Remote administration of servers and services (RDP, Terminal Services).

- Virus checkers and violations, service pack upgrades and hardware failures
- Monitoring programs: use of Network Monitoring and Management tools/protocols.
- Monitoring event logs: monitor events to identify and track security events, resource usage, system and application errors, limiting the size of event logs to preserve disc space, archiving event logs to track trends over time
- Legal, social and ethical issues

LEARNING AND TEACHING STRATEGY

Formal lectures together with accompanying handouts/slide presentations will be used to convey key concepts and paradigms. Laboratory work will focus on practical activities which will provide students with enhanced network configuration and management skills. In order to emulate 'accurate' network organisational contexts, a collaborative environment for practical components of work will be implemented.

Network security skills will be developed via practical lab sessions that focus on implementing a range of services, simulating passive and active attacks and implementing apposite controls/countermeasures.

The allocation of teaching to deliver the module is:

Activity type	Hours	Percentage
Scheduled learning	60	30%
Independent learning	140	70%
Placement learning	0	
TOTAL	200	100%

ASSESSMENT

Description of each assessment component and its weighting, together with an example for new forms of assessment:

Assessment Component 1 – Coursework - 50%

Demonstrate professional practice and sound understanding of the skills and knowledge required to deploy manage and maintain Computer Networks, Operating systems and the intrinsic/core services they provide. Students will be required to complete a number of worksheets.

Students will be required to develop a systematic understanding of the principle stages of configuring/deploying 'network services' in local and remote 'virtualised' network platforms. Students will typically be required to complete a number of worksheets,

(approximately 5 in total). Example worksheets could be: WS1: Build a Virtualised Network, WS2: Manage network resources, WS3: Enforcing user security policies, WS4: Implement Service architecture WS5: Intrinsic/Extrinsic Operating System security principles

Exemplar: 'A simulated network infrastructure for secure local/remote management of intrinsic network based services.'

Assessment Component 2 – Coursework - 50%

Assessment is a written report (in the form of a security plan) which evaluates security principles and practices, which are demonstrated via deployment of security protocols tools, techniques and practices in tutorials (e.g. Configuring Layer 2/3/4 IP Tables for Firewalling, Armouring the Operating System services against Port scanners NMAP, Vulnerability Assessment and Patching (Nessus, Update Services), Ethical hacking techniques: Kali Linux, Network node Performance benchmarking/vulnerability assessment.

Exemplar: 'An applied network security audit/plan for a case study scenario. '

Assessment Summary

Activity type	Percentage
Written	0%
Coursework	100%
Practical	0%
TOTAL	100%

BIBLIOGRAPHY

Essential

Minas, M. et al (2014) *Mastering Windows Server 2012*, Sybex International

Cole E (2009) *Network Security Bible 2nd Edition*, John Wiley and Sons

Background

Minas, M. et al (2010) *Mastering Windows Server 2008 R2*, Sybex International

Hallberg B (2013) *Networking A Beginners Guide*, 6th edition, McGraw-Hill Osborne

Desmond B. et al (2013) *Active Directory: Designing, Deploying, and Running Active Directory 5th edition*, O'Reilly Media

Stallings W(2013) *Network Security Essentials, Applications and Standards 5th edition*, Pearson

Kurose J (2013) *Computer Networking: A top down approach*, 6th edition, Pearson

Negus C (2012), *Linux Bible, 8th edition*

De Laet D. et al (2008) *Network Security Fundamentals 1st edition, John Wiley and Sons*

Journals

ACM Transactions

IEEE (*available from Apollo*)

Computer Networking

Data Communications

Websites

<http://www.visualwin.com/>

http://www.windownetworking.com/articles_tutorials/

<http://www.networkworld.com>

<http://www.serverwatch.com/tutorials>

<http://www.techtutorials.info/windows.html>

http://www.windowsecurity.com/articles_tutorials/

MODULE CODE:	ACCC5005
TITLE:	Project Management
DATED:	03/06/2014
LEVEL:	5
CREDITS:	10

AIM(S)

- To provide students with a critical awareness of the contemporary challenges facing IT managers and the key decisions they must take in order to satisfy the principal stakeholders to create quality systems within the promised timescale and budget. The student will be able to critically appreciate the importance of professional conduct and consider the ethical and legal issues facing IT personnel.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to demonstrate the ability to:

1. Evaluate project management methods and techniques, and demonstrate an appreciation of the legal and ethical issues, including sustainability.
2. Demonstrate a critical awareness and systematic understanding of a range of contemporary project management techniques while working as a member of a team.

