

| | |
|---------------------|--------|
| Module Code: | COM438 |
|---------------------|--------|

| | |
|----------------------|---------------|
| Module Title: | Managing Data |
|----------------------|---------------|

| | | | |
|---------------|---|----------------------|----|
| Level: | 4 | Credit Value: | 20 |
|---------------|---|----------------------|----|

| | | | |
|------------------------|------|--------------------|------|
| Cost Centre(s): | GACP | JACS3 code: | I240 |
|------------------------|------|--------------------|------|

| | | | |
|-----------------|------------------------------|-----------------------|------------|
| Faculty: | Arts, Science and Technology | Module Leader: | Bindu Jose |
|-----------------|------------------------------|-----------------------|------------|

| | |
|---------------------------------------|---------|
| Scheduled learning and teaching hours | 48 hrs |
| Guided independent study | 152 hrs |
| Placement | 0 hrs |
| Module duration (total hours) | 200 hrs |

| Programme(s) in which to be offered (not including exit awards) | Core | Option |
|------------------------------------------------------------------------|------|--------------------------|
| BSc (Hons) Computer Science | ✓ | <input type="checkbox"/> |
| BSc (Hons) Computing | ✓ | <input type="checkbox"/> |
| BSc (Hons) Computer Networks and Security | ✓ | <input type="checkbox"/> |
| BSc (Hons) Cyber Security | ✓ | <input type="checkbox"/> |
| BSc (Hons) Applied Cyber Security | ✓ | |
| BSc (Hons) Applied Software Engineering | ✓ | |

| |
|-----------------------|
| Pre-requisites |
| None |

Office use only

Initial approval: 30/08/2018

Version no:2

With effect from: 01/09/2018

Date and details of revision: Jan 2022: Addition of DA programme titles

Version no:

Module Aims

This module aims to develop a broad knowledge of storing and managing data to satisfy the organizational requirements. These will be reinforced by developing the practical skills required for using the structures and features of a query language in order to maintain and interrogate a relational database management system. The SQL constructs used adhere to the current standards, so will be applicable in all SQL-based platforms. The resultant skills will help prepare the student to enter commercially operated database environments and to manage the system to the requirements of the industry.

Intended Learning Outcomes

Key skills for employability

- KS1 Written, oral and media communication skills
- KS2 Leadership, team working and networking skills
- KS3 Opportunity, creativity and problem solving skills
- KS4 Information technology skills and digital literacy
- KS5 Information management skills
- KS6 Research skills
- KS7 Intercultural and sustainability skills
- KS8 Career management skills
- KS9 Learning to learn (managing personal and professional development, self-management)
- KS10 Numeracy

At the end of this module, students will be able to

Key Skills

| At the end of this module, students will be able to | | Key Skills | |
|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|------------|------|
| 1 | Explore the fundamentals and functions of a Database Management System (DBMS) | KS1 | KS6 |
| | | KS9 | |
| 2 | Analyse the data requirements of a system and create the database to support the data requirements. | KS1 | KS2 |
| | | KS3 | KS4 |
| | | KS5 | KS6 |
| | | KS7 | KS8 |
| | | KS9 | KS10 |
| 3 | Create, modify and delete tables and views, and identify the consequences of such actions. | KS3 | KS4 |
| | | KS9 | KS10 |
| 4 | Explore the concepts of Relational Algebra and common operations: RESTRICT, PROJECT, JOIN, UNION, PRODUCT, DIFFERENCE and its relationships to SQL. | KS3 | KS4 |
| | | KS9 | KS10 |
| 5 | Given a requirement for a data retrieval or update, Design, Plan, Execute and Evaluate an appropriate SQL statement | KS3 | KS4 |
| | | KS9 | KS10 |
| 6 | Explore database administration, database security, concurrency, and recovery issues in multiuser database environment | KS3 | KS4 |
| | | KS6 | KS7 |
| | | KS9 | KS10 |

Transferable skills and other attributes

- Personal motivation, organisation and time management
- Ability to collaborate and plan
- Written and verbal communication skills
- Research and analytical skills

Derogations

None

Assessment:

Indicative Assessment Tasks:

Assessment of this unit will be through a combination of course work (70%) which includes a number of individual tasks and an In-Class Test (30%). The students will be expected to develop skills in completing the assignments as each will be an integral part of the learning process.

| Assessment number | Learning Outcomes to be met | Type of assessment | Weighting (%) | Duration (if exam) | Word count (or equivalent if appropriate) |
|-------------------|-----------------------------|--------------------|---------------|--------------------|-------------------------------------------|
| 1 | 1-6 | Coursework | 70% | N/A | N/A |
| 2 | 2-6 | In-class test | 30% | 1.5 hrs | N/A |

Learning and Teaching Strategies:

The module will be taught by a mixture of lectures, laboratory workshops and seminar sessions, and self-study exercises.

The lectures will normally be used to introduce the various concepts and principles of the module's topics. Each lecture will normally be followed either by a laboratory workshop or a seminar session. During the laboratory sessions students will gain practical experience by applying information systems concepts on commercial DBMS(s) and simple expert systems tools; they will use material that will encourage each students to work at his/her own speed.

During workshops students will work individually and in small groups; it is envisaged that the workshops and seminars will allow students to explore in depth specific issues which arise in Database systems development and maintenance and to benefit by peer contribution.

For the self-study exercises and assessment, students are expected to spend time on unsupervised work in the computer laboratories and in private study.

Syllabus outline:

Basic concepts of Data and Database
 Database approach
 Database design and development: Data analysis, Conceptual Design, Logical Design, principles of Normalisation, Physical Design, implementation
 Relational Algebra
 Defining database and its objects: Tables, Views, Indexes
 Security and Concurrency issues in a Multiuser Database Environment

Indicative Bibliography:

Essential reading

None.

Other indicative reading

Coronel, C. and Morris, S. (2018), *Database Systems: Design, Implementation, and Management*. 13th ed. Australia: Course Technology.

Connolly, T.M. and Begg, C.E. (2014), *Database Systems - A Practical Approach to Design Implementation and Management*. 6th ed. Harlow: Pearson Education.

Viescas, J.L. (2018), *SQL Queries for Mere Mortals: A Hands-On Guide to Data Manipulation in SQL*. Harlow: Addison-Wesley.

Patrick, J.J. (2009), *SQL Fundamentals*. 3rd ed. Upper Saddle River, NJ: Prentice Hall.

Journals (available electronically through the library)

ACM Digital Library
 IEEE Xplore

| | |
|---------------------|--------|
| Module Code: | COM439 |
|---------------------|--------|

| | |
|----------------------|----------------------------------|
| Module Title: | Problem Solving with Programming |
|----------------------|----------------------------------|

| | | | |
|---------------|---|----------------------|----|
| Level: | 4 | Credit Value: | 20 |
|---------------|---|----------------------|----|

| | | | |
|------------------------|------|--------------------|------|
| Cost Centre(s): | GACP | JACS3 code: | I322 |
|------------------------|------|--------------------|------|

| | | | |
|-----------------|------------------------------|-----------------------|-----------------------|
| Faculty: | Arts, Science and Technology | Module Leader: | Prof. Richard Picking |
|-----------------|------------------------------|-----------------------|-----------------------|

| | |
|---------------------------------------|---------|
| Scheduled learning and teaching hours | 36 hrs |
| Guided independent study | 164 hrs |
| Placement | 0 hrs |
| Module duration (total hours) | 200 hrs |

| Programme(s) in which to be offered (not including exit awards) | Core | Option |
|------------------------------------------------------------------------|------|--------------------------|
| BSc (Hons) Computer Game Development | ✓ | <input type="checkbox"/> |
| BSc (Hons) Computer Science | ✓ | <input type="checkbox"/> |
| BSc (Hons) Computing | ✓ | <input type="checkbox"/> |
| BSc (Hons) Computer Networks and Security | ✓ | <input type="checkbox"/> |
| BSc (Hons) Cyber Security | ✓ | <input type="checkbox"/> |
| BSc (Hons) Applied Software Engineering | ✓ | |
| BSc (Hons) Applied Cyber Security | ✓ | |

| |
|-----------------------|
| Pre-requisites |
| None. |

Office use only

Initial approval: 30/08/2018
 With effect from: 01/09/2018
 Date and details of revision:

Version no:1

Version no:

Module Aims

This module will introduce students to the key concepts of software design and development. It will take a systematic approach to problem solving, and will use design methods to enable students to construct programmed solutions. A modern, object-oriented computer programming language will be used in a hands-on laboratory setting, where students will work through a number of exercises to develop the fundamental skills to prepare them for more complex software engineering practice at a higher level.

This module aims to:

- Use logical thinking and algorithmic techniques to enable students to solve procedural problems.
- Provide students with knowledge and skills to use notations and tools to articulate problem solutions in the form of program designs.
- Give students a clear understanding of the software development process, including analysis, design, implementation and testing.
- Introduce a modern object-oriented programming language, giving students a clear understanding of the syntax and structure of that language.
- Give students a clear understanding of the object-oriented programming paradigm.
- Introduce students to an Integrated Development Environment to support the production of object-oriented applications.

Intended Learning Outcomes

Key skills for employability

- KS1 Written, oral and media communication skills
 KS2 Leadership, team working and networking skills
 KS3 Opportunity, creativity and problem solving skills
 KS4 Information technology skills and digital literacy
 KS5 Information management skills
 KS6 Research skills
 KS7 Intercultural and sustainability skills
 KS8 Career management skills
 KS9 Learning to learn (managing personal and professional development, self-management)
 KS10 Numeracy

At the end of this module, students will be able to

Key Skills

| At the end of this module, students will be able to | | Key Skills | |
|-----------------------------------------------------|----------------------------------------------------------------------------------------|------------|-----|
| 1 | Interpret problem specifications, and translate them into logical, designed solutions. | KS1 | KS2 |
| | | KS3 | KS4 |
| | | KS5 | KS6 |
| 2 | Use program designs to develop working computer programs. | KS1 | KS2 |
| | | KS3 | KS4 |
| | | KS5 | |
| 3 | Demonstrate an understanding of object-oriented programming. | KS1 | KS2 |
| | | KS3 | KS4 |

| | | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|-----|-----|
| | | KS5 | |
| 4 | Use an Integrated Development Environment (IDE) to build graphical user interfaces. | KS1 | KS2 |
| | | KS3 | KS4 |
| | | KS5 | |
| 5 | Understand the key stages of software development and their relationship to the discipline of Software Engineering. | KS1 | KS2 |
| | | KS3 | KS4 |
| | | KS5 | |
| Transferable skills and other attributes | | | |
| <ul style="list-style-type: none"> • Personal motivation, organisation and time management • Ability to collaborate and plan • Written and verbal communication skills • Research and analytical skills | | | |

Derogations

None.

