MODULE SPECIFICATION (UNDERGRADUATE)

Status Approved

DATE OF VALIDATION	
Date of most recent modification (faculty/ADQU use only)	
Current version number (AQDU use only)	2

1.MODULE CODE	**2.MODULE TITLE**
CIS1109	DIGITAL WORLD: COMPUTER ARCHITECTURE & NETWORKS
3.LEVEL	**4. CREDIT RATING**
4	20
5. NOTIONAL LEARNING HOURS	**6. PLANNING UNIT**
200	Computer Science
7. ADMINISTRATIVE BASE (FACULTY)	**8. MODULE LEADER(S)**
Faculty of Arts & Sciences	James Coleman
9. OTHER STAFF CONTRIBUTING TO DELIVERY	
Shirley Hunter Barnett	

11. MODULE KEYWORDS/PHRASES

COMPUTER ARCHITECTURE, COMPUTER LOGIC, BINARY NUMBERS & LOGIC, CPU INSTRUCTIONS, OPERATING SYSTEMS, COMPUTER NETWORKS, NETWORK TOPOLOGIES, LAN, WAN, PROTOCOLS

12. MODULE PRE- OR CO-REQUISITES, FORBIDDEN COMBINATIONS OR OTHER RESTRICTIONS

13. BRIEF DESCRIPTION OF THE MODULE

This module explores how the world of the 21st century is underpinned by computing technology while challenging students to envision their possible future developments as Computing professionals.
It discusses how current and modern computer architectures operate and analyses the technology on which they depend, starting with current central processing units (CPUs) and their instruction sets and progressing to the principles of modern multitasking operating systems that are supported by the underlying hardware architectures. An important aspect of modern computer technology is networking. The module introduces and covers basic principles of networks, their interconnecting components and protocols used in enabling reliable communications.

14. RATIONALE

This module aims to help students develop an understanding of the essential concepts of digital computing which are important for further study at level 5 and level 6. These include binary logic, digital computer system operation including modern processors and their components, systems and application of operating systems to supporting running of multiple application software often concurrently. One of the computing and communications enabling technologies today is networking so heavily relied on by a plethora of communications devices. The module therefore looks at network topologies, different types of networks from LANs to WANs and introduces the basic principles of protocol layers and models used in reliable data communications.
A key feature of this module is the way that it integrates a wide range of theory and practice to provide the students with a systemic view of the interconnections and how everyday applications are enabled by digital computing technology. The delivery pattern of a one-semester module is essential to this approach.
As an introductory level 4 module, academic skills are introduced and reinforced at appropriate points to ensure they are relevant and not divorced from the subject study.

15. INDICATIVE CONTENT

Computer Systems
Computer Architecture: Components/ concepts- CPU, ALU, Control unit, Bus, RAM, I/O, Storage. Instruction sets.
Operating Systems: Functions (process management, memory management, file management, I/O subsystem). System Software / Virtual machines.
Maths for computing: Data representation, binary, hex, number conversions, simple binary calculations, representing characters, truth tables and digital logic operations. Digital logic components such as simple logic gates and their

interconnections.
Networks and Data Communications
Data communications & concepts: Media (Fibre/ copper/wireless - 3G/802.11)
Networking: (LAN/ WAN/ MAN; concepts of layers, addresses & packet switching) Internet/ Internet of things- ubiquitous computing/ mobile). IPv4 addressing. OSI and TCP/IP protocol comparisons.

16. INTENDED LEARNING OUTCOMES (ILOs)

By the end of this module, students will be able to:

1	Identify and explain the purpose of the components and hardware/software interfaces that make up the architecture of a modern microprocessor based digital computer systems
2	Explain the functions of a modern operating system
3	Explain the principles and technologies used in local and wide-area computer networks.
4	Test, evaluate and comment on the functions of various aspects of computer hardware and software through practical experimentation.

17. LEARNING AND TEACHING

a) Scheduled learning and teaching activities

Type of pedagogical Activity	Description	Hours
Lecture	Students should attend all lectures	12
Seminar	Students should attend all seminars	24
Tutorial	The session will allow focused tutoring to individual and/or small groups of students regarding the topics / subject matter contained within the module.	12

b) External visits and work-based learning

Type of pedagogical Activity	Description	Hours

c) Online teaching (asynchronous)

Type of pedagogical Activity	Description	Hours

d) Guided Independent Study

Additional Information	Hours
Students are typically expected to complete	152

17d. Overall Approaches for Teaching, Learning & Assessment

1. Active learning / limited lecturing
Laboratory sessions will enable students to develop understanding of the principles of modern computer organization and architectures, network interconnection components and protocols.
The practical sessions will be supported by software simulations of aspects of technology which are either impossible or impractical to demonstrate otherwise.