INDICATIVE CONTENT

- Understanding the roles and responsibilities within project teams and the management of people and change.
- Ethical, legal and professional responsibilities incumbent on IS/IT managers, e.g. intellectual property, data protection, codes of practice (BCS), legal frameworks, contracts.
- Resourcing alternatives: for example, outsourcing, developing bespoke software or purchasing sophisticated software packages (such as enterprise systems)
- Project Planning: Function Point Analysis (FPA), Critical Path Analysis (PERT, CPM), Gantt Charts, Work Breakdown Structures (WBS).
- Concepts of Quality Management: quality assurance, quality control methods, quality standards.
- Factors influencing project success or failure
- Risk management: health and safety, sustainability and green drivers for project success
- BCS guidelines on Green and Sustainable IT
- Financial appraisal methods, e.g. payback, discounted cash flow

LEARNING AND TEACHING STRATEGY

The conceptual, theoretical issues are suited to delivery during weekly lectures. However, tutorials are necessary to develop the practical skills required to investigate the requirements and design a solution to the business problem presented in the case study used as a vehicle for assessment. The lecture and tutorials will be student driven, reflecting the knowledge and skill required at each stage of project development.

The allocation of teaching to deliver the module is:

Activity type	Hours	Percentage
Scheduled learning	30	30%
Independent learning	70	70%
Placement learning	0	
TOTAL	100	100%

ASSESSMENT

Description of each assessment component and its weighting, together with an example for new forms of assessment:

Assessment Component 1 – Coursework – 100%

Students will be required to write a written report discussing project management concepts and methods. They will also be required to create a written plan and/or do a group presentation to an audience of their peers that also demonstrates teamwork

Exemplar: 'Analyse the quality management procedure, risk management and ethical and legal issues that would be required when building a PID for a given scenario. Present plans while working as a team'

Assessment Summary

Activity type	Percentage
Written	0%
Coursework	100%
Practical	0%
TOTAL	100%

BIBLIOGRAPHY

Essential

Hughes, B. and Cotterell, M. (2009), 5th Edition *Software Project Management*, McGraw-Hill

Maylor, H. (2010) *Project Management*. Financial Times/Prentice Hall
Background

Newton, R. (2013), *The Project Management Book: How to Manage Your Projects to Deliver Outstanding Results*, FT Publishing International

Barker, S., Cole, R. (2012) 3rd Edition, *Brilliant Project Management: What the Best Project Managers Know, Do and Say*, Pearson

Dobson, M.S. (2010) *Creative Project Management*. McGraw-Hill

Larson, E.W. (2010) 5th Edition, *Project Management: The Managerial Process*. McGraw-Hill

Journals

ACM Transactions on Information Systems

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Journal of Systems Management

Websites

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<http://www.bized.co.uk>

<http://www.managers.org.uk>

<http://www.cbronline.com>

<http://www.eevl.ac.uk>

<http://juno.emeraldinsight.com>

<http://www.ft.chadwyck.co.uk>

<http://www.itwales.com>

<http://www3.gartner.com>

<http://www.silicon.com>

<http://projectmanagement.ittoolbox.com/>

<http://www.michaelgreer.com/>

<http://www.ics.ltsn.ac.uk/resources/projman/index.html>

<http://www.niwotridge.com/Resources/PM-SWEResources/PMResources.htm>

<http://www.tickit.org/international.htm>

MODULE CODE:	ACCC5006
TITLE:	Research Methods
DATED:	03/06/2014
LEVEL:	5
CREDITS:	10

AIM(S)

To underpin academic research and the third year major project, and to provide students with a comprehensive and systematic understanding of the knowledge and skills needed to collect, interpret, analyse, synthesise and present data using appropriate research methods. The module will extend the student's technical expertise in information systems development such that s/he is able to evaluate the suitability of different development methods for different situations.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to demonstrate the ability to:

1. Review critically the current research literature pertinent to a research topic and communicate the results of the research to specialist and non-specialist audiences.
2. Demonstrate a sound understanding of research and development strategies and use these to produce a proposal suitable for a Major Project that meets ethical and sustainability guidelines.

INDICATIVE CONTENT

- Research principles and approaches (e.g. the research process, purpose, sources of data including primary/secondary research, quantitative/qualitative data, objective/hypothesis formation, reliability, validity, generalisability)
- Research design strategies, (e.g. experiments, surveys, case studies), their advantages and limitations, and their suitability to a variety of research contexts
- Data collection & sampling methods (e.g. interviews, questionnaires, observation), and their advantages and limitations in a variety of contexts
- Data analysis of both qualitative and quantitative information, including the use of appropriate computer software
- Developing and structuring a research proposal: problem identification, formulating aims/hypotheses, sampling, sustainability and ethical issues and the practicalities of design
- Referencing conventions (e.g. the Harvard system, numeric system)
- Critical, analytical thinking and writing

LEARNING AND TEACHING STRATEGY

Students are required to critically analyse journal papers and produce a project proposal based on a self-selected topic. This module, therefore, requires that students demonstrate a high level of self-direction and initiative, and take responsibility for the direction of their own learning. This is reflected in the teaching and learning strategy implemented. Lectures will be used to introduce conceptual, theoretical issues and key ideas and will allow students to engage in discussion on the application of the theoretical concepts to practical situations. For the exploration of these topics and their application to practical, pathway-specific situations and case studies, tutorials are the most appropriate strategy. During tutorials a flexible, student-led approach will be taken; students will discuss and develop individual project ideas, and will be given the opportunity to consult with topic specialists amongst the teaching team.

