



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

MODULE DIRECTORY

LEVEL 7

SCHOOL OF APPLIED COMPUTING

FACULTY OF ARCHITECTURE, COMPUTING AND ENGINEERING

2018-2019

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INTRODUCTION

This Module Directory includes all the modules for Level 7 within the School of Applied Computing in the academic year 2018-2019.

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 School/Faculty. If you require assistance in identifying the modules for your programme of study, please contact the Programme Director (whose name and contact details are provided in the accompanying Programme of Study Handbook), or the relevant Faculty Office.

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.

MODULES

Insert modules here – to be drawn from Swansea Modules Repository or the QAIMODULES repository

MODULE CODE: ACCA7000
TITLE: Programming and Software Testing
DATED: 16/08/2018

LEVEL: 7
CREDITS: 20

JACS CODE: I200

AIM(S)

To develop a critical understanding of the techniques, principles and concepts of programming and software testing.

LEARNING OUTCOMES

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

- apply the software constructs in the development of programs and demonstrate an ability to solve programming problems;
- reflect on the importance of software testing and have an appreciation of the software test process.

INDICATIVE CONTENT

- Software constructs of a programming language e.g. Java.
- Problem solving techniques e.g. using functions to subdivide a more complex problem.
- Construction of a simple class, attributes, constructors and methods.
- Black box vs white box testing, bounds checking, code coverage, etc.
- Unit tests including unit test frameworks e.g. JUnit.
- Javadoc, self-documented code.

LEARNING AND TEACHING STRATEGY

The study time for the module is divided as follows:

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

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Coursework	Equivalent to 2500 words	50%

Assessment Component 2

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Coursework	Equivalent to 2500 words	50%

Assessment Summary

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

READING LIST

Module Code	ACCA7000	
Module Title	Programming and Software Testing	
Classification	Reading List entry	Electronic*
Essential	Shildt, H. (2017), <i>Java: A Beginner's Guide</i> , Oracle Press	☒
Essential	Cadenhead, R., (2017), <i>Java in 24 Hours</i> , Sams Publishing	☒
Further	Jorgensen. P., (2013), <i>Software Testing: A Craftsman's Approach</i> , CRC Press	☒
Further	Page, A., Johnston, K., (2008), <i>How We Test Software at Microsoft</i> , Microsoft Press	☒
Further	IEEE Xplore	☒
Further	ACM Transactions	☒

MODULE CODE: **ACCA7001**
TITLE: **Agile Software Engineering Principles**
DATED: **16/08/2018**

LEVEL: **7**
CREDITS: **20**

JACS CODE: **I200**

AIM(S)

To provide the student with a systematic theoretical and practical understanding of agile software engineering principles, including the underlying concepts, methods and supporting tools.

LEARNING OUTCOMES

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

- Show a mastery of contemporary agile software engineering principles including software development methods, tools and techniques used in the development of a software artefact.
- Critically evaluate selected agile methods, tools and techniques and their deployment

INDICATIVE CONTENT

- Software Dev Life Cycle
- Requirements Analysis
- User Stories
- Object Orientated Analysis and Design
- UML
- Iterative / incremental development methods
- Unified Process (UP), Agile Methodologies (XP, Scrum etc.)
- Distributed development and tools: Source Code Management (CVS, Git, etc.)
- Test driven development
- Object Doubles (inc. Mock objects, Stubs, Fakes and Dummies) and tools
- GUI Testing (e.g. Twist, Silk Test, Robot Framework etc.)
- Continuous deployment
- Continuous Integration
- Professional Practice (open source licencing)

LEARNING AND TEACHING STRATEGY

The study time for the module is divided as follows:

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

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Report	2500 words	50%

Assessment Component 2

☐ Written exam ☐ Coursework ☒ Practical

Mode of assessment	Volume	Weighting
Practical in-class test	2 hours	50%

Assessment Summary

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

READING LIST

Module Code	ACCA7001	
Module Title	Agile Software Engineering Principles	
Classification	Reading List entry	Electronic*
Essential	Laster, B (2018) Jenkins 2: Up and Running: Evolve Your Deployment Pipeline for Next Generation Automation, Boston: O'Reilly	☒
Further	Mukherju, J (2018) The Power Of Continuous Delivery In DevOps: Reduce Difficulty By Increasing Frequency Of Your Product Releases (Continuous Everything Book 2), Amazon Media	☒
Further	Laster, B (2016) Professional Git, Wrox	☒
Further	Stephens, M. and Rosenberg, D. (2010) <i>Design Driven Testing: Test Smarter, Not Harder</i> , New York: Apress	☐
Further	Wazlawick, R. S. (2014) <i>Object-Oriented Analysis and Design for Information Systems: Modeling with UML, OCL and IFML</i> , Burlington, Mass: Morgan Kaufmann	☒
Further	Rosenberg, D. and Stephens, M. (2013) <i>Use Case Driven Object Modeling with UML Theory and Practice</i> , New York: Apress	☐
Further	Jorgensen, P. C. (2013) <i>Software Testing: A Craftsman's Approach, 4th Edition</i> , Boca Raton: Auerbach	☒

Further	IEEE Transactions on Software Engineering	☒
Further	Software Engineering Journal	☒
Further	ACM Transactions on Software Engineering and Methodology	☒
Further	IEEE Software, Software Practice and Experience	☒
Further	Journal of Software Maintenance	☒
Further	http://www.agilealliance.org/	☒
Further	http://jenkins-ci.org/	☒
Further	https://www.ieee.org/	☒

MODULE CODE: ACCA7002
TITLE: Database Systems
DATED: 16/08/2018

LEVEL: 7
CREDITS: 20

JACS CODE: I200

AIM(S)

To provide students with a systematic theoretical and practical understanding of the design, implementation and application of database systems. Including more advanced concepts that underpin multi-user database architectures for business applications.

LEARNING OUTCOMES

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

- Apply well-established database analysis and design techniques to critically analyse and implement real-world database application scenarios.
- Critically evaluate selected database methods, tools and techniques and their deployment in a multi-user database environment.

INDICATIVE CONTENT

- Database models (e.g. relational, Object-Oriented and Object relational)
- Database design and entity analysis techniques e.g. conceptual, logical and physical database design, entity relationship modelling, normalisation and indexes.
- Structured Query Language (SQL): data definition, data manipulation and data control languages.
- Database security and access control, e.g. database security threats and countermeasures, access control techniques.
- Multi-user database concepts e.g. transaction management, concurrency control and recovery and distributed databases, CAP Theorem.
- Non SQL database systems and concepts e.g. NoSQL and NewSQL technologies.
- Professional, legal and ethical issues related to data management and data governance.
- Introduction to Big Data Concepts e.g. Hadoop

LEARNING AND TEACHING STRATEGY

The study time for the module is divided as follows:

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

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Coursework project	2500 words	50%

Assessment Component 2

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Coursework project	2500 words	50%

Assessment Summary

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

READING LIST

Module Code	ACCA7002	
Module Title	Database Systems	
Classification	Reading List entry	Electronic*
Essential	Connolly, T., Begg, C., (2015), <i>Database Systems: A Practical Approach to Design, Implementation and Management</i> , 6 th Edition, Pearson (Int)	☒
Essential	Hernandez, M., (2013), <i>Database Design for Mere Mortals: A Hands-on Guide to Relational Database Design 3rd Edition</i> , Addison Wesley	☒
Essential	Hills, T., (2016), <i>NoSQL and SQL Data Modeling: Bringing Together Data, Semantics, and Software</i> , Technics Publications	☒
Further	Dayley, B., (2014), <i>NoSQL with MongoDB in 24 Hours</i> , Sams Teach Yourself, Sams Publishing	☒
Further	Harrison, G., (2015), <i>Next Generation Databases: NoSQL and Big Data</i> , Apress	☒
Further	Sullivan, D., (2015), <i>NoSQL for Mere Mortals</i> , Addison-Wesley Professional	☒
Further	Ricardo, C. M., Urban, S. D. (2015), <i>Databases Illuminated</i> , 3rd Edition, Jones & Bartlett Learning	☒
Further	IEEE Xplore	☒
Further	ACM Transactions	☒

MODULE CODE: **ACCA7003**
TITLE: **Object-Oriented Programming**
DATED: **16/08/2018**

LEVEL: **7**
CREDITS: **20**

JACS CODE: **I200**

AIM(S)

To provide the student with a conceptual understanding of abstract data types, data structures and algorithms used in computer science and software engineering and the ability to apply these concepts using object oriented development methods.

LEARNING OUTCOMES

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

- Critically evaluate the suitability of selected algorithms and data structures to solve given problems.
- Design and develop OO applications to solve a given problem scenario.

