

MODULE DIRECTORY

LEVEL 6

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 6 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

MODULE CODE: ACCA6000
TITLE: Advanced Cybersecurity
DATED: 02/08/2017

LEVEL: 6
CREDITS: 20

JACS CODE: I160

AIM(S)

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

LEARNING OUTCOMES

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

- demonstrate a systematic understanding of a wide range of current research and technological advances in cybersecurity;
- consistently apply the principles and practices of cybersecurity for mitigating the key technical internet security vulnerabilities and threats that organisations face.

INDICATIVE CONTENT

- Fundamentals of Computer Security.
- Networking Concepts.
- Cryptography.
- Internet Security Technologies.
- Security of Computer Communications.
- Wireless Security.
- Windows Security.
- Linux Security.
- Web Applications and Security.
- Defensive Network Infrastructure – Intrusion Detection/Firewalls.
- Malware, Virus and Worms.
- Network Traffic Analysis and Forensics using Wireshark.
- Data Loss Prevention.
- Penetration Testing.

LEARNING AND TEACHING STRATEGY

A combination of lectures, practical laboratory sessions, seminars, guided tutorials and a range of student centred learning techniques will be used in this module. This will be supplemented with appropriate technical papers as required on the VLE.

Facilities will be available to allow practical exploration of cybersecurity.

Tutorial classes will concentrate on the technical design.

Laboratories will be used to allow students to gain skills with the aid of lab equipment and appropriate software such as VM virtualbox, Kali, Nmap, Packet tracer, Wireshark, SAINT, Nessus, System tools, etc.

The allocation of teaching to deliver the module is:

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

ASSESSMENT

Assessment Component 1 (2500 words) – Coursework - 50%

Produce a practical implementation of a security tool or system or provide a safe and secure web platforms to conduct real-life penetration testing without the fear of breaking the law, accompanied by a written report critically evaluating the security issues.

Exemplar: 'A Systematic Research of Security and Policies for Internet and local/remote networks.'

Assessment Component 2 (2 hours) – Exam - 50%

End-of-module examination to demonstrate theoretically, through a written examination to test theoretical concepts and advanced knowledge of the technological, design and management control of security.

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
If yes please provide brief details (no more than 100 words): Sustainability is core to this module as underlined by its outcome: "...consistently apply the principles and practices of cybersecurity for mitigating the key technical internet security vulnerabilities and threats that organisations face."	

MODULE CODE: ACCA6001
TITLE: Network and Data Centre Management
DATED: 02/08/2017

LEVEL: 6
CREDITS: 20

JACS CODE: I120

AIM(S)

- To provide students with an in-depth knowledge of the techniques, strategies, and tools available to IT managers for the design, implementation, and maintenance of a corporate IT infrastructure and data centres. The module will also develop students' independent research capability, especially in the areas of network planning, storage area networks, design, and management for corporate environments.

LEARNING OUTCOMES

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

- critically evaluate strategic planning, design and management issues relating to the corporate IT network infrastructure;
- research how storage area networks relates to the wider field of data centres and critically evaluate current and advancements in the field, including sustainability.

INDICATIVE CONTENT

- LAN and SAN.
- Introduction to server farm
 - o Data centre architecture
 - o Application architecture model
- Data centre network design
 - o Data centre topologies
 - o Fully redundant layer 2 and layer 3 design
- Server and application architecture.
- Server load balancing.
- Server farm protocols.
- Data centre unified fabric.
- The sustainable data centre
 - o SNMP, Broadband and Telecommunication Network Management
 - o Management tools, systems and applications

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 theoretical work, case studies and real-world scenarios to help students develop technical and analytical skills.

Laboratories will be used to allow students to improve their knowledge of network functionality by applying knowledge using contemporary hardware and software with the aid of lab equipment and appropriate software such as OPNET, Packet tracer, GNS, etc.

The allocation of teaching to deliver the module is:

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

ASSESSMENT

Assessment Component 1 (2500 words) – Coursework - 50%

Research and prepare a research paper and present findings.

Exemplar: 'Research and construct a network management system'

Assessment Component 2 (2 hours) – Written - 50%

End-of-module examination to test theoretical concepts contained in the module.

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
If yes please provide brief details (no more than 100 words):	
"The sustainable data centre" is taught as part of this module.	

MODULE CODE: CSAC6000
M3X8645
TITLE: Major Project
DATED: 03/06/2014

LEVEL: 6
CREDITS: 40

JACS CODE: I900

AIM(S)

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

LEARNING OUTCOMES

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

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

INDICATIVE CONTENT

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

LEARNING AND TEACHING STRATEGY

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

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

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

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

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

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

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

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

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

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

The proposed arrangements for marking projects are:

- The supervisor will act as the first marker for all projects for which they have supervisory responsibility.
- A different member of the academic staff of the university will second-mark projects.

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

The allocation of teaching to deliver the module is:

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

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

ASSESSMENT

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

Assessment Component 1 – Practical - 15% - Interim Viva

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

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

Skills for Professional Practice				
Project Plan	10	10	10	10
Quality of Presentation	10	10	10	10
TOTAL	100	100	100	100

Assessment Component 2 – Coursework - 55% - Final Report

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

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

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

During this final stage the student is required to demonstrate their project to both markers. This enables authentication of the work to ensure it's that of the student by providing an

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

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

Assessment Component 4 – Coursework – 10% - Exhibition board

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

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

Assessment Summary

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

BIBLIOGRAPHY

Essential

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

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

McCormac, C and Davis, J. (2012) *Research Project Success: The Essential Guide for Science and Engineering Students*, Royal Society of Chemistry

O'Leary, Z. (2013) *Doing Your Research Project*, 2nd Edition, SAGE Publications Ltd

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

Background

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

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

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

Davies, M. B. (2007) *Doing a Successful Research Project*, Palgrave Macmillan: Basingstoke

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

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

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

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

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

Journals

Appropriate journals from the core subject areas.

Websites

Appropriate websites from the core subject areas.

MODULE CODE: M6X01080
TITLE: Advanced AI and Machine Learning
DATED: 03/06/2014

LEVEL: 6
CREDITS: 20

JACS CODE: I460

AIM(S)

- To develop students' systematic understanding of AI and machine learning principles and techniques used in Games, Visualisation and Interactive Applications.

LEARNING OUTCOMES

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

1. Critically analyse, evaluate and apply A.I. and machine learning methods to solve given problems.
2. Analyse practical problems and synthesise appropriate software solutions using selected AI/machine learning methods.

INDICATIVE CONTENT

- Definition and review of Artificial Intelligence, General History, and Games AI.
- Review of probability and statistics
- Trigger systems, terrain analysis, obstacle evasion, movement, influence maps
- Decision making and the development of methods for controlling and implementing behaviour of agents (bots). For example, fuzzy logic, knowledge representation, rule based systems, decision trees, etc.
- Local search methods, evolutionary computing.
- Machine Learning: unsupervised/ supervised learning, Classifying, Naïve Bayes, Clustering, K-means, Function approximation/ neural nets, Bayesian networks
- Complexity and Emergent Behaviour including swarming, flocking and particle systems

LEARNING AND TEACHING STRATEGY

This module will build upon the work covered in the pre-requisite level 5 module *Agent AI*. Lectures will be used to deliver the concepts and more advanced ideas underpinning AI and machine learning topics.

Tutorial work will be used to develop specific A.I. techniques used in games programming. This will include group discussions and the implementation of algorithms using appropriate game Software Development Kits and Applications.