The allocation of teaching to deliver the module is:

Activity type	Hours	Percentage
Scheduled learning	30	30%
Independent learning	70	70%
Placement learning	0	
TOTAL	100	100%

ASSESSMENT

Assessment Component 1 – Coursework - 20%

Write a 400-word gobbet based upon one of several published papers relevant to their degree line.

Exemplar:

Reference text: Turing, Alan (1936). On Computable Numbers, with an Application to the Entscheidungsproblem. Proceedings of the London Mathematical Society 42:230-265.

Write a 400-word critique of the paper provided. This should cover the following factors:

- Context (20%) – What is the context of the paper? Are the authors big names in their field (or did they go on to become such)? What else was going on in the field at the time?
- Analysis (60%) – What are the key developments that this paper is describing? How important is this nowadays? What did it lead to? How does it differ from the other

- Evaluation (20%) – How important was the development reported in the paper? How long did it take to have an effect upon the field?

DON'Ts and DOs for Students

DON'Ts

- DON'T write an essay about the subject the paper relates to. If you are given a paper by Alan Turing then don't write an essay about who Turing was, but instead discuss the contents of the paper, their context and their impact
- DON'T just paraphrase what is already in the piece. You need to evaluate that information as well.
- DON'T get carried away writing a short biography of the author: only include information of the author that is relevant to assessing the value of this particular paper.
- DON'T write an introduction and conclusion like with an essay.

DOs

- DO include cross-references to any other primary sources, written or otherwise, that you are aware of that contrast or corroborate with what is said in this paper.
- DO include a bibliography showing everything you have read in preparing your critique, even if it is not specifically cited. The references and bibliography do NOT count towards the word count.
- DO be PRECISE, CONCISE and STRICT about only sticking to relevant information: you've only got 400 words. The use of bullet points is acceptable.

Assessment Component 2 – Coursework - 80%

Students are required to write a project proposal for the major project that they will complete in their third year.

Exemplar:

Identify an area of study, relevant to your degree pathway, in which you would like to conduct your own research for your B.Sc. final year research dissertation or project.

Produce a project proposal in which you introduce and justify your chosen research. The document should contain the following sections:

1. INTRODUCTION / BACKGROUND TO THE PROPOSED RESEARCH

- Give your research a working title.
- Describe clearly the background to the subject area of study. This should involve a short critical review of the literature pertaining to your research topic (diverse sources such as academic, governmental and industrial literature). Ensure that all literature sources identified are referenced correctly (use the numeric system of referencing, and append a reference list and, where appropriate, a bibliography).
- Provide the reader with an understanding of the field in which your study lies and an idea of where and how your study fits into this field. In other words, you must justify a rationale for the study, based on the literature review. Why is the research worth doing? Is it topical, interesting, controversial, applied in a new context, etc? Have there been similar studies? Is there a gap?
- If relevant, introduce the industry/organisation/context that is being investigated.
- Define one overarching aim of the study (the research purpose). Construct a series of objectives that specify what you will do to achieve the aim (typically 3 or 4 objectives). The objectives represent major components that direct your activity, i.e. to breakdown the study into identifiable sub-tasks. Ensure that they are SMARTly phrased, incorporating higher order verbs (to analyse..., to evaluate..., to design and develop... etc.).
- What are your expected outcomes/deliverables? What will you submit at the end of the study? A set of recommendations based on synthesis of primary and secondary research? Models and algorithms developed to address specific problems? Web design guidelines?

2. RESEARCH & DEVELOPMENT METHODS

- Where relevant, identify and *justify* the research methods that you will use to gather your data and/or evaluate your results. This *may* include:
 - Research philosophy and approach (positivism or phenomenology? Induction or deduction?)
 - Research strategy (experiment, case study, survey, etc.)
 - The study population and sample (who are they, do you have access?)
 - Data collection methods for each objective (interview, questionnaire, observation, document review, etc.).
 - Reliability and validity
- If relevant, identify and *justify* any development methods and techniques that you will use as part of systems development (e.g. lifecycle models, AGILE approach, prototyping, UML, storyboards, etc.).
- Identify risks/limitations/ethical/legal issues and ways that you might deal with those risks.
- How will you analyse the data/evaluate your results? (e.g. SPSS, content analysis, compare with user requirements and aims and objectives, software tests, user tests, benchmarks, etc.) What statistical techniques do you plan to use?

3. RESOURCES & PLANNING

- Identify any **resources** required (computer systems, application packages and programming languages to be used, access to journals or people).
- Construct a Gantt chart that demonstrates evidence of project planning and management. Identify the timescales for each component of the study. Make sure

that your Gantt chart suitably represents the research and development models you have chosen to use.

Assessment Summary

Activity type	Percentage
Written	0%
Coursework	100%
Practical	0%
TOTAL	100%

BIBLIOGRAPHY

Essential

Marder, M. (2011) *Research Methods for Science*, Cambridge University Press: Cambridge.

Weaver, P. (2004) *Success in Your Project: a Guide to Student System Development Projects*, Prentice Hall: Harlow

Background

Avison, D. and Fitzgerald, G. (2007) 4th Edition, *Information Systems Development: Methodologies, Techniques and Tools*, McGraw-Hill: Maidenhead.

