

MODULE DIRECTORY

LEVEL 5

ACADEMIC DISCIPLINE OF COMPUTING

WALES INSTITUTE OF SCIENCE & ART

2022-2023

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INTRODUCTION

This Module Directory includes all the modules for Level 5 within the Academic Discipline of Computing in the academic year 2022-2023.

This directory accompanies the Programme of Study Handbook, which will provide you with details of which modules you will be studying for your programme this year in the 'Programme of Study' section. This directory may include modules that are running on other programmes of study within your Academic Discipline/Institute. If you require assistance in identifying the modules for your programme of study, please contact the Programme Manager (whose name and contact details are provided in the accompanying Programme of Study Handbook), or the relevant Institute 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	ACCA5023
Title	Network Operating Systems and Services
Date	09/09/2020
Level	5
Credits	20
Pre-Requisites	None

AIM(S)

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

LEARNING OUTCOMES

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

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

INDICATIVE CONTENT

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

- Monitoring programs: use of network monitoring and management tools/protocols.
- Network penetration testing as pertains to the services explored.
- Legal, social and ethical issues.

Study Time Allocation

The study time for the module is divided as follows:

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

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Coursework	2500 words	50%

Assessment Component 2

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Coursework	2500 words	50%

Assessment Summary

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

INDICATIVE READING LIST

Module Code	ACCA5023	
Module Title	Network Operating Systems and Services	
Classification	Reading List entry	Electronic*
Essential	Bekim Dauti (2019) Windows Server 2019 Administration Fundamentals: A beginner's guide to managing and administering Windows Server environments, 2nd Edition. Packt Publishing	☐
Essential	Evi Nemeth et al. (2017) UNIX and Linux System Administration Handbook. Addison Wesley	☐
Further	ACM	☒

Further	IEEE	☒
Further	Computer Networking	☒
Further	Data Communications	☒

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

AIM(S)

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

LEARNING OUTCOMES

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

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

INDICATIVE CONTENT

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

Study Time Allocation

The study time for the module is divided as follows:

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

ASSESSMENT

Assessment Component 1

☐ Written exam ☐ Coursework ☒ Practical

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

Assessment Component 2

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Online test	1 hour	25%

Assessment Summary

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

INDICATIVE READING LIST

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

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

AIM(S)

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

LEARNING OUTCOMES

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

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

INDICATIVE CONTENT

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

Study Time Allocation

The study time for the module is divided as follows:

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

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Essay	2500 words	50%

Assessment Component 2

☐ Written exam ☒ Coursework ☐ Practical

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

Assessment Summary

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

INDICATIVE READING LIST

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

Module Code	ACCA5026
Title	Databases and Application Development
Date	09/09/2020
Level	5
Credits	20
Pre-Requisites	None

AIM(S)

- To provide students with a systematic understanding of the concepts underlying the design and development of databases and data applications for real-world problems.

LEARNING OUTCOMES

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

- Critically evaluate the concepts, technologies and techniques used in the design and development of databases and data applications.
- Select and deploy appropriate concepts, technologies and techniques to design and implement database solutions and backend data applications for real-world problem scenarios.

INDICATIVE CONTENT

- Relational database concepts e.g. data independence, normalisation techniques, transaction management.
- Database query languages e.g. Structured Query Language (SQL).
- NoSQL and NewSQL database concepts.
- Data models e.g. entity-relationship, object-oriented, object-relational, and NoSQL models.
- Software programming languages, development libraries, frameworks, object-oriented design methods, design patterns, and architectural models for data applications.
- Data access, management and manipulation techniques, options for preserving data and dynamic data content, and displaying data user interfaces and views.
- Security, authorisation and authentication measures in databases and data applications.
- Testing, debugging, and evaluation techniques and tools.

Study Time Allocation

The study time for the module is divided as follows:

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

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Portfolio	6 - 8 elements	100%

Assessment Summary

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

INDICATIVE READING LIST

Module Code	ACCA5026	
Module Title	Databases and Application Development	
Classification	Reading List entry	Electronic*
Essential	Connolly, T., Begg, C., 2015, <i>Database Systems: A Practical Approach to Design, Implementation and Management</i> , 6th Edition, Addison Wesley	☒
Essential	Viescas, J. L., 2018, <i>SQL Queries for Mere Mortals: A Hands-On Guide to Data Manipulation in SQL</i> , 4 th Edition, Addison-Wesley Professional	☒
Essential	Joshi, B., 2019, <i>Beginning Database Programming Using ASP.NET Core 3: With MVC, Razor Pages, Web API, jQuery, Angular, SQL Server, and NoSQL</i> , Apress	☒
Further	Freeman, A., 2020, <i>Pro ASP.NET Core 3: Develop Cloud-Ready Web Applications Using MVC 3, Blazor, and Razor Pages</i> , 8 th Edition, Apress	☒
Further	Lock, A., 2018, <i>ASP.NET Core in Action</i> , Manning Pub	☒
Further	Kleppmann, M., 2017, <i>Designing Data-Intensive Applications: The Big Ideas Behind Reliable, Scalable, and Maintainable Systems</i> , O'Reilly Media	☒
Further	Sharp, J., 2018, <i>Microsoft Visual C# Step by Step</i> (9th Edition), Microsoft Press	☒
Further	Troelsen, A., Japiske, P., 2017, <i>Pro C# 7: With .NET and .NET Core</i> , 8 th Edition, Apress	☒

Module Code	ACCA5027
Title	Geographical Information Systems
Date	09/09/2020
Level	5
Credits	20
Pre-Requisites	None

AIM(S)

- To introduce the student to the science technology and management of geographical information. The student should develop a critical understanding of the underlying theories of GIS through examination of current GIS software trends. A coherent understanding of geovisualisation 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:

- Evaluate and critically appraise a variety of application areas, which could benefit from a GIS solution.
- Demonstrate a conceptual understanding of visual perception and communications.
- Accurately identify spatial databases and understand the concepts of manipulating and representing spatial data solutions.