INDICATIVE CONTENT

- Abstract data types (ADT)
- Simple data structures: stacks, queues
- Static and dynamic memory allocation for implementing data structures
- Files and record structures
- Containers and iterators
- Lists, linked lists, heaps, trees, binary trees, graphs
- sorting and searching algorithms
- Hashing: open addressing, chaining
- Complexity considerations
- Concepts of object orientation including objects, classes, encapsulation composition, inheritance, delegation, polymorphism, interfaces.
- Object oriented design methods
- UML
- Software frameworks, SDK, API programming
- Object oriented programming

LEARNING AND TEACHING STRATEGY

The study time for the module is divided as follows:

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

ASSESSMENT

Assessment Component 1

☒ **Written exam** ☐ **Coursework** ☐ **Practical**

Mode of assessment	Volume	Weighting
Written Exam	2 hours	50%

Assessment Component 2

☐ **Written exam** ☒ **Coursework** ☐ **Practical**

Mode of assessment	Volume	Weighting
Coursework	2500 words	50%

Assessment Summary

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

READING LIST

Module Code	ACCA7003	
Module Title	Object-Oriented Programming	
Classification	Reading List entry	Electronic*
Essential	Thottungal,F.J. (2017 Introduction to Algorithms: Quick & Easy, Amazon Media	☒
Further	Sedgewick (2014) Algorithms 4 th edition (Deluxe), Amazon Media	☒
Essential	Meyers.S (2014) Effective Modern C++, O'Reilly Media	☒
Further	Stroustrup,B (2014) Programming: Principles and Practice Using C++	☒
Further	Gonnet, G. and Baeza-Yates, R., (1991) <i>Handbook of Algorithms and Data Structures</i> , Addison-Wesley	☐
Further	IEEE Xplore	☒
Further	ACM Transactions	☒

MODULE CODE: ACCA7004
TITLE: Web Development
DATED: 16/08/2018

LEVEL: 7
CREDITS: 20

JACS CODE: I200

AIM(S)

To provide students with a systematic theoretical and practical understanding of the web application languages and techniques.

LEARNING OUTCOMES

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

- Demonstrate a systematic understanding of the web application development process and the architecture of web applications.
- Select and critically evaluate the web development technologies, techniques and tools applied to the implementation of a web application.

INDICATIVE CONTENT

- Client-side development languages and techniques. HTML, CSS, SASS, etc.
- Applications of JavaScript including AJAX and the role of web services in application development. Data exchange using JSON.
- Virtualisation of developer environments e.g. using Docker, etc.
- Server-side development
- Database programming including ORM tools.

LEARNING AND TEACHING STRATEGY

The study time for the module is divided as follows:

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

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Report	2500 words	50%

Assessment Component 2

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Report	2500 words	50%

Assessment Summary

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

READING LIST

Module Code	ACCA7004	
Module Title	Web Development	
Classification	Reading List entry	Electronic*
Essential	Nixon, R., (2018), <i>Learning PHP, MySQL & JavaScript: With jQuery, CSS & HTML5, 5th Edition</i> , O'Reilly	☒
Essential	Flanagan, D., (2011), <i>JavaScript: The Definitive Guide: Activate Your Web Pages</i> , O'Reilly	☒
Essential	Freeman. A., (2017), <i>Pro ASP.NET Core MVC 2, 7th Edition</i> , Apress	☒
Further	Welling, L., Thomson, L., (2016), <i>PHP and MySQL Web Development, 5th Edition</i> , Addison-Wesley Professional	☒
Further	Mead, A., (2018), <i>Learning Node.js Development: Learn the fundamentals of Node.js, and deploy and test Node.js applications on the web</i> , Packt Publishing	☒
Further	Meloni, J.C., (2014), <i>HTML, CSS and JavaScript All in One, Sams Teach Yourself: Covering HTML5, CSS3, and jQuery, 2nd Edition</i> , Sams Publishing	☒
Further	Miell, I., Sayers, A. H., (2016), <i>Docker in Practice</i> , Manning Publishing	☐
Further	IEEE Xplore	☒
Further	ACM Transactions	☒

MODULE CODE: ACCA7005
TITLE: Web Services
DATED: 16/08/2018

LEVEL: 7
CREDITS: 20

JACS CODE: I200

AIM(S)

To provide students with a systematic theoretical and practical understanding of the design and implementation of cloud based applications and services.

LEARNING OUTCOMES

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

- Deploy cloud-based technologies, design principles and patterns to build web services and applications.
- Critically evaluate technologies, tools, patterns and methods for cloud application development.

INDICATIVE CONTENT

- Web services, REST Web Services, etc.
- Cross-Origin Resource Sharing (CORS)
- Serverless applications.
- Cloud computing, ethos of the public cloud, cloud related design patterns e.g. Stability patterns such as the Bulkhead and Circuit Breaker patterns
- Concurrency including race conditions, semaphores, mutexes, async, etc.

LEARNING AND TEACHING STRATEGY

The study time for the module is divided as follows:

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

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Report	2500 words	50%

Assessment Component 2

☒ Written exam ☐ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Exam	2 hours	50%

Assessment Summary

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

READING LIST

Module Code	ACCA7005	
Module Title	Web Services	
Classification	Reading List entry	Electronic*
Essential	Balachandar, B. M., (2017), <i>RESTful Java Web Services: A pragmatic guide to designing and building RESTful APIs using Java, 3rd Edition</i> , Packt Publishing	☒
Essential	Gilbert, J., (2018), <i>Cloud Native Development Patterns and Best Practices: Practical architectural patterns for building modern, distributed cloud-native systems</i> , Packt Publishing	☒
Essential	Stojanovic, S., (2018), <i>Serverless Applications with Node.js: Using AWS Lambda and Claudia.js</i> , Mannings Publications	☐
Further	Wittig, A., Wittig, M., (2018), <i>Amazon Web Services in Action, 2nd Edition</i> , Mannings Publications	☐
Further	Kalin, M., (2013), <i>Java Web Services: Up and Running: A Quick, Practical, and Thorough Introduction, 2nd Edition</i> , O'Reilly	☒
Further	Burns, B., (2018), <i>Designing Distributed Systems: Patterns and Paradigms for Scalable, Reliable Services</i> , O'Reilly	☒
Further	Zambrano, B., (2018), <i>Serverless Design Patterns and Best Practices: Build, secure, and deploy enterprise ready serverless applications with AWS to improve developer productivity</i> , Packt Publishing	☒
Further	Sreeram, P. K., (2017), <i>Azure Serverless Computing Cookbook: Build applications hosted on serverless architecture using Azure Functions</i> , Packt Publishing	☒
Further	IEEE Xplore	☒
Further	ACM Transactions	☒

MODULE CODE: ACCA7006
TITLE: Major Project
DATED: 16/08/2018

LEVEL: 7
CREDITS: 60

JACS CODE: I200

AIM(S)

- To deepen students' critical faculties and powers of expression providing them with practice in the organisational skills necessary to pursue a research project using appropriate research methodologies to investigate and analyse relevant issues.
- To allow the student to advance their knowledge and understanding by undertaking and managing a significant project of their own choice, related to the major themes of their MSc programme.

LEARNING OUTCOMES

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

- Critically evaluate technical and other literature and to apply the evidence gathered to solve a complex problem
- Demonstrate a professional and systematic approach to the solution of complex problems
- Demonstrate high level professional skills to present information both orally and in a written form
- Demonstrate the ability, as an individual, to plan a complex project and to produce a convincing artefact as a solution to the problem
- Understand and effectively apply the legal ethical and professional issues in the development of a project

INDICATIVE CONTENT

- Research principles and approaches
- Research methodologies - historical, descriptive, correlational, comparative, experimental.
- Developing a proposal - research statement, research outline and design research schedule
- Collation and communication - recording and organising information, analysis of results, communicating the results, referencing, plagiarism.
- Project planning - project time scale control
- Establishing and justifying metrics, analysis of test results, including software benchmarking,
- Contingency planning
- Development of documentation for academic projects
- Presentation of work produced to an academic audience
- Subject-specific content as required
- Intellectual property - copyright, trademarks, patents.

- Social and cultural context, and ethical issues

LEARNING AND TEACHING STRATEGY

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	15	3%*
Independent learning	585	97%
Placement learning	0	0%
TOTAL	600	100%

(*Note: regular contact with project supervisor will also be required, and is included in the hours above)

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Project Proposal	2,000 words	10%

Assessment Component 2

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Final Report	11,000 words max	70%

Assessment Component 3

☐ Written exam ☐ Coursework ☒ Practical

Mode of assessment	Volume	Weighting
Final Presentation	20 minutes	20%

The Major Project module deviates from the standard assessment recommendations given in the quality handbook due to its special role within the programme. This module has been developed and perfected over many years and it was found that without several levels of intermediate assessment then students tended to fall behind on this module.