Baase, S. (2008) 3rd Edition *A Gift of Fire: Social, Legal, and Ethical Issues for Computing and the Internet*: International Edition, Pearson: NY

Collis, J. and Hussey, R. (2009) 3rd Edition, *Business Research: a Practical Guide for Undergraduate and Postgraduate Students*, Palgrave Macmillan: Basingstoke

Klein, G. and Dabney, A. (2013) *The Cartoon Guide To Statistics*, Hill and Wang: NY.

Quinn, M. J. (2009) 3rd Edition, *Ethics for the Information Age: International Edition*, Pearson: NY

Yin, R K. (2008) 4th Edition, *Case Study Research: Design and Methods*, Sage: Beverly Hills.

Websites

<http://www.acm.org>

<http://www.ieee.org>

<http://www.bcs.org>

<http://www.theregister.co.uk>

MODULE CODE:	ACCC5004
TITLE:	Web Development
DATED:	03/06/2014
LEVEL:	5
CREDITS:	20

AIM(S)

- To provide students with a systematic understanding of web development using server-side programming languages.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to demonstrate the ability to:

1. Evaluate the concepts, principles, technologies and techniques used in the development of web applications.
2. Design and implement web applications using server-side programming language(s) to resolve a range of web-based problem scenarios.

INDICATIVE CONTENT

- Server-side programming languages eg PHP, ASP.NET
- Syntax, semantics, constructs including data types, variables, operators, arrays, lists etc.
- Web-based database programming techniques providing typical CRUD functionality
- Implementing dynamic database relationships
- Reading and validating data from web forms eg cleaning data, string processing
- Handling stateless HTTP eg cookies, sessions
- Dynamic content eg user-driven events

LEARNING AND TEACHING STRATEGY

Essential concepts and principles will be delivered formally in lectures supported by concurrent practical laboratory exercises, which will allow students to deploy appropriate theory, practices and tools. Seminars will be punctuated with examples designed to underpin the ideas and techniques introduced, reducing the conceptual leap from theory to practice.

The allocation of teaching to deliver the module is:

Activity type	Hours	Percentage
Scheduled learning	60	30%
Independent learning	140	70%
Placement learning	0	
TOTAL	200	100%

ASSESSMENT

Description of each assessment component and its weighting, together with an example for new forms of assessment:

Assessment Component 1 – Coursework - 50%

The assignment will require students to implement web applications meeting the requirements of a loosely-defined scenario. Implement a web application to solve a range of problems.

Exemplar: 'Develop an eCommerce application using PHP and MySQL'

Assessment Component 2– Coursework - 50%

The assignment will require students to implement web applications meeting the requirements of a loosely-defined scenario. Implement a web application introducing a web framework or library.

Exemplar: 'Develop a car rental web application using ASP.Net'

Assessment Summary

Activity type	Percentage
Written	0%
Coursework	100%
Practical	0%
TOTAL	100%

BIBLIOGRAPHY

Essential

Walther S and Dudek N S (2014) *ASP.NET 4.5 Unleashed*, Sams

Ullman, L (2011) *PHP and MySQL for Dynamic Web Sites: Visual QuickPro Guide*, Peachpit Press

Background

McGrath, M (2012) *PHP and MySQL In Easy Steps*, in easy steps.

Tatroe K, MacIntyre P and Lerdorf, R (2013) *Programming PHP*, O Reilly.

MacDonald, Matthew (2012) *Beginning ASP .NET 4.5 in C# 5th Edition*, Apress.

Gaylor, JN., Wenz, C., Rastogi, P and Miranda, T (2013) *Professional ASP.NET 4.5 in C# and VB*, Wrox.

Websites

<http://www.php.net>

<http://www.phpbuilder.com/>

<http://www.asp.net/mvc>

LEVEL 6 OLD Cloud Computing Modules

MODULE CODE:	ACUA6002
TITLE:	Big Data
DATED:	03/06/2014
LEVEL:	6
CREDITS:	20

AIM(S)

- To provide students with a comprehensive and systematic understanding of the concepts underlying the collection, storage and analysis of Big Data. The student's technical skills will be extended to allow them to use both data analysis and data mining tools in order to extract meaningful information from large datasets and present it in an effective manner.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to demonstrate the ability to:

1. Critically discuss the concepts behind, sources of and problems related to Big Data
2. Design, build and professionally document a small data warehouse suitable for use with Big Data
3. Perform data analysis and reporting on complex data within a Big Data data warehouse
4. Demonstrate a creative use of appropriate data mining and data visualisation techniques within a Big Data context.

INDICATIVE CONTENT

- Origins and sources of Big Data; volume, velocity, variety and ambiguity problems
- Big Data architectures and technologies; Hadoop, NoSQL and others
- Data warehousing for Big Data; traditional and modern architectures; workload management; emerging technologies
- Information management; Big Data lifecycle; semantic layers and the semantic web
- Data-driven architectures; master data management and metadata management
- Analysis and visualisation of Big Data; data mining, text mining, data modelling.