Assessment:

Indicative Assessment Tasks:

The assessment will comprise of two pieces of course work, comprising of exercises and/or larger programs, program design, program listings and evidence of testing will be the main components of the assessments.

| Assessment number | Learning Outcomes to be met | Type of assessment | Weighting (%) | Duration (if exam) | Word count (or equivalent if appropriate) |
|-------------------|-----------------------------|--------------------|---------------|--------------------|-------------------------------------------|
| 1 | 1, 2, 3, 4, 5 | Coursework | 50 | | |
| 2 | 1, 2, 3, 4, 5 | Coursework | 50 | | |

Learning and Teaching Strategies:

The module will be delivered through a combination of formal lectures, tutorials and labs. Students will have access to lecture materials and ancillary resources, via the University's VLE platform.

Syllabus outline:

Syllabus outline:

1. Problem solving techniques and logical thinking.
2. Program design tools.
3. Programming rules.
4. Program constructs (sequence, selection, iteration).
5. Subprograms.
6. Data structures.

- | |
|------------------------------------------------------------------------------------------------------------------------------------------------|
| 7. Object-oriented programming techniques. 8. Graphical user interface programming with an IDE. 9. The practice of software engineering. |
|------------------------------------------------------------------------------------------------------------------------------------------------|

| |
|---------------------------------|
| Indicative Bibliography: |
|---------------------------------|

| |
|--------------------------|
| Essential reading |
|--------------------------|

| |
|------|
| None |
|------|

| |
|---------------------------------|
| Other indicative reading |
|---------------------------------|

| |
|--------------------------------------------------------------------------------------------------------------------|
| Stroustrup, B. (2013) <i>The C++ Programming Language</i> . 4th ed. Upper Saddle River, NJ: Pearson Addison Wesley |
|--------------------------------------------------------------------------------------------------------------------|

| |
|--------------------------------------------------------------------------------------------------------|
| Stroustrup, B. (2014), <i>Programming: Principles and Practice Using C++</i> . 2nd ed. Addison Wesley. |
|--------------------------------------------------------------------------------------------------------|

| |
|---------------------------------------------------------------------------------|
| Picking, R. (2007), <i>Get on up with Java</i> . Colchester: Lexden Publishing. |
|---------------------------------------------------------------------------------|

| |
|---------------------------------------|
| C/C++ Language and Standard Libraries |
|---------------------------------------|

| |
|-----------------------------------------------------------------------------------------------------------------------------|
| https://msdn.microsoft.com/en-us/library/hh875057.aspx |
|-----------------------------------------------------------------------------------------------------------------------------|

| |
|---------------------------------|
| The Java Language Specification |
|---------------------------------|

| |
|-----------------------------------------------------------------------------------------------------------------------------------------|
| https://docs.oracle.com/javase/specs/jls/se7/html/index.html |
|-----------------------------------------------------------------------------------------------------------------------------------------|

Module specification

When printed this becomes an uncontrolled document. Please access the **Module Directory** for the most up to date version by clicking on the following link: [Module directory](#)

| | |
|---------------|------------------|
| Module code | COM465 |
| Module title | Computer Systems |
| Level | 4 |
| Credit value | 20 |
| Faculty | FAST |
| Module Leader | Teri Birch |
| HECoS Code | 100734 |
| Cost Code | GACP |

Programmes in which module to be offered

| Programme title | Is the module core or option for this programme |
|-------------------------------------------|-------------------------------------------------|
| BSc (Hons) Computer Science | Core |
| BSc (Hons) Computing | Core |
| BSc (Hons) Computer Networks and Security | Core |
| BSc (Hons) Cyber Security | Core |
| BSc (Hons) Applied Cyber Security | Core |
| BSc (Hons) Applied Software Engineering | Core |

Pre-requisites

None

Breakdown of module hours

| | |
|----------------------------------------------------------------------|---------------|
| Learning and teaching hours | 36 hrs |
| Placement tutor support | 0 hrs |
| Supervised learning e.g. practical classes, workshops | 0 hrs |
| Project supervision (level 6 projects and dissertation modules only) | 0 hrs |
| Total active learning and teaching hours | 36 hrs |
| Placement / work based learning | 0 hrs |
| Guided independent study | 164 hrs |

| | |
|--------------------------------------|---------|
| Learning and teaching hours | 36 hrs |
| Module duration (total hours) | 200 hrs |

| | |
|------------------------------|------------|
| For office use only | |
| Initial approval date | 06/08/2021 |
| With effect from date | 01/09/2021 |
| Date and details of revision | |
| Version number | 1 |

Module aims

The module aims to provide students with a grounding in the architecture and organisation of modern computer systems.

Module Learning Outcomes - at the end of this module, students will be able to:

| | |
|---|-------------------------------------------------------------------------------------------------------------------|
| 1 | Describe the major sub-systems, components and operation of computer systems. |
| 2 | Explain the key differences difference between techniques used in computer systems |
| 3 | Demonstrate proficiency in the use of binary and hexadecimal number systems, including real and negative numbers. |
| 4 | Identify designs for computer system components using logic gates and circuits. |

Assessment

Indicative Assessment Tasks:

This section outlines the type of assessment task the student will be expected to complete as part of the module. More details will be made available in the relevant academic year module handbook.

The development of a Portfolio (3000 words) whereby students will be given assessment topics through tutorials and coursework (a number of tasks as formative assessment)

| Assessment number | Learning Outcomes to be met | Type of assessment | Weighting (%) |
|-------------------|-----------------------------|--------------------|---------------|
| 1 | 1-4 | Portfolio | 100% |

Derogations

None

Learning and Teaching Strategies

The module will be delivered through a combination of formal lectures, tutorials, practical demonstrations and labs. Students will have access to lecture materials, and ancillary resources, via the University's VLE platform.

Indicative Syllabus Outline

Brief history of computer systems and key developments
Top-Level View of Computer System Functions and Interconnection
Number systems: decimal, binary and hexadecimal
Number systems: Binary arithmetic and floating point numbers
Digital Logic: Gates and circuits
Boolean algebra and Karnaugh maps
Processor structure and function
Memory: Logic and Organization
Memory: Hardware
Input/Output: Data Storage and Devices
Input/Output: Interfaces and Peripherals

Indicative Bibliography:

Please note the essential reads and other indicative reading are subject to annual review and update.

Essential Reads

Stallings, W. (2015), *Computer Organization and Architecture: Designing for Performance*. 10th ed. Boston:Pearson.

Other indicative reading

Aho, A. and Ullman, J. (1992), *Foundations of Computer Science*. Freeman. Available online: <http://infolab.stanford.edu/~ullman/focs.html>

Null, L. and Lobur, J. (2015). *Essentials of Computer Organization and Architecture*. 4th ed. Burlington: Jones and Bartlett Publishers.

Tanenbaum, A. and Austin, T. (2012), *Structured Computer Organization*. 6th ed. Harlow: Pearson.

Employability skills – the Glyndŵr Graduate

Each module and programme is designed to cover core Glyndŵr Graduate Attributes with the aim that each Graduate will leave Glyndŵr having achieved key employability skills as part of their study. The following attributes will be covered within this module either through the content or as part of the assessment. The programme is designed to cover all attributes and each module may cover different areas.

Core Attributes

Engaged
Enterprising
Creative

Key Attitudes

Commitment
Curiosity
Resilience
Confidence
Adaptability

Practical Skillsets

Digital Fluency
Organisation
Critical Thinking
Emotional Intelligence
Communication

| | |
|---------------------|--------|
| Module Code: | COM457 |
|---------------------|--------|

| | |
|----------------------|--------------------------------|
| Module Title: | Discrete Computational Methods |
|----------------------|--------------------------------|

| | | | |
|---------------|---|----------------------|----|
| Level: | 4 | Credit Value: | 20 |
|---------------|---|----------------------|----|

| | | | |
|------------------------|------|--------------------|--------|
| Cost Centre(s): | GACP | HECoS code: | 100960 |
|------------------------|------|--------------------|--------|

| | | | |
|-----------------|------------------------------|-----------------------|------------|
| Faculty: | Arts, Science and Technology | Module Leader: | Bindu Jose |
|-----------------|------------------------------|-----------------------|------------|

| | |
|---------------------------------------|----------------|
| Scheduled learning and teaching hours | 48 hrs |
| Guided independent study | 152 hrs |
| Placement | 0 hrs |
| Module duration (total hours) | 200 hrs |

| Programme(s) in which to be offered (not including exit awards) | Core | Option |
|------------------------------------------------------------------------|------|--------------------------|
| BSc (Hons) Computer Science | ✓ | <input type="checkbox"/> |
| BSc (Hons) Computer Science (with Industrial Placement) | ✓ | <input type="checkbox"/> |
| BSc (Hons) Cyber Security | ✓ | <input type="checkbox"/> |
| BSc (Hons) Cyber Security (with Industrial Placement) | ✓ | <input type="checkbox"/> |
| BSc (Hons) Applied Cyber Security | ✓ | <input type="checkbox"/> |

| |
|-----------------------|
| Pre-requisites |
| None. |

Office use only

Initial approval: 30/08/2018
With effect from: 01/09/2018
Date and details of revision:

Version no:1

Version no:

Module Aims

The module aims to provide students with a grounding in the broad logical and mathematical principles that will support and underpin their future studies in their respective subject discipline. This module will also enable students to apply relevant mathematical methods and techniques to practical problems.

Intended Learning Outcomes

Key skills for employability

- KS1 Written, oral and media communication skills
- KS2 Leadership, team working and networking skills
- KS3 Opportunity, creativity and problem solving skills
- KS4 Information technology skills and digital literacy
- KS5 Information management skills
- KS6 Research skills
- KS7 Intercultural and sustainability skills
- KS8 Career management skills
- KS9 Learning to learn (managing personal and professional development, self-management)
- KS10 Numeracy

At the end of this module, students will be able to

Key Skills

| | | | |
|---|--------------------------------------------------------------------------------------------------------------------------|-----|-----|
| 1 | Recognize, describe and apply correct mathematical notation | KS1 | KS2 |
| | | KS3 | KS4 |
| | | KS5 | KS6 |
| 2 | Express and manipulate mathematical concepts with the necessary rigour. | KS1 | KS2 |
| | | KS3 | KS4 |
| | | KS5 | |
| 3 | Identify and apply appropriate mathematical tools and methods in solving real-life and computing-related problems. | KS1 | KS2 |
| | | KS3 | KS4 |
| | | KS5 | |
| 4 | Appreciate how well-designed simple algorithms can solve complex computational problems | KS1 | KS2 |
| | | KS3 | KS4 |
| | | KS5 | |
| 5 | Solve mathematical problems using appropriate tools/methods/formula/algorithms, decision making and independent thought. | KS1 | KS2 |
| | | KS3 | KS4 |
| | | KS5 | |

Transferable skills and other attributes

- Personal motivation, organisation and time management
- Ability to collaborate and plan
- Written and verbal communication skills
- Research and analytical skills

Derogations

None.