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	80%
Practical	20%
TOTAL	100%

READING LIST

Module Code	ACCA7006	
Module Title	Major Project	
Classification	Reading List entry	Electronic*
Essential	McCormac, C. and Davis, J. (2015) <i>Research Project Success: The Essential Guide for Science and Engineering Students</i> , Cambridge: Royal Society of Chemistry	☒
Essential	Greenfield, T. (2016) <i>Research Methods for Postgraduates</i> , London: Arnold	☒
Further	O'Leary, Z. (2015) <i>The Essential Guide to Doing Your Research Project</i> , Newcastle upon Tyne: Sage	☒
Further	Kranzler, J. H. (2017) <i>Statistics for the Terrified</i> , Upper Saddle River: Prentice Hall	☒
Further	Maylor H. (2010) <i>Project Management</i> , Boston: Pearson	☐
Further	Avison, D. and Fitzgerald, G. (2007) <i>Information Systems Development: Methodologies, Techniques and Tools</i> , 4 th Edition, New York: McGraw-Hill	☐
Further	Highsmith J. (2009) <i>Agile Project Management: Creating Innovative Products</i> , 2 nd Edition, Boston: Addison-Wesley	☒
Further	Hughes, B. and Cotterell, M. (2009) <i>5th Software Project Management</i> , New York: McGraw-Hill	☐
Further	Phillips, J. (2010) <i>IT Project Management: On Track from Start to Finish</i> , New York: McGraw-Hill	☐
Further	Yeates, D. Cadle (2008), <i>Project Management for Information Systems (5th Edition)</i> , Upper Saddle River: Prentice Hall	☐
Further	Baase, S. (2012) <i>A Gift of Fire: Social, Legal, and Ethical Issues for Computing and the Internet: International Edition</i> , 4 th Edition, Boston: Pearson	☐
Further	Collis, J. and Hussey, R. (2009) <i>Business Research: a Practical Guide for Undergraduate and Postgraduate Students</i> , 3rd Edition, London: Palgrave Macmillan	☐
Further	Cottrell, S. (2011) <i>Critical Thinking Skills: Developing Effective Analysis and Argument - Palgrave Study Guides</i> , 2nd Edition, London: Palgrave Macmillan	☐
Further	Davies, M. B. (2007) <i>Doing a Successful Research Project</i> , London: Palgrave Macmillan	☐
Further	Dawson, C. W. (2009) <i>Projects in Computing and Information Systems: a Student's Guide</i> , 2nd Edition, Boston: Addison-Wesley	☐
Further	Denscombe, M. (2010) <i>The Good Research Guide</i> , Oxford: OUP	☐
Further	Few, S. (2012) <i>Show Me the Numbers: Designing Tables and Graphs to Enlighten</i> , Burlingame: Analytics Press	☐
Further	Quinn, M. J. (2010) <i>Ethics for the Information Age: International Edition - 4th Edition</i> , Boston: Pearson	☐
Further	Yin, R. K. (2008) <i>Case Study Research: Design and Methods</i> , 4th Edition, Newcastle upon Tyne: Sage	☐

Further	Journals ACM Transactions on Information Systems Behaviour and Information Technology Communications on the ACM International Journal of Electronic Commerce Journal of Strategic Information Systems Journal of Systems Management	☒
Further	Websites http://www.acm.org 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://www.mckinseyquarterly.com http://www.zdnetweek.co.uk http://projectmanagement.ittoolbox.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 http://www.bcs.org/ http://www.uml.org/ http://www.omg.org/	☒

MODULE CODE: ACFA7000
TITLE: Research Techniques
DATED: 29/06/2017

LEVEL: 7
CREDITS: 20

JACS CODE: N600

AIM(S)

- To deepen students' critical faculties and powers of expression and to provide them with practice in the organisational skills necessary to pursue a research project. This will also enable them to use appropriate research methodologies to investigate and analyse relevant issues and to understand research concepts and develop research competencies.
- To provide students with the skills needed to perform statistical analyses upon data of many different types and levels of complexity and to present this data in a manner that is visually clear and easy to understand.

LEARNING OUTCOMES

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

- Generate a project proposal that meets a given user requirement, showing some degree of innovation and originality while independently gathering and collating appropriate information from a variety of sources.
- Perform data analyses appropriate to a domain and a problem, including the identification of appropriate measures of centre and distribution, calculation of statistical significance, testing of statistical hypotheses and analysis of variance.
- Demonstrate a deep understanding of the cognitive principles involved in presenting data effectively and in identifying problems with visualisations.

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)
- Research methodologies - historical, descriptive, correlational, comparative, experimental.
- Field data - survey design, questionnaires, sampling, statistical techniques, interviews, case studies, observation.
- Developing a proposal - research statement, research outline and design research schedule

- Collation and communication - recording and organising information, analysis of results, communicating the results, referencing, plagiarism.
- Project planning - project time scale control
- Intellectual property - copyright, trademarks, patents.
- Social and cultural context, and ethical considerations.
- Measures of centre and distribution, axioms and theorems of probability, normal and other distributions.
- Calculation of statistical significance, student's t-test, analysis of variance.
- Rearrangement and interaction of data - Interactive rearrangement of numerical, categorical, topological, symbolic and ordinal data
- Quantitative data - Univariate, bivariate, multivariate and hypervariate data
- Data representation - Representing data through size, colour, coding, angle, length, icons, etc
- Dynamic exploration - Investigation of local neighbourhood through exploration.
- Presentation - Presentation strategies, importance of focus + context
- Connectivity - Representing general and tree networks, disjoint graphs, cone trees etc

LEARNING AND TEACHING STRATEGY

This module will deliver the initial material via formal lectures but this will be supplemented by tutorials and group presentations after the initial phase. Students will also develop the skills necessary to write technical papers which will be presented in front of groups of other students to simulate a mock technical conference. Referencing skills will be given a very high priority throughout the module.

Recognising that many students will have had a limited introduction to statistics in the past, the module will assume no prior knowledge of statistics, and will introduce students to the process of analysing data through a combination of lectures and problem-solving tutorials.

It will also introduce students to a variety of information visualisation techniques, looking at how to select and arrange data and then developing methods for displaying data to highlight the interactions between multiple variables and data types.

It will go on to look at methods for representing and encoding data in order to enable easy exploration of the data. Practical experience will be given a priority so that students can not only identify problems in visualisations but rectify them and generate clear and effective data displays.

The allocation of teaching to deliver the module is:

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

ASSESSMENT

Assessment Component 1 – Coursework 60%

Each student is required to prepare a project proposal detailing the aim of the research, a rationale for the proposed work, research strategy, resource requirements and a project plan (approximately 3500 words).

Assessment Component 2 – Practical 40%

The student will produce an A2 conference poster based upon their project proposal (500 words equivalent). They will then give an 8-10 minute oral presentation describing and discussing their proposal.

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	60%
Practical	40%
TOTAL	100%

EDUCATION FOR SUSTAINABLE DEVELOPMENT (ESD)

Does the module contribute to ESD?	Yes ✓
	No
A significant part of this module is focused on developing the skills required to perform research into a topic; the topic of research does not need to be computing-related but might be anything the student needs to research in their future career. The skills gained are therefore transferable and contribute towards the students' life-long learning.	

READING LIST

Module Code	ACFA7000	
Module Title	Research Techniques	
Classification	Reading List entry	Electronic*
Essential	Few, S. (2012) <i>Show Me the Numbers</i> , Burlingame: Analytics Press	☐
Essential	Greenfield, T. (2016) <i>Research Methods for Postgraduates, 3rd Edition</i> , London: Arnold	☐
Essential	Kranzler, J.H. (2011) <i>Statistics for the Terrified, 5th Edition</i> , Upper Saddle River: Prentice Hall	☐
Further	Spence, R. (2014) <i>Information Visualization: an Introduction</i> , Boston: Addison-Wesley	☐

Further	Leedy, P. D. and Ormrod, J. E. (2012) <i>Practical Research Planning and Design, 10th Edition</i> , Boston: Pearson Education	☐
Further	Bell, J. (2014) <i>Doing Your Research Project, 6th Edition</i> , Maidenhead: Open University Press	☐
Further	Berry, R. (Ed) (2013) <i>The Research Project: How to Write It, 5th Edition</i> , London: Routledge	☐
Further	Blaxter, L., Hughes, C. and Tight, M. (2010) <i>How to Research, 4nd Edition</i> , Maidenhead: Open University Press	☐
Further	Fowler, F. (2013) <i>Survey Research Methods 5th Edition</i> , Newcastle upon Tyne: Sage Publications	☐
Further	Oppenheim, A. (2005) <i>Questionnaire Design, Interviewing and Attitude Measurement</i> , London: Continuum	☐
Further	Saunders, M. Lewis, P. and Thornhill, A. (2015) <i>Research Methods for Business Students</i> , London: Pearson	☐
Further	Azzara, C. (2010) <i>Questionnaire Design for Business Research</i> , Tate Publishing	☐
Further	IEEE Transactions on Visualisation and Computer Graphics	x
Further	Information Visualization (SAGE)	x
Further	http://www-969.ibm.com/software/analytics/manyeyes/#/	x
Further	http://www.theusrus.de/Mondrian/	x

MODULE CODE: ACFA7001
TITLE: Research Project/ Dissertation
DATED: 29/06/2017

LEVEL: 7
CREDITS: 120

JACS CODE: W200

AIM(S)

- To attain necessary research skills in order to pursue an extended, independent research project
- To provide an opportunity for critical and evaluative research which engages with issues and debate relevant to the chosen subject.

LEARNING OUTCOMES

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

- Successfully complete a self-managed and extended piece of work, requiring independent thought and initiative.
- Complete their research and present a completed document within a defined timescale and to agreed standards;
- Make evident a deep and sophisticated knowledge of their particular chosen topic of research;
- Apply a sophisticated and critical awareness of relevant theoretical and conceptual considerations underpinning a research project.