LEARNING AND TEACHING STRATEGY

Essential concepts and principles will be delivered formally in lectures supported by concurrent practical laboratory exercises, which will allow students to deploy appropriate theory, practices and tools. Case-study driven examples will be explored in detail to accentuate best-practice and practically explore issue resolution.

The allocation of teaching to deliver the module is:

Activity type	Hours	Percentage
Scheduled learning	60	30%
Independent learning	140	70%
Placement learning	0	
TOTAL	200	100%

ASSESSMENT

Description of each assessment component and its weighting, together with an example for new forms of assessment:

Assessment Component 1 – Written - 30%

Discuss the origins and sources of Big Data and identify potential solutions for commonly-encountered problems in the use of Big Data.

Exemplar: 'A case study to describe the data collection process of an online local news provider.

- Discuss the different types of data that the company will need to capture, process and store
- Critically appraise the tools and technologies available to the company and recommend which combination of these the company should use.
- Identify any potential weaknesses within the proposed system and suggest creative solutions to help ameliorate these.'

Assessment Component 2 – Coursework – 70%

Design and produce professional-standard reports based upon an example Big Data data warehouse using appropriate tools and techniques. Select and apply appropriate data mining processes to Big Data within a given problem domain and produce effective visualisations of the results.

Exemplar: 'The data provided is an indicative sample of the type of data collected by an online local news provider. Using this data you should do the following:

- Design and develop an appropriate data warehouse structure to store the data provided. You should justify all of your design decisions.
- Upload the data into your data warehouse, documenting the ETL process in a professional manner.
- Design, develop and critically evaluate reports that can be run to retrieve and display the following data:
 - All stories on a user-defined topic
 - All stories within a user-defined geographical area
 - A timeline showing the development of a complex story over a period of at least a week
 - Stories that are related to a user-defined story by location, content or other features.'

Assessment Summary

Activity type	Percentage
Written	30%
Coursework	70%
Practical	0%
TOTAL	100%

BIBLIOGRAPHY

Essential

Krishnan, K. (2013) *Data Warehousing in the Age of Big Data*. Elsevier.

Du, H (2010), *Data Mining Techniques and Applications – An introduction*. CEngage learning

Background

Foreman, J. W. (2013) *Data Smart: Using Data Science to Transform Information into Insight*. Wiley.

Provost, F. and Fawcett, T. (2013) *Data Science for Business*. O'Reilly Media.

Kimball, R., and Ross, M. (2013), *The Data Warehouse Toolkit (3rd Ed.)* Wiley.

Schutt, R. and O'Neill, C. (Eds.) (2013) *Doing Data Science*. O'Reilly Media.

Smolan, R. and Erwit, J. (2012), *The Human Face of Big Data*. Sterling.

Tuffery, S. (2011), *Data Mining and Statistics for Decision Making*. Wiley.

Witten, I.H., Frank, E. and Hall, M.A. (2011), *Data Mining – Practical Machine Learning Tools and Techniques*. Morgan Kaufmann

Websites

<http://www.kimballgroup.com>

tkdd.acm.org

<http://www.computer.org/tkde> (IEEE)

MODULE CODE:	ACCC6000
TITLE:	Data Centre Technologies
DATED:	03/06/2014
LEVEL:	6
CREDITS:	20

AIM(S)

- To study in depth the technical details of data center fundamentals and technologies. To contextualize an overview of how DC technologies fits into the wider field of cloud computing.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to demonstrate the ability to:

1. Demonstrate comprehensive and detailed theoretical knowledge of data center technologies and their deployment.
2. Research how data center relates to the wider field of cloud computing and critically evaluate current and advancements in the field, including sustainability.

INDICATIVE CONTENT

- LAN and SAN
- Introduction to server farm
 - Data centre architecture
 - Application architecture model
- Data centre network design
 - Data centre topologies
 - Fully redundant layer 2 and layer 3 design
- Server and application architecture
- Server load balancing
- Server farm protocols
- Data centre unified fabric
- The sustainable data centre

LEARNING AND TEACHING STRATEGY

The conceptual, theoretical issues are suited to delivery during weekly lectures. These topics necessitate exploration and application to case studies pertaining to cluster computing, for which laboratory work is the most appropriate strategy. Students will be expected to read widely within the literature relevant to the subject area.

The allocation of teaching to deliver the module is:

Activity type	Hours	Percentage
Scheduled learning	60	30%
Independent learning	140	70%
Placement learning	0	
TOTAL	200	100%

ASSESSMENT

Description of each assessment component and its weighting, together with an example for new forms of assessment:

Assessment Component 1 – Written- 50%

Complete a written examination to demonstrate technical knowledge based on theoretical principles.

Assessment Component 2 – Coursework– 50%

This assignment will require students to write a report to demonstrate understanding and knowledge on latest advancement on data centre technologies.

Exemplar: ‘Critically evaluate storage area network architecture and security issues.’