INDICATIVE CONTENT

- Identifying types of data involved in Geo-information systems including DIGIMAP.
- Fundamental theories of spatial databases and spatial analysis including SQL.
- Geovisualisation and cartographic representation of sociodemographic data.
- The principles of thematic mapping and attributes of spatial data sets.
- Evaluating usage of GIS within the organisations including location-based services, location intelligence and epidemiology studies.
- Using appropriate GIS software for data analysis.
- Development of end user GIS applications

Study Time Allocation

The study time for the module is divided as follows:

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

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Research Report	2500 words	50%

Assessment Component 2

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Report / Demo	2500 words	50%

Assessment Summary

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

INDICATIVE READING LIST

Module Code	ACCA5027	
Module Title	Geographical Information Systems	
Classification	Reading List entry	Electronic*
Essential	Longley, P, Goodchild, M, Maguire, D, Rhind, D (2015) <i>Geographical Information Systems and Science</i> , Wiley	☒
Essential	Heywood, I., Cornelius, S. and Carver, S. (2011) <i>An Introduction to Geographical Information Systems</i> , Prentice Hall	☒
Further	Daniel, L., Loree, P. and Whitener, A. (2002) <i>Inside MapInfo Professional</i> , Onward Press,	☐
Further	Worboys, M. and Duckham, M. (2004)	☐
Further	Whitener, A. (1997) <i>MapBasic Developers Guide</i> , Onword Press	☐
Further	http://www.mapinfo.co.uk	☒
Further	http://www.agi.org.uk/	☒
Further	http://www.ordnancesurvey.co.uk/oswebsite/	☒
Further	http://ukdataservice.ac.uk/	☒
Further	http://digimap.edina.ac.uk/digimap/home	☒

Module Code	ACCA5028
Title	Indie Game Development
Date	09/09/2020
Level	5
Credits	20
Pre-Requisites	None

AIM(S)

- To synthesise software development concepts and the principles and techniques of games development with the aim of producing an independent (indie) game artefact.

LEARNING OUTCOMES

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

- Develop a systematic understanding of the principles, concepts, and techniques used in the development of games.
- Synthesise and deploy appropriate technologies, software programming techniques, design patterns, frameworks, and games engine platforms in the development of indie games.

INDICATIVE CONTENT

- Fundamentals of games development, such as concept development, gameplay design, core mechanics, user interfaces, game characters, storytelling, AI techniques, etc.
- Games development engines, e.g. Unity, Unreal, for developing cross-platform and mobile games.
- Frameworks and software design patterns for common problems in games development.
- Data persistence techniques for saving and loading data between sessions in games, e.g. JSON, serialisation and deserialization.
- Testing, debugging, and evaluation. Optimisation and performance techniques.

Study Time Allocation

The study time for the module is divided as follows:

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

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Portfolio	6 - 8 elements	100%

Assessment Summary

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

INDICATIVE READING LIST

Module Code	ACCA5028	
Module Title	Indie Game Development	
Classification	Reading List entry	Electronic*
Essential	Adams, E., 2013, <i>Fundamentals of Game Design</i> , 3 rd Edition, New Riders	☒
Essential	Bond, J. B., 2017, <i>Introduction to Game Design, Prototyping, and Development: From Concept to Playable Game with Unity and C#</i> , 2 nd Edition, Addison-Wesley Professional	☒
Essential	Hocking, J., 2018, <i>Unity in Action: Multiplatform game development in C#</i> , 2 nd Edition, Manning Publications	☒
Further	Nystrom, R., 2014, <i>Game Programming Patterns</i> , Genever Benning	☒
Further	Baron, D., 2019, <i>Hands-On Game Development Patterns with Unity 2019: Create engaging games by using industry-standard design patterns with C#</i> , Packt Publishing	☒
Further	Daglow, D. L., 2018, <i>Indie Games: From Dream to Delivery</i> , Sausalito Media LLC	☒
Further	Chandler, H. M., Chandler, R., 2010, <i>Fundamentals of Game Development</i> , Jones & Bartlett Learning	☐
Further	Felicia, P., 2019, <i>Unity from Zero to Proficiency (Beginner): A Step-by-step guide to coding your first game</i>	☒

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

AIM(S)

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

LEARNING OUTCOMES

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

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

INDICATIVE CONTENT

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

Study Time Allocation

The study time for the module is divided as follows:

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

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

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

Assessment Component 2

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Essay	2500 words	50%

Assessment Summary

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

INDICATIVE READING LIST

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

Module Code	ACCA5030
Title	Software Engineering Principles and Testing
Date	09/09/2020
Level	5
Credits	20
Pre-Requisites	None

AIM(S)

- To enable students to evaluate and deploy appropriate software methodologies, software development methods, tools and techniques in the design and testing of software.

LEARNING OUTCOMES

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

- Evaluate software development approaches, software development methodologies, software design techniques and approaches for collaborative working
- Recognise the importance of software testing and demonstrate knowledge of the essential principles of test development
- Apply effective judgement in the selection and deployment of software development principles and techniques in the implementation of software

INDICATIVE CONTENT

- Software development process and approaches e.g. Software Development Life-Cycle (SDLC), Agile, SCRUM
- Software development methodologies and approaches e.g. Waterfall, Spiral, Iterative Development, RUP
- Software development methods e.g. Feature Driven Development
- Software design methods e.g. User Stories vs Use Cases, Class Diagrams
- Software quality and complexity e.g. coding standards, Cyclomatic complexity
- Software development tools e.g. UML design tools, code coverage tools, software configuration management (SCM)
- Essential software testing principles and concepts e.g. Black Box vs White Box, Unit Testing
- Software test frameworks
- Software design principles and patterns e.g. cohesion vs coupling, Decorator Pattern

Study Time Allocation

The study time for the module is divided as follows:

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

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Essay and Implementation	5000 words equivalent	100%

Assessment Summary

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

INDICATIVE READING LIST

Module Code	ACCA5030	
Module Title	Software Engineering Principles and Testing	
Classification	Reading List entry	Electronic*
Essential	Sommerville, I. (2015), Software Engineering, , Pearson	☒
Essential	Ammann, P., Offutt, J., (2016) Introduction to Software Testing, 2 nd Edition, Cambridge University Press	☒
Further	Gamma, E., Helm, R. Johnson, R., Vlissides, J., (1994), Design patterns : elements of reusable object-oriented software, Addison Wesley	☒
Further	Crispin, L., (2008), Agile Testing: A Practical Guide for Testers and Agile Teams, Addison-Wesley	☒
Further	Martin, R., (2008), Clean Code: A Handbook of Agile Software Craftsmanship, Prentice Hall	☒
Further	Langr, J., (2013), Modern C++ Programming with Test-Driven Development: Code Better, Sleep Better, Pragmatic Bookshelf	☒
Further	Sutherland, J., (2015) Scrum: The Art of Doing Twice the Work in Half the Time, Random House Business	☒

Module Code	ACCA5031
Title	Web and Mobile Technologies
Date	09/09/2020
Level	5
Credits	20
Pre-Requisites	None

AIM(S)

- To provide students with a systematic understanding of web and mobile using client- and server-side technologies.