Assessment:

Indicative Assessment Tasks:

The assessment will comprise of two pieces of course work, comprising of exercises and/or larger programs, program design, program listings and evidence of testing will be the main components of the assessments.

| Assessment number | Learning Outcomes to be met | Type of assessment | Weighting (%) | Duration (if exam) | Word count (or equivalent if appropriate) |
|-------------------|-----------------------------|--------------------|---------------|--------------------|-------------------------------------------|
| 1 | 1, 2, 3, 4, | Coursework | 60 | | 1,800 |
| 2 | 5 | In-class test | 40 | 1.5 hrs | |

Learning and Teaching Strategies:

The module will be delivered through a combination of formal lectures, tutorials, practical demonstrations and labs. Students will have access to lecture materials, and ancillary resources, via the University's VLE platform.

Syllabus outline:

Syllabus outline:

- Types of number and bases
- Units and conversions
- Algebra: representation and manipulation
- Linear algebra: vectors and matrices, linear transformation, solving systems of equations
- Discrete mathematics
- Sets and sequences
- Equalities and inequalities
- Statistics and probability Representing data: charts, graphs and tables Computational Thinking Algorithms Measuring Performance

Indicative Bibliography:

Essential reading

Ferreira Filho, W. (2017). *Computer Science Distilled: Learn the Art of Solving Computational Problems*. Code Energy.

Other indicative reading

Croft, A. and Davison, R. (2016). Foundation Maths, Sixth Edition. Prentice Hall.

Haggarty, R. (2002). Discrete Mathematics for Computing, Prentice Hall. Lehman, E.,

Leighton, F. T., & Meyer, A. R. (2010). Mathematics for computer science. URL:
<https://courses.csail.mit.edu/6.042/spring17/mcs.pdf> Arora,

S., & Barak, B. (2009). Computational complexity: a modern approach. Cambridge University Press. URL: <http://theory.cs.princeton.edu/complexity/book.pdf> <http://www.purplemath.com/>
<https://www.mathsisfun.com/>

| | | | |
|------------------------|------------------------------|-----------------------|---------------|
| Module Code: | COM538 | | |
| Module Title: | Cyber Security and Forensics | | |
| Level: | 5 | Credit Value: | 20 |
| Cost Centre(s): | GACP | HECoS code: | 100366 |
| Faculty: | Arts, Science and Technology | Module Leader: | Nigel Houlden |

| | |
|---------------------------------------|----------------|
| Scheduled learning and teaching hours | 30 hrs |
| Guided independent study | 170 hrs |
| Placement | 0 hrs |
| Module duration (total hours) | 200 hrs |

| Programme(s) in which to be offered (not including exit awards) | Core | Option |
|----------------------------------------------------------------------------------------|------|--------------------------|
| BSc (Hons) Computer Science | ✓ | <input type="checkbox"/> |
| BSc (Hons) Cyber Security | ✓ | <input type="checkbox"/> |
| BSc (Hons) Applied Cyber Security | ✓ | |
| Stand alone module aligned to BSc (Hons) Cyber Security for QA and assessment purposes | | ✓ |

Pre-requisites

None.

Office use only

Initial approval: 30/08/2018

Version no:1

With effect from: 01/09/2018

Date and details of revision:

Version no:

Module Aims

This module will give students a broad grounding in the basics of security and digital forensics. It will introduce students to technological security basics, beginning with physical and environmental security factors and the identification and management of risks to security and privacy. Upon completion of the module, students will be competent in discussing and analysing security threats by evaluating the potential business impact, and be competent in determining appropriate interventions and techniques to mitigate and monitor these risks. The module also deals with forensics and provides students with exposure to data recovery techniques that could be used in criminal investigation and data recovery scenarios.

Intended Learning Outcomes

Key skills for employability

- KS1 Written, oral and media communication skills
- KS2 Leadership, team working and networking skills
- KS3 Opportunity, creativity and problem solving skills
- KS4 Information technology skills and digital literacy
- KS5 Information management skills
- KS6 Research skills
- KS7 Intercultural and sustainability skills
- KS8 Career management skills
- KS9 Learning to learn (managing personal and professional development, self-management)
- KS10 Numeracy

At the end of this module, students will be able to

Key Skills

| At the end of this module, students will be able to | | Key Skills | |
|-----------------------------------------------------|---------------------------------------------------------------------------------|------------|------|
| 1 | Discuss the computer security and forensic investigation landscape | KS1 | KS4 |
| | | KS5 | KS7 |
| | | KS8 | KS10 |
| 2 | Recognise and manage security and privacy threats using technological solutions | KS3 | KS4 |
| | | KS5 | KS10 |
| | | | |
| 3 | Apply forensic investigation tools to recover and collate lost and hidden data | KS1 | KS4 |
| | | KS5 | KS6 |
| | | KS10 | |

Transferable skills and other attributes

- Personal motivation, organisation and time management
- Ability to collaborate and plan
- Written and verbal communication skills
- Research and analytical skills

Derogations

None.

Assessment:

Indicative Assessment Tasks:

Assessment is formed of two components: a class test, which will validate student acquisition and understanding of theoretical principles that relate to computer security and forensics; and a practical test, which will require students to demonstrate proficiency in configuring and testing security mechanisms as well as applying forensic investigation skills to recover lost data and form a case or profile under time-limited conditions. As such, the assignment strategy supports the intentions of the learning outcomes: to ensure students have a competent knowledge and understanding in Cyber Security and Forensic principles, but with greater emphasis being placed upon their ability to implement these techniques and technologies.

| Assessment number | Learning Outcomes to be met | Type of assessment | Weighting (%) | Duration (if exam) | Word count (or equivalent if appropriate) |
|-------------------|-----------------------------|--------------------|---------------|--------------------|-------------------------------------------|
| 1 | 1 | In-class test | 30% | 1 hour | N/A |
| 2 | 2, 3 | Coursework | 70% | N/A | 3 hours |

Learning and Teaching Strategies:

This module has an emphasis in the practical issues related to Cyber Security and Forensics and will be delivered using a combination of formal lecturers, tutorials, practical demonstrations and lab sessions. The split between theory and practical teaching and learning is approximately 40% and 60% respectively. The formal delivery will be supplemented by reading materials, such as academic papers and industry technology reports, which will be made available via the University's VLE.

Syllabus outline:

Threats and risks
 Asset management and physical security
 Risk management and security standards
 Predictive business impact analysis
 Viruses, malware and other nasty software
 Authentication
 Access control
 Cryptography
 Software security
 Operating systems security
 Phishing and email privacy
 Security management
 Forensic investigation
 Data recovery and file analysis
 Email and web forensics

Legal issues, cyber crime and ethics

Indicative Bibliography:

Essential reading

Pfleeger, C.P., Pfleeger, S.L., and Marguiles, J. (2015). *Security in Computing*. 5th ed. Prentice-Hall.

Stallings, W. and Brown, L. (2017). *Computer Security: Principles and Practice*. 4th ed. Boston: Pearson.

Other indicative reading

Howard, M., LeBlanc, D. and Viega, J. (2009). *The 24 Deadly Sins of Software Security*. California: McGraw-Hill/Osborne.

Davis, C., Cowen, D. and Philipp, A. (2009), *Hacking Exposed Computer Forensics: Secrets & Solutions*. 2nd ed. London: McGraw-Hill/Osborne.

Nestlet, V.J., Harrison, K., Hirsch, M.P., and Conklin, W.A. (2014), *Principles of Computer Security Lab Manual*. 4th ed. London: McGraw-Hill/Osborne.

| | |
|---------------------|--------|
| Module Code: | COM540 |
|---------------------|--------|

| | |
|----------------------|---------------------------------------------|
| Module Title: | Databases and Web-based Information Systems |
|----------------------|---------------------------------------------|

| | | | |
|---------------|---|----------------------|----|
| Level: | 5 | Credit Value: | 20 |
|---------------|---|----------------------|----|

| | | | |
|------------------------|------|--------------------|------|
| Cost Centre(s): | GACP | JACS3 code: | I160 |
|------------------------|------|--------------------|------|

| | | | |
|-----------------|------------------------------|-----------------------|------------|
| Faculty: | Arts, Science and Technology | Module Leader: | Bindu Jose |
|-----------------|------------------------------|-----------------------|------------|

| | |
|---------------------------------------|----------------|
| Scheduled learning and teaching hours | 36 hrs |
| Guided independent study | 164 hrs |
| Placement | 0 hrs |
| Module duration (total hours) | 200 hrs |

| Programme(s) in which to be offered (not including exit awards) | Core | Option |
|------------------------------------------------------------------------|------|--------------------------|
| BSc (Hons) Computer Science | ✓ | <input type="checkbox"/> |
| BSc (Hons) Computing | ✓ | <input type="checkbox"/> |
| BSc (Hons) Applied Software Engineering | ✓ | |

| |
|-----------------------|
| Pre-requisites |
| None. |

Office use only

Initial approval: 30/08/2018

Version no:1

With effect from: 01/09/2018

Date and details of revision:

Version no:

Module Aims

This module will introduce students to the key concepts of software design and development on web platforms; closed source and open source systems. It covers technical aspects of analysing, designing and implementing database and web-based information systems.

The module will provide students with conceptual and practical understanding of website design and development, and encourages the integration of good interface design with effective system functionality.

This module aims to:

- Use logical thinking and algorithmic techniques to enable students to solve problems.
- Provide students with knowledge and skills to use Database Management Systems (DBMS) with web technologies, with the focus on SQL.
- Give students a clear understanding of the software development process, including analysis, design, testing, and implementation of web site deployments.
- Using modern object-oriented programming language, giving students a clear understanding of the syntax and structure of that language.