The allocation of teaching to deliver the module is:

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

ASSESSMENT

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

Assessment Component 1 – Written - 50%

Exam: Analyse, evaluate and use AI and machine learning techniques to solve given problems.

Assessment Component 2 – Coursework – 50%

Use a programming language or scripting tools and SDK to solve problems using AI/machine learning methods.

Exemplar:

“Development of an opponent combat assessment system using Naive Bayes classification”

Assessment Summary

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

BIBLIOGRAPHY

Essential

Russell, S. and Norvig, P. (2009) *Artificial Intelligence: A Modern Approach* (3rd edition), Prentice Hall

Bishop, C.M. (2007) *Pattern Recognition and Machine Learning*, Springer

Background

Millington, I. (2009) *Artificial Intelligence for Games*, 2nd edition, CRC Press

Rabin, S. (2013) *Game AI Pro: Collected Wisdom of Game AI Professionals*, CRC Press

Mark, D. (2009) *Behavioral Mathematics for Game AI*, Delmar

Schwab, B. *AI Game Engine Programming*, (2nd Edition), Charles River Media (2008)

Barber, M. (2012) *Bayesian Reasoning and Machine Learning*, Cambridge University Press

Websites

<http://www.acm.org>

<http://www.aigamedev.com>

<http://www.ieee.org>

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

MODULE CODE: M6X01081
TITLE: Advanced Graphics
DATED: 03/06/2014

LEVEL: 6
CREDITS: 20

JACS CODE: I710

AIM(S)

- Critically evaluate the principles and techniques used in two and three dimensional computer graphics, emphasizing the construction of algorithms required to animate and render graphical images used in real-time games programming.

LEARNING OUTCOMES

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

1. Critically evaluate techniques and algorithms used in computer graphics and animation
2. Synthesise appropriate graphical techniques and algorithms to address complex problems associated to games engine development

INDICATIVE CONTENT

- Graphics hardware/terminology and games platforms
- Advanced Graphics API features, hardware acceleration and the graphics pipeline.
- 3D transformations, perspective, hidden surface determination, illumination models, user interaction, reflections, shadows
- Texture mapping - bump, mipmap, hemisphere, texture baking.
- Particle systems
- Approaches taken to tackle real-time visual effects rendering - fog, water, rain, fire, lens flare
- Emerging methods and techniques used in generating realistic scenes
- Animation of graphical objects and characters
- Use of fractals in graphics, e.g. landscapes, compression
- Representing curves and surfaces

LEARNING AND TEACHING STRATEGY

Lectures, tutorials and demonstrations will be used throughout the module. Electronic handouts will be given on each topic covered via VLE.

The allocation of teaching to deliver the module is:

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

ASSESSMENT

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

Assessment Component 1 – Coursework - 50%

Synthesise a software solution that renders an animated graphical image or scene using appropriate algorithms and APIs.

Exemplar: 'Create your own 3D graphics render engine from first principles.'

Assessment Component 2 – Written exam (2 hours) – 50%

Devise and sustain the argument for the selection of graphic algorithms to be used in computer games.

Assessment Summary

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

BIBLIOGRAPHY

Essential

Rost, R.J, Licea-Kane, B (2011) OpenGL shading Language 3rd Edition, Addison Wesley.

Hearn, D and Baker, P.M (1986) Computer Graphics C Version, Prentice Hall

Foley, VanDam, Feiner, Hughes (1991), Computer Graphics: Principles and Practice 2nd edition, Addison Wesley

Background

Akenine-Moller, T and Haines, E, (2002), Real Time rendering. A.K Peters

Watt, Alan (1998) 3D Computer Graphics 2nd Edition, Addison Wesley

Van Verth, J.M, Bishop, L.M (2004) Essential Mathematics for Games and Interactive Applications. A Programmers Guide, Morgan Kaufmann

MODULE CODE: CSAC6001
M6X01084
TITLE: Advanced Routing
DATED: 03/06/2014

LEVEL: 6
CREDITS: 20

JACS CODE: I120

AIM(S)

- To study in depth the technical issues related to advance routing protocols. To have a detailed knowledge of interior and exterior gateway 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:

1. Demonstrate comprehensive and detailed knowledge of routing infrastructure within a WAN network.
2. Design, implement and test various routing protocols within a network
3. Demonstrate in depth theoretical understanding of interior and exterior routing protocols in an enterprise network.

INDICATIVE CONTENT

- Review of IP routing, static, dynamic and on-demand 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 routing for enterprise campus networks.
- IPv6 addressing, IPv6 tunnels, 6to4 tunnels.

LEARNING AND TEACHING STRATEGY

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

Tutorial classes will concentrate on the technical design

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

The allocation of teaching to deliver the module is:

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

ASSESSMENT

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

Assessment Component 1 – Written - 50%

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

Assessment Component 2 – Practical – 50%

This assessment will require students to implement and test complex routing protocols over WAN and LAN internetworks and this will be assessed by a lab based practical exam.

Assessment Summary

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

BIBLIOGRAPHY

Essential

D. Teare, (2010) *Implementing Cisco IP Routing (Route) foundation learning guide*, Cisco press.

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

Background

R. Graziani and A. Johnson, (2011) *Routing protocols and concepts: CCNA exploration companion guide*, Cisco Press.

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

Websites

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

MODULE CODE: CSAC6004
M6X01086
TITLE: Advanced Web Development
DATED: 03/06/2014

LEVEL: 6
CREDITS: 20

JACS CODE: I320

AIM(S)

- To extend the student's knowledge of current web development concepts, principles and techniques including deploying web development frameworks and/or application platforms in the construction of web applications using appropriate languages and tools.

LEARNING OUTCOMES

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

1. Develop a systematic understanding of the syntax, semantics, concepts and principles of web programming for complex web applications
2. Deploy web programming techniques, design patterns, frameworks and/or application platforms
3. Critically evaluate the techniques and technology used in the development of web applications

INDICATIVE CONTENT

- Asynchronous communications using AJAX, polling for data and COMET, data transfer formats including JSON and XML.
- JavaScript templates for dynamically inserting data into web pages e.g. Handlebars.js
- Object-oriented PHP and associated design patterns
- Model View Controller (MVC) design pattern, principles of framework development, PHP MVC Frameworks e.g. Yii, Cake PHP, etc., ASP.Net MVC, Symfony, Drupal and RESTful web services
- NoSQL databases e.g. MongoDB, Cassandra, etc
- Server-side development using Node.js

LEARNING AND TEACHING STRATEGY

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

The allocation of teaching to deliver the module is:

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

ASSESSMENT

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

Assessment Component 1 – Coursework – 50%

Develop an application that demonstrates an understanding of advanced web programming techniques discussed during the module.

Exemplar: 'Develop a web application using object-oriented PHP.'

Assessment Component 2 – Coursework - 50%

Develop an application that demonstrates an understanding of the techniques, web frameworks/platforms discussed during the module.

Exemplar: 'Develop a web application for an eCommerce store using a PHP framework.'

Assessment Summary

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

BIBLIOGRAPHY

Essential

Zandstra, M. (2010) *PHP Objects, Patterns and Practice 3rd Edition*, Apress

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Background

Flanagan, D. (2011) *JavaScript: The Definitive Guide*, O'Reilly.