LEARNING OUTCOMES

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

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

INDICATIVE CONTENT

- Client-side scripting languages eg JavaScript
- Server-side programming languages eg PHP
- Syntax, semantics, constructs including data types, variables, operators, arrays, lists etc.
- Web-based database programming techniques providing typical CRUD functionality
- Reading and validating data from web forms eg cleaning data, string processing
- Handling stateless HTTP eg cookies, sessions
- Dynamic content eg time-driven events
- Use of web-based data for different audiences eg mobile applications
- Programming for mobile applications
- Use of cross-platform techniques for mobile applications
- The DOM

Study Time Allocation

The study time for the module is divided as follows:

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

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Coursework	2000 words equivalent	50%

Assessment Component 2

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Coursework	2000 words equivalent	50%

Assessment Summary

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

INDICATIVE READING LIST

Module Code	ACCA5031	
Module Title	Web and Mobile Technologies	
Classification	Reading List entry	Electronic*
Essential	Welling, L. (2016) PHP and MySQL Web Development, 5th Edition, Addison Wesley	☐
Further	Nixon, R. (2016) <i>Learning PHP, MySQL & JavaScript: With jQuery, CSS & HTML5</i> , 4 th Edition, O'Reilly Media	☐
Further	Snider, E (2019) <i>Mastering Xamarin.Forms: App architecture techniques for building multi-platform, native mobile apps with Xamarin.Forms 4</i> , 3rd Edition, Packt Publishing	☐
Further	Bennett, J (2018) <i>Xamarin in Action: Creating Native Cross-Platform Mobile Apps</i> , Manning Publications	☐

Module Code	ACCA5032
Title	Object Oriented Programming and Algorithms
Date	09/09/2020
Level	5
Credits	20
Pre-Requisites	None

AIM(S)

- To provide students with a conceptual understanding of abstract data types, data structures and algorithms used in web development and the ability to apply these concepts using object oriented (OO) development methods in web development scenarios

LEARNING OUTCOMES

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

- Critically evaluate the suitability of selected algorithms and data structures to solve given problems
- Develop OO solutions to solve a given problem scenario(s) often encountered in web development

INDICATIVE CONTENT

- Abstract data types (ADT)
- Simple data structures e.g. stacks, queues
- Complex data structures and algorithms e.g. lists, linked lists, heaps
- Graphs – properties and graph traversal
- Trees – properties, traversal, balancing
- Hashing
- Algorithms for sorting
- Algorithms for searching
- Containers and iterators
- Object oriented concepts e.g. classes, objects, encapsulation, inheritance and polymorphism
- Essential object oriented programming principles for web development

Study Time Allocation

The study time for the module is divided as follows:

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

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Implementation and Essay	2500 words equivalent	50%

Assessment Component 2

☒ Written exam ☐ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Exam	2 hours	50%

Assessment Summary

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

INDICATIVE READING LIST

Module Code	ACCA5032	
Module Title	Object Oriented Programming and Algorithms	
Classification	Reading List entry	Electronic*
Essential	Greene, J., Stellman, A., (2020) Head First C#, 4 th Edition, O'Reilly	☐
Essential	Cormen, T.H., Leiserson, C.E., (2009) Introduction to Algorithms, MIT Press	☒
Further	Weisfeld, M., (2018), The Object-Oriented Thought Process, Addison Wesley	☒
Further	Sharp, J., (2018), Microsoft Visual C# Step by Step, Microsoft Press	☐
Further	Sedgewick, R., (2011) Algorithms, 4th edition, Addison-Wesley	☐

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

AIM(S)

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

LEARNING OUTCOMES

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

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

INDICATIVE CONTENT

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

Study Time Allocation

The study time for the module is divided as follows:

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

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

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

Assessment Component 2

☐ Written exam ☒ Coursework ☐ Practical

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

Assessment Summary

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

INDICATIVE READING LIST

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

Module Code	ACCA5033	
Module Title	Changemakers: Creativity and Value Creation	
Classification	Reading List entry	Electronic*
Essential	Hargreaves, J., and Page, L. (2013) <i>Reflective Practice</i> . (Key Themes in Health and Social Care Series). Polity Press.	☒
Essential	Nardi, P.M. (2017) <i>Critical Thinking : Tools for Evaluating Research</i> . University of California Press	☒
Essential	Westerman, G., Bonnet, D. and McAfee, A., <i>Leading Digital: Turning Technology Into Business Transformation</i> . (Audiobook) Recorded Books. 2017.	☒
Further	Schiama, G. (2011) <i>Managing Knowledge Assets and Business Value Creation in Organizations : Measures</i>	☒

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

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

AIM(S)

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

LEARNING OUTCOMES

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

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

INDICATIVE CONTENT

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

Study Time Allocation

The study time for the module is divided as follows:

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

ASSESSMENT

Assessment Component 1

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

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

Assessment Summary

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

INDICATIVE READING LIST

Module Code	ACCA5034	
Module Title	Data Security and Compliance	
Classification	Reading List entry	Electronic*
Essential	Principles of Information Security, 6th Edition Michael E. Whitman Herbert J. Mattord Copyright 2018	☐
Essential	Ladley, J. (2012), Data Governance: How to Design, Deploy and Sustain an Effective Data Governance Program, Morgan Kaufmann, MA, USA.	☒
Essential	Plotkin, D. (2013), Data Stewardship: An Actionable Guide to Effective Data Management and Data Governance, Morgan Kaufmann, MA, USA.	☒
Further	CISSP Guide to Security Essentials, 2nd Edition. Peter H. Gregory, Copyright 2015. ISBN-10: 130584601X ISBN-13: 9781305846012	☒
Further	Information Security Governance: A Practical Development and Implementation Approach by Krag Brotby. ISBN: 978-1-118-58551-1. August 2017	☒
Further	Gregory, P.H. (2015) CISSP Guide to Security Essentials, 2nd Edition. Course Technology.	☒
Further	Quinn, M. J. (2015), Ethics for the Information Age: International Edition, Pearson: NY, 2015	☒

Further	Brotby, K. (2017), Information Security Governance: A Practical Development and Implementation Approach, Wiley.	☒
Further	IEEE/ACM, IEEE/ACM Transactions on Networking	☒
Further	IEEE, IEEE Network Magazine	☒
Further	Science Direct	☒
Further	Scopus	☒
Further	ACM Transactions on Database Systems	☒
Further	ACM Transactions on Information Systems	☒
Further	CISCO Academy Website, cisco.netacad.net (password access only)	☒

Module Code	ACCA5035
Title	Changemakers: Building your Personal Brand for Sustainable Employment
Date	25/06/2020
Level	5
Credits	20
Pre-Requisites	none

AIM(S)

- To build the skills and competencies necessary for career resilience and professional development for the future work context.