Intended Learning Outcomes

Key skills for employability

| | |
|------|-------------------------------------------------------------------------------------|
| KS1 | Written, oral and media communication skills |
| KS2 | Leadership, team working and networking skills |
| KS3 | Opportunity, creativity and problem solving skills |
| KS4 | Information technology skills and digital literacy |
| KS5 | Information management skills |
| KS6 | Research skills |
| KS7 | Intercultural and sustainability skills |
| KS8 | Career management skills |
| KS9 | Learning to learn (managing personal and professional development, self-management) |
| KS10 | Numeracy |

At the end of this module, students will be able to

Key Skills

| At the end of this module, students will be able to | | Key Skills | |
|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|------------|-----|
| 1 | Appreciate the business related issues, the context, role and architecture of database and web-based information systems | KS1 | KS3 |
| 2 | Apply appropriate methodologies, techniques and approaches for the development of web sites. | KS1 | KS3 |
| | | KS6 | KS9 |
| 3 | Construct small-scale web sites based on current technologies using appropriate modern languages and available tools. | KS1 | KS2 |
| | | KS5 | |
| 4 | Evaluate the technical factors associated with implementing DBMS backend to web services. | KS3 | KS4 |
| | | KS5 | KS9 |
| 5 | | KS1 | KS2 |
| | | KS4 | KS6 |

| | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--|
| Apply HCI Design principles and implement well-designed, fit for purpose, web interfaces for different devices from desktop devices to mobile devices. | KS9 | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--|

Transferable skills and other attributes

- Personal motivation, organisation and time management
- Ability to collaborate and plan
- Written and verbal communication skills
- Research and analytical skills

Derogations

None.

Assessment:

Indicative Assessment Tasks:

The module has two equally weighted assessment. Students are required to work in groups to analyse, design and implement a database-driven web-based information system for a specified business problem. It will provide students with the opportunity to undertake research on current issues and practical techniques in database and web-based information systems. It will also enable students to apply their knowledge to a practical business problem, demonstrating their skills for problem-solving and critical thinking/evaluation. Marks for the work will be derived from the software deliverable; the application of appropriate theories, technologies and good practice; and documentation reflecting on the work done and the processes involved.

| Assessment number | Learning Outcomes to be met | Type of assessment | Weighting (%) | Duration (if exam) | Word count (or equivalent if appropriate) |
|-------------------|-----------------------------|--------------------|---------------|--------------------|-------------------------------------------|
| 1 | 1,2 | Coursework | 50% | | |
| 2 | 3, 4,5 | Coursework | 50% | | |

Learning and Teaching Strategies:

Lectures, supported by tutorials and practical sessions where students get the opportunity to put theory into practice.

The lectures will focus on presenting key topics and concepts, whereas the practical/tutorial based learning will provide exposure to hardware and software platforms, and the use of toolkits for designing and developing web sites and web applications.

These sessions will also support the study of underlying subject-based concepts and principles.

Formative, self-directed exercises will be used to support transfer of knowledge and understanding.

Students will have access to lecture materials, and ancillary resources, via the University's VLE platform.

Syllabus outline:

- Concepts and fundamentals of database and web-based information systems
- Database analysis and design techniques: fact finding, entity relationship modelling, and normalisation
- Web Site Development, including: An overview of platform specific frameworks, e.g. ASP.NET and PHP.
- An Introduction to development frameworks; Human Computer Interaction issues, such as Interfaces on differing screen sizes.
- Interaction through current technologies, location services, orientation, user preferences and data storage with a major focus on DBMS.
- Server-side & client-side programming
- Designing and implementing web database applications as an information system
- The use of lightweight web servers for development, debugging and user-interface testing.
- Business related issues in the context of database and web-based information systems

Indicative Bibliography:

Essential reading

There are no essential texts; the module will use relevant online reference material.

Other indicative reading

Elmasri, R. and Navathe S.B. (2016), *Fundamentals of Database Systems*. 7th ed. Harlow: Pearson Education.

Viescas, J.L. (2018), *SQL Queries for Mere Mortals: A Hands-On Guide to Data Manipulation in SQL*. 4th ed. Harlow: Addison-Wesley.

Valacich, J. and George, J. (2016), *Modern Systems Analysis and Design*. 8th ed. Harlow: Pearson Education.

Learn ASP.NET

<https://www.asp.net/learn>

Getting Started with SQL Server Express Edition

[https://technet.microsoft.com/en-us/library/ms165608\(v=sql.90\).aspx](https://technet.microsoft.com/en-us/library/ms165608(v=sql.90).aspx)

PHP Documentation

<http://php.net/docs.php>

MySQL Documentation

<https://dev.mysql.com/doc/>

EasyPHP (DevServer)

<http://www.easyphp.org/documentation/devserver/>

| | |
|---------------------|--------|
| Module Code: | COM543 |
|---------------------|--------|

| | |
|----------------------|----------------------------------------------|
| Module Title: | Internet and Mobile Applications Development |
|----------------------|----------------------------------------------|

| | | | |
|---------------|---|----------------------|----|
| Level: | 5 | Credit Value: | 20 |
|---------------|---|----------------------|----|

| | | | |
|------------------------|------|--------------------|------|
| Cost Centre(s): | GACP | JACS3 code: | I610 |
|------------------------|------|--------------------|------|

| | | | |
|-----------------|------------------------------|-----------------------|-------------|
| Faculty: | Arts, Science and Technology | Module Leader: | John Worden |
|-----------------|------------------------------|-----------------------|-------------|

| | |
|---------------------------------------|---------|
| Scheduled learning and teaching hours | 30 hrs |
| Guided independent study | 170 hrs |
| Placement | 0 hrs |
| Module duration (total hours) | 200 hrs |

| Programme(s) in which to be offered (not including exit awards) | Core | Option |
|------------------------------------------------------------------------|------|--------------------------|
| BSc (Hons) Computer Game Development | ✓ | <input type="checkbox"/> |
| BSc (Hons) Computing | ✓ | <input type="checkbox"/> |
| BSc (Hons) Applied Software Engineering | ✓ | |

| |
|-----------------------|
| Pre-requisites |
| None. |

Office use only

Initial approval: 30/08/2018

Version no:1

With effect from: 01/09/2018

Date and details of revision:

Version no:

Module Aims

This module will introduce students to the key concepts of software design and development on mobile platforms, such as Android or iOS.

A modern, object-oriented computer programming language will be used in a hands-on laboratory setting, where students will create mobile apps.

This module aims to:

- Use logical thinking and algorithmic techniques to enable students to solve problems.
- Provide students with knowledge and skills to use notations and techniques to articulate problem solutions in the form of program designs.
- Give students a clear understanding of the software development process, including analysis, design, implementation and testing.
- Using modern object-oriented programming language, giving students a clear understanding of the syntax and structure of that language.

Intended Learning Outcomes

Key skills for employability

- KS1 Written, oral and media communication skills
- KS2 Leadership, team working and networking skills
- KS3 Opportunity, creativity and problem solving skills
- KS4 Information technology skills and digital literacy
- KS5 Information management skills
- KS6 Research skills
- KS7 Intercultural and sustainability skills
- KS8 Career management skills
- KS9 Learning to learn (managing personal and professional development, self-management)
- KS10 Numeracy

| At the end of this module, students will be able to | | Key Skills | |
|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----|
| 1 | Apply appropriate methodologies, techniques and approaches for the development of application software for mobile devices, including data structures. | KS1 | KS2 |
| | | KS3 | |
| 2 | Construct small-scale client applications (e.g. 2D mini game) based on current technologies using appropriate modern languages and available tools. | KS1 | KS2 |
| | | KS3 | |
| 3 | Evaluate the technical and non-technical factors associated with the development of a range of mobile applications and systems. | KS3 | KS4 |
| | | KS6 | |
| 4 | Apply HCI Design principles and implement well-designed, fit for purpose, graphical user interfaces for different devices such as phones and tablet devices | KS1 | KS2 |
| | | KS4 | |

Transferable skills and other attributes

- Personal motivation, organisation and time management
- Ability to collaborate and plan
- Written and verbal communication skills
- Research and analytical skills

Derogations

None.

Assessment:

Indicative Assessment Tasks:

The module is assessed through the development of apps, which implement current mobile technologies, together with supporting documentation in the form of a design-based report.

Marks for the work will be derived from the software deliverable; the application of appropriate theories, technologies and good practice; and documentation reflecting on the work done and the processes involved.

| Assessment number | Learning Outcomes to be met | Type of assessment | Weighting (%) | Duration (if exam) | Word count (or equivalent if appropriate) |
|-------------------|-----------------------------|--------------------|---------------|--------------------|-------------------------------------------|
| 1 | 1,2 | Coursework | 50% | | |
| 2 | 3, 4 | Coursework | 50% | | |

Learning and Teaching Strategies:

Lectures, supported by tutorials and practical sessions where students get the opportunity to put theory into practice.

The lectures will focus on presenting key topics and concepts, whereas the practical/tutorial based learning will provide exposure to hardware and software platforms, and the use of toolkits for designing and developing mobile applications.

These sessions will also support the study of underlying subject-based concepts and principles.

Formative, self-directed exercises will be used to support transfer of knowledge and understanding.

Students will have access to lecture materials, and ancillary resources, via the University's VLE platform.

Syllabus outline:

Mobile Application Development, including: An overview of device-specific frameworks, e.g. Android SDK and/or iOS Framework.

An Introduction to development frameworks; Human Computer Interaction issues, such as Interfaces on small displays with limited user attention.

Interaction through touch/swipe gestures, accelerometers, predictive texting, location services, orientation, user-input, user preferences and data storage.

The use of emulators for development, debugging and user-interface testing.

Indicative Bibliography:

Essential reading

There are no essential texts; the module will use relevant online reference material.

Other indicative reading

Android Developer Guides

<https://developer.android.com/guide/index.html>

Apple Developer Documentation

<https://developer.apple.com/documentation/>

| | |
|---------------------|--------|
| Module Code: | COM546 |
|---------------------|--------|

| | |
|----------------------|---------------------|
| Module Title: | Server Technologies |
|----------------------|---------------------|

| | | | |
|---------------|---|----------------------|----|
| Level: | 5 | Credit Value: | 20 |
|---------------|---|----------------------|----|

| | | | |
|------------------------|------|--------------------|------|
| Cost Centre(s): | GACP | JACS3 code: | G410 |
|------------------------|------|--------------------|------|

| | | | |
|-----------------|------------------------------|-----------------------|---------------|
| Faculty: | Arts, Science and Technology | Module Leader: | Nigel Houlden |
|-----------------|------------------------------|-----------------------|---------------|

| | |
|---------------------------------------|---------|
| Scheduled learning and teaching hours | 30 hrs |
| Guided independent study | 170 hrs |
| Placement | 0 hrs |
| Module duration (total hours) | 200 hrs |

| Programme(s) in which to be offered (not including exit awards) | Core | Option |
|------------------------------------------------------------------------|------|--------------------------|
| BSc (Hons) Computer Networks and Security | ✓ | <input type="checkbox"/> |
| BSc (Hons) Cyber Security | ✓ | <input type="checkbox"/> |
| BSc (Hons) Applied Cyber Security | ✓ | |

| |
|-----------------------|
| Pre-requisites |
| None. |

Office use only

Initial approval: 30/08/2018
 With effect from: 01/09/2018
 Date and details of revision:

Version no:1

Version no:

Module Aims

This module aims to introduce students to the more advanced issues of planning, designing and building computer servers. This module will enable students to design and implement systems with appropriate software solutions. It provides an understanding of the operation of the underlying hardware and software and gives practical systems-level experience of client server-based applications.