Assessment Summary

Activity type	Percentage
Written	50%
Coursework	50%
Practical	0%
TOTAL	100%

BIBLIOGRAPHY

Essential

M. Arregoces and M. Portolani (2012) Data Centre Fundamentals, Cisco Press

T. Lammle and J. Swartz (2014) Introducing Data Center Technologies Study guide, Sybex

Background

T. Lammle and J. Swartz (2014) Introducing Data Center Networking Study guide, Sybex

G. Santana (2014) Data Centre Virtualisation Fundamentals, Cisco Press

MODULE CODE:	ACUA6001
TITLE:	Data Centre Virtualisation
DATED:	03/06/2014
LEVEL:	6
CREDITS:	20

AIM(S)

- To study in depth the technical aspects of virtualisation, especially type 1 hypervisors. To contextualize an overview of how virtualisation fits into the wider field of cluster computing.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to demonstrate the ability to:

1. Demonstrate comprehensive and detailed knowledge of complex virtualisation technologies and their deployment.
2. Demonstrate in depth theoretical understanding of how virtualisation relates to the wider field of cloud computing, including a rational underpinning of theoretical principles including sustainability.

INDICATIVE CONTENT

- Theoretical understanding and underpinning of type 1 hypervisors.
- Bare metal hypervisor technology selection, including (but not limited to) Hyper-V, VMWare and Xen.
- Hardware implications and requirements of virtualised systems, including SAN infrastructure for high-density servers and unified fabric scalability.
- Physical limitations and external considerations for virtualised implementations and architectures, secure energy supply and sustainability.
- Failover of virtualised systems.
- Snapshotting and snapshot teleportation.
- Quorum-based decision making, including quorum modes and majorities.

LEARNING AND TEACHING STRATEGY

The conceptual, theoretical issues are suited to delivery during weekly lectures. These topics necessitate exploration and application to case studies pertaining to cluster computing, for which laboratory work is the most appropriate strategy. Students will be expected to read widely within the literature relevant to the subject area.

The allocation of teaching to deliver the module is:

Activity type	Hours	Percentage
Scheduled learning	60	30%
Independent learning	140	70%
Placement learning	0	
TOTAL	200	100%

ASSESSMENT

Description of each assessment component and its weighting, together with an example for new forms of assessment:

Assessment Component 1 – Coursework- 50%

Design, implement and deploy a suitable virtualisation environment based on a given enterprise-driven specification. This will be assessed via written coursework in the form of a critical report to evaluate the implemented virtualised architecture.

Exemplar: 'Deployment of a Hyper-V solution for a virtualisation problem.'

Assessment Component 2 – Written– 50%

Complete a written examination based on a given enterprise-based case study which:

- Explores analytical frameworks systematically as pertains to the provided study.
- Synthesises theoretical material with practical case study based information to generate critique.
- Considers the application of analysis techniques and tools for this case.

Exemplar: 'Analysis of analytical frameworks for enterprise-based clustering.'

Assessment Summary

Activity type	Percentage
Written	50%
Coursework	50%
Practical	0%
TOTAL	100%

BIBLIOGRAPHY

Essential

Portnoy, M.(2012) *Virtualization Essentials*, Wiley

Santana, G.A.A. (2013) *Data Center Virtualization Fundamentals: Understanding Techniques and Designs for Highly Efficient Data Centers with Cisco Nexus, UCS, MDS, and Beyond*, Pearson Education

Background

Erl, T. and Puttini, R. and Mahmood, Z. (2013) *Cloud Computing: Concepts, Technology and Architecture*, Pearson Education

Rhoton, J. and Haukioja, R. (2011) *Cloud Computing Architected*, Recursive, Limited

MODULE CODE:	CSAC6002
TITLE:	Wide Area Networks
DATED:	03/06/2014
LEVEL:	6
CREDITS:	20

AIM(S)

- To study in depth the technical issues related to WAN technologies. To have a detailed knowledge of WAN protocols and technologies and to understand the fundamental technical principles underlying autonomous systems.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to demonstrate the ability to:

1. Demonstrate in depth theoretical understanding of WAN protocols and technologies in a network.
2. Design, implement and test various WAN protocols within a complex wide area network
3. Demonstrate a conceptual understanding of WAN technologies and protocols to critically evaluate current research and advanced scholarship in wide area networks.

INDICATIVE CONTENT

- WAN technologies, Asynchronous connections and HDLC
- Point-to-Point protocol
- Frame-relay
- NAT and PAT for IPv4 and IPv6
- Broadband solutions
- Securing site-to-site connectivity – VPN, GRE tunnel, and IPSec
- Monitoring the network using syslog, SNMP and NETFLOW

LEARNING AND TEACHING STRATEGY

The majority of factual material will be presented in lectures using handouts, guided reading and use of internet and intranet material as required.

Tutorial classes will concentrate on the technical design

Laboratories will be used to allow students to gain advanced routing and switching skills with the aid of lab equipment and appropriate software such as OPNET, Packet tracer, GNS, etc.

The allocation of teaching to deliver the module is:

Activity type	Hours	Percentage
Scheduled learning	60	30%
Independent learning	140	70%
Placement learning	0	
TOTAL	200	100%

ASSESSMENT

Description of each assessment component and its weighting, together with an example for new forms of assessment:

Assessment Component 1 – Written - 50%

Complete a written examination to demonstrate technical knowledge based on theoretical principles.