LEARNING OUTCOMES

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

- Evaluate personal employability skills and their congruence with the skills required for professional practice in a real or simulated environment.
- Build a personal brand and promote a professional identity for a specific opportunity.

INDICATIVE CONTENT

- Analysing your employment sector in order to identify problems, gaps in the market and how you can add value for sustainable employability.
- Building your brand and promoting a professional identity through personal skills analysis and personal development planning.
- Contemporary technologies: developing an online personal presence (e.g. basic website building/social media/blogs/vlogs etc.).
- Search techniques for employment/self-employment opportunities.
- Adopting project management approaches (defining the problem; setting the goals and objectives, milestones and monitoring, evaluation).
- Collaboration, networking, building social capital, negotiation and influencing.
- Awareness, emotional intelligence, well-being and resilience.
- Ethics, values, diversity, inclusion, intercultural awareness and responsible stewardship: issues, challenges and actions.
- Cultural and linguistic expression.

Study Time Allocation

The study time for the module is divided as follows:

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

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

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

Assessment Component 2

☐ Written exam ☒ Coursework ☒ Practical

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

Assessment Summary

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

INDICATIVE READING LIST

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

Module Code	ACCA5035	
Module Title	Changemakers: Building your Personal Brand for Sustainable Employment	
Classification	Reading List entry	Electronic*
Essential	Lock, D. (2018). <i>Project management</i> . Routledge	☒
Essential	Dweck, C. (2017) <i>Mindset: Changing The Way You think To Fulfil Your Potential</i> . Robinson Publishers.	☒
Essential	Griffith, B.A. (2014) <i>Working in Teams: Moving From High Potential to High Performance</i> . SAGE Publications Inc.	☒
Essential	Baguley, P. (2003). <i>Teams and team-working</i> (New ed.). London: Teach Yourself.	☐
Essential	Gensler, H. J. (2017). <i>Ethics : A contemporary introduction</i> (3 rd ed., Routledge contemporary introductions to philosophy). New York: Routledge.	☐
Essential	Well-being of Future Generations (Wales) Act 2015 (Online). Available at http://www.legislation.gov.uk/anaw/2015/2/contents/enacted	☒
Further	Smale, B. and Fowlie, J. (2015) <i>How to Succeed at University an Essential Guide to Academic Skills and Personal Development</i> (2 nd Ed.). Los Angeles, [Calif.]: SAGE Study Skills Ser. Web.	☒
Further	Phillips, S. (2014) <i>The complete guide to professional networking : the secrets of online and offline success</i> . London, England : Kogan Page	☒
Further	Snow, S. (2018) <i>Dream Teams: Working Together Without Falling Apart</i> . Piatkus.	☒
Further	Williams, B. (2020) <i>Diversity in the Workplace: Eye-Opening Interviews to Jumpstart Conversations about Identity, Privilege, and Bias</i> . Rockridge Press	☒
Further	Dawson, P. and Andriopoulos, C. (2017) <i>Managing Change, Creativity and Innovation</i> . SAGE Publications Ltd.	☒
Further	Clements, P., & Jones, J. (2008). <i>The diversity training handbook a practical guide to understanding & changing attitudes</i> (3rd ed.). London ; Philadelphia: Kogan Page.	☒

Module Code	ACCB5011
Title	Advanced Software Development
Date	09/09/2020
Level	5
Credits	20
Pre-Requisites	None

AIM(S)

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

LEARNING OUTCOMES

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

- Critically evaluate the suitability of selected algorithms and data structures to solve given problems
- Develop OO solutions to solve a given problem scenario(s)

INDICATIVE CONTENT

- Abstract data types (ADT)
- Simple data structures e.g. stacks, queues
- Complex data structures and algorithms e.g. lists, linked lists, heaps
- Graphs – properties and graph traversal
- Trees – properties, traversal, balancing
- Hashing
- Algorithms for sorting
- Algorithms for searching.
- Containers and iterators
- Object oriented concepts e.g. classes, objects, encapsulation, inheritance and polymorphism
- Essential object oriented programming principles

Study Time Allocation

The study time for the module is divided as follows:

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

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Implementation and Essay	2500 words equivalent	50%

Assessment Component 2

☒ Written exam ☐ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Exam	2 hours	50%

Assessment Summary

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

INDICATIVE READING LIST

Module Code	ACCB5011	
Module Title	Advanced Software Development	
Classification	Reading List entry	Electronic*
Essential	Horton, I., Weert, P.V., (2018), Beginning C++17: From Novice to Professional, 5 th Edition, Apress	☐
Essential	Cormen, T.H., Leiserson, C.E., (2009) Introduction to Algorithms, MIT Press	☐
Further	Greene, J., Stellman, A., (2020) Head First C#, 4 th Edition, O'Reilly	☐
Further	Weisfeld, M., (2018), The Object-Oriented Thought Process, Addison Wesley	☐
Further	Sedgewick, R., (2011) Algorithms, 4th edition, Addison-Wesley	☐

Module Code	ACCB5017
Title	Games Architecture and Mechanics
Date	09/09/2020
Level	5
Credits	20
Pre-Requisites	None

AIM(S)

- To achieve a systematic understanding of core games software, tools and concepts used in games and physics engines.

LEARNING OUTCOMES

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

- Demonstrate a sound understanding of the architecture of games and physics engine components necessary for the development of games software.
- Deploy appropriate languages, tools and techniques in the development of games and game physics applications.

INDICATIVE CONTENT

- Games programming principles and techniques
- Games programming design patterns
- Application and use of software libraries, SDKs and APIs used in Games programming
- Application of specified programming language (C/C++)
- Cross platform development for game development QT, SDL2, etc.
- Importing game resources e.g. textures, audio, 3D models, etc
- Principles of 3D graphics and the Graphics pipeline
- Graphics APIs, eg OpenGL
- Physics Engine architecture
- Mechanics
- Bounding Volumes
- Collision Detection
- Collision Response
- Numerical Integration and updates

- Physics Engine APIs and libraries, eg Bullet, PhysX, etc.