Manricks, G. (2013) *Instant Handlebars.js*, Packt Publishing

Chodorow, K. (2013) *MongoDB: The Definitive Guide*, O'Reilly

Mikowski, M., Powell, J. (2013) *Single Page Web Applications*, Manning Publications

Kurtz, J. (2013) *ASP.Net MVC4 and the Web API: Building a REST Service from Start to Finish*, Apress

Journals

ACM *Transactions on Database Systems*

ACM Transactions on Internet Technology

The International World Wide Web Conference

Visual Software Journal

Web Developers Journal (online <http://www.WebDevelopersJournal.com>)

MODULE CODE: M6X01087
TITLE: Big Data
DATED: 03/06/2014

LEVEL: 6
CREDITS: 20

JACS CODE: I260

AIM(S)

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

LEARNING OUTCOMES

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

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

INDICATIVE CONTENT

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

LEARNING AND TEACHING STRATEGY

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

The allocation of teaching to deliver the module is:

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

ASSESSMENT

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

Assessment Component 1 – Written - 30%

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

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

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

Assessment Component 2 – Coursework – 70%

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

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

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

Assessment Summary

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

BIBLIOGRAPHY

Essential

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

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

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

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

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

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

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

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

Websites

<http://www.kimballgroup.com>

tkdd.acm.org

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

MODULE CODE: CSAC6003
M6X01088
TITLE: Business Information Systems
DATED: 03/06/2014

LEVEL: 6
CREDITS: 20

JACS CODE: I200

AIM(S)

- To provide students with a comprehensive and systematic understanding of the concepts underlying modern Business Intelligence Systems. The student's technical skills will be extended to allow them to extract Business Intelligence from a dataset using both data analysis and data mining tools.

LEARNING OUTCOMES

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

1. Synthesise a solution to a small data warehousing problem from a sound understanding of the role and capabilities of modern business information systems
2. Select and perform appropriate data analysis and reporting on data within a BIS and critically evaluate the results
3. Provide business intelligence through the creative application of appropriate data mining processes and the critical evaluation of their results.

INDICATIVE CONTENT

- Source systems, data warehouses and data marts; dimensional modelling
- Business requirements; roles within the development and operations teams
- ETL process; data cleaning
- Reporting systems; data presentation; dashboards
- Data analysis; OLAP cubes
- Data mining; clustering, classification, association

LEARNING AND TEACHING STRATEGY

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

The allocation of teaching to deliver the module is:

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

ASSESSMENT

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

Assessment Component 1 – Written - 30%

Critically review the technologies, architectures and use of business information systems.

Exemplar: 'Given a case study organisation, research and evaluate the technologies that the organisation might use for its operational business information system. From this, critically evaluate the options available to the organisation and recommend an appropriate combination of technology and data architecture that will meet their needs.'

Assessment Component 2 – Coursework – 70%

Design and produce business intelligence reports upon an example data warehouse using appropriate tools and techniques.

Exemplar:

'The data provided is an indicative sample of the type of data collected by a local company. Using this data you should do the following:

- Design and develop an appropriate data warehouse structure to store the data provided. You should justify all of your design decisions.
- Upload the data into your data warehouse, documenting the ETL process in a professional manner.
- Create a storyboard for a real-time management dashboard showing the current state of the company.
- Design, develop and critically evaluate OLAP reports that can be run to retrieve and display the following:
 - o The top 5 suppliers over a user-defined period
 - o The top 5 most profitable products over a user-defined period
 - o The top 5 costs in each department over a user-defined period.'

Assessment Summary

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

BIBLIOGRAPHY

Essential

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

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

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

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

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

Websites

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<http://tkdd.acm.org>

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

MODULE CODE: M6X01090
TITLE: Critical and Real-Time Application Programming
DATED: 03/06/2014

LEVEL: 6
CREDITS: 20

JACS CODE: I300

AIM(S)

- To provide students with a comprehensive understanding and knowledge of real-time systems, their applicability, including in the domain of safety critical systems, and methods utilised in their development and representation.

LEARNING OUTCOMES

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

1. Demonstrate a systematic understanding of the concepts of real-time systems and the role they play in the design of such systems
2. Undertake an informed discussion on the concepts related to the development of safety critical systems.

INDICATIVE CONTENT

- Hard/Soft real-time, Timing, Uniprocessor, Multiprocessor, Concurrency
- Processes, multi-tasking, threads, synchronisation and communication, semaphores, deadlock.
- Concurrency control mechanisms: two phase locking, time stamp ordering, resource matrices
- Scheduling, clocks, embedded systems
- Device IO, polling, signals, memory mapped devices
- Real-time Systems – Simple looping systems, cyclic executives, real-time executives RTOS etc.
- Design Approaches for Real-Time Systems (e.g. RT-UML, Ward-Mellor, JSD, HOOD, CSP, MASCOT, etc.)
- Formal logic, algebraic concepts and specifications; approaches to developing formal specification: Petri Nets, Z, VDM, etc.
- Safety Critical Systems Development (e.g. Safety Analysis, Hazard Analysis, Risk Analysis, Hazard Reduction, Development methods for Safety Critical Systems)

LEARNING AND TEACHING STRATEGY

Key ideas and concepts will be delivered through a formal mechanism such as lectures, which will allow students to gain the knowledge applicable to the module. Students will be encouraged to further research these and present their findings to groups of peers and the module tutor. Practical laboratories will be used to illuminate the concepts, theories and practices of real-time systems. Additionally, the use of case studies and the development of workable solutions to the problems encountered will encourage the students to develop their technical skills of design and development during practical workshop sessions.

The allocation of teaching to deliver the module is:

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

ASSESSMENT

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

Assessment Component 1 – Coursework - 50%

This assignment will allow the student to demonstrate his/her ability to employ design techniques/models through the development of a proposed set of models for both requirements and design to a given set of specifications and produce from this a working solution.

Exemplar: 'Design and implement a real-time system for controlling of a level crossing using suitable methods, technologies and tools.'

Assessment Component 2 – Coursework - 50%

The coursework will require the student to research critical systems and provide 'papers' that demonstrate an informed discussion into this.

Exemplar: 'Write a paper which details STPA, its foundations (STAMP and systems theory) and makes a case for its use over traditional even-chain models.'

Assessment Summary

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

BIBLIOGRAPHY

Essential

Douglass, B. P. (2014) *Real-time UML Workshop for Embedded Systems*, 2nd Ed., Newnes

Leveson, N. G. (2012) *Engineering a Safer World*, MIT Press

Background

Osharna, R., Kraeling, M. (2013) *Software Engineering for Embedded Systems*, Newnes

Bayle, J. (2013) *C Programming for Arduino*, PACKT Publishing

Abbot, D. (2012) *Linux for Embedded and Real-time Applications*, 3rd Ed., Newnes

Rierson, L. (2013) *Developing Safety Critical Software: A Practical Guide for Aviation and DO178C Compliance*, CRC Press

Hollnagel, E., Woods D. D., Leveson N. G. (2006) *Resilience Engineering: Concepts and Precepts*, Ashgate Publishing Ltd

Williams, R. (2006). *Real-time Systems Development*, Butterworth-Heinemann

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MODULE CODE: M6X01093
TITLE: Distributed and Cluster Computing
DATED: 03/06/2014

LEVEL: 6
CREDITS: 20

JACS CODE: I320

AIM(S)

- To provide the student with the major concepts involved in the implementation, testing and debugging of scalable distributed applications, with a focus on high performance scientific computing.