Class-based exercises will also include group work, short presentations.

Students will explore issues related to technological development and implementation through a series of structured exercises which will assist in reinforcing understanding of the techniques and issues involved in the design and implementation of computer systems. These activities will be supported by quizzes and group discussions/seminars. Students will experience all types of assessment in a purely formative manner prior to summative.

2. Formative assessment and feedback: Built in opportunities for students to:
o Discuss criteria & use exemplars
o Discuss feedback
o Apply feedback in future work
o Peer assess (where they have knowledge)

3. MCQs used to test knowledge and provide feedback. Peers to assess presentations/ feedback, Tutor feedback where it relies on their expertise.
4. Academic Skills development involves repeated writing practice & group / peer exercise.
5. Using Networked applications for learning (eg Google Drive / SkyDrive)
6. Week 5 indicator of engagement/ achievement.

7. Opportunities for dialogue, particularly around assessment & feedback will be built into the module.

17e. TECHNOLOGY ENHANCED LEARNING (TEL)

The module will be supported by a Virtual Learning Environment (VLE) which will include on-line coursework submissions, quizzes and appropriate software downloads required for practical tutorials and home-working.
Specialised educational simulation software will be used to support the practical assignments.
Wherever possible work will be submitted through Blackboard. TurnItIn will be used as a formative tool for students to check and improve their writing. All marks will be communicated to students via the VLE.

18. FORMATIVE ASSESSMENT

Formative assessment and feedback:
Peer assessments
Informal Q/A sessions.
On-line quizzes, marked by computer.
Sample exam questions, mainly self assessed.

19. SUMMATIVE ASSESSMENT

a) Written Examinations

Assessment Code	Description	Volume	Weighting	Learning Outcomes	Final Assessment	Pass / Fail
EX1	An exam will be conducted to assess the understanding of general theoretical aspects of the subjects covered during the lectures.	1.5 Hour	30	1, 2, 3, 4	Y	
Overall Percentage of assessment by Written Examination						**30**

b) Practical

Assessment Code	Description	Volume	Weighting	Learning Outcomes	Final Assessment	Pass / Fail
Overall Percentage of assessment by Practical						

c) Coursework

Assessment Code	Assessment Type	Description	Volume	Weighting	Learning Outcomes	Final Assessment	Pass / Fail
CW1	P	Independent completion of a portfolio of exercises.	equivalent to approximately 2000 words	70	1,2,3,4		
Overall Percentage of assessment by Coursework							**70**

Additional Assessment Information

CW1: This coursework is an individual assignment and covers a range of self-contained practical exercises on computer architecture and modern networking topics and are designed to underpin the theory covered during the lectures. The completed exercises will constitute an assessed portfolio of activities. Each exercise is designed to be completed during one tutorial session. A single 'log-sheet' will be included with each completed set of exercises. This will be filled by the student and will contain a brief account of student's understanding of the work undertaken and may also include a brief reflection.

CW1 reassessment: This will require the student to research and prepare a 1500 to 2000 words of report on several identified key aspects of modern computer systems architecture. The format of the report and the minimum sections required will be provided in advance.

20. KEY TEXTS

Englander, I. (2010)*The Architecture of Computer Hardware and Systems Software.*4th Edition. John Wiley.

Null, L. and Lobur, J. (2015)*The Essentials of Computer Organization and Architecture.* Fourth edition. Jones and Bartlett Publishers, Inc.

21. OTHER LEARNING RESOURCES

Hardware and software resources:

Standard PC's intalled in labs
Network simulation software
CPU, operating system and network simulation software

Additional reading material:

Garrido, M.J., Schlesinger, R. (2011) Principles of Modern Operating Systems. 2nd edition. Jones and Bartlett Publishers, Inc.
Comer, D. E. (2015). Computer Networks and Internets. 6th edition. Prentice Hall Press.
Murdocca, M. and Heuring, V. (2007) *Computer Architecture and Organization - An Integrated Approach*. Wiley.
Patterson, D.A. and Hennessy, J.L. (2014)*Computer Organization and Design.* Fifth edition. Morgan Kaufmann.
Williams R. (2006)*Computer SystemsArchitecture - A Networking Approach*. 2nd edition. Pearson/Prentice Hall.
Kurose, J.F., Ross, K.W. (2012) Computer Networking - A top-down approach. 5th edition. Boston: Addison Wesley.

HECOS Codes

HECOS	Description
100734	computer architectures