Study Time Allocation

The study time for the module is divided as follows:

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

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Written Assessment	2500 words	50%

Assessment Component 2

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Written Assessment	2500 words	50%

Assessment Summary

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

INDICATIVE READING LIST

Module Code	ACCB5017	
Module Title	Games Architecture and Mechanics	
Classification	Reading List entry	Electronic*
Essential	Millington. I. (2010) Game Physics Engine Development 2 nd Edition, CRC Press	☒
Essential	Van Verth, J.M, Bishop, L.M (2015) Essential Mathematics for Games and Interactive Applications. A Programmers Guide, Morgan Kaufmann	☒
Essential	Hearn, D and Baker, P.M (2010) Computer Graphics with OpenGL, 4 th Edition, Prentice Hall	☒
Essential	Nystrom, R (2014) Games Programming Patterns, Genever Benning	☒
Further	Shreiner, D, et al (2016) OpenGL Programming Guide, 9th Edition, Addison-Wesley	☒

Further	Lengyel, E (2011) Mathematics for 3D Game Programming and Computer Graphics 3 rd Edition, Cengage Learning	☐
Essential	Lengyel, E. (2016) Foundations of Game Engine Development, Volume 1: Mathematics, Terathon Software.	☐
Further	Lengyel, E. (2016) Foundations of Game Engine Development, Volume 2: Rendering, Terathon Software.	☐

Module Code	ACCB5021
Title	Statistical Programming
Date	09/09/2020
Level	5
Credits	20
Pre-Requisites	None

AIM(S)

- To develop the knowledge and skills required to perform more advanced statistical analysis of experimental and informatics data.
- To develop the knowledge and skills required to perform basic statistical programming in an appropriate programming language.

LEARNING OUTCOMES

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

- Select and apply appropriate statistical methods for the analysis of experimental data
- Manipulate data and implement statistical programming techniques on large datasets
- Select and apply appropriate visualisation methods for the presentation of analytical data

INDICATIVE CONTENT

- Data input and output in multiple formats, including graphical plots
- Scripts and functions
- Performing basic statistical analyses including correlation analysis and statistical tests.
- Building packages with suitable documentation and examples
- Data preparation for import into analysis and visualisation tools

Study Time Allocation

The study time for the module is divided as follows:

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

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Programming problems	2500 words equivalent	50%

Assessment Component 2

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Programming problems	2500 words equivalent	50%

Assessment Summary

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

INDICATIVE READING LIST

Module Code	ACCB5021	
Module Title	Statistical Programming	
Classification	Reading List entry	Electronic*
Essential	Matloff, N (2013) <i>The Art of R Programming</i> , No Starch Press	☒
Further	Kranzler, J.H. (2010) <i>Statistics for the Terrified</i> , Pearson	☒
Further	Cotton, R (2013) <i>Learning R</i> , O'Reilly	☒
Further	Alvaro, F (2016) <i>R: Easy R Programming for Beginners</i> , Pearson	☒
Further	Spiegel, M.R (2014) <i>Shaum's Outline of Statistics, fifth ed.</i> , McGraw Hill Education Limited	☒
Further	Gonick, L & Smith, W. (2000) <i>Cartoon Guide to Statistics</i> , William Morrow Paperbacks	☒

Module Code	ACCD5000
Title	Computer Forensics
Date	09/09/2020
Level	5
Credits	20
Pre-Requisites	None

AIM(S)

- To provide students with computer forensics concepts and understanding for the need of computer forensics. Students will learn best practices for general incidence response. The module will then focus on the tools and techniques to perform a full computer forensic investigation

LEARNING OUTCOMES

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

- Use their knowledge, of the fundamentals of computer forensics, to evaluate and formulate a range of problems and solutions with respect to the relationship between IT and forensics.
- Communicate accurately and reliably the legal aspects of forensics and the best practices for incidence response.

INDICATIVE CONTENT

- Introduction to Computer Forensics.
- Computer Forensics Investigation Process.
- Searching and Seizing Computers.
- Presenting Digital Evidence.
- First Responder Procedures.
- Understanding Hard Disks and File Systems.
- Data Acquisition and Duplication.
- Recovering Deleted Files and Deleted Partitions.
- Forensics Investigation using CAINE Live DVD.
- Forensics Investigation Using AccessData FTK.
- Network Forensics Investigation using Wireshark.
- Steganography and Image File Forensics.

Study Time Allocation

The study time for the module is divided as follows:

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

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Coursework	4000 words	100%

Assessment Summary

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

INDICATIVE READING LIST

Module Code	ACCD5000	
Module Title	Computer Forensics	
Classification	Reading List entry	Electronic*
Essential	The Basics of Digital Forensics: The Primer for Getting Started in Digital Forensics. Author: John Sammons.	☐
Essential	Digital Evidence and Computer Crime: Forensic Science, Computers, and the Internet. Author: Eoghan Casey.	☐
Essential	Digital Forensics with Open Source Tools. Authors: Cory Altheide and Harlan Carvey	☐
Essential	X-Ways Forensics Practitioner's Guide: Authors: Brett Shavers and Eric Zimmerman.	☐
Further	Incident Response and Computer Forensics, Second Edition. Authors: Chris Prosis, Kevin Mandia, and Matt Pepe.	☐
Further	Incident Response: Computer Forensics Toolkit. Author: Douglas Schweizer.	☐
Further	Forensic Computing: A Practitioner's Guide, Second edition. Authors: Tony Sammes and Brian Jenkinson.	☐
Further	Journals IEEE/ACM, IEEE/ACM Transactions on Networking IEEE, IEEE Network Magazine Science Direct Scopus	☒

	ACM Transactions on Database Systems ACM Transactions on Information Systems	
Further	Websites http://www.tandf.co.uk/15567281 www.cftt.nist.gov http://www.jdfsl.org/ CERIAS Forensics Research (http://www.cerias.purdue.edu/research/forensics/) DoD Cyber Crime Center (http://www.dc3.mil) http://www.digitalforensicsmagazine.com/ http://nij.ncjrs.org/publications/pubs_db.asp	☒

MODULE CODE: ACDA5000
TITLE: Communications and Protocols
DATED: 16/08/2018

LEVEL: 5
CREDITS: 20

JACS CODE: H610

AIM(S)

To equip students with a critical understanding of both digital communications and digital signal processing systems. A detailed understanding of digital modulation techniques along with relevant digital signal processing methods will be developed along with a knowledge that will equip the student with the skills needed to design, analyse and simulate digital signal processing and digital communications systems.

LEARNING OUTCOMES

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

1. demonstrate detailed knowledge and critical understanding of the theoretical concepts of digital signal processing and digital communications systems;
2. demonstrate a critical analysis of information through the use of system level simulation software.