INDICATIVE CONTENT

This will depend on the area of research within the elected programme on which an individual student has chosen to focus. Students will have the opportunity to undertake an extended research project upon a topic of their own choice in consultation with both the subject tutor and the Programme Director. The subject will need to come within the broad research areas of academic staff within the Faculty.

LEARNING AND TEACHING STRATEGY

This module is scheduled for part two of the programme which is self-directed under the supervision of an appropriately matched member of academic staff. Tutorials be used in order to support discussion and critical evaluation of what has been learned as well as enabling students to pursue their own questions. These tutorials will discuss subjects such as:

- literature review;
- use of primary and secondary data;

- selection of research methodology and tools;
- recognition of assumptions and limitations of the study;
- research project design;
- effective management of the research project;
- structure, style and presentation;
- drawing conclusions and making deductions

The allocation of teaching to deliver the module is:

Activity type	Hours	Percentage
Scheduled learning	60	5%
Independent learning	1,140	95%
Placement learning	0	0%
TOTAL	1,200	100%

ASSESSMENT

Assessment Component 1 - Coursework 90%

Dissertation: (30,000 words)

Area of research decided in consultation with and approved by the Programme Director.

Assessment Component 2 – Practical 10%

Viva presented (15min)

Assessment Summary

Activity type	Percentage
Oral exam	10%
Coursework	90%
Practical	
TOTAL	100%

EDUCATION FOR SUSTAINABLE DEVELOPMENT (ESD)

Does the module contribute to ESD?	Yes
The module will contribute to ESD and this will be directed by the area of the discipline on which the research will focus. The delivery of the module will: • make resources supporting teaching and learning available electronically and move away from the reliance on hard copies; • enable students to submit, where possible, all assignments electronically; • create an electronic archive rather than a paper one; • expand the use of Moodle to support all teaching and increase the numbers of completely paperless modules;	

READING LIST

Module Code	ACFA7001	
Module Title	Research Project / Dissertation	
Classification	Reading List entry	Electronic*
Essential	A specific bibliography of primary and secondary texts is to be developed by the student, under direction of an academic supervisor and relating directly to the individuals student's research. Since the module comprises of independent study, it is up to the student to seek out secondary or archival material in the course of their research. Supervisors will guide, and encourage the research process, which may include online journals, audio-visual material, artifacts from special collections etc.	☐

MODULE CODE: M7X01688
TITLE: Data Mining
DATED: 29/06/2017

LEVEL: 7
CREDITS: 20

JACS CODE: G340

AIM(S)

- To develop the student's ability to apply suitable statistical and data mining techniques using a variety of supervised and unsupervised data mining methods.

LEARNING OUTCOMES

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

- Apply and justify the application of a range of statistical methods and data mining techniques to the extraction of information from data.
- Critically evaluate the validity of the techniques employed with respect to the relevant data and to their intended use.
- Interpret the intelligence provided by the data mining process within the context of the data set investigated.
- Effectively communicate the data mining process and its results to a decision maker.

INDICATIVE CONTENT

- Data mining methodologies such as CRISP-DM and SEMMA
- Data preparation and manipulation
- Basic algorithms: statistical modelling, decision trees, rulesets, association rules, linear models, instance-based learning, clustering, multi-instance learning
- Credibility of data mining solutions; training and testing, information loss, cost curves; minimum description length principle
- Machine learning; classification, association, perceptrons, numeric prediction, Bayesian networks, semi-supervised and unsupervised learning
- Data transformations; attribute selection, discretisation, projection, sampling, cleansing
- Applications of data mining
- WEKA as a data mining workbench

LEARNING AND TEACHING STRATEGY

The module will initially use lectures to introduce the theoretical material, and will follow this with labs using hypothetical datasets to illustrate the material introduced and to demonstrate its practical application. The taught sessions will be supplemented by additional study material and directed self-study to reinforce the ideas and concepts presented in the lectures and tutorials through further reading and online materials.

In the second part of the module, students will utilise the skills they have learned by performing a significant data mining investigation of an appropriate self-selected dataset. The student will select a dataset for which they can act as a domain expert and will select, justify and perform a range of explorations upon it, then report their findings.

The allocation of teaching to deliver the module is:

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

ASSESSMENT

Assessment Component 1 – Practical 10%

The student will give an 8-10 minute oral presentation describing their dataset and justifying its selection with reference to its suitability for exploration, the aims of their exploration and what they hope to find within the data.

Assessment Component 2 – Coursework 70%

Each student is required to prepare a report describing their dataset, their data exploration, and the results thereof (4000 words).

Assessment Component 3 – Practical 20%

The student will produce an A2 conference poster based upon the results of their data exploration (1,000 words equivalent). They will then give an 8-10 minute oral presentation describing both the process and the results of their data exploration and justifying their use of particular analysis techniques used.

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

EDUCATION FOR SUSTAINABLE DEVELOPMENT (ESD)

Does the module contribute to ESD?	Yes ✓
	No
The material covered in this module is applicable to an extremely wide range of academic, business and industrial fields, thus providing students with opportunities to go into many different fields of employment.	

BIBLIOGRAPHY

Essential

Hall, M. A., Frank, E. and Witten, I. H. (2011) *Data Mining: Practical Machine Learning Tools and Techniques*, 3rd Edition, Burlington: Morgan Kaufmann

Recommended

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

Background

Kranzler, J. H. (2011) *Statistics for the Terrified*, 5th Edition, Upper Saddle River: Prentice Hall

Journals

IEEE Transactions on Knowledge and Data Engineering
Data Mining and Knowledge Discovery
ACM Transactions on Knowledge Discovery from Data
ACM SIGKDD Explorations
Intelligent Data Analysis
International Journal of Data Mining and Bioinformatics
Statistical Analysis and Data Mining
Transactions on Machine Learning and Data Mining

Websites

<http://www.kdnuggets.com/>
<http://www.kdd.org/>

MODULE CODE: M7X01689
TITLE: Data Warehousing
DATED: 29/06/2017

LEVEL: 7
CREDITS: 20

JACS CODE: I240

AIM(S)

- This module provides students with the contemporary knowledge of the role of data warehousing to deliver business intelligence and to develop in students the skills necessary to deliver business intelligence through the use of a recognised lifecycle development model.

LEARNING OUTCOMES

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

- Analyse critically the capabilities and role of a data warehouse within given scenarios.
- Systematically and comprehensively understand the process of On-line Analytical Processing (OLAP) server capabilities for multi-dimensional analysis.
- Comprehensively apply a comprehensive knowledge and systematic understanding of essential concepts, principles and tools to build, test and debug a data warehousing that provide business intelligence to its users using current research and professional good practice.

INDICATIVE CONTENT

- Data Warehouse, Data Mart and Big Data concepts;
- Data Warehousing design:
- Data Warehouse architecture;
- Data Warehouse development methodologies;
- Business dimensional lifecycle;
- Data warehouse tools and technologies;
- Data warehouse development issues.
- Data governance and data stewardship
- Online Analytical Processing (OLAP):
- Multidimensional Data Model;
- OLAP tools.
- Business Intelligence:
- Measures of success;
- Executive support;
- Luck, opportunity, frustration, threat.

LEARNING AND TEACHING STRATEGY

Student learning will be facilitated via a mixture of lectures, tutorials and laboratory workshops. The lectures will be used as a basis for the presentation and discussion of theoretical ideas and concepts, while the tutorials will enable students to develop further the implications inherent in the application of the theoretical concepts to practical, real-life situations; these will be supported by practical laboratory based case-study application. During tutorials, a flexible, student-led approach will be taken. Case-study industry based examples will be explored in detail to accentuate best-practice and commercial issues. Seminars will allow students to disseminate their own reading and research to peers, and provide a forum for group discussion.

The allocation of teaching to deliver the module is:

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

ASSESSMENT

Assessment Component 1 – Coursework100%

Each student is required to produce a small-scale prototype data warehouse to solve a case-study-based problem. From this they will use an appropriate OLAP environment to demonstrate the capabilities of analysing multi-dimensional data for decision-making in a business environment and use appropriate tools and techniques to produce business intelligence reports. They will also present a report (3500 words) describing the design and building of this system and the business intelligence it produces.

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

EDUCATION FOR SUSTAINABLE DEVELOPMENT (ESD)

Does the module contribute to ESD?	Yes
	No ✓
If yes please provide brief details (no more than 100 words):	

BIBLIOGRAPHY

Essential

Kimball, R. and Ross, M. (2013) *The Data Warehouse Toolkit: The Definitive Guide to Dimensional Modelling*, 3rd Edition, Hoboken: Wiley

Larson, B. (2012) *Delivering Business Intelligence with Microsoft SQL Server 2012, 3rd Edition*, New York: McGraw-Hill

Recommended

Corr, L. and Stagnitto, J. (2011) *Agile Data Warehouse Design: Collaborative Dimensional Modelling, from Whiteboard to Star Schema*, Leeds: DecisionOne Press

Background

Plotkin, D. (2013) *Data Stewardship: An Actionable Guide to Effective Data Management and Data Governance*, Burlington: Morgan Kaufmann

Journals

ACM Transactions on Database Systems
ACM Transactions on Information Systems
ACM Transactions on Algorithms
ACM SIGMOD (Special Interest Group on Management of Data)
ACM SIGIR (Special Interest Group on Information Retrieval)
Journal of Data and Information Quality
Communications of the ACM
Appropriate sites on the World Wide Web will also be used.