LEARNING OUTCOMES

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

1. Critically evaluate essential client/server principles to build, test and debug software in a scalable distributed or high-performance application.
2. Synthesise solutions to complex high-performance scientific computing problems through the design, development and deployment of a scalable application.

INDICATIVE CONTENT

- Service Oriented Architectures (SOA).
- Distributed system components for windows- and/or a web-based application (for example, DCOM, JavaBeans, Windows Communication Foundation, Web Services).
- Use of threads within distributed and scientific components.
- Message Passing Interface (MPI).
- Parallelism strategies, including mixed-mode parallelism.
- GPGPU processing.

LEARNING AND TEACHING STRATEGY

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

The allocation of teaching to deliver the module is:

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

ASSESSMENT

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

Assessment Component 1 – Coursework- 50%

The assessment will test theoretical understanding and application of concepts. The assessment will demand critical appraisal of appropriate literature and will focus on the development of an open-ended system. This system will be set in a general form; students should note that concepts and models are generic and may be applied to a variety of software implementations. Therefore, students will be given scope to self-select a topic area for the development of a piece of distributed software to demonstrate and underpin complex concepts described in the report.

Exemplar: 'Analysis and deployment of critical WCF concepts.'

Assessment Component 2 – Coursework – 50%

A provided case study requiring the completion and parallelism of software by the student for critical analysis. The assessment will test practical understanding and ability to implement a software solution for a specific scientific computing problem, then critically appraise their solution.

Assessment Summary

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

BIBLIOGRAPHY

Essential

Robert Daigneau (2011); *Service Design Patterns: Fundamental Design Solutions for SOAP/WSDL and RESTful Web Services*, Addison-Wesley

Joseph Albahari, Ben Albahari (2012); *C# 5.0 Pocket Reference: Instant Help for C# 5.0 Programmers*

William Gropp (2000); *Using MPI: Portable Parallel Programming with the Message-Passing Interface* (Scientific and Engineering Computation)

Background

Juval Lowy (2010); *Programming WCF Services: Mastering WCF and the Azure AppFabric Service Bus*

MODULE CODE: M6X01094
TITLE: Distributed Enterprise Applications
DATED: 03/06/2014

LEVEL: 6
CREDITS: 20

JACS CODE: I320

AIM(S)

- To provide the student with the major concepts involved in the implementation, testing and debugging of scalable, distributed applications.

LEARNING OUTCOMES

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

1. Critically appraise the major concepts, principles and practice to design distributed software components for use in enterprise services.
2. Demonstrate a comprehensive knowledge and understanding of complex client/server concepts, principles and tools to build, test, debug and critically evaluate software components in scalable, distributed applications.

INDICATIVE CONTENT

- Distributed system components for windows- and/or a web-based application (for example, DCOM, JavaBeans, Windows Communication Foundation, Web Services).
- Remote method execution between components and an application front-end (for example, RMI interface).
- Service Oriented Architectures (SOA).
- XML Web services (for example, XML standards).
- Use of threads within distributed components.
- Messaging and message queues for passing information

LEARNING AND TEACHING STRATEGY

Essential concepts and principles will be delivered formally in tutorials supported by concurrent practical laboratory exercises, which will allow students to deploy appropriate theory, practices and tools. Case-study industry based examples will be explored in detail to accentuate best-practice and commercial issues.

The allocation of teaching to deliver the module is:

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

ASSESSMENT

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

Assessment Component 1 – Coursework- 50%

Coursework report revolving around software created by the student for critical analysis. The assessment will test practical understanding and ability to implement a software solution for a specific distributed problem, then critically appraise their solution.

Exemplar: 'Distributed computing principles through Web Services.'

Assessment Component 2 – Coursework – 50%

The assessment will test theoretical understanding and application of concepts. The assessment will demand critical appraisal of appropriate literature and will focus on the development of an open-ended system. This system will be set in a general form; students should note that concepts and models are generic and may be applied to a variety of software implementations. Therefore, students will be given scope to self-select a topic area for the development of a piece of distributed software to demonstrate and underpin complex concepts described in the report.

Exemplar: 'Analysis and deployment of critical WCF concepts.'

Assessment Summary

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

BIBLIOGRAPHY

Essential

Robert Daigneau (2011) *Service Design Patterns: Fundamental Design Solutions for SOAP/WSDL and RESTful Web Services*, Addison-Wesley

Douglas K. Barry (2011) *Web Services, Service-Oriented Architectures, and Cloud Computing: The Savvy Manager's Guide*

Joseph Albahari, Ben Albahari (2012) *C# 5.0 Pocket Reference: Instant Help for C# 5.0 Programmers*

Background

Juval Lowy (2010) *Programming WCF Services: Mastering WCF and the Azure AppFabric Service Bus*

Liu Mike (2012) *WCF 4.5 Multi-Layer Services Development with Entity Framework*

MODULE CODE: M6X01096
TITLE: Emerging Web Technologies
DATED: 03/06/2014

LEVEL: 6
CREDITS: 20

JACS CODE: I160

AIM(S)

- To track the latest trends in web development and new methods for displaying and interacting with content. These technologies are emerging in the sense that they have not been fully adopted or have the potential to give rise to new ways of interacting with the Internet.

LEARNING OUTCOMES

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

1. Critically evaluate the application of an emerging technology, library, framework or programming technique that is novel to them in a specified loosely-defined scenario.
2. Creatively and innovatively apply the principles, concepts and techniques related to an emerging technology to solve a range of problems.

INDICATIVE CONTENT

- Advanced programming techniques e.g. object-oriented JavaScript, design patterns, parallel programming, delegates, events, LINQ, etc., flow based programming (e.g. NoFlo.js)
- Domain Specific Languages, preprocessors e.g. CoffeeScript, LESS and Sass
- JavaScript libraries and frameworks e.g. backbone.js, angular.js, knockout.js, ember.js, etc.
- Interacting with a server, WebSocket API, developing client and server applications, etc.
- HTML5 canvas and graphics. 2D and 3D principles including transformations, cameras, lighting, materials and shaders. Third-party graphics libraries e.g. three.js for WebGL, etc.
- Possible applications of augmented and virtual reality.
- Interactive devices including Lenovo Horizon Multimode Table PC, Google Glass, Oculus Rift, Leap Motion and Kinect controllers

LEARNING AND TEACHING STRATEGY

Essential concepts and principles will be delivered formally in tutorials supported by concurrent practical laboratory exercises, which will allow students to deploy appropriate theory, practices and tools. Seminars will be punctuated with examples designed to underpin the ideas and techniques introduced, reducing the conceptual leap from theory to practice. Through the tutorial, the student will be exposed to a variety of technologies and concepts to enable the student to select a technology for further study.

The allocation of teaching to deliver the module is:

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

ASSESSMENT

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

Assessment Component 1 – Coursework- 50%

Produce a written report that explains the types of applications of a technology/concept, evaluates the benefits and drawbacks of its usage, and the performance/appropriateness of the technology in a variety of scenarios. Alternatively, they may be asked to develop an application that demonstrates the effectiveness of a specified technology or group of technologies.

Exemplar: 'Develop a football team management web application using Backbone.js.'

Assessment Component 2 – Written - 50%

Critically evaluate principles and techniques that can be applied to a number of different scenarios.