Intended Learning Outcomes

Key skills for employability

- KS1 Written, oral and media communication skills
- KS2 Leadership, team working and networking skills
- KS3 Opportunity, creativity and problem solving skills
- KS4 Information technology skills and digital literacy
- KS5 Information management skills
- KS6 Research skills
- KS7 Intercultural and sustainability skills
- KS8 Career management skills
- KS9 Learning to learn (managing personal and professional development, self-management)
- KS10 Numeracy

At the end of this module, students will be able to

Key Skills

| At the end of this module, students will be able to | | Key Skills | |
|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|------------|-----|
| 1 | Demonstrate an understanding of the operation and features of Network Operating Systems, compare and evaluate the most common examples. | KS1 | KS2 |
| | | KS3 | |
| | | | |
| 2 | Design a practical computer server system with a large number of nodes and explain how it could be implemented and managed. | KS1 | KS2 |
| | | KS3 | KS4 |
| | | | |
| 3 | Apply appropriate levels of Security and understand the use of network gateways. | KS2 | KS3 |
| | | KS4 | |
| | | | |
| 4 | Set up User Accounts and Print Services on a Network, user applications such as Web Server, Email, file servers, etc. | KS2 | KS3 |
| | | KS4 | |
| | | | |
| 5 | Select appropriate system software to fulfil server tasks. | KS2 | KS3 |
| | | KS4 | |
| | | | |
| 6 | Implement appropriate security measures at server operating system level. | KS2 | KS3 |
| | | KS4 | |
| | | | |

Transferable skills and other attributes

- Personal motivation, organisation and time management
- Ability to collaborate and plan
- Written and verbal communication skills
- Research and analytical skills

Derogations

None.

Assessment:

Indicative Assessment Tasks:

The case study involves the building of servers and configuring key services. All of the tasks involved in the building of servers, will be documented. A written report will be required which will focus on migration techniques involving two or more sites running dissimilar network operating systems.

| Assessment number | Learning Outcomes to be met | Type of assessment | Weighting (%) | Duration (if exam) | Word count (or equivalent if appropriate) |
|-------------------|-----------------------------|--------------------|---------------|--------------------|-------------------------------------------|
| 1 | 1,2,3,4,5,6 | Case Study | 100% | | 4000 |

Learning and Teaching Strategies:

Teaching and learning will be delivered through lectures, tutorials, workshops, laboratory group tasks, self-directed study and research.

Each topic will be introduced in lectures, followed by tutorials/workshops to deepen the theoretical principles with practical applications. Some of the tutorials will be group based and some individual

Students will have access to lecture materials, and ancillary resources, via the University's VLE platform.

Syllabus outline:

The module will deal with the design principles and implementation practices of Network Operating systems and the practices and technologies of setting up a medium sized network containing multiple servers.

Open Systems versus proprietary solutions.

Planning and Maintaining Network Security and a Security Infrastructure.

Designing secure networks in a multi-server environment.

Managing and Implementing Disaster Recovery.

Suitable backup strategies.

Installing & Configuring Operating systems and the Network infrastructure including printing Techniques for user account management and scripting.

Implementation of common applications and services typically Web Servers, FTP, Email, relational databases. etc.

The uses of Cloud Computing and Virtualisation.

Current issues in networking for example Bring Your Own Device to work (BYOD).

Indicative Bibliography:

Essential reading

There are no essential texts; the module will use relevant online reference material.

Other indicative reading

Thomas, O. (2017), *Windows Server 2016 Inside Out*. Washington: Microsoft Press.

Rosen, R. (2013), *Linux Kernel Networking: Implementation and Theory*. New York: Apress.

Windows Server technical content library

<https://docs.microsoft.com/en-us/windows-server/windows-server>

Linux.org

<https://www.linux.org/>

Android Developer Guides

<https://developer.android.com/guide/index.html>

| | |
|---------------------|--------|
| Module Code: | COM640 |
|---------------------|--------|

| | |
|----------------------|-----------------------------|
| Module Title: | Advanced Mobile Development |
|----------------------|-----------------------------|

| | | | |
|---------------|---|----------------------|----|
| Level: | 6 | Credit Value: | 20 |
|---------------|---|----------------------|----|

| | | | |
|------------------------|------|--------------------|------|
| Cost Centre(s): | GAPC | JACS3 code: | I610 |
|------------------------|------|--------------------|------|

| | | | |
|-----------------|------------------------------|-----------------------|-------------|
| Faculty: | Arts, Science and Technology | Module Leader: | John Worden |
|-----------------|------------------------------|-----------------------|-------------|

| | |
|---------------------------------------|---------|
| Scheduled learning and teaching hours | 24 hrs |
| Guided independent study | 176 hrs |
| Placement | 0 hrs |
| Module duration (total hours) | 200 hrs |

| Programme(s) in which to be offered (not including exit awards) | Core | Option |
|------------------------------------------------------------------------|------|--------------------------|
| BSc (Hons) Computer Game Development | ✓ | <input type="checkbox"/> |
| BSc (Hons) Computing | ✓ | <input type="checkbox"/> |
| BSc (Hons) Applied Software Engineering | ✓ | |

| |
|-----------------------|
| Pre-requisites |
| None |

Office use only

Initial approval: 30/08/2018

Version no:1

With effect from: 01/09/2018

Date and details of revision:

Version no:

Module Aims

To provide guidelines, design principles and experience in developing advanced object oriented apps for mobile devices, such as Android based devices and/or Apple iOS based devices. The business model for App-Store marketing (Google Play and other variants) will be discussed as a paradigm for the development of new start-up companies. Social Issues, which consider M-Commerce and Mobile Payment systems, and issues to do with Mobile Privacy and Ethics.

Intended Learning Outcomes

Key skills for employability

- KS1 Written, oral and media communication skills
- KS2 Leadership, team working and networking skills
- KS3 Opportunity, creativity and problem solving skills
- KS4 Information technology skills and digital literacy
- KS5 Information management skills
- KS6 Research skills
- KS7 Intercultural and sustainability skills
- KS8 Career management skills
- KS9 Learning to learn (managing personal and professional development, self-management)
- KS10 Numeracy

At the end of this module, students will be able to

Key Skills

| At the end of this module, students will be able to | | Key Skills | |
|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----|
| 1 | Design apps appropriately for implementation in Java with the Android SDK, and/or Objective-C on iOS. | KS1 | KS3 |
| | | KS4 | |
| | | | |
| 2 | Demonstrate an in depth understanding of the characteristics and limitations of mobile hardware devices and the importance of usability in mobile apps. | KS4 | KS5 |
| | | | |
| | | | |
| 3 | Develop, test and deploy mobile-device apps that use device-specific application programming interfaces (APIs) and demonstrate current practice in mobile computing contexts. | KS3 | KS4 |
| | | | |
| | | | |
| 4 | Evaluate the current professional and ethical issues, in particular those relating to security and privacy of user data. | KS5 | KS6 |
| | | | |
| | | | |

Transferable skills and other attributes

- Personal motivation, organisation and time management
- Ability to collaborate and plan
- Written and verbal communication skills
- Research and analytical skills

Derogations

None

Assessment:

Indicative Assessment Tasks:

The module is assessed through a report and the development of apps, which implement current mobile technologies, together with supporting documentation in the form of a design based report.

Marks for the work will be derived from: the software deliverable; the application of appropriate principles, technologies and good practice; and documentation reflecting on the work done and the processes involved.

| Assessment number | Learning Outcomes to be met | Type of assessment | Weighting (%) | Duration (if exam) | Word count (or equivalent if appropriate) |
|-------------------|-----------------------------|--------------------|---------------|--------------------|-------------------------------------------|
| 1 | 4 | Report | 50 | | |
| 2 | 1, 2, 3 | Coursework | 50 | | |

Learning and Teaching Strategies:

Lectures, supported by tutorials and practical sessions where students get the opportunity to put theory into practice.

The lectures will focus on presenting key topics and concepts, whereas the practical/tutorial based learning will provide exposure to hardware and software platforms, and the use of toolkits for designing and developing mobile applications.

These sessions will also support the study of underlying subject-based concepts and principles.

Formative, self-directed exercises will be used to support transfer of knowledge and understanding.

Students will also discuss and exchange information through peer group discussions and presentations (using a VLE platform).

Syllabus outline:

Mobile App Development, including: An overview of device-specific frameworks, e.g. Android SDK and/or iOS Framework.

Contemporary software architectures, including service oriented architecture (SOA) and microservices architecture

Investigating advanced features in the development frameworks and environments;

Human Computer Interaction issues, such as Interfaces on small displays with limited user attention and internationalization.

Interaction through touch/swipe gestures, accelerometers, predictive texting, location services, and orientation; user-input and user preferences.

The use of emulators for development, debugging and first-level user-interface testing.

The Data Protection Act (DPA) (GDPR); in regards to privacy, when developing mobile apps.

Indicative Bibliography:

Essential reading

There are no essential texts; the module will use relevant online reference material.

Other indicative reading

Android Developer Guides

<https://developer.android.com/guide/index.html>

Apple Developer Documentation

<https://developer.apple.com/documentation/>

Privacy in mobile apps

<https://ico.org.uk/media/for-organisations/documents/1596/privacy-in-mobile-apps-dp-guidance.pdf>

| | |
|---------------------|--------|
| Module Code: | COM641 |
|---------------------|--------|

| | |
|----------------------|-------------------------------------|
| Module Title: | Distributed Data and Data Analytics |
|----------------------|-------------------------------------|

| | | | |
|---------------|---|----------------------|----|
| Level: | 6 | Credit Value: | 20 |
|---------------|---|----------------------|----|

| | | | |
|------------------------|------|--------------------|------|
| Cost Centre(s): | GACP | <u>JACS3</u> code: | I240 |
|------------------------|------|--------------------|------|

| | | | |
|-----------------|------------------------------|-----------------------|------------|
| Faculty: | Arts, Science and Technology | Module Leader: | Bindu Jose |
|-----------------|------------------------------|-----------------------|------------|

| | |
|---------------------------------------|---------|
| Scheduled learning and teaching hours | 36 hrs |
| Guided independent study | 164 hrs |
| Placement | 0 hrs |
| Module duration (total hours) | 200 hrs |

| Programme(s) in which to be offered (not including exit awards) | Core | Option |
|------------------------------------------------------------------------|------|--------------------------|
| BSc (Hons) Computer Science | ✓ | <input type="checkbox"/> |
| BSc (Hons) Computing | ✓ | <input type="checkbox"/> |
| BSc (Hons) Applied Software Engineering | ✓ | <input type="checkbox"/> |

| |
|-----------------------|
| Pre-requisites |
| None |

Office use only

Initial approval: 30/08/2018

Version no:1

With effect from: 01/09/2018

Date and details of revision:

Version no:

Module Aims

This module aims to extend the students' knowledge of database system and data analytics by introducing them to a number of advanced topics and techniques. Topics covered include distributed data, data warehousing, data intensive computing, data science and data analytics, personalised data and other advanced database topics.