Websites

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

<http://businessintelligence.com/>

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

MODULE CODE: M7X01690
TITLE: Distributed Web Applications
DATED: 29/06/2017

LEVEL: 7
CREDITS: 20

JACS CODE: I160

AIM(S)

- To provide students with a systematic understanding of the principles, concepts and techniques used in the development of distributed web applications, with a focus on cloud-based architectures.

LEARNING OUTCOMES

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

- Research and develop a comprehensive understanding of the deployment of distributed type 1 hypervisors for cloud-based applications.
- Explain and apply current principles and software development practices in the commissioning of a failover cluster.

INDICATIVE CONTENT

- Bare metal (type 1) hypervisor deployment strategies and practices.
- Code development for cloud-based distributed infrastructures.
- Development and deployment of software as a service.
- Failover of virtualised systems.
- Snapshotting and snapshot teleportation.
- Software as a service.
- Quorum-based decision making, including quorum modes and majorities.

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	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1 – Written 50%

This assessment will consist of an examination that will explore the students' knowledge and understanding of core theoretical concepts relating to cloud-based infrastructures and applications. (2 hours)

Assessment Component 2 – Coursework 50%

Students will be required to complete an assignment requiring them to build a software application using an appropriate technology for a specified scenario for deployment on a distributed cloud-based infrastructure (2,500 words equivalent)

Assessment Summary

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

EDUCATION FOR SUSTAINABLE DEVELOPMENT (ESD)

Does the module contribute to ESD?	Yes
	No ✓
If yes please provide brief details (no more than 100 words):	

BIBLIOGRAPHY

Essential

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

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

Background

Rhoton, J. and Haukioja, R. (2011) *Cloud Computing Architected*, Tunbridge Wells: Recursive

Kavis, M. J. (2014) *Architecting the Cloud: Design Decisions for Cloud Computing Service Models (SaaS, PaaS, and IaaS)*, Hoboken: Wiley

Bahga, A. (2013) *Cloud Computing: A Hands-On Approach*, CreateSpace Independent Publishing Platform

Marinescu, D. (2013) *Cloud Computing Theory and Practice*, Burlington, Mass: Morgan Kaufmann

Journals

Journal of Cloud Computing

Communications of the ACM

MODULE CODE: M7X01691
TITLE: Emerging Network Technologies
DATED: 29/06/2017

LEVEL: 7
CREDITS: 20

JACS CODE: I160

AIM(S)

- To give students both a theoretical and a practical understanding of the design, operation and applications of the most important advanced and emerging network technologies

LEARNING OUTCOMES

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

- Consistently apply a comprehensive understanding of the emerging network technologies.
- Design, test and critically analyse real world network scenarios using state of the art modelling and simulation of emerging and advanced network technologies.

INDICATIVE CONTENT

- Enabling Technologies for 3GPP LTE-Advanced Networks
- Wireless Networks:
 - Cellular Networks (3G/4G, Towards 5G wireless cellular networks)
 - IEEE 802.11 networks (Wireless Sensor Networks (WSN), Wireless Mesh Networks (WMN), Mobile Ad hoc Networks (MANET))
 - WiMAX
 - Other emerging wireless networks.
- Digital Communications:
 - Spread Spectrum (frequency hopping and direct sequence)
 - Cognitive Radio
 - Data transmission
 - Multiple access methods (Multi-Channel assignment)
- Optical fibre as a communication channel
- Voice over IP technologies: SIP, H323, RSVP, MGCP, Design Considerations for VoIP
- Mobile IP and other mobile technologies
- Advanced simulation and Modelling of 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 applying understanding and knowledge through theoretical problem solving questions relating to lectures, case studies pertaining to emerging technologies and concentrate on the technical calculations needed for advanced network design and analysis.

Laboratories will be used to allow students to gain advanced network modelling and simulation skills with the aid of appropriate software such as QualNet, OPNET, MATLAB/SIMULINK 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	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1 – Written 50%

Demonstrate a knowledge on emerging network technologies via a time constrained end of year examination. (2 hours)

Assessment Component 2 – Coursework 50%

Use network simulation software to design a practical real life system using a suitable network simulation tool such as QualNet, OPNET Modeler. A written report will evaluate the implemented network design and/or protocol is required. (2500 words)

Exemplar: Students will demonstrate critical awareness of the current and emerging technologies in computer networking. Students will design, model, implement and critically analyse novel and emerging network technologies using advance simulation tools such as QualNet, OPNET, MATLAB/SIMULINK.

Assessment Summary

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

EDUCATION FOR SUSTAINABLE DEVELOPMENT (ESD)

Does the module contribute to ESD?	Yes ✓
	No
This modules introduce various computer simulation software to test network scenarios before implementing in real world. This help to reduce carbon footprint and test multiple scenarios without need of buying new equipment, use of electrical equipment, and save most valuable time.	

BIBLIOGRAPHY

Essential

Tanenbaum, A. S. and Wetherall D. J. (2013) *Computer Networks: International Version, 5th Edition*, Boston: Pearson

Sethi, A. S. and Hnatyshin, V. Y. (2012) *The Practical OPNET User Guide for Computer Network Simulation*, London: Chapman & Hall/CRC

Background

Glisic, S. G. (2010) *Advanced Wireless Communications and Internet: Future Evolving Technologies*, Hoboken: Wiley

Konig, H. (2012) *Protocol Engineering*, New York: Springer

Khan, S., Pathan, A. K. and Alrajeh, N. A. (2012) *Wireless Sensor Networks: Current Status and Future Trends*, London: CRC

Holger, K. and Willig, A. (2007) *Protocols and Architectures for Wireless Sensor Networks*, Hoboken: Wiley

Lu, Z. and Yang, H. (2012), *Unlocking the Power of OPNET Modeler*, Cambridge: Cambridge University Press

Journals

IEEE/ACM, IEEE/ACM Transactions on Networking
IEEE, IEEE Network Magazine, Science Direct

Websites

IEEE XPLORE

MODULE CODE: M7X01695
TITLE: Implementing IP Routing
DATED: 29/06/2017

LEVEL: 7
CREDITS: 20

JACS CODE: I160

AIM(S)

- To study in depth the technical issues related to advanced routing protocols and switching. To have a detailed knowledge of internal and external routing protocols 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:

- Consistently apply a comprehensive and detailed knowledge of IP Routing within enterprise network environments.
- Implement advanced routing protocols in the administration of WAN and LAN internetworks.

INDICATIVE CONTENT

- IP routing: static, dynamic and on-demand routing.
- Classful and classless routing.
- Distance vector and link state routing protocols.
- EIGRP, DUAL algorithm, load balancing, and authentication.
- OSPF, area types, network types, and authentication.
- BGP: IBGP, EBGP, single homed, dual homed, and multi homed.
- Route manipulation and implementing path control.
- IPv6 in an enterprise network
- Router security
- Routing protocol authentication

LEARNING AND TEACHING STRATEGY

The majority of factual material will be presented in lectures using hand-outs, 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	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1 – Practical 50%

Students will be required to implement and test advanced routing protocols over WAN and LAN. This will be assessed within a laboratory based practical exam (2 hours).

Assessment Component 2 – Written 50%

Students will sit a 2-hour exam which would allow them to demonstrate technical knowledge based on theoretical principles. (2 hours)

Assessment Summary

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

EDUCATION FOR SUSTAINABLE DEVELOPMENT (ESD)

Does the module contribute to ESD?	Yes
	No ✓
If yes please provide brief details (no more than 100 words):	

BIBLIOGRAPHY

Essential

Wallace, K. (2014) *CCNP Routing and Switching Route 300-101 Official Cert Guide*, Indianapolis: Cisco Press

Teare, D. (2010) *Implementing Cisco IP Routing (ROUTE) Foundation Learning Guide: Foundation Learning for the ROUTE 642-902 Exam*, Indianapolis: Cisco Press

Background

Cisco (2014) *Routing and Switching Essential Companion Guide*, Indianapolis: Cisco Press

Cisco (2014) *Scaling Networks Companion Guide*, Indianapolis: Cisco Press

Malhotra, R (2002), *IP Routing*, Sebastopol: O'Reilly

Slattery, T., Burton, W. and Burton, B. (2002) *Advanced IP Routing in Cisco Networks*, New York: McGraw-Hill

Journals

ACM Transactions on Networking

IEEE Transactions on Networking

IEEE Transactions on Communications

Websites

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

MODULE CODE: M7X01696
TITLE: IP Switched Networks
DATED: 29/06/2017

LEVEL: 7
CREDITS: 20

JACS CODE: I120

AIM(S)

- To study in depth the technical details related to switching with in an enterprise network. To have a detailed knowledge of multilayer switching and VLANs and to understand the underlying principles of their deployment in enterprise networks.