Assessment Summary

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

BIBLIOGRAPHY

Essential

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Wang, V., Salim, F., Moskovits, P. (2013) *The Definitive Guide to HTML5 WebSocket*, Apress

Background

Matsuda, K., Lea, R. (2013) *WEBGL Programming Guide*, Addison-Wesley

Osmani, A. (2013) *Developing Backbone.js Applications*, O'Reilly

Green, B. (2013) *AngularJS*, O'Reilly

Osmani, A. (2012) *Learning JavaScript Design Patterns*, O'Reilly

Journals

ACM Transactions on Database Systems

ACM Transactions on Internet Technology

The International World Wide Web Conference

Visual Software Journal

Web Developers Journal (online <http://www.WebDevelopersJournal.com>)

MODULE CODE: M6X01097
TITLE: End User Computing
DATED: 03/06/2014

LEVEL: 6
CREDITS: 20

JACS CODE: I320

AIM(S)

- To encourage students to critically appraise the concept of End-User Computing as a means of overcoming the systems development backlog. By understanding the control issues involved in End-User Computing application development in a business environment they are encouraged to apply underlying concepts and principles of end-user application development and building a system using an appropriate fourth generation language.

LEARNING OUTCOMES

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

1. Show a critical understanding of the end-user computing environment and where and when it is appropriate.
2. Demonstrate a sound understanding of the essential programming concepts of a fourth generation language used to create software applications.

INDICATIVE CONTENT

- End-User Computing and where it is relevant.
- Investigation of the concepts and problems associated with end user computing.
- Good operational practice.
- Fourth generation language facilities and application domains.
- Design an appropriate control strategy for a given situation.
- Design appropriate standards for end-user application development.
- Demonstrate competence in the use of applications software and its customisation to meet user needs.
- Design and implement an end-user application from a given case study.

LEARNING AND TEACHING STRATEGY

Formal lectures together with accompanying handouts/slide presentations will be used to impart key ideas and concepts. Tutorials will enable students to develop technical skills in the development of end-user application software through use of fourth generation language.

The allocation of teaching to deliver the module is:

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

ASSESSMENT

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

Assessment Component 1 – Coursework- 40%

Evaluate EUC for a given business case. They will be expected to critically evaluate the current business scenario and demonstrate their understanding of EUC as a business solution.

Exemplar: 'Build a system using Excel and VBA to provide a solution for the Sustainable cycle stores booking and invoicing system'

Assessment Component 2 – Coursework – 60%

Demonstrate understanding of EUC in a practical sense by building a solution using a 4GL for the given business problem.

Exemplar: 'Build a system using Access and VBA to provide a solution for the Sustainable cycle stores booking and invoicing system. Write a brief report to compare the two systems'

Assessment Summary

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

BIBLIOGRAPHY

Essential

Patricia Cardoza, Teresa Hennig, Graham Seach, Armen Stein (2010) *Access 2010 VBA programmer's Reference*, John Wiley and Sons, Ltd.

Paul T. Kimmel, Stephen Bullen, John Green, Rob Bovey, Robert Rosenberg, Brian Patterson (2010) *Excel 2010 VBA Programmer's Reference*, John Wiley and Sons, Ltd

Background

Elmasri, R. and Navathe, S. (2010) *Fundamentals of Database Systems*, Addison Wesley

Patricia Ward (2008) 2nd edition, *Database Management Systems* Thomson Learning

MODULE CODE: M6X01098
TITLE: Geographical Information Systems
DATED: 03/06/2014

LEVEL: 6
CREDITS: 20

JACS CODE: F846

AIM(S)

- To develop the students' conceptual understanding of data collection and presentation in spatial terms. The student should develop a critical understanding of the underlying theories of GIS through examination of the origins of GIS and critical evaluation of current GIS software trends. A coherent understanding of visualisation is regarded as a key concept and will be developed throughout the module.

LEARNING OUTCOMES

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

1. Evaluate and critically appraise a variety of application areas, which could benefit from a GIS solution.
2. Demonstrate a conceptual understanding of visual perception and communications.
3. Accurately identify spatial databases and devise thematic mapping solutions.

INDICATIVE CONTENT

- Exploring the origins of GIS and cartographic representation.
- Identifying types of data involved in Geo-information systems.
- Fundamental theories of spatial databases and spatial analysis.
- Investigating attribute data management and attributes of spatial data sets.
- Analytical modelling in GIS.
- The principles of thematic mapping and data visualisation.
- Evaluating GIS within the organisation.
- Using GIS software for data analysis.
- Implementation of End-user software solutions using GIS add-ons.

LEARNING AND TEACHING STRATEGY

Key concepts and theoretical issues will be delivered through a formal mechanism such as lectures, which will allow the students to gain the knowledge applicable to this module. Students will be encouraged to explore these issues during tutorials and apply them to appropriate case studies pertaining to GIS and its use in industry. The development of workable solutions to problems encountered will encourage the student to develop their technical skills in developing practical GIS solutions.

The allocation of teaching to deliver the module is:

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

ASSESSMENT

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

Assessment Component 1 – Coursework- 50%

Write a research report on current trends in GIS evaluating end users perception of the software.

Exemplar: 'Write a research paper discussing the use of GIS to map the recent MMR outbreak in Swansea'

Assessment Component 2 – Coursework – 50%

Compare and contrast visual and non-visual database solutions. Build a prototype GIS application on a given theme, using appropriate software. Discuss the merits of using GIS software in contrast to non-spatial solutions.

Exemplar: 'Build a GIS to support a LBS application that maps the new university campus'

Assessment Summary

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

BIBLIOGRAPHY

Essential

Longley, P, Goodchild, M, Maguire, D, Rhind, D (2010) *Geographical Information Systems and Science*, Wiley

Heywood, I., Cornelius, S. and Carver, S. (2010) *An Introduction to Geographical Information Systems*, Prentice Hall

Background

Daniel, L., Loree, P. and Whitener, A. (2002) *Inside MapInfo Professional*, Onword Press,

Worboys, M. and Duckham, M. (2004) *GIS: A Computing Perspective, 2nd Edition*, Taylor and Francis

Whitener, A. (1997) *MapBasic Developers Guide*, Onword Press

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MODULE CODE: M6X01099
TITLE: High Performance Computing for Games and Visualisation
DATED: 03/06/2014

LEVEL: 6
CREDITS: 20

JACS CODE: I114

AIM(S)

- To provide the student with the necessary skills to undertake a critical evaluation of emerging technologies, methods and techniques used to model engaging and immersive game environments. It will also provide students with an ability to deploy solutions to solve complex problems using HPC technologies within a CGI and AI programming context.

LEARNING OUTCOMES

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

1. Critically review literature related to a proposed topic of study suitable for parallelisation using HPC techniques and produce a coherent academic paper relating the research undertaken to the proposed topic.
2. Demonstrate systematic use of established HPC approaches, software design methods and practical programming skills in the development of a parallelised software solution.

INDICATIVE CONTENT

- HPC principles
- Distributed systems, cluster farms
- Programming the GPGPU using suitable languages
- The lecturer will guide the student in the choice of suitable topics and algorithms suitable for implementation using HPC techniques for example topics in:-
- Natural phenomena and physical modelling
- Graphical simulation
- Stereoscopic methods and visual simulation
- Shader development
- Artificial Intelligence, modelling realistic AI agents

LEARNING AND TEACHING STRATEGY

Lectures will be used to deliver the concepts underpinning HPC methods and GPGPU programming techniques used in advanced games development. Tutorial work will be used to support research into selected algorithms and related HPC methods. Supervised practical sessions will be used to allow the student to develop software.