INDICATIVE CONTENT

- Digital signal processing: signals and sequences, the sampling theorem and digital convolution
- Spectrum Analysis: The Discrete and Fast Fourier Transforms
- Moving average and windowed FIR filter design and implementation, simulation of filters and DSP concepts.
- Signals and Channels: Wireless channel characteristics including, Gaussian, Rayleigh and Rician noise
- Digital Communications: Modulation methods, error detection and correction, signals and noise considerations.
- Baseband pulse transmission: PAM, sampling theorem, TDM, FDM, binary signalling, eye diagrams, PCM
- Communications Protocols: Modbus, Fieldbus, PFOFIBUS, IoT Protocols, Zigbee, LonTalk, CAN, VAN, LIN, R2232, Rs485 etc
- Digital modulation and demodulation: ASK, PSK, FSK, QPSK, MSK, spread spectrum (CDMA TDMA etc.).
- Coding: Channel and source coding, information theory.
- Legal aspects of spectrum use

LEARNING AND TEACHING STRATEGY

The study time for the module is divided as follows:

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

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Essay	2,000 words	50%

Assessment Component 2

☒ Written exam ☐ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Exam	2 hours	50%

Assessment Summary

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

READING LIST

Module Code	ACDA5000	
Module Title	Communications and Protocols	
Classification	Reading List entry	Electronic*
Essential	Michael Parker Digital Signal Processing 101: Everything You Need to Know to Get Started 26 Jun 2017	☒
Essential	Louis E. Frenzel, Principles of Electronic Communication Systems – 16 Mar 2016	☒
Essential	Bernard Sklar, Digital Communications: Pearson New International Edition: Fundamentals and Applications 6 Aug 2013 by	☒
Further	Communication Systems Paperback – 8 May 2009 by Simon Haykin (Author), Michael Moher (Author)	☐
Further	Communication Networks in Automation: Bus Systems. Components. Configuration and Management. Protocols. Security Hardcover – 1 Oct 2018 by Ricarda Koch (Author), Ralph Luftner (Author)	☐
Further	Communication Systems for Electrical Engineers (Springer Briefs in Electrical and Computer Engineering) Paperback – 7 Jan 2018 by Mohammad A. Matin (Author)	☐
Further	Problem-Based Learning in Communication Systems Using MATLAB and Simulink (IEEE Series on Digital & Mobile Communication) Hardcover – 15 Apr 2016 by Kwonhue Choi (Author), Huaping Liu (Author)	☐
Further	The Essential Guide to Digital Signal Processing (Essential Guide Series) (Essential Guides (Prentice Hall)) Paperback – 15 May 2014 Richard G. Lyons (Author), D. Lee Fugal (Contributor)	☐
Further	IEEE Communications Magazine	☒
Further	IEEE Signal Processing Magazine	☒
Further	http://www.mathworks.co.uk	☒

Module Code	ACDA5001
Title	Electrical Engineering
Date	13/10/2021
Level	5
Credits	20
Pre-Requisites	None

AIMS

- To develop a knowledge of circuit theory and principles and a critical understanding and analysis of AC and DC electrical and electronic systems.

LEARNING OUTCOMES

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

- Critically Analyse and evaluate AC and DC electrical circuits and systems including Three Phase Systems
- Perform critical analysis and detailed simulation of relevant circuits.

INDICATIVE CONTENT

- Circuit theorems and application to complex AC & DC networks and electronic circuits.
- Complex Power calculations
- Power Factor and Power Factor Correction
- Maximum Power Transfer for resistive and reactive circuits.
- Three Phase circuits.
- Star-Delta and Delta –Star transformations.
- Equivalent circuits for transformers
- Complex wave analysis
- Laplace Transforms

Study Time Allocation

The study time for the module is divided as follows:

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

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Assignment	2000 Words	50%

Assessment Component 2

☒ Written exam ☐ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Exam	2 Hours	50%

Assessment Summary

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

INDICATIVE READING LIST

Module Code	ACDA5001	
Module Title	Electrical Engineering	
Classification	Reading List entry	Electronic*
Essential	Nilsson, J. and Riedel, S. (2010) <i>Electric Circuits</i> , 9 th Ed, Boston: Prentice Hall	☒
Essential	Bird, J. (2010) <i>Electrical Circuit Theory and Technology</i> , 4 th Ed, Oxford: Newnes (2010)	☒
Essential	Bird, J. (2010) <i>Electrical and Electronic Principles and Technology</i> , 4th Ed. Oxford: Newnes	☒
Further	Cathey, J. J. (2011) <i>Schaum's Outline of Electronic Devices and Circuits</i> 2 nd Ed, New York: McGraw Hill	☐
Further	Agarwal, A. and Lang, J. (2005) <i>Foundations of Analog and Digital Electronic Circuits</i> , Amsterdam: Morgan Kaufmann	☐

Module Code	ACDA5002
Title	Electronics I
Date	13/10/2021
Level	5
Credits	20
Pre-Requisites	None

AIM(S)

- To build on the basic component level theory studied at Level 4, and thus provide the student with knowledge of how these components are utilised in real life scenarios as functional building blocks or as parts of holistic working systems, with emphasis given to design solutions based on embedded microcontroller / microprocessors.

LEARNING OUTCOMES

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

- Demonstrate and critically analyse the deployment of discrete components and microcontrollers in the design of functional building blocks and complete circuits.
- Critically analyse existing designs and be able to understand and effectively communicate how they function.

INDICATIVE CONTENT

- Design of simple linear power supplies. Single, Split and multi rail.
- SMPS principles. Buck, Boost configurations etc.
- DC Power Control. Using e.g. PWM techniques.
- AC Power Control. Using e.g. phase angle firing.
- Data acquisition via custom devices/modules
- Serial and Parallel bus interfacing
- System Input, Output and UI design considerations
- Case studies of existing embedded system designs.
- Awareness and evaluation of various design approaches. E.g. microcontroller vs ASIC vs Embedded PC etc.