LEARNING OUTCOMES

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

- Consistently apply a comprehensive and detailed knowledge of IP switching techniques within an enterprise networks.
- Select and deploy various switching techniques to design, implement and troubleshoot complex switch networks using Layer 2 and 3 switches on Enterprise networks.

INDICATIVE CONTENT

- Enterprise campus architecture
- Layer 2, layer 3, layer 4, and layer 7 switching
- Switch Configuration
- Switch Port Configuration
- Implementing VLANs in campus networks
- VLAN trunking, Private VLANs, link aggregation and Etherchannel
- Spanning tree protocol (STP), Rapid STP, and multiple spanning tree (MSTP).
- Inter-VLAN routing
- DHCP in a multilayer switched environment
- Securing Switched networks

LEARNING AND TEACHING STRATEGY

The majority of factual material will be presented in lectures using hand-outs, 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	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1 – Practical 50%

This assessment will require students to implement and test various switching techniques over LAN and this will be assessed by a lab based practical exam. (2 hours)

Assessment Component 2 – Written 50%

This will be a 2-hour exam which will allow the student to demonstrate technical knowledge based on theoretical principles. (2 hours)

Assessment Summary

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

EDUCATION FOR SUSTAINABLE DEVELOPMENT (ESD)

Does the module contribute to ESD?	Yes
	No ✓
If yes please provide brief details (no more than 100 words):	

BIBLIOGRAPHY

Essential

Hucaby, D. (2014) *CCNP Routing and Switching SWITCH 300-115 Official Cert Guide*, Indianapolis: Cisco Press

Froom, R., Sivasubramanian, B. and Frahim, E. (2010), *Implementing Cisco IP Switched Networks (SWITCH) Foundation Learning Guide: Foundation Learning for SWITCH 642-813*, Indianapolis: Cisco Press

Recommended

Hucaby, D. (2014) *CCNP Routing and Switching SWITCH 300-115 Official Cert Guide*, Indianapolis: Cisco Press

Background

Cisco (2014) *Routing and Switching Essential Companion Guide*, Indianapolis: Cisco Press

Cisco (2014) *Scaling Networks Companion Guide*, Indianapolis: Cisco Press

Douglas, C. (2009), *Computer Networks and Internets*, Boston: Pearson Education

Theoharakis, V. and Sepanos, D. (2002) *Enterprise Networking: Multilayer Switching and Applications*, Hershey: Idea Group Publishing

Journals

ACM Transactions on Networking

IEEE Transactions on Networking

IEEE Transactions on Communications

Websites

www.netacad.com (password access only)

MODULE CODE: M7X01697
TITLE: Leadership and Management
DATED: 21/07/2015

LEVEL: 7
CREDITS: 20

JACS CODE: N200

AIM(S)

- To develop a critical and analytical understanding of the qualities and strategies required for effective leadership within organisations and to encourage the development of Leadership skills

LEARNING OUTCOMES

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

1. Critically review current research and advanced scholarship on leadership to demonstrate systematic understanding of current issues in leadership within a variety of organisations.
2. Evaluate and develop effective leadership skills for the individual, the team and for self with a view to promoting a high performance high achievement culture

INDICATIVE CONTENT

- The history and context of Leadership, and a critical appraisal of its role in organisations
- Leadership or Management? Theoretical, practical and research-based views
- The role and impact of vision, direction and entrepreneurial leadership
- Understanding the place of problem solving, decision-making, planning, delegation, communication and self-management skills;
- Developing a high performance culture: mobilizing the potential of people, develop and sustain learning within a learning environment, enhance the provision of quality services
- Leading teams and individuals: manage and develop self and own performance, maintain and develop team and individual performance, build and maintain productive working relationships
- Leadership development: contemporary leadership development issues and initiatives e.g. Self managed learning, talent management and succession
- The increasing importance and widening debate on Leadership responsibilities in areas such as ethics, social responsibility, cultural diversity, power and control

LEARNING AND TEACHING STRATEGY

As the module aims to develop a critical and analytical understanding of the qualities and strategies required for effective leadership and to encourage the development of leadership skills and qualities, student-centred learning strategies are necessary. Seminars, tutorials and workshops will form the majority of the learning strategy to allow students to interact with material through case studies, group discussions and practical exercises.

Students will also be encouraged to attend relevant guest speaker presentations and carry out their own research for dissemination to the rest of the group. Material for discussion in seminars and tutorials will be in a variety of formats such as DVD, pod casts, leader profiles, case studies, questionnaires and presentations with plenty of opportunity for formative feedback regarding their critique and application of the material

The allocation of teaching to deliver the module is:

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

ASSESSMENT

Assessment Component 1 – Coursework 100%

The assessment is designed to allow students to demonstrate their knowledge and understanding of leadership and its application to organisational performance. Students are expected to draw on leadership theory to underpin their discussion and critically apply it in order to evaluate the effectiveness of a leader of their choice.

Students will further be expected to demonstrate how the leader under investigation contributes to promoting a high performance culture and to make justified recommendations to improve on this contribution. The assignment is deliberately broad so as to cater for the different student cohorts studying this module and to enable it to be relevant to their own organisation or of one of their choice. (5000 words)

Assessment Summary

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

EDUCATION FOR SUSTAINABLE DEVELOPMENT (ESD)

Does the module contribute to ESD?	Yes
	No ✓
If yes please provide brief details (no more than 100 words):	

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Essential

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Rickards, T. and Clark, M. (2006) *Dilemmas of Leadership*, London: Routledge

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Western, S. (2010) *Leadership: A Critical Text*, Newcastle upon Tyne: Sage

Yuki, G. (2010) *Leadership in Organizations*, 7th Edition, Upper Saddle River: Prentice Hall

Journals

People Management: CIPD

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Human Resource Management Journal: CIPD

Educational Management and Administration

Research in Post-Compulsory Education

Websites

www.acas.gov.uk

www.cipd.co.uk

www.i-l-m.com

www.leadership-he.com

www.managers.org.uk/institute

www.dti.gov.uk/bestpractice/management/leadership.htm

MODULE CODE: M7X01698
TITLE: Major Project
DATED: 21/07/2015

LEVEL: 7
CREDITS: 60

JACS CODE: I200

AIM(S)

To allow the student to advance their knowledge and understanding by undertaking and managing a significant project of their own choice, related to the major themes of their MSc programme.

LEARNING OUTCOMES

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

1. Apply relevant techniques of research and enquiry to create and interpret knowledge in the area of study.
2. Demonstrate self-direction in tackling and solving problems, and act autonomously in planning and implementing tasks.
3. Produce a deliverable applicable to the project type.
4. Generate, analyse and justify appropriate results and conclusions, demonstrating awareness of the limitations of the research and the impact on sustainability.
5. Critically evaluate the potential impact of the project, including consideration of issues that might arise if the project was implemented within a real-world context.
6. Produce an organised and structured document that adheres to academic convention and communicates conclusions clearly, and present the findings of the study to a specialist audience and/or non-specialist audiences both orally and visually.

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 Part II studies with a project proposal already formulated. This proposal will normally be generated as an outcome of the Part 1 module *Research Methods and Data Analysis*.

A suggested project list from academic staff will be made available to the students as a guide. Students may also submit their own titles. All titles must be approved by an appropriate member(s) of the programme team and the Project Co-ordinator to check that their level and validity is appropriate for Masters' level. 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:

- Data Collection-based
- Review-based
- Analysis-based
- Experiment-based
- Development-based

It is expected that eCommerce students would undertake Data Collection-, Analysis- or Review-based projects, Computer Networks and Security students would undertake Experiment- or Development- based projects while Applied Computing, Games and VFX, and Software Engineering student would undertake Development-based projects. However, it is not impossible that a student from a more technical stream could conduct a Review-based project, or an eCommerce 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.

Should the focus of a student's project significantly change as the project 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.

The student will be supervised, as far as is reasonably practicable, by a member of staff with knowledge of the project's topic area. In accordance with UWTSD regulations, the project will be double-marked by two members of staff.

See below for assessment.

The proposed arrangements for marking projects are:

- The supervisor will normally 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 without consultation with the other 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).
- At the *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 result in failure of the module.

The allocation of teaching to deliver the module is:

Activity type	Hours	Percentage
Scheduled learning	15	3%
Independent learning	585	97%
Placement learning	0	0%
TOTAL	600	100%

ASSESSMENT

Assessment Component 1 – Coursework – Final Report - 70%

The type of project undertaken by the student depends on the MSc programme being studied and on agreement with the project supervisor. Five types of project are defined, Data Collection, Review, Experiment, Development and Analysis. 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 Data Collection and Review projects have assessment weighted more towards literature research and the written analysis of results (15,000 words)

	Data Collection	Review	Analysis	Experiment	Development
Research-informed Literature					
Introduction	5	5	5	5	5

Literature Review	25	40	30	25	15
Knowledge and Understanding of Subject					
Methodology	5	5	5	5	5
Data Collection Process Design	15	-	-	-	-
Requirements/Design	-	-	-	-	10
Analysis					
Problem Definition	-	-	10	-	-
Results and Discussions	30	30	30	30	30
Conclusions and Recommendations	10	10	10	10	10
Practical Application and Deployment					
Development	-	-	-	-	15
Experimental Design	-	-	-	15	-
Skills for Professional Practice					
Reflection	5	5	5	5	5
Quality of Report	5	5	5	5	5
TOTAL	100	100	100	100	100

Assessment Component 2 – Practical - Final Viva / Demo – 20%

The student is required to undertake an Individual presentation. This partly enables authentication of the work to ensure it is 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 data collection or review project, an extended viva is used to allow the student to provide a more in-depth justification for research approach, analysis and findings (circa 10 minute presentation).