The allocation of teaching to deliver the module is:

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

ASSESSMENT

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

Assessment Component 1 – Coursework - 50%

Produce a written academic paper reviewing current literature related to a given topic.

Exemplar: 'Produce a written academic paper to appraise current literature related to a given topic.'

Assessment Component 2 – Coursework – 50%

Solve complex problems associated with parallelisation of real-time graphics algorithms

Exemplar: 'Synthesise a solution to solve complex problems associated with parallelisation of real-time graphics algorithms'

Assessment Summary

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

BIBLIOGRAPHY

Essential

Kochan, Stephen G. (2013) *Programming in C (Developer's Library) 4th Edition*, Addison Wesley

McGrath, M. (2009) *C Programming In Easy Steps 4th Edition*, In Easy Steps

Background

Russell, S and Norvig (2010) *P Artificial Intelligence: A Modern Approach (3rd Edition)*, Pearson

Hwu, Wen-Mei W W GPU (2011) *Computing Gems Emerald Edition*, Morgan Kaufmann

Websites

<http://www.acm.org>

<http://www.aigamedev.com>

http://www.nvidia.com/object/cuda_home_new.html

<http://developer.nvidia.com/cuda/cuda-education-training>

<http://www.ieee.org>

MODULE CODE: M6X01100
TITLE: Interactive Graphics Programming
DATED: 03/06/2014

LEVEL: 6
CREDITS: 20

JACS CODE: I700

AIM(S)

- To develop the students' conceptual understanding of the principles and techniques used in interactive computer graphics. It seeks to equip students with current ideas and practice in this field and emphasises the development of three dimensional, animated, graphical images and scenes using an appropriate programming language and APIs.

LEARNING OUTCOMES

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

1. Demonstrate a thorough and systematic understanding of techniques and algorithms used in generating 3D graphical images.
2. Deploy accurately an appropriate programming language and graphics library to develop three dimensional, interactive animated graphical scenes.

INDICATIVE CONTENT

- Linear Maths: Vectors and Matrices, etc relevant to Computer graphics
- 2D and 3D graphics primitives and object representation, supporting data structures
- Transformations and projections.
- Determining visibility, hidden line/surface removal and clipping
- Local and global illumination including shading, colour models, material properties, shadows, reflection.
- Interpolation
- Texture mapping
- Modelling
- Ray tracing, Ray Casting
- Representation of curves
- Rasterization
- Vision
- User interaction (e.g. mobile devices, pointing devices, touch screens, etc.)
- Animation, object picking, collision detection and response

LEARNING AND TEACHING STRATEGY

Key ideas and concepts will be delivered through a formal mechanism such as lectures, which will allow students to gain the knowledge applicable to the module. Additionally, the development of workable solutions to the problems encountered will encourage the students to develop their technical skills of design and development during practical workshop sessions. This will involve programming using suitable software, SDKs and APIs.

The allocation of teaching to deliver the module is:

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

ASSESSMENT

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

Assessment Component 1 – Coursework - 60%

Students will demonstrate a thorough understanding of appropriate graphics concepts and programming skills and will focus on the development of useable graphics applications for PC or mobile devices. The student will implement an interactive graphics scene using an appropriate programming language and APIs with an accompanying report.

Exemplar:

“Implementation of an interactive museum exhibition using 3D graphics programming techniques.”

Assessment Component 2 – Written – 40%

An examination testing theoretical understanding and application of mathematical and graphics concepts. For example, students will demonstrate accurate use of mathematical and algorithmic techniques used in generating a graphical image.

Assessment Summary

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

BIBLIOGRAPHY

Essential

Hearn, D. and Baker, M.D. (2004) *Computer Graphics, 2nd edition*, Addison-Wesley

Dave Shreiner, D, et al, (2013) *OpenGL Programming Guide, 8th Edition*, Addison-Wesley (2013)

Background

Hill, F.S. (2008) *Computer Graphics using OpenGL, 3rd Edition*, Prentice Hall International Inc.

Websites

<http://www.acm.org>

<http://www.flipcode.com>

<http://www.gamedev.net>

<http://www.siggraph.org>

<http://www.gamastura.com>

<http://www.khronos.org/opengles/>

MODULE CODE: M6X01102
TITLE: Managing People and Change
DATED: 03/06/2014

LEVEL: 6
CREDITS: 20

JACS CODE: N600

AIM(S)

- To evaluate the issues involved in the management of people and change initiatives in business. The student will consider the management of people in the workplace for the improvement of organisational and individual efficiency and effectiveness, with particular emphasis on Human Resource Management and the management of change. The module will exemplify best practices associated with various HR initiatives such as recruitment and selection, learning and development, employee engagement, job satisfaction and change management.

LEARNING OUTCOMES

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

1. Critically evaluate various HRM initiatives to understand how they improve organisational and employee performance.
2. Critically appraise and synthesise change management concepts and strategies in order to create a socially responsible change management plan.

INDICATIVE CONTENT

- Management ethics and corporate social responsibility.
- Human resource initiatives: for example, work-life balance, managing diversity, training and continuing professional development, performance evaluation, recruitment/selection, working with trades unions.
- Work schedule options such as flexible working, job sharing, home working/telecommuting.
- Work design and technology: for example, business process re-engineering, work redesign options such as job rotation, job enlargement, job enrichment.
- Contemporary change issues for today's managers: for example, stimulating organisational innovation, building a learning organisation, knowledge management systems.
- Stimulants/drivers for change: for example, technology, sustainability issues, nature of the workforce, social trends, competition, etc.
- Sources of individual and organisational resistance to change and tactics to overcome the resistance.
- Approaches to managing change: for example, planned versus emergent change, Lewin's force field analysis and three step model, action research, organisational development.
- Structure, culture and human resource policies and their impact on change initiatives.
- Professional Legal and ethical issues related to employment, working conditions, health and safety, organisation responsibility, sustainability issues.

LEARNING AND TEACHING STRATEGY

The conceptual and theoretical models are suited to delivery during weekly lectures. However, for the exploration of these topics and their application to organisational case

studies pertaining to management of people and change, tutorials are the most appropriate strategy. It is envisaged that the learning environment will be highly interactive and participative, seeking to use and build on students experiences. Discussions, simulations, case studies and video materials will be used to develop conceptual, analytical and decision making skills relevant to up-to-date real-world scenarios.

The allocation of teaching to deliver the module is:

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

ASSESSMENT

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

Assessment Component 1 – Coursework - 50%

Evaluate and document the effects of human resource management policies and initiatives on individual, group and/or organisational performance. Write a report that evaluates the rationale for, and the benefits and limitations associated with selected human resource management policies and initiatives.

Exemplar: 'Research a new HR initiative and produce a report which highlights the benefits to employees and the Organisation.'

Assessment Component 2 – Coursework - 50%

Evaluate relevant change initiatives in organisation/s to enhance individual, group and/or organisational performance and document the evaluation. Produce a set of recommendations to minimise resistance to change.

Exemplar: 'Write a professional report that evaluates change management concepts strategies and practices in order to create a change management plan.'

Assessment Summary

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

BIBLIOGRAPHY

Essential

Redman, T. and Wilkinson, A. (2013) 4th Edition, *Contemporary Human Resource Management: Text and Cases*, FT Press: Harlow.

Hayes, J., (2010) 3rd edition, *The Theory and Practice of Change Management*. Palgrave Macmillan.