Study Time Allocation

The study time for the module is divided as follows:

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

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Assignment	2500 Words	60%

Assessment Component 2

☐ Written exam ☐ Coursework ☒ Practical

Mode of assessment	Volume	Weighting
Timed Lab exercise	2 hr timed session	40%

Assessment Summary

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

INDICATIVE READING LIST

Module Code	ACDA5002	
Module Title	Electronics I	
Classification	Reading List entry	Electronic*
Essential	Horowitz, P. and Hill, W. (2015) <i>The Art of Electronics</i> , 3rd ed Cambridge: Cambridge University Press	☒
Essential	Scherz, P. and, Monk, S. (2016) <i>Practical Electronics for Inventors</i> , New York: McGraw Hill	☒
Further	Embedded Control Handbook – Microchip Technologies http://ww1.microchip.com/downloads/cn/devicedoc/cn_00711a.pdf	☐
Further	<i>Elektor</i> – Electronics Design Magazine. UWTSD Owen Library.	☐

MODULE CODE: ACDA5007
TITLE: Computer Aided Engineering
DATED: 15/08/2018

LEVEL: 5
CREDITS: 20

JACS CODE: H610

AIM(S)

- To introduce students to a range of Computer Aided Engineering (CAE) methods and their applicability.
- To introduce the idea of verification and validation of CAE solutions and the relation to OME.

LEARNING OUTCOMES

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

- Demonstrate knowledge and critical understanding of CAE tools and their limitations.
- Proficiently use CAE tools to analyse and solve problems.

INDICATIVE CONTENT

- Introduction to Finite Element Analysis including the benefits of using CAE models in test & evaluation
- The finite element method and its relation to other numerical simulation methods including finite difference
- The Lagrangian and Eulerian frameworks
- Verification and Validation
- Three dimensional vector systems and their relation to numerical simulations
 - (i) Example of using symmetry to aid analysis: principal planes and principal stresses
 - (ii) Use of thin and thick-walled pressure vessels as an example of verification and validation by relation to exact analytic solutions
 - (iii) EM Example: predict the radiation pattern of a dipole antenna using method of moments and finite element analysis (e.g. using FeKo), and compare results to analytic solution.
- Computer aided design
- 3D Parametric Modelling
- Assemblies in CAD
- Manufacturing drawings
- Motion simulation
- Finite element analysis in CAD
- Pre- and post-processing and its relation to data visualisation
- Fast-running engineering models and their utility

LEARNING AND TEACHING STRATEGY

The study time for the module is divided as follows:

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

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Assignment report	2000 Words	50%

Assessment Component 2

☒ Written exam ☐ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Written Exam	2 Hours	50%

Assessment Summary

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

READING LIST

Module Code	ACDA5007	
Module Title	Computer Aided Engineering	
Classification	Reading List entry	Electronic*
Essential	Bird, John O; Ross, C, <i>Mechanical engineering principles</i> , Routledge 3rd Ed. (2014)	☒
Further	Bryan J Mac Donald, <i>Practical Stress Analysis with Finite Elements</i> , 2007	☐
Further	F. Beer, E. Johnson et al, <i>Mechanics of Materials</i> , McGraw-Hill, 2015	☒
Further	<i>Mechanics of Engineering Materials</i> , P.P. Benham, R.J. Crawford, C.G. Armstrong, <i>Mechanical Science</i> , W. Bolton , Wiley-Blackwell (2006)	☐
Further	<i>Mechanical Technology</i> , D.H. Bacon, Butterworth-Heinemann , 1998	☒

Module Code	ACDA5008
Title	Digital Signal Processing and Communications
Date	15/08/2018
Level	5
Credits	10
Pre-Requisites	None

AIM(S)

- To equip students with a critical understanding of both digital communications and digital signal processing systems. A detailed understanding of digital modulation techniques along with relevant digital signal processing methods will be developed along with a knowledge that will equip the student with the skills needed to design, analyse and simulate digital signal processing and digital communications systems.

LEARNING OUTCOMES

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

- Demonstrate detailed knowledge of the basic theoretical concepts of digital signal processing and digital communication systems;
- Demonstrate proficient use of system level simulation software.

INDICATIVE CONTENT

- Digital signal processing: signals and sequences, the sampling theorem and digital convolution;
- Spectrum Analysis: The Discrete and Fast Fourier Transforms;
- Moving average and windowed FIR filter design and implementation, simulation of filters and DSP concepts;
- Digital Communications, Signals and Channels.

Study Time Allocation

The study time for the module is divided as follows:

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

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Lab Report	2,000 words	100%

Assessment Summary

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

INDICATIVE READING LIST

Module Code	ACDA5008	
Module Title	Digital Signal Processing and Communications	
Classification	Reading List entry	Electronic*
Essential	Parker, M. (2017) <i>Digital Signal Processing 101: A Practical Guide</i> , Oxford: Newnes.	☒
Essential	Haykin, S. (2013) <i>Digital Communication Systems: A Modern Introduction</i> , Hoboken, NJ: Wiley	☐
Further	G. and A. Levesque (2015) <i>Modeling of Digital Communication Systems Using Simulink</i> , Hoboken, NJ: Wiley-Blackwell	☒
Further	Sklar, B. (2013) <i>Digital Communications: Fundamentals and Applications</i> New International Edition London: Pearson	☒
Further	Journals IEEE Communications Magazine IEEE Signal Processing Magazine	☒
Further	Websites http://www.mathworks.co.uk	☒

Module Code	ACDA5009
Title	Electromagnetic Radiation
Date	13/10/2021
Level	5
Credits	20
Pre-Requisites	None

AIM(S)

- To develop a comprehensive understanding of the theoretical and practical aspects of electromagnetics
- To develop an ability to interpret results gained from electromagnetic simulation;

LEARNING OUTCOMES

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

- Provide evidence of a systematic understanding of the scientific concepts underpinning magneto-static and AC time-harmonic problems;
- Analyse results obtained from the application of specific electromagnetic modelling techniques and correlate those results with physical characteristics.

INDICATIVE CONTENT

- Electromagnetic Theory;
- Electromagnetic spectrum;
- Electromagnetic wave properties;
- Wave guides;
- Waves and beams, phased array systems, tracking systems;
- Material Properties, Magnetization and Hysteresis, Magnetic Circuit Theory, Electromagnetic Induction, Maxwell's Equations, Complex Impedance and Transient Circuit Theory;
- Electromagnetic compatibility testing;
- Ionising and non-ionising radiation;
- Radar Hardware and design;
- Lasers: properties, hazards and selection;
- Doppler effects;
- Hazards, health and safety.

Study Time Allocation

The study time for the module is divided as follows:

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

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Report	2,500 Words	50%

Assessment Component 2

☒ Written exam ☐ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Written Exam	2 Hours	50%

Assessment Summary

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

INDICATIVE READING LIST

Module Code	ACDA5009	
Module Title	Electromagnetic Radiation	
Classification	Reading List entry	Electronic*
Essential	Edminister, J. A. and Mahmood, N. (2018) <i>Electromagnetics, Schaum's Outline Series</i> , New York: McGraw Hill	☒
Further	Joint Services Publications (2011) 390 - <i>Military Laser Safety</i>	☐
Further	Joint Services Publications (2021) 375 - <i>Health and Safety</i>	☐
Further	Journals IEEE Xplore ACM Digital Library	☒

Module Code	ACDA5017
Title	Group Project
Date	13/10/2021
Level	5
Credits	20
Pre-Requisites	None

AIM(S)

- To apply engineering principles and skills to the cost effective solution of technical problems with due regard to specification, design, cost and methods of production, working in a team, and developing effective team skills.