Intended Learning Outcomes

Key skills for employability

- KS1 Written, oral and media communication skills
- KS2 Leadership, team working and networking skills
- KS3 Opportunity, creativity and problem solving skills
- KS4 Information technology skills and digital literacy
- KS5 Information management skills
- KS6 Research skills
- KS7 Intercultural and sustainability skills
- KS8 Career management skills
- KS9 Learning to learn (managing personal and professional development, self-management)
- KS10 Numeracy

At the end of this module, students will be able to

Key Skills

| At the end of this module, students will be able to | | Key Skills | |
|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------|
| 1 | Critically assess some of the more advanced developments in database technology. e.g. Stored Procedures and Functions | KS1 | KS3 |
| | | KS4 | KS5 |
| | | KS6 | KS9 |
| 2 | Evaluate the current issues associated with theory to practical implementations in database research. | KS1 | |
| | | KS3 | KS4 |
| | | KS5 | KS6 |
| | | KS7 | KS8 |
| 3 | Explore advanced aspects of data warehousing, distributed data, data science and data analytics encompassing the principles, research results and commercial application of the technologies. | KS9 | KS10 |
| | | KS1 | KS2 |
| | | KS3 | KS4 |
| | | KS5 | KS6 |
| | | KS7 | KS8 |
| 4 | Critically evaluate the adoption/use of data analytics and business intelligence practices for achieving organisational benefits. | KS9 | KS10 |
| | | KS1 | |
| | | KS3 | KS4 |
| | | KS5 | KS6 |
| | | KS7 | KS8 |
| | | KS9 | KS10 |

Transferable skills and other attributes

- Personal motivation, organisation and time management
- Ability to collaborate and plan
- Written and verbal communication skills
- Research and analytical skills

Derogations

None

Assessment:

Indicative Assessment Tasks:

Assessment of the module will be based on coursework requiring the students to design (assignment 1) database solutions (for example Data Warehouse, Distributed Database etc.) and critically evaluating (assignment 2) adoption of data analytics and the issues for a given business scenario.

| Assessment number | Learning Outcomes to be met | Type of assessment | Weighting (%) | Duration (if exam) | Word count (or equivalent if appropriate) |
|-------------------|-----------------------------|--------------------|---------------|--------------------|-------------------------------------------|
| 1 | 1,2 & 3 | Coursework | 50% | | 2500 |
| 2 | 1,2 & 4 | Coursework | 50% | | 2500 |

Learning and Teaching Strategies:

The module will be taught using a mixture of lectures, laboratory workshops, seminar sessions, and self-study exercises. The lectures will normally introduce the various concepts and principles of the module's topics.

Each lecture will normally be followed either by a laboratory workshop or a seminar session. Students will also disseminate and discuss information through student-led seminars and peer group discussion.

It is our belief that students learn more effectively when they are actively involved in learning activities that reinforce the theories that are being discussed in class.

For the self-study exercises and assessment, students are expected to spend time on unsupervised work in the computer laboratories and in private study.

Syllabus outline:

Advanced Data Models: Distributed Database, Data Warehouse, Stored Procedure and Functions

Applications: Use of Data: Data Intensive Computing, Data Science, Data Warehousing, Data Analytics, Business Intelligent Systems

Emerging Technologies and Trends in database management systems: A review of current technologies, the issues raised by them, and outstanding problems of current and future database management technologies

Indicative Bibliography:

Other indicative reading

Isson, J.P. (2018), *Unstructured Data Analytics - How to Improve Customer Acquisition, Customer Retention, and Fraud Detection and Prevention*, CENGAGE Learning

Connolly, T.M. and Begg, C.E. (2014), *Database Systems - A Practical Approach to Design Implementation and Management*. 6th ed. London: Addison-Wesley.

Elmasri, R. and Navathe, S.B. (2016), *Fundamentals of Database Systems*. 7th ed. Harlow: Pearson Education.

Hwang, K. and Chen, M. (2017), *Big-Data Analytics for Cloud, IoT and Cognitive Computing*. Chichester: Wiley-Blackwell.

Journals (available electronically through the library)

ACM Digital Library
IEEE Xplore

| | |
|---------------------|--------|
| Module Code: | COM642 |
|---------------------|--------|

| | |
|----------------------|-----------------|
| Module Title: | Ethical Hacking |
|----------------------|-----------------|

| | | | |
|---------------|---|----------------------|----|
| Level: | 6 | Credit Value: | 20 |
|---------------|---|----------------------|----|

| | | | |
|------------------------|------|--------------------|------|
| Cost Centre(s): | GAPC | <u>JACS3</u> code: | I190 |
|------------------------|------|--------------------|------|

| | | | |
|-----------------|------------------------------|-----------------------|--------------------|
| Faculty: | Arts, Science and Technology | Module Leader: | Dr. Paul Comerford |
|-----------------|------------------------------|-----------------------|--------------------|

| | |
|---------------------------------------|----------------|
| Scheduled learning and teaching hours | 24 hrs |
| Guided independent study | 176 hrs |
| Placement | 0 hrs |
| Module duration (total hours) | 200 hrs |

| Programme(s) in which to be offered (not including exit awards) | Core | Option |
|------------------------------------------------------------------------|------|--------------------------|
| BSc (Hons) Cyber Security | ✓ | <input type="checkbox"/> |
| BSc (Hons) Computer Networks and Security | ✓ | <input type="checkbox"/> |
| BSc (Hons) Applied Software Engineering | ✓ | <input type="checkbox"/> |

| |
|-----------------------|
| Pre-requisites |
| None |

Office use only

Initial approval: 30/08/2018
 With effect from: 01/09/2018
 Date and details of revision:

Version no:1

Version no:

Module Aims

The module aims to give students a solid and professional level of competence in the field of ethical hacking, which is predominantly led by the coverage of tools, techniques and systems that allow penetration testing to be carried out on computer systems and networks. Much of the module material follows the footsteps of a would-be intruder and thus includes coverage of the communication and social side of computer attacks as well as the technological. Having been led to understand how systems, software and devices can be vulnerable to unwanted penetration, students will then investigate countermeasures and organisational strategies to mitigate these risks. The module leans towards practical skills and content, but is strongly underpinned by theory and current research.

Intended Learning Outcomes

Key skills for employability

- KS1 Written, oral and media communication skills
- KS2 Leadership, team working and networking skills
- KS3 Opportunity, creativity and problem solving skills
- KS4 Information technology skills and digital literacy
- KS5 Information management skills
- KS6 Research skills
- KS7 Intercultural and sustainability skills
- KS8 Career management skills
- KS9 Learning to learn (managing personal and professional development, self-management)
- KS10 Numeracy

At the end of this module, students will be able to

Key Skills

| At the end of this module, students will be able to | | Key Skills | |
|-----------------------------------------------------|----------------------------------------------------------------------------------------------------------------|------------|-------|
| 1 | Differentiate between a range of threats and techniques used in attacks on computer systems | KS1 | KS4 |
| | | KS5 | KS 6 |
| 2 | Investigate ethical and legal issues surrounding cyber security | KS 1 | KS 3 |
| | | KS 4 | KS 5 |
| | | KS 6 | KS 9 |
| 3 | Evaluate computer systems and networks to identify weaknesses and vulnerabilities in an ethically sound manner | KS 1 | KS 3 |
| | | KS 4 | KS 5 |
| | | KS 6 | KS 10 |
| 4 | Synthesise a series of technological interventions to address computer security problems | KS 2 | KS 3 |
| | | KS 4 | KS 9 |
| | | KS10 | |

Transferable skills and other attributes

- Personal motivation, organisation and time management
- Ability to collaborate and plan

- Written and verbal communication skills
- Research and analytical skills

Derogations

None

Assessment:

Indicative Assessment Tasks:

Reflecting the nature of the learning outcomes, assessment is divided between evaluation of students' acquisition of theory, current research, and practical abilities. In the first component, students will be required to produce a report based upon recent or emerging types of cyber-attack. They should describe these attacks and their solutions at a deep, technical level and contextualise them from data, privacy, ethical, legal, and social perspectives. The second assignment will require students to demonstrate their practical abilities in the domain of penetration testing, information gathering, and problem-solving abilities. For example, students in this assignment may role play attacker and system administration in a type of 'war game' before swapping roles.

| Assessment number | Learning Outcomes to be met | Type of assessment | Weighting (%) | Duration (if exam) | Word count (or equivalent if appropriate) |
|-------------------|-----------------------------|--------------------|---------------|--------------------|-------------------------------------------|
| 1 | 1, 2 | Report | 40 | | 2,000 |
| 2 | 3, 4 | Practical | 60 | | 3 hours |

Learning and Teaching Strategies:

This module has an emphasis in the practical issues related to Ethical Hacking and will be delivered using a combination of formal lecturers, tutorials, practical demonstrations and lab sessions. The split between theory and practical teaching and learning is approximately 40% and 60% respectively. The formal delivery will be supplemented by reading materials, such as academic papers and industry technology reports, which will be made available via the University's VLE.

Syllabus outline:

- Information gathering and social engineering
- Ports and protocols
- Data privacy
- Attacks from within an organisation
- Penetration testing and fuzzing
- Exploiting vulnerabilities
- Windows and Linux local system exploits and attacks
- Software vulnerabilities
- Ethics of penetration testing
- Wireless network attacks
- Smartphone and mobile device exploits
- Cyber-crime and the law
- Logging and responding to incidents

- Disaster and recovery strategies

Indicative Bibliography:

Essential reading

McClure, S., Scambray, J., and Kurtz, G. (2012). Hacking Exposed: Network Security Secrets and Solutions. 7th ed. New York: McGraw-Hill/Osborne.

Shema, M. and Johnson, B.C. (2014), Anti-Hacker Tool Kit. 4th ed. New York: McGraw-Hill/Osborne.

Wrightson, T. (2014). Advanced Persistent Threat Hacking: The Art and Science of Hacking any Organization. New York: McGraw-Hill/Osborne.