Background

Holbeche, L and Matthews, G. (2012) Engaged: *Unleashing your Organisation's Potential Through Employee Engagement*. Financial Times/Prentice Hall.

Mullins, L. J. (2013) *Management and Organisational Behaviour*. Harlow: FT Publishing International.

Sibbet, D., (2013) *Visual Leaders: New Tools for Visioning, Management, and Organization Change: New Tools for Visioning, Management, and Organizational Change*. John Wiley and Sons.

Truss, C., Mankin, D., Kelliher, C., (2012) 1st edition, *Strategic Human Resource Management*. OUP Oxford.

Foot, M. and Hook, M. (2011) 6th Edition, *Introducing Human Resource Management*. FT Press: Harlow.

Marchington, M. and Wilkinson, A. (2012) 5th Edition, *Human Resource Management at Work*. CIPD: London.

MacLeod, D and Brady, C. (2007) *The Extra Mile: How to Engage Your People to Win*. Financial Times/ Prentice Hall.

Beardwell, J. and Claydon, T. (2010) 6th edition, *Human Resource Management: A Contemporary Approach*. Financial Times/ Prentice Hall.

Martin, M and Jackson, T. (2005) *Personnel in Practice*. CIPD

Journals

Human Resource Management Journal
Journal of Management Studies
Journal of Organisational Behaviour
Journal of Organisational Change Management
Management Review
Management Today
People Management
Personnel Review
Personnel Today

Websites

<http://www.cipd.co.uk>
<http://businesscasestudies.co.uk>
<http://www.businessballs.com>
<http://360.datamonitor.com/>
<http://www.businesslink.gov.uk>
<http://www.bized.co.uk>

<http://juno.emeraldinsight.com>

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

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

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

<http://www.ordnancesurvey.co.uk/oswebsite/>

<http://ukdataservice.ac.uk/>

<http://digimap.edina.ac.uk/digimap/home>

MODULE CODE: M6X01105
TITLE: Network Multiplayer Games
DATED: 03/06/2014

LEVEL: 6
CREDITS: 20

JACS CODE: I610

AIM(S)

- To provide a requisite understanding of the key principles and techniques of networked multiplayer game programming, and the development of game clients and servers. Students will gain an appreciation of networking principles, technology, protocols, services and the performance limitations of networking. In addition, the concepts and techniques of multi-processing/threading and web development will be covered.

LEARNING OUTCOMES

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

1. Conceptualise the architecture, technology and protocols used in networked multiplayer games.
2. Critically evaluate the principles, concepts and techniques, and justify their use in the implementation of real-time networked multi-user and web applications
3. Deploy appropriate methods and techniques in the development of aspects of a multiplayer game, management tool and web application.

INDICATIVE CONTENT

- Architecture of a networked multiplayer game
- Networking principles and technology e.g.
 - OSI 7 layers, TCP, UDP
 - LAN and WAN
 - Routers, bridges, hubs, collision and broadcast domains
- Network programming e.g. BSD sockets. Including UDP/TCP clients and servers, byte ordering, etc.
- Optimization of multiplayer games including performance issues and dead reckoning.
- Real-time multiplayer/multiuser development with particular focus on multithreading and processing, including critical regions, mutexes, semaphores, etc
- Web development for remote access and management e.g. web based management tools for game server
- Web services and database management e.g. database storage of player details

LEARNING AND TEACHING STRATEGY

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

The allocation of teaching to deliver the module is:

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

ASSESSMENT

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

Assessment Component 1 – Coursework - 50%

Implementing an aspect of a multiplayer game and a web application. Evaluate the benefits and drawbacks of applying networked multithreaded principles and techniques in a variety of multiplayer game scenarios

Exemplar: 'Develop a multiplayer network game of your choice.'

Assessment Component 2 – Written - 50%

Discuss the concepts of network theory, and technology in a written examination.

Assessment Summary

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

BIBLIOGRAPHY

Essential

Steed, A. (2010) *Networked Graphics: Building Networked Games and Virtual Environments*, Morgan Kaufmann

Williams, A. (2012) *C++ Concurrency in Action: Practical Multithreading*, Manning Publications

Background

Tanenbaum, A.S., Wetherall, D.J. (2010) *Computer Networks, Fifth Edition*, Prentice Hall

Armitage, G., Claypool, M., Branch, P. (2006) *Networking and Online Games: Understanding and Engineering Multiplayer Internet Games*, Wiley-Blackwell

Hughes, C. (2008) Hughes, T., *Professional Multicore Programming: Design and Implementation for C++ Developers*, John Wiley and Sons

Quinn, B., Shute, D. (2011) *Windows Sockets Network Programming*, Addison-Wesley

Stevens, W.R. (2012) *UNIX Network Programming: v. 2: Interprocess Communications*, Prentice Hall

Journals

ACM: Computers in Entertainment

ACM: Workshop Proceedings on Network and System Support for Games

Journal of Games Development

Journal of Virtual Environments

MODULE CODE: M6X01108
TITLE: Shader Development
DATED: 03/06/2014

LEVEL: 6
CREDITS: 20

JACS CODE: I700

AIM(S)

- To critically evaluate hardware accelerated GPGPU programming paradigms with respect to real-time visualisation tools development

LEARNING OUTCOMES

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

1. Critically analyse existing techniques and approaches used in the computer graphics and VFX pipelines
2. Synthesise appropriate techniques and algorithms using GPGPU programming to solve a given problem

INDICATIVE CONTENT

- GPGPU - hardware acceleration
- VFX graphics pipeline
- Programming the GPGPU using suitable languages
- Real-time / Off-line rendering paradigms
- Shader development - surface, displacement, light, volume and image shaders
- Texture mapping / baking
- Particle / fluid systems

LEARNING AND TEACHING STRATEGY

Lectures, tutorials and demonstrations will be used throughout the module. Electronic handouts will be given on each topic covered via VLE.

The allocation of teaching to deliver the module is:

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

ASSESSMENT

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

Assessment Component 1 – Coursework - 60%

Devise and sustain the arguments for the use of a GPGPU programming language within an existing VFX pipeline.

Exemplar: 'Synthesize a solution to a complex graphics problem using an appropriate shader language within an existing VFX pipeline'

Assessment Component 2 – Practical - 40%

Select an appropriate GPGPU programming language and SDK together with associated hardware and implement algorithms/techniques to solve a complex problem

Assessment Summary

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

BIBLIOGRAPHY

Essential

Rost, R.J, Licea-Kane, B (2010), *OpenGL Shading Language Third Edition*, Addison Wesley.

Apodaca A.A and Gritz L (2000) *Advanced Renderman. Creating CGI for Motion Pictures*, Academic Press

Upstill S (1992), *The Renderman Companion*, Addison Wesley

Background

Wen-Mei W.H (2011) *GPU Computing Gems. Emerald Edition*, Morgan Kaufmann

Fernando R (2004), *GPU Gems. Programming Techniques, Tips, and Tricks for Real-Time Graphics*, Addison Wesley

Pharr M (2005) *GPU Gems 2. Programming Techniques for High Performance Graphics and General-Purpose Computation*, Addison Wesley

Nguyen H (2008) *GPU Gems 3*, Addison Wesley

MODULE CODE: M6X01110
TITLE: Usability Engineering
DATED: 03/06/2014

LEVEL: 6
CREDITS: 20

JACS CODE: I140

AIM(S)

- To build upon students' interface design skills to give the ability to apply and analyse techniques of usability engineering.