LEARNING OUTCOMES

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

- Select, specify and plan a project, as part of a team, and to verbally present the design and development concepts and implementation stages.
- Select appropriate design methodology and development an artefact from initial concept to final realisation, including references to the project specification, research, implementation and achievements etc.
- Implement the design and development, as part of a team, and demonstrate its operation and also demonstrate an ability to produce the design on time and within budget.

INDICATIVE CONTENT

- Systematic design procedures
- Objective design selection
- Project Planning
- Cost prediction, manufacturing
- Quality and reliability
- Technical report writing
- Group working and management
- Communication skills
- Legal, social, and ethical and entrepreneurial aspects of projects

Study Time Allocation

The study time for the module is divided as follows:

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

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Portfolio of work	5000 words equivalent	100%

Students will produce a portfolio of work appropriate to the nature of their project. Portfolio elements will include a selection of the following:

- Written Report
- Presentation slides
- Demonstration of work
- Ethical approval form

Assessment Summary

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

INDICATIVE READING LIST

Module Code	ACDA5017	
Module Title	Group Project	
Classification	Reading List entry	Electronic*
Essential	Schertz, P. (2012) <i>Practical Electronics for Inventors</i> , New York: McGraw Hill Professional	☐
Essential	Sherin, A. (2013) <i>Sustainable Thinking: Ethical Approaches to Design and Design Management</i> , Required Reading Range New York: Fairchild	☐
Further	Floyd, T. L. (2009) <i>Electronic Circuits Fundamentals</i> , 8/E, Boston: Prentice Hall	☐
Further	Mataric, M. J. (2007) <i>The Robotics Primer: Intelligent Robotics & Autonomous Agents</i> , Massachusetts: MIT Press	☐
Further	Elkitor Electronics World	☐

Module Code	ACDA5018
Title	Distributed Intelligence Systems
Date	13/10/2021
Level	5
Credits	20
Pre-Requisites	None

AIM(S)

- To develop in the student an in depth understanding of the design and implementation of distributed microcontroller systems and their application to modern electronic devices and systems.

LEARNING OUTCOMES

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

- Analyse distributed microcontroller systems for a range of technical applications through the use of state-of-the-art simulation and synthesis software.
- Implement advanced distributed microcontroller systems, including point to point and point to multipoint systems.

INDICATIVE CONTENT

- Interconnection standards and protocols
- Point to point systems, Point to multipoint systems: Mesh, Star
- RS232, RS485, SPI, I2C, CAN
- LoRa, Bluetooth, Zigbee
- Data security, design safety features, failure modes

Study Time Allocation

The study time for the module is divided as follows:

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

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Report	2,500 words	50%

Assessment Component 2

☐ Written exam ☐ Coursework ☒ Practical

Mode of assessment	Volume	Weighting
Lab Practical	2 Hours	50%

Assessment Summary

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

INDICATIVE READING LIST

Module Code	ACDA5018	
Module Title	Distributed Intelligence Systems	
Classification	Reading List entry	Electronic*
Essential	Williams, R. (2006) <i>Real-time Systems Development</i> . Oxford: Butterworth-Heinemann	☐
Essential	Gaonkar, R. S. <i>Fundamentals of Microcontrollers and Applications in Embedded Systems with the PIC18F Microcontroller Famil)</i> Clifton Park NY: Thomson / Delmar Learning	☐
Essential	Bates, M. (2008) <i>Programming 8-Bit PIC Microcontrollers in C with Interactive Hardware Simulation</i> . Oxford: Newnes	☐
Further	Journals	☐

Module Code	ACDA5022
Title	Work-Based Group Project
Date	17/08/2022
Level	5
Credits	20
Pre-Requisites	None

AIM(S)

- As a team, apply system thinking principles and skills to the solution of a defined technical problem.

LEARNING OUTCOMES

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

- Select, specify and plan a project, as part of a team, and to present the design and development concepts and implementation stages.
- Select appropriate design methodology and development of an artefact from initial concept to final realisation.
- Critically evaluate the component features of the design and explain strategies for delivery of a reliable and robust product.
- Demonstrate specific in-depth knowledge and understanding of legal, social, ethical, environmental and sustainability issues relating to the project.

INDICATIVE CONTENT

- Systematic design procedures
- Objective design selection
- Project Planning
- Cost prediction,
- Manufacturing techniques
- Quality and reliability
- Technical report writing
- Group working and management
- Communication skills
- Legal, social, and ethical aspects of projects
- Environmental and sustainability

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	24	12%
Independent learning	176	88%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

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

Students will produce a portfolio of work appropriate to the nature of their project. Portfolio elements could include a selection of the following:

- Written Report
- Presentation slides
- Demonstration of work
- Ethical approval form
- Logbook

Assessment Summary

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

INDICATIVE READING LIST

Module Code	ACDA5022	
Module Title	Work-Based Group Project	
Classification	Reading List entry	Electronic*
Essential	The Work Based and Placement Learning Association (2013) <i>Good Practice Guide for Workbased Learning and Placement Learning in Higher Education</i> , Sheffield : ASET	☒
Essential	McCormac, C. and Davis, J. (2012) <i>Research Project Success: The Essential Guide for Science and Engineering Students</i> , Royal Society of Chemistry	☐

Essential	O'Leary, Z. (2013) <i>Doing Your Research Project, 2nd Edition</i> , SAGE Publications Ltd	☐
Essential	Gray, D. E. (2018) <i>Doing Real World Research</i> , London : SAGE	☐
Further	Kerzner, H. (2017) <i>Project Management: A Systems Approach to Planning, Scheduling, and Controlling</i> , New Jersey : John Wiley	☐
Further	Curedale, R. (2016) <i>Design Thinking Process and Methods - 3rd ed</i> , Design Community College	☐
Further	McKeown, M. (2014) <i>The Innovation Book: How to Manage Ideas and Execution for Outstanding Results (The X Book)</i> , FT Publishing International.	☒
Further	Yin, R. K, (2008) <i>Case Study Research: Design and Methods - 4th ed</i> , Sage : Beverly Hills	☐