	Data Collection	Review	Analysis	Experiment	Development
Knowledge and Understanding of Subject					
Response to Questioning	30	30	30	30	30
Analysis					
Discussion of Findings	50	50	50	30	30
Practical Application and Deployment					
Demo	-	-	-	20	20
Skills for Professional Practice					
Presentation Style	10	10	10	10	10
Supporting Materials	10	10	10	10	10
TOTAL	100	100	100	100	100

Assessment Component 3 – Coursework – Exhibition Board – 10%

The Exhibition Board requires students to present their project work visually. This 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. (1,000 word equivalent)

	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 exam	0%
Coursework	80%
Practical	20%
TOTAL	100%

EDUCATION FOR SUSTAINABLE DEVELOPMENT (ESD)

Does the module contribute to ESD?	Yes ✓
	No
There is an explicit requirement that Major Project meets ethical and sustainability guidelines and the School of Applied Computing aims to produce graduates who understand their professional responsibilities in this area. The Major Project, is the culmination of the MSc programme being studied and is underpinned by the successful completion of the taught modules of Part 1 which includes sustainability. The University recognises that sustainability issues cannot be understood through single disciplines. Ethical and Sustainability considerations go hand in hand with the Major Project which is often cross-disciplinary. Sustainable development requires systemic approaches which go beyond analysis in terms of 'problem-solving' and/or 'cause-effect' and this is a theme developed in the Major Project.	

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Essential

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Saunders, M., Lewis, P. and Thornhill, A. (2012) *Research Methods for Business Students 6th Edition*, Upper Saddle River: Prentice Hall/FT

Background

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Baase, S. (2012) *A Gift of Fire: Social, Legal, and Ethical Issues for Computing and the Internet: International Edition, 4th Edition*, Boston: Pearson

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

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

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Dawson, C. W. (2009) *Projects in Computing and Information Systems: a Student's Guide, 2nd Edition*, Boston: Addison-Wesley

Denscombe, M. (2010) *The Good Research Guide*, Oxford: OUP

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

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

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

Journals

Appropriate journals from the core subject areas.

Websites

Appropriate websites from the core subject areas.

MODULE CODE: M7X01699
TITLE: Managing Information Systems and Projects
DATED: 29/06/2017

LEVEL: 7
CREDITS: 20

JACS CODE: N213

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:

- Evaluate critically the suitability of alternative project development methods for different contexts.
- Understanding of a range of contemporary project management techniques and apply them appropriately in specific scenarios.
- Appraise critically quality control and audit processes and recommend an appropriate quality framework that aligns benchmarks with project requirements.

INDICATIVE CONTENT

- The evolving role of information systems in organisations leading to strategic and innovative uses of IS/IT.
- The use of acknowledged information systems development paradigms, processes and methodologies to develop variations for complex, atypical or ambiguous situations.
- General approaches to information systems development (e.g. process-oriented, data-driven, integrated, rapid, object-oriented, people/organisational-oriented)
- 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, risk management, health and safety.
- 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.
- Risk management: health and safety, sustainability and green drivers for project success
- BCS guidelines on Green and Sustainable IT
- Factors influencing project success or failure
- 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. Students will be expected to read relevant literature widely such that their arguments can be informed by current research and leading-edge practice in information systems and technology management.

The allocation of teaching to deliver the module is:

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

ASSESSMENT

Assessment will be by case study/practically based coursework assignment which will be split into logical stages to simulate the process undertaken when managing information systems projects. The student will be required to:

Assessment Component 1 – Coursework 50%

Using selected project development methods, analyse a given information problem and document the stages of the model; including the production of a project initiation documentation/feasibility study which should include an appropriate statement of scope and objectives, the specification of the requirements for the proposed system and using established techniques, a set of models that reflects aspects of the design of a computer-based system. The student must also demonstrate a good understanding of the theoretical concepts when considering the ethical and legal requirements necessary for IT project management (2500 words)

Assessment Component 2 – Coursework 50%

Select and deploy a suitable framework to evaluate alternative project development methods. Using the framework, document an evaluation of at least two different project development methods appropriate to the case study, and use suitable secondary sources to justify conclusions (2,500 words).

Exemplar:

The “Sustainable Cycling Stores” are a small chain of independent shops trading in bicycles, parts and repairs. They pride themselves on offering a flexible service to cyclists that suit most needs and pockets. Their main aim is to work for the good of the environment and they therefore promote recycling.

You work for ‘GetitIT’ IT specialists and your team have been employed by “Sustainable Cycling Stores” to prepare project management plans. The plans will control the implementation of a new Information Systems (IS), which will hopefully provide the stores with a WEB presence.

From initial investigations it has now been established that you need to look further at the project as a whole and produce a comprehensive Project Initiation Document to present to Mr Wheelie, the Managing Director of “Sustainable Cycling Stores”.

Assessment Summary

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

EDUCATION FOR SUSTAINABLE DEVELOPMENT (ESD)

Does the module contribute to ESD?	Yes ✓
	No
Transferable skills contributing to lifelong learning.	

BIBLIOGRAPHY

Essential

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

Recommended

Maylor, H. (2010) *Project Management*, Upper Saddle River: Prentice Hall

Cadles, J. and Yeates, D. (2007) *Project Management for Information Systems*, Upper Saddle River: Prentice Hall

Highsmith, J. (2009), *Agile Project Management: Creating Innovative Products*, 2nd Edition, Boston: Addison-Wesley

Background

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

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

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

Mullins, L. J. (2010) *Management and Organisational Behaviour* (9th Edition), Upper Saddle River: Prentice Hall

Journals

ACM Transactions on Information Systems

Behaviour and Information Technology

Communications on the ACM

International Journal of Electronic Commerce

Journal of Strategic Information Systems

Journal of Systems Management

Websites

<http://www.acm.org>

<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://www.mckinseyquarterly.com>

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

<http://projectmanagement.ittoolbox.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>

<http://www.bcs.org/>

<http://www.uml.org/>

<http://www.omg.org/>

MODULE CODE: M7X01701
TITLE: Network Security
DATED: 29/06/2017

LEVEL: 7
CREDITS: 20

JACS CODE: I120

AIM(S)

- To provide students with an appreciation of information 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 posed to networks 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 the ability to:

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

INDICATIVE CONTENT

- Current and emerging security related web-based technologies eg Intranet, ecommerce
- Use of the Security Policy and Security Management in an organisation eg roles and responsibilities, security policies
- Cryptography and Digital Identification: PKI, Signatures, Certificates
- Cyber security
- Web server security
- Operating system security
- Firewalls and their architectures e.g. packet filtering, proxies and stateful-packet inspection:
- Virtual Private Networks (VPNs) concepts:
- Implementing Defence-in-Depth strategies: eg tools for scanning system weaknesses
- The future of Information Security eg m-commerce, ID theft, biometrics
- Wireless Security
- Intrusion detection
- Honeypots/Honeynets

LEARNING AND TEACHING STRATEGY

A combination of lectures, practical laboratory sessions, guided tutorials and a range of student centred learning techniques will be used in this module. This will be supplemented by hand-outs and copies of appropriate technical papers as required. Facilities will be available to allow practical exploration of systems security.

The allocation of teaching to deliver the module is:

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

ASSESSMENT

Assessment Component 1 – Written 50%

Students will demonstrate theoretically, through a written examination, an advanced knowledge of the technological, design and management control of security. (2 hours)

Assessment Component 2 – Coursework 50%

Student will complete coursework assignment with a practical component related to concepts and ideas to real world situations. A written analytical report is required. (2500 words)

Exemplar: Students will demonstrate knowledge on technologies of network and systems security, which include but are not limited to various cryptographic techniques and their applications in network security, web security, operating systems security, database security. The importance of a security policy is also considered.