Weidman, G., (2014). Penetration Testing: A Hands-on Introduction to Hacking. No Starch Press.

Other indicative reading

Conheady, S. (2014). Social Engineering in IT Security: Tools, Tactics and Techniques. New York: McGraw/Osborne.

IEEE Security & Privacy Magazine, IEEE
Computers and Security (journal), Elsevier Publishing
Journal of Cybersecurity, Oxford University Press
Journal of Cyber Security Technology, Taylor and Francis

| | |
|---------------------|--------|
| Module Code: | COM643 |
|---------------------|--------|

| | |
|----------------------|---------------------|
| Module Title: | Future Technologies |
|----------------------|---------------------|

| | | | |
|---------------|---|----------------------|----|
| Level: | 6 | Credit Value: | 20 |
|---------------|---|----------------------|----|

| | | | |
|------------------------|------|--------------------|------|
| Cost Centre(s): | GACP | <u>JACS3</u> code: | V550 |
|------------------------|------|--------------------|------|

| | | | |
|-----------------|------------------------------|-----------------------|-----------------|
| Faculty: | Arts, Science and Technology | Module Leader: | Prof. Vic Grout |
|-----------------|------------------------------|-----------------------|-----------------|

| | |
|---------------------------------------|---------|
| Scheduled learning and teaching hours | 24 hrs |
| Guided independent study | 176 hrs |
| Placement | 0 hrs |
| Module duration (total hours) | 200 hrs |

| Programme(s) in which to be offered (not including exit awards) | Core | Option |
|------------------------------------------------------------------------|------|--------------------------|
| BSc (Hons) Computer Game Design and Enterprise | ✓ | <input type="checkbox"/> |
| BSc (Hons) Computer Game Development | ✓ | <input type="checkbox"/> |
| BSc (Hons) Computer Science | ✓ | <input type="checkbox"/> |
| BSc (Hons) Computing | ✓ | <input type="checkbox"/> |
| BSc (Hons) Computer Networks and Security | ✓ | <input type="checkbox"/> |
| BSc (Hons) Cyber Security | ✓ | <input type="checkbox"/> |
| BSc (Hons) Applied Software Engineering | ✓ | |
| BSc (Hons) Applied Cyber Security | ✓ | |

| |
|-----------------------|
| Pre-requisites |
| None. |

Office use only

Initial approval: 30/08/2018

With effect from: 01/09/2018

Date and details of revision:

Version no:1

Version no:

Module Aims

The aim of this module, always to be scheduled as close to the end of the overall programme as possible, is to allow students to identify, critically examine and debate a range of current and future technical and social issues in computing, engineering and technology and, in so doing, develop a critical awareness of the impact of current and emerging research and development. It will enable students to gain a broad general knowledge of some current research areas in computing and engineering and their application in industry, commerce and further afield. In a general sense, the module will introduce students to the field of 'Futurology'. Both the emphasis on *looking ahead* and the clear balance between technological advancement and social implications are essential features of the module.

Intended Learning Outcomes

Key skills for employability

- KS1 Written, oral and media communication skills
- KS2 Leadership, team working and networking skills
- KS3 Opportunity, creativity and problem solving skills
- KS4 Information technology skills and digital literacy
- KS5 Information management skills
- KS6 Research skills
- KS7 Intercultural and sustainability skills
- KS8 Career management skills
- KS9 Learning to learn (managing personal and professional development, self-management)
- KS10 Numeracy

At the end of this module, students will be able to

Key Skills

| | | | |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|
| 1 | Assess emergent computing and engineering technologies at various stages of research, development and deployment | KS1 | |
| | | KS5 | KS6 |
| | | KS7 | KS8 |
| 2 | Identify, critically analyse and debate current and future issues in computing and engineering | KS1 | KS2 |
| | | KS5 | KS6 |
| | | KS7 | KS8 |
| 3 | Synthesise conflicting opinions regarding emergent and future technologies and their wider social, ethical, legal, political, economic, environmental and demographic drivers and impact | KS1 | KS2 |
| | | KS5 | KS6 |
| | | KS7 | KS8 |
| 4 | Discuss and make informed predictions regarding the directions taken by various aspects of computer technologies and their application and impact in the short, medium and long-term future | KS1 | |
| | | KS5 | KS6 |
| | | KS7 | KS8 |

Transferable skills and other attributes

- *Personal motivation, organisation and time management*
- *Ability to collaborate and plan*
- *Written and verbal communication skills*
- *Research and analytical skills*

Derogations

None.

Assessment:

Indicative Assessment Tasks:

There are two connected components to the assessment for this module, requiring students to conduct an in-depth investigation into a topic within the broad scope of '*Emerging Technology*', and to prepare (1) a group presentation and (2) an individual report. Students will, in small groups, choose or be otherwise allocated a topic within the broad scope of *Emerging Technology*. They will prepare and deliver a 25-35 minute group presentation to the rest of the class and other staff on this topic then, individually, submit a 3,500 (+/- 10%) word paper on the topic, possibly on a particular/extended subject/field/application within it, if they wish. The emphasis throughout will be on the future development of the subject and well-grounded speculation is encouraged. Alongside discussion of technological principles, full consideration of the wider social, ethical, legal, political, economic, environmental and demographic drivers and impact is expected in both components. The group element of the assessment will be worth 40% of the overall module mark and the individual report 60%.

| Assessment number | Learning Outcomes to be met | Type of assessment | Weighting (%) | Duration (if exam) | Word count (or equivalent if appropriate) |
|-------------------|-----------------------------|--------------------|---------------|--------------------|-------------------------------------------|
| 1 | 1 2 3 4 | Presentation | 40 | 30 mins | |
| 2 | 1 3 4 | Report | 60 | | 3,500 |

Learning and Teaching Strategies:

The module will be delivered through a combination of staff 'keynotes', formal lectures, tutorials, practical demonstrations and student labs. Use will be made of the University VLE to direct students to further reading, particularly to introduce students to current issues and topics that arise as the module progresses. Students will also be given reading lists and useful URLs to develop their work on the module. A key element in the learning process will be the independent study component. Industrial contacts will be used wherever possible to strengthen and validate key topics.

Syllabus outline:

The purpose of this module, at level six, is to provide students with a thorough and up-to-date knowledge of current trends in computing and to reinforce this where possible with the involvement of staff 'keynotes' and local industry. By definition the syllabus will be reviewed regularly but the focus for students will always be how to identify and critically analyse current issues in computing and be able to put developed arguments supporting and refuting issues, otherwise known as 'Futurology'.

The syllabus will naturally be reviewed on a regular (probably twice-yearly) basis with redundant material being discarded and new introduced in its place. Typical content, based on current directions, could include:

- The 'Internet of Things' and Big Data Analytics
- Social implications of emerging technology
- The 'STEEPLED' model (BCS LSEPIs)
- Computers and the Environment/Green IT and environmental computing
- Computer Forensics
- Accessibility and Usability
- Optical, Quantum or Biological Computing
- Parallel and Grid Computing
- Interactive Television
- Intelligence in Future Imaging Technology
- AI, AGI and Robotics
- Models of Intelligence
- Human-Computer Interaction/Evolving interfaces
- Ethics, privacy, etc,
- Health and safety
- Security and threats
- Political aspects of technology
- Ethical hacking
- Computing in the developing world
- Philosophical principles/Computational philosophy
- Technology adoption
- New aspects of Computer Storage
- New Developments in CPU/Architecture
- New Platforms
- Radio Frequency Identification (RFID) and other technologies
- The Technological Singularity (and other 'singularities')
- Social Media and its Impact

Indicative Bibliography:

Essential reading

Weinersmith, K. and Weinersmith, Z. (2017), *Soonish: Ten Emerging Technologies That Will Improve and/or Ruin Everything*. Particular Books.

Other indicative reading

Grout V., *Conscious*, Amazon Publishing (2017), Paperback: ISBN: 978-1520590127, <https://www.amazon.co.uk/Conscious-Vic-Grout/dp/1520590121>, Kindle: <https://www.amazon.co.uk/Conscious-Vic-Grout-ebook/dp/B06X3V8TFG>

The British Computer Society (BCS), <http://www.bcs.org.uk>

The Institution of Engineering and Technology (IET), <http://www.theiet.org>

The Institute of Electrical and Electronic Engineers (IEEE), www.ieee.org

IEEE Computer and Communication Societies,

<http://www.computer.org> and <http://www.comsoc.org/>

The Association of Computing Machinery (ACM), <http://www.acm.org>

Media Technology websites such as the BBC, <http://www.bbc.co.uk/news/technology/>

"Future Internet" (a scholarly open access journal on Internet technologies and the information society, published quarterly online by MDPI) <http://www.mdpi.com/journal/futureinternet>

"Turing's Radiator" ('Pleasantly warm topics in Computational Philosophy') <http://vicgrout.net/>

| | |
|---------------------|--------|
| Module Code: | COM644 |
|---------------------|--------|

| | |
|----------------------|-----------------------|
| Module Title: | IT Project Management |
|----------------------|-----------------------|

| | | | |
|---------------|---|----------------------|----|
| Level: | 6 | Credit Value: | 20 |
|---------------|---|----------------------|----|

| | | | |
|------------------------|------|--------------------|------|
| Cost Centre(s): | GACP | <u>JACS3</u> code: | G920 |
|------------------------|------|--------------------|------|

| | | | |
|-----------------|------------------------------|-----------------------|-------------|
| Faculty: | Arts, Science and Technology | Module Leader: | Denise Oram |
|-----------------|------------------------------|-----------------------|-------------|

| | |
|---------------------------------------|---------|
| Scheduled learning and teaching hours | 48 hrs |
| Guided independent study | 152 hrs |
| Placement | 0 hrs |
| Module duration (total hours) | 200 hrs |

| Programme(s) in which to be offered (not including exit awards) | Core | Option |
|------------------------------------------------------------------------|------|--------------------------|
| BSc (Hons) Computer Science | ✓ | <input type="checkbox"/> |
| BSc (Hons) Computing | ✓ | <input type="checkbox"/> |
| BSc (Hons) Computer Networks and Security | ✓ | <input type="checkbox"/> |
| BSc (Hons) Cyber Security | ✓ | <input type="checkbox"/> |
| BSc (Hons) Applied Software Engineering | ✓ | |
| BSc (Hons) Applied Cyber Security | ✓ | |

| |
|-----------------------|
| Pre-requisites |
| None. |

Office use only

Initial approval: 30/08/2018
 With effect from: 01/09/2018
 Date and details of revision:

Version no:1

Version no:

Module Aims

The module aims to encourage a critically and theoretically informed and reflective approach to IT project management and to develop students' understanding of the current issues affecting the management of IT projects. The module will permit students to critically evaluate the basic tools and techniques used in IT project management and increase self-awareness and insight into both professional and ethical issues relevant to the discipline of IT projects.