Assessment Component 3 – Practical- 50%

This assessment will require students to implement and test complex WAN protocols over WAN and LAN internetworks. This will be a lab based examination.

Assessment Summary

Activity type	Percentage
Written	50%
Coursework	0%
Practical	50%
TOTAL	100%

BIBLIOGRAPHY

Essential

Connecting Networks companion guide by Cisco Networking Academy, Cisco Press, 2013.

B. Vachon and R. Graziani (2011), *Accessing the WAN: CCNA Exploration companion guide*, Cisco Press.

Background

N. Olifer and V. Olifer (2006) *Computer Networks Principles, Technologies and Protocol for Network Design*, John Wiley and Sons, Ltd.

P. J. Conlan, (2009) *Cisco Network Professional's Advanced Internetworking Guide*, Sybex.

D. E. Comer, (2009) *Computer Networks and Internets, 5th Ed*, Upper Saddle River, N.J Pearson education.

K. Pahlavan and P. Krishnamurthy (2009), *Networking Fundamentals*, John Wiley and Sons Inc.

Websites

<http://www.netacad.com> (username and password required)

MODULE CODE:	CSAC6000
TITLE:	Major Project
DATED:	03/06/2014
LEVEL:	6
CREDITS:	40

AIM(S)

- To provide an opportunity for the student to develop and demonstrate their ability to manage a significant project of their own choice, related to the major themes of their chosen course.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to demonstrate the ability to:

1. Evaluate critically the literature pertaining to a problem.
2. Select and apply relevant research and/or development methods and techniques from the evidence gathered in order to solve the problem.
3. Produce a deliverable applicable to the project type.
4. Generate and justify appropriate results and conclusions, demonstrating awareness of the limitations of the research and the impact on sustainability.
5. Produce an organised and structured document that adheres to academic convention.
6. Present the findings of the study to a specialist audience.
7. Demonstrate transferable skills to show organised work as an individual with minimum guidance.

INDICATIVE CONTENT

- Overview of research and development methodologies suitable for student projects.
- Overview of common statistical techniques
- Visualisation of different data types
- Ethical issues
- Sustainability issues
- Establishing and justifying metrics, analysis of test results e.g. including software benchmarking,
- Contingency planning
- Development of documentation for academic projects
- Presentation of work produced to an academic audience
- Subject-specific content as required

LEARNING AND TEACHING STRATEGY

Students will commence their Level 6 studies with a project proposal already formulated. For continuing students, this proposal will normally be generated as an outcome of the level 5 module Research. Direct entrants to level 6 will receive guidance and support prior to the start of the academic year.

All proposals will be reviewed by the Project Co-ordinator. The project selected must be appropriate to the themes of the student's programme of study, and meet ethical and sustainability guidelines.

Based upon the proposal, each student will be allocated an individual supervisor. A nominal assessment type will be agreed at the start of the project:

- Survey-based
- Review-based
- Experimental-based
- Development-based

It is expected that BIT students would undertake Survey- and Review-based projects, CNets students would undertake Experimental-based projects, Mobile, Games, SE etc would undertake Development-based projects, while Engineering students would undertake Experimental- or Development-based project. However, it is not impossible that a student from a more technical stream could conduct a Review-based project, or a BIT student could conduct a Development-based project. Situations such as these will be carefully considered by staff to ensure that the project selected is appropriate to the themes and outcomes of the student's programme and the students advised accordingly.

NB: In the case of Computing Portfolio students, in order to achieve BCS accreditation, the projects selected must be appropriate to the themes of the programme. SE and Games students must conduct an Experiment- or Development-based project in order to fulfil the BCS conditions for partial CEng credit.

Should the focus of a student's project significantly change as the module progresses, it may be possible to change the assessment type on the advice of the supervisor and the Project Co-ordinator.

The student will be required to work on their own initiative in the production of the project and all associated documentation. The supervisor will provide support and guidance to the student. Additionally, a project handbook will be issued.

A series of lectures will be provided during the first semester to cover the material defined within the indicative content and other relevant topics, and to provide general support to students in preparing for assessment milestones. Direct-entry students will also be expected to attend a condensed version of the Research Methods module prior to beginning this module.

The student's supervisor and one other member of the academic staff with knowledge of the project's topic area will assess the work. See below for assessment.

The proposed arrangements for marking projects are:

- The supervisor will act as the first marker for all projects for which they have supervisory responsibility.
- A different member of the academic staff of the university will second-mark projects.
- The two markers will mark the projects independently and then agree a consensus mark. If the two markers cannot agree, or the two marks are not within 10 points of each other, a third marker will be assigned. All markers will need to agree a final mark.
- All projects to be made available to External Examiner(s).
- All third-marked projects will be seen by the External Examiner(s).
- The student will be required to undertake an interim *viva voce* at approximately a halfway point through the module and a final *viva voce* at the end of the module. Present at a *viva voce* will be the student's supervisor plus at least one other member of Academic Staff. The *viva voce* consists of a fifteen minute presentation by the student about their project, followed by a question and answer session where the student will have the opportunity to demonstrate their knowledge of the work undertaken, and to identify issues that may have been omitted from the final submitted document. Non-attendance at a *viva voce* will normally results in failure of the module.

The allocation of teaching to deliver the module is:

Activity type	Hours	Percentage
Scheduled learning	25	6%
Independent learning	375	94%
Placement learning		
TOTAL	400	100%

Note: Each student is allocated 20 minutes for an individual supervision per week. Based on a 30 week year, each student receives 10 hours individual tuition. This should be factored into the resources required for delivering this module.

ASSESSMENT

Description of each assessment component and its weighting, together with an example for new forms of assessment:

Assessment Component 1 – Practical - 15% - Interim Viva

This milestone enables the student's progress to be checked and evaluated to ensure that they are on-course to complete their project. Feedback can be provided and adjustments can be made to the project at this stage.

	Survey	Review	Experiment	Development
Knowledge and Understanding of Subject				
Response to Questioning	20	20	20	20
Research-informed Literature				
Literature Review (level of progress, suitable synthesis of background material completed)	40	40	40	40
Analysis				
Discussion of Findings	20	20	10	10
Practical Application and Deployment				
Code examples/prototypes/demo	-	-	10	10
Skills for Professional Practice				
Project Plan	10	10	10	10
Quality of Presentation	10	10	10	10
TOTAL	100	100	100	100

Assessment Component 2 – Coursework - 55% - Final Report

The type of project undertaken by the student depends on the programme being studied and on agreement with the project supervisor. Four types of project are defined, Survey, Review, Experiment and Development. Different assessment weightings have been allocated to these projects according to the nature of the deliverable expected. Therefore, Experiment and Development projects where the deliverable is typically an implementation, design, simulation, etc., have assessment that has been weighted more towards this emphasis. Whereas, Survey and Review projects have assessment weighted more towards literature research and written analysis of results.

	Survey	Review	Experiment	Development
Research-informed Literature				
Introduction	5	5	5	5
Literature Review	20	35	20	15
Knowledge and Understanding of Subject				
Methodology	5	5	5	5
Survey Design	15	-	-	-
Requirements/Design	-	-	-	5
Analysis				
Results & Discussions	25	25	25	25
Conclusions and Recommendations	10	10	10	10
Practical Application and Deployment				
Development	-	-	-	15
Experimental Design	-	-	15	-
Skills for Professional Practice				
Reflection	10	10	10	10
Quality of Report	10	10	10	10
TOTAL	100	100	100	100

Assessment Component 3 – Practical - 20% - Final Viva/Demo

During this final stage the student is required to demonstrate their project to both markers. This enables authentication of the work to ensure it's that of the student by providing an opportunity for close questioning of the deliverable. In addition, the markers will verify that the deliverable performs as indicated in the final report to allow marks to be adjusted accordingly. The presentation requires the student to defend their work in a formal setting before both markers. For students completing a survey or review, an extended viva is used to allow the student to provide a more in-depth justification for research approach, analysis and findings.

	Survey	Review	Experiment	Development
Knowledge and Understanding of Subject				
Response to Questioning	30	30	30	30
Analysis				
Discussion of Findings	50	50	25	25
Practical Application and Deployment				
Demo	-	-	25	25
Skills for Professional Practice				
Presentation Style	10	10	10	10
Supporting Materials	10	10	10	10
TOTAL	100	100	100	100

Assessment Component 4 – Coursework – 10% - Exhibition board

The exhibition affords students the opportunity to develop their personal self promotion skills and encourage an entrepreneurial attitude towards their work. This will also be used to encourage students to publish their findings, and to promote their work to potential employers.

	Common to all project types
Knowledge and Understanding of Subject	
Clarity of Technical Description	50
Skills for Professional Practice	
Quality of Visual Display	50
TOTAL	100

Assessment Summary

Activity type	Percentage
Written	
Coursework	65%
Practical	35%
TOTAL	100%

BIBLIOGRAPHY

Essential

Avison, D. and Fitzgerald, G. (2007), *Information Systems Development: Methodologies, Techniques and Tools*, 4th Edition McGraw-Hill: Maidenhead.

Kranzler, J.H. (2010) *Statistics for the Terrified*, 5th Edition ,Pearson, NY.

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Research Project Success: The Essential Guide for Science and Engineering Students, Royal Society of Chemistry

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Cottrell, S.(2011) *Critical Thinking Skills: Developing Effective Analysis and Argument*, Palgrave Study Guides, 2nd Edition, Palgrave Macmillan: Basingstoke

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Denscombe, M (2010) *The Good Research Guide*, OU Press: Buckingham

Few, S (2012) *Show Me the Numbers: Designing Tables and Graphs to Enlighten*, Analytics Press: Burlingame.

Quinn, M. J. (2010) *Ethics for the Information Age: International Edition*, 4th Edition, Pearson: NY

Yin, R K, (2008) *Case Study Research: Design and Methods*, 4th Edition, Sage: Beverly Hills.

Journals

Appropriate journals from the core subject areas.

Websites

Appropriate websites from the core subject areas.

