

Computer Networks (ICT Skills) (A13487)

Short Title: Computer Networks (ICT Skills)

Department: Computing and Mathematics

Credits: 5

Level: Advanced

Description of Module / Aims

This module introduces data communications terminology and concepts, network protocols and models. Students will use protocol analysis software to explore various network protocol operations. An examination of TCP/IP, IP addressing and Ethernet is presented as well as a brief introduction to Routing and Wireless LANs. Practical skills are an essential part of this module.

Programmes

	stage/semester/status
COMP-0519 Higher Diploma in Science in Computer Science (WD_KCOSC_G)	4 / 1 / M

Indicative Content

- Introduction to Computer Networks and Protocols
- OSI and TCP/IP models
- Ethernet
- Network Layer Protocols and Functionality
- IP Addressing and subnetting
- Routing
- Transport Layer Protocols and Functionality
- Application Layer Protocols and Functionality e.g. HTTP, FTP, DNS, SMTP
- Wireless LANs

Learning Outcomes

On successful completion of this module, a student will be able to:

1. Use network protocol models to explain the layers of communications in data networks.
2. Describe in detail the major components, operation and functionality of a computer network and commonly used protocols and services.
3. Design, calculate and apply subnet masks and addresses.
4. Build a simple Ethernet network using routers and switches.
5. Use Cisco CLI to perform basic router and switch configuration.
6. Analyse the operations and features of network protocols and services using protocol inspection software.
7. Implement a basic wireless network.

Learning and Teaching Methods

- The lectures will introduce the theory content to the student. The student will be encouraged to participate in class discussions and ask questions to support their learning process.
- The practical classes facilitate the student in implementing the theory learned in the lectures.
- The continuous assessment will require the student to apply the theory and practical knowledge to a business solution.

Assessment Methods

	Weighting	Outcomes Assessed
Final Written Examination	50%	1,2,3
Continuous Assessment	50%	
In-Class Assessment	50%	3,4,5,6,7

Assessment Criteria

<40%: Unable to describe the major functions and operation of a Computer Network. Unable to describe and compare the OSI and TCP/IP models. Poor understanding of role of communications protocols in computer networks.

40%–49%: Can describe and compare the OSI and TCP/IP models. Can provide overview of main computer network components and protocols.

50%–59%: All of the above. Can describe in detail the data encapsulation process. Demonstrate an understanding of basic LAN implementation.

60%–69%: In addition, be able to recommend a network solution given an organisations' requirements.

70%–100%: All the above to an excellent level. Be able to analyse and design solutions to a high standard for a range of both complex and unforeseen problems through the use and modification of appropriate skills and tools.

Learning Modes

Learning Type	F/T Hours	P/T Hours
Lecture	12	
Practical	36	
Independent Learning	87	

Supplementary Material(s)

- "Association for Computing Machinery." <http://www.acm.org>
- "Cisco." <http://www.cisco.com/web/learning/netacad/index.html>
- "IEEE Communications Society." <http://www.comsoc.org>
- "IEEE Computer Society." <http://www.computer.org>
- Dye, M., R. McDonald and A. Rufi. *Network Fundamentals: CCNA Exploration Companion Guide (Cisco Networking Academy)*. New York: Cisco Press, 2011.
- Tanenbaum, A. *Computer Networks*. 4th Ed.. New York: Prentice Hall, 2002.

Requested Resources

- Room Type: Computer Lab

Computer Systems (ICT Skills) (A13622)

Short Title: Computer Systems (ICT Skills)

Department: Computing and Mathematics

Credits: 5

Level: Advanced

Description of Module / Aims

The focus of this module will be on five components: computer architecture, memory management, process management, file system management and virtualisation. The student will be given hands-on experience in installing and configuring contemporary operating systems and application services with an emphasis on the Linux environment, including use of the command line interface and writing scripts.

Programmes

	stage/semester/status
COMP-0518 Higher Diploma in Science in Computer Science (WD_KCOSC_G)	4 / 1 / M

Indicative Content

- Translation and calculation in the following number bases: Binary, octal, decimal, hexadecimal. Mod arithmetic
- Boolean Algebra: Basic logic & truth tables
- Computer System Architecture – CPU, memory, storage
- Data Representation
- Operating system structure: Components, services and utilities
- Process Management: Data structures, concurrency, threads, scheduling, synchronization
- File management: File-system utilities, file system implementation, case studies
- Memory management: Paging, segmentation, virtual memory
- Scripting
- Virtualisation

Learning Outcomes

On successful completion of this module, a student will be able to:

1. Perform calculations in binary, octal, decimal and hexadecimal number bases.
2. Understand the basics of Boolean Logic.
3. Understand how the components of a computer system operate together.
4. Demonstrate the relationship between high-level software, low-level programming and hardware.
5. Describe the memory, process and file management components of a modern operating system with regard to: Operation principles, data structure requirements and algorithms used.
6. Explain the concepts and theory of virtualisation and in particular how this relates to operating systems management and development.
7. Install and setup some contemporary operating systems (within a virtual PC environment), and configure the services necessary to support basic applications.
8. Demonstrate competency with a limited set of the utilities (e.g. file management) provided by a contemporary operating system.

Learning and Teaching Methods

- This module will be delivered using a combination of lectures and practical laboratory work.
- The lectures will be used to introduce new topics and their related concepts.
- The practicals will focus on developing the practical skills of the student using simulation exercises.

Assessment Methods

	Weighting	Outcomes Assessed
Final Written Examination	50%	1,2,3,5,6
Continuous Assessment	50%	
Practical	25%	4,7,8
Practical	25%	4,7,8

Assessment Criteria

<40%: Cannot represent the conceptual design of the system components presented in class or explain operation principles at a basic level.

40%–49%: Knows the role of each component addressed by the learning outcomes and can represent their conceptual design, supported with a basic narrative description of the operation principles.

50%–59%: As well as a clear understanding of the components' operation principles, can describe some of the design alternatives covered in the lectures, showing awareness for some of their strengths and weaknesses.

60%–69%: Can demonstrate a comprehensive understanding of the material covered in the lectures.

70%–100%: Excellent understanding of the presented material and displays value added knowledge as a result of independent learning.

Learning Modes

Learning Type	