LEARNING OUTCOMES

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

1. Research and evaluate cognitive and social information processing
2. Select, apply and analyse critically techniques of interface evaluation
3. Synthesize a solution to a complex design problem from the concepts and principles of usability engineering and software development
4. Critically analyse input and output hardware appropriate for specialised applications, for example for use by disabled people, and for three-dimensional modeling applications

INDICATIVE CONTENT

- Cognitive aspects of information: perception: sensory inputs and the human memory system; concept formation and knowledge representation; cognitive processing: attention, reasoning,
- The social aspect of information: semiotics and language; verbal and non-verbal languages
- Interface evaluation methods (for example, observation, verbal protocol analysis, structured expert reviewing).
- The scope and role of usability engineering methods (for example, task analysis, GOMS, communicating sequential processes).
- Usability engineering methodologies to create a suitable interface and their relation to the software design process.
- I/O devices for specialised design needs (for example, 3-dimensional interfaces and interfaces for users with disabilities).

LEARNING AND TEACHING STRATEGY

The course will be delivered by a one-hour lecture each week to present key ideas. Students will be expected to read widely papers relevant to the subject area, and to build on their skills using hardware and software. Weekly tutorials will be used to discuss papers and case studies, and to introduce the use of appropriate hardware and software.

The allocation of teaching to deliver the module is:

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

ASSESSMENT

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

Assessment Component 1 – Written exam - 50%

Apply analysis of cognitive processing in interface design scenarios. Demonstrate the ability to make judgements in the application of cognitive and social psychology to a given interface design scenario.

Assessment Component 2 – Coursework - 50%

Demonstrate a critical awareness of usability engineering issues and synthesise usability engineering and software issues within a particular context.

Exemplar: 'Design and develop a prototype mobile application applying persuasive technology (for example a diet and exercise application).'

Assessment Summary

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

BIBLIOGRAPHY

Essential

Shneiderman,B and Plaisant, C (2013) *Designing the User Interface: Strategies for Effective Human-Computer Interaction (5th Edition)*, Addison-Wesley Publishing Co

Background

Rogers Y, Sharp, H, & Preece, J (2011) *Interaction Design: Beyond Human-Computer Interaction. 3rd Edition*, John Wiley & Sons, Inc

Lazar, J., Fend, JH and Hochheiser, H (2011) *Research Methods in Human-Computer Interaction*, Wiley

Beynon, D (2013) *Designing Interactive Systems: A Comprehensive Guide to HCI, UX and Interaction Design*, Pearson

Jacko, Julie A (2012) *The Human-Computer Interaction Handbook. (3rd Edition)* CRC Press

Buxton, B. (2011) *Sketching User Experiences: The Workbook*, Morgan Kaufmann

Journals

BCS Human Computer Interaction Group Proceedings

ACM Publications: Communications, Interactions, SIGCHI

Websites

<http://www.usability.gov/>

<http://www.w3.org/standards/webdesign/accessibility> Web accessibility standards

<http://www.nngroup.com/articles/> Short usability articles from Jacob Neilson

<http://msdn.microsoft.com/en-us/library/windows/desktop/aa511283.aspx>

MODULE CODE: M6X01111
TITLE: User Experience Design
DATED: 03/06/2014

LEVEL: 6
CREDITS: 20

JACS CODE: I140

AIM(S)

- To support students in the development of pervasive and engaging user experiences, in particular those focussed on media-rich multi-modal interaction with ubiquitous and personal computing devices. Students will gain experience of prototyping and testing of single-user and multi-user interactions within a web environment.

LEARNING OUTCOMES

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

1. Critically reflect upon current design practice, selecting appropriate techniques and technologies for a wide range of interactions.
2. Research user needs within both personal and social interactivity spheres for unconstrained problems.
3. Select and apply appropriate UX methodologies and good practices to prototype innovative interaction within a social context.
4. Critically analyse and reflect upon the results of UX testing.

INDICATIVE CONTENT

- Principles and techniques of UX/user-centred design; best practices; criticisms
- Human beings; ergonomics, psychophysics, psychology, perception and cognition
- UX Elements; visual design, information architecture, interaction design, usability, multimodality
- Interaction requirements; social and emotional requirements; single-user and multi-user interactions
- Prototyping, modeling, patterns, personae; scenarios; gamification
- UX testing; designing and running testing workshops

LEARNING AND TEACHING STRATEGY

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

The allocation of teaching to deliver the module is:

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

ASSESSMENT

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

Assessment Component 1 – Written - 30%

Critically review the physiological and psychological requirements of UX design.

Exemplar: 'For two of the given case study examples, critically review, compare and contrast the physiological and psychological requirements placed upon the user by the two examples. Identify any problems that are raised by these examples and suggest solutions for them that are applicable to both ordinary- and extraordinary users.'

Assessment Component 2 – Coursework - 70%

Perform extensive UX testing on applications and devices to produce reports that critically evaluate their strengths and weaknesses and provide recommendations for further improvement.

Exemplar:

'For any two of the mobile devices listed, perform a professional-level usability analysis of two of the applications listed. This analysis should consider task analysis, heuristic analysis and scenario-based user testing, and should critically compare the usability of the different versions of the software. Potential problems should be identified and creative solutions suggested for these based upon your knowledge of both theoretical principles and current design practices.'

Assessment Summary

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

BIBLIOGRAPHY

Essential

Beynon, D. (2013), *Designing Interactive Systems (3rd Ed.)*. Pearson.

Krug, S. (2013), *Don't Make me Think Revisited*. Voices That Matter.

Norman, D. (2013), *The Design of Everyday Things (revised and expanded edition)*. MIT Press.

Background

Caddick, R. and Cable, S. (2011), *Communicating the User Experience: A Practical Guide for Creating Useful UX Documentation*. Wiley.

Garrett, J.J. (2010), *The Elements of User Experience*. Voices That Matter

Kumar, J.M. and Herger, M. (2013), *Gamification at Work: Designing Engaging Business Software*. The Interaction Design Foundation.

Soegaard, M and Dam, R.D. (Eds.) (2013), *Encyclopedia of Human-Computer Interaction* (2nd Ed). The Interaction Design Foundation.

Unger, R. and Chandler, C. (2012), *A Project Guide To UX Design*. Voices That Matter.

Journals

ACM Transactions on Computer-Human Interaction

ACM Transactions on Graphics

IEEE Explore

IEEE Spectrum

IEEE Transactions on Human-Machine Systems

IEEE Transactions on Systems, Men and Cybernetics

IEEE Transactions on Visualisation and Computer Graphics

Websites

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

<http://www.usability.gov/>

<http://www.interaction-design.org/>

MODULE CODE: CSAC6002
M6X01113
TITLE: Wide Area Networks
DATED: 03/06/2014

LEVEL: 6
CREDITS: 20

JACS CODE: I120

AIM(S)

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

LEARNING OUTCOMES

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

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

INDICATIVE CONTENT

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

LEARNING AND TEACHING STRATEGY

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

Tutorial classes will concentrate on the technical design

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

The allocation of teaching to deliver the module is:

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

ASSESSMENT

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

Assessment Component 1 – Written - 50%

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

Assessment Component 3 – Practical- 50%

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

Assessment Summary

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

BIBLIOGRAPHY

Essential

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

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

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

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

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

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

Websites

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