Assessment Summary

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

EDUCATION FOR SUSTAINABLE DEVELOPMENT (ESD)

Does the module contribute to ESD?	Yes
	No ✓
If yes please provide brief details (no more than 100 words):	

BIBLIOGRAPHY

Essential

Stallings, W. (2010) *Cryptography and Network Security: Principles and Practice*, Upper Saddle River: Prentice Hall

Bejtlich, R. (2005) *The Tao of Network Security Monitoring: Beyond Intrusion Detection*, Boston: Addison-Wesley

McClure, S. (2012) *Hacking Exposed 7: Network Secrets and Solutions*, New York: McGraw-Hill Osborne

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Blunden, W. (2013) *The Rootkit Arsenal: Escape and Evasion in the Dark Corners of the System*, 2nd Edition, Burlington: Jones and Bartlett Learning

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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

Websites

IEEE XPLORE

CISCO Academy Website, cisco.netacad.net (password access only)

MODULE CODE: M7X01702
TITLE: Research Methods and Data Analysis
DATED: 21/07/2015

LEVEL: 7
CREDITS: 20

JACS CODE: N600

AIM(S)

- To deepen students' critical faculties and powers of expression and to provide them with practice in the organisational skills necessary to pursue a research project. This will also enable them to use appropriate research methodologies to investigate and analyse relevant issues and to understand research concepts and develop research competencies.
- To provide students with the skills needed to perform statistical analyses upon data of many different types and levels of complexity and to present this data in a manner that is visually clear and easy to understand.

LEARNING OUTCOMES

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

1. Generate a project proposal that meets a given user requirement, showing some degree of innovation and originality while independently gathering and collating appropriate information from a variety of sources.
2. Perform data analyses appropriate to a domain and a problem, including the identification of appropriate measures of centre and distribution, calculation of statistical significance, testing of statistical hypotheses and analysis of variance.
3. Demonstrate a deep understanding of the cognitive principles involved in presenting data effectively and in identifying problems with visualisations.

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)
- Research methodologies - historical, descriptive, correlational, comparative, experimental.
- Field data - survey design, questionnaires, sampling, statistical techniques, interviews, case studies, observation.
- Developing a proposal - research statement, research outline and design research schedule

- Collation and communication - recording and organising information, analysis of results, communicating the results, referencing, plagiarism.
- Project planning - project time scale control
- Intellectual property - copyright, trademarks, patents.
- Social and cultural context, and ethical considerations.
- Measures of centre and distribution, axioms and theorems of probability, normal and other distributions.
- Calculation of statistical significance, student's t-test, analysis of variance.
- Rearrangement and interaction of data - Interactive rearrangement of numerical, categorical, topological, symbolic and ordinal data
- Quantitative data - Univariate, bivariate, multivariate and hypervariate data
- Data representation - Representing data through size, colour, coding, angle, length, icons, etc
- Dynamic exploration - Investigation of local neighbourhood through exploration.
- Presentation - Presentation strategies, importance of focus + context
- Connectivity - Representing general and tree networks, disjoint graphs, cone trees etc

LEARNING AND TEACHING STRATEGY

This module will deliver the initial material via formal lectures but this will be supplemented by tutorials and group presentations after the initial phase. Students will also develop the skills necessary to write technical papers which will be presented in front of groups of other students to simulate a mock technical conference. Referencing skills will be given a very high priority throughout the module.

Recognising that many students will have had a limited introduction to statistics in the past, the module will assume no prior knowledge of statistics, and will introduce students to the process of analysing data through a combination of lectures and problem-solving tutorials.

It will also introduce students to a variety of information visualisation techniques, looking at how to select and arrange data and then developing methods for displaying data to highlight the interactions between multiple variables and data types.

It will go on to look at methods for representing and encoding data in order to enable easy exploration of the data. Practical experience will be given a priority so that students can not only identify problems in visualisations but rectify them and generate clear and effective data displays.

The allocation of teaching to deliver the module is:

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

ASSESSMENT

Assessment Component 1 – Coursework 60%

Each student is required to prepare a project proposal detailing the aim of the research, a rationale for the proposed work, research strategy, resource requirements and a project plan (approximately 3500 words).

Assessment Component 2 – Practical 20%

The student will produce an A2 conference poster based upon their project proposal (500 words equivalent). They will then give an 8-10 minute oral presentation describing and discussing their proposal.

Assessment Component 3 – Coursework 20%

The students will critically evaluate visualisations of data sets containing multiple types of data and will analyse and present such datasets in a professional manner that supports the cognitive processes relating to recognition and understanding of such data (approximately 1000 words).

Exemplar: 'Using the original Morton-Thiokol data set and slides showing damage to the Space Shuttle's 'O'-rings during previous launches as your data source:

- Evaluate the effectiveness of the data presentation on the original slides
- Create a visualisation of the dataset that makes it easy to see the dangers of launching the Space Shuttle at low ambient temperatures.'

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	80%
Practical	20%
TOTAL	100%

EDUCATION FOR SUSTAINABLE DEVELOPMENT (ESD)

Does the module contribute to ESD?	Yes ✓
	No
A significant part of this module is focused on developing the skills required to perform research into a topic; the topic of research does not need to be computing-related but might be anything the student needs to research in their future career. The skills gained are therefore transferable and contribute towards the students' life-long learning.	

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Essential

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Recommended

Card, S., MacKinlay, J. and Schneiderman, B. (1999) *Readings in Information Visualization - Using Vision to Think*, Burlington, Mass: Morgan Kaufmann

Spence, R. (2014) *Information Visualization: an Introduction*, Boston: Addison-Wesley

Tufte, E. R. (2001) *The Visual Display of Quantitative Information*, 2nd Edition, Cheshire: CT: Graphics Press

Leedy, P. D. and Ormrod, J. E. (2012) *Practical Research Planning and Design*, 10th Edition, Boston: Pearson Education

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Bell, J. (2005) *Doing Your Research Project*, 4th Edition, Maidenhead: Open University Press

Berry, R. (Ed) (2000) *The Research Project: How to Write It*, 4th Edition, London: Routledge

Blaxterm, L., Hughes, C. and Tight, M. (2001) *How to Research*, 2nd Edition, Maidenhead: Open University Press

Fowler, F. (2002) *Survey Research Methods* 3rd Edition, Newcastle upon Tyne: Sage Publications

Oppenheim, A. (1992) *Questionnaire Design, Interviewing and Attitude Measurement*, London: Continuum

Journals

IEEE Transactions on Visualisation and Computer Graphics

Information Visualization (SAGE)

Websites

<http://www-969.ibm.com/software/analytics/manyeyes/#/>

<http://www.theusrus.de/Mondrian/>

MODULE CODE: M7X01705
TITLE: Web Technologies for eCommerce
DATED: 21/07/2015

LEVEL: 7
CREDITS: 20

JACS CODE: P413

AIM(S)

- To equip the student with a conceptual and practical understanding of web standards and their application in the development of web sites and information systems which conform to usability guidelines.

LEARNING OUTCOMES

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

1. Develop a conceptual understanding of the essential principles and techniques required in an effective, well designed web site, using appropriate web standard languages.
2. Develop web content, satisfying specific requirements and evaluate the appropriateness of the content in terms of usability, security and accessibility guidelines, based on current research.

INDICATIVE CONTENT

- Understand the rationale and semantics of Web Standard languages;
- User needs analysis;
- Theory of WWW structure and hypertext navigation;
- File size constraints regarding quality vs download times;
- Procurement and processing of media for web use
- Colour theory and Typography for the Web;
- Visual communication, screen design and HCI design factors;
- Human, social and cultural factors relevant to web authoring;
- Information architectures such as website tree diagrams, wire-frames, site maps, storyboards;

- Usability and Accessibility guidelines;
- Format web pages using markup language (eg HTML5)
- Presentation and positioning of information using CSS, layout techniques eg responsive sites
- Progressive enhancement techniques
- Scripting and site interactivity using DOM scripting eg JavaScript;
- Web site creation and management tools;
- Interaction of websites with server-side languages
- Practical security considerations for websites

LEARNING AND TEACHING STRATEGY

Essential concepts and principles will be delivered formally in combined lecture/tutorial sessions which allow the students to gain an understanding of the appropriate theory, and simultaneously test implementation techniques, practices and tools. Case-study industry based examples will be explored in detail to accentuate best-practice and commercial issues.

All course material will be stored on the Universities Virtual Learning environment, allowing students to gain access to handouts/slides/tutorials both on and off campus.

The allocation of teaching to deliver the module is:

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

ASSESSMENT

Assessment Component 1 – Coursework 100%

Students will produce a website which conforms to the latest web standards and usability guidelines with accompanying report. (5000 words equivalent)

Exemplar:

“Produce an informational-based website with limited interactivity, which conforms to web standards and usability guidelines”

Assessment Summary

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

EDUCATION FOR SUSTAINABLE DEVELOPMENT (ESD)

Does the module contribute to ESD?	Yes ✓
	No
While the module is primarily a software development one, students will be instructed in good software development techniques which will make software developed easy to maintain and with consideration to accessibility to all groups. A good design will mean use of fewer resources in the future as extensive site re-design should be unnecessary.	

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Krug, S. (2013) *Don't Make Me Think, Revisited: A Common Sense Approach to Web Usability, 3rd Edition*, San Francisco: Voices That Matter/New Riders

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Ravensbergen, R. and Schoneville, S. (2013), *Magento Beginner's Guide, 2nd Edition*, Birmingham: Packt

Williams, A. (2013), *SEO 2013 and Beyond: Search Engine Optimization will never be the same again! (Webmaster Series)*, CreateSpace Independent Online Publishing Platform

Websites

<http://www.w3.org>

<http://www.w3cschools.com>

<http://www.htmlgoodies.com>

<http://www.webaim.org>

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

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