Intended Learning Outcomes

Key skills for employability

- KS1 Written, oral and media communication skills
- KS2 Leadership, team working and networking skills
- KS3 Opportunity, creativity and problem solving skills
- KS4 Information technology skills and digital literacy
- KS5 Information management skills
- KS6 Research skills
- KS7 Intercultural and sustainability skills
- KS8 Career management skills
- KS9 Learning to learn (managing personal and professional development, self-management)
- KS10 Numeracy

At the end of this module, students will be able to

Key Skills

| At the end of this module, students will be able to | | Key Skills | |
|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------|
| 1 | Demonstrate and justify a professional approach to IT practice, including adhering to the codes and guidelines of professional bodies within the industry. | KS1 | KS5 |
| | | KS8 | KS9 |
| | | | |
| 2 | Evaluate the professional, ethical, social and legal implications associated with IT project management. | KS1 | KS5 |
| | | KS6 | KS8 |
| | | KS9 | |
| 3 | Critically evaluate possible solutions to a problem and select the best approach, both technically and commercially, demonstrating a critical understanding of the importance of the decision-making process in IT management. | KS1 | KS2 |
| | | KS3 | KS8 |
| | | | |
| 4 | Evaluate and apply the essential tools and techniques of IT project management. | KS3 | KS4 |
| | | KS5 | KS10 |
| | | | |
| 5 | Demonstrate an in depth understanding of the issues involved in planning and controlling an IT project. | KS1 | KS2 |
| | | KS3 | KS6 |
| | | | |

Transferable skills and other attributes

- Personal motivation, organisation and time management
- Ability to collaborate and plan
- Written and verbal communication skills
- Research and analytical skills

Derogations

None.

Assessment:

Indicative Assessment Tasks:

100% Coursework – The module will be assessed through coursework; a portfolio that includes a series of formative tasks to be completed over the semester and weekly practical assessments, using case studies, presentations, and student-led seminars and discussions.

There is an intermediate group Viva where students will defend and justify their approach to the project. The students will also defend and justify their contribution to the portfolio with a final Viva after submission of the portfolio giving them an individual vocal opportunity to support their work.

Indicative assessment: students are given a case study, this will include role-play whereby the students are allocated a specific professional role and given a problem situation to resolve. They will demonstrate IT project management skills and knowledge by identifying and solving problems as well as defending and justifying any decisions made. Students have the opportunity to relate theory to practice.

| Assessment number | Learning Outcomes to be met | Type of assessment | Weighting (%) | Duration (if exam) | Word count (or equivalent if appropriate) |
|-------------------|-----------------------------|--------------------|---------------|--------------------|-------------------------------------------|
| 1 | 1-5 | Coursework | 100 | | 4000 |

Learning and Teaching Strategies:

The module is delivered through a mixture of lectures, lab work, seminars and directed private study.

Students will also disseminate and discuss information through student-led seminars, peer group discussion and formative presentations of their work, both individually and as a member of a team.

Syllabus outline:

Syllabus outline:

- The unique nature of IT project management

- Projects and the reasons why these can fail.
- Software Engineering
- GDPR
- The importance of decision-making
- Quality issues and quality management: ISO9000, and other relevant standards
- Techniques and tools for IT project management
- Responsible IT management
- IT Project Management in Practice
- Current issues in the management of IT projects
- Managing people and resources
- The impact of culture, systems and organisational structure on project management processes
- Professional, ethical, social and legal implications
- Health and Safety and environmental aspects of IT Project Management

Indicative Bibliography:

Essential reading

None

Other indicative reading

Hughes, B. (2012), *Project Management for IT-related Projects*. 2nd ed. Swindon: BCS.

Morgan, J. and Dale, C. (2013), *Managing IT Projects for Business Change*. BCS

Sommerville, I. (2016), *Software Engineering*. 10th ed. Boston: Pearson

Harrin, E. (2013), *Shortcuts to Success: Project Management in the Real World*. 2nd ed. Swindon: BCS.

Lientz, B.P. and Larssen, L. (2006), *Risk Management for IT Projects*. Swindon: BCS.

Electronic Resources :

ACM www.acm.org

BCS Code of Conduct <http://www.bcs.org.uk>

ISO Standards <http://www.iso.org/iso/home/standards.htm>

Journals: (available electronically through the library).

ACM Digital Library

IEEE Xplore

| | |
|---------------------|--------|
| Module Code: | COM645 |
|---------------------|--------|

| | |
|----------------------|------------------|
| Module Title: | Network Security |
|----------------------|------------------|

| | | | |
|---------------|---|----------------------|----|
| Level: | 6 | Credit Value: | 20 |
|---------------|---|----------------------|----|

| | | | |
|------------------------|------|--------------------|------|
| Cost Centre(s): | GACP | <u>JACS3</u> code: | I120 |
|------------------------|------|--------------------|------|

| | | | |
|-----------------|------------------------------|-----------------------|--------------------|
| Faculty: | Arts, Science and Technology | Module Leader: | Dr. Paul Comerford |
|-----------------|------------------------------|-----------------------|--------------------|

| | |
|---------------------------------------|---------|
| Scheduled learning and teaching hours | 24 hrs |
| Guided independent study | 176 hrs |
| Placement | 0 hrs |
| Module duration (total hours) | 200 hrs |

| Programme(s) in which to be offered (not including exit awards) | Core | Option |
|------------------------------------------------------------------------|------|--------------------------|
| BSc (Hons) Computer Networks and Security | ✓ | <input type="checkbox"/> |
| BSc (Hons) Cyber Security | ✓ | <input type="checkbox"/> |

| |
|-----------------------|
| Pre-requisites |
| None |

Office use only

Initial approval: 30/08/2018

Version no:1

With effect from: 01/09/2018

Date and details of revision:

Version no:

Module Aims

The aim of this module is to provide students with a critical understanding of security threats against network and cloud computing systems and the security measures designed to protect such systems. The module will explicitly develop students' knowledge and experience in the design and application of network and cloud security solutions. The module will also equip students for further academic study and future employability in the area of computer security.

The curriculum provides an introduction to the core security concepts and skills needed for the installation, troubleshooting, and monitoring of network devices to maintain the integrity, confidentiality, and availability of data and devices.

Intended Learning Outcomes

Key skills for employability

- KS1 Written, oral and media communication skills
- KS2 Leadership, team working and networking skills
- KS3 Opportunity, creativity and problem solving skills
- KS4 Information technology skills and digital literacy
- KS5 Information management skills
- KS6 Research skills
- KS7 Intercultural and sustainability skills
- KS8 Career management skills
- KS9 Learning to learn (managing personal and professional development, self-management)
- KS10 Numeracy

At the end of this module, students will be able to

Key Skills

| At the end of this module, students will be able to | | Key Skills | |
|-----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|------------------------------|--|
| 1 | Critically analyse security threats in the digital world within a professional and ethical context. | KS1, KS2, KS3, KS4, KS5, KS6 | |
| | | | |
| | | | |
| 2 | Model and design a range of modern symmetric and asymmetric encryption problems appropriate to modern communication systems. | KS1, KS2, KS3, KS4, KS5, KS6 | |
| | | | |
| | | | |
| 3 | Apply a range of security tools and algorithms related to computer security. | KS4, KS5 | |
| | | | |
| | | | |
| 4 | Design and synthesise security protocols and algorithms. | KS1, KS2, KS3, KS4, KS5, KS6 | |
| | | | |
| | | | |

MODULE SPECIFICATION PROFORMA

| | | | |
|---|-------------------------------------------------------------------------------------------------------|------------------------------------|--|
| 5 | Critically analyse ethical issues relating to privacy and anonymity in today's digital society. | KS1, KS2, KS3, KS4, KS5, KS6 | |
| | | | |
| | | | |
| 6 | Justify the selection of appropriate standards in the context creating appropriate security policies. | KS1, KS2, KS3, KS4, KS5, KS6 | |
| | | | |
| | | | |

Transferable skills and other attributes

- Personal motivation, organisation and time management
- Ability to collaborate and plan
- Written and verbal communication skills
- Research and analytical skills

Derogations

None

Assessment:

Indicative Assessment Tasks:

Assessment 1 will comprise of a written assignment covering the syllabus topics. This will be in the form of a case study with a research element. Assessment 2 is a practical test to be completed on the lab and will assess a student's ability to design and configure an appropriate network security solution for a given scenario including configuration of firewalls, VPNs and other network security measures. Assessment 3 will be an in-class test hosted on the University VLE and will assess students on their knowledge and understanding of the course content.

| Assessment number | Learning Outcomes to be met | Type of assessment | Weighting (%) | Duration (if exam) | Word count (or equivalent if appropriate) |
|-------------------|-----------------------------|--------------------|---------------|--------------------|-------------------------------------------|
| 1 | 1-6 | Coursework | 40 | | 2500 |
| 2 | 1-6 | Practical | 30 | 2 hours | |
| 3 | 1-6 | In-class test | 30 | 1.5 hours | |

Learning and Teaching Strategies:

The learning on this module will be through a series, on-line learning materials and tutorial supports. Teaching and learning will be delivered through (a) lectures (b) tutorials/workshops (c) laboratory and group assignments (d) self-directed study and research: self-selected reading, workshop preparation, literature searching. Each topic will be

introduced in lectures, followed by tutorials/workshops to deepen the theoretical principles with practical applications. Some of the tutorials will be group based and some individual.

Syllabus outline:

- Elements of applied cryptography
- Information security concepts
- Securing the network.
- Network security applications:
- Authentication applications
- IP security
- Web security
- E-Mail security
- Systems security
- Intruders
- Malicious software
- Firewalls
- Strategies of developing and maintaining a network security
- Cloud computing fundamentals
- Cloud computing architecture
- Cloud computing software security
- Risk issues of cloud computing
- Cloud computing security architecture

Indicative Bibliography:

Essential reading

Pfleeger, C.P., Pfleeger, S.L., and Marguiles, J. (2015). *Security in Computing*. 5th ed. Prentice-Hall.

Stallings, W. (2017), *Cryptography and Network Security: Principles and Practices*. 7th ed. Upper Saddle River, NJ: Pearson/Prentice Hall.

Santos, O. and Stuppi, J. (2015), *CCNA Security 210-260 Official Cert Guide*. Indianapolis IN: Cisco Press.

Other indicative reading

Shostack, A. (2014), *Threat Modeling: Designing for Security*. Indianapolis: John Wiley & Sons.

Engebretson, P. and Kennedy, D. (2013), *The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy*. 2nd ed. Waltham, USA: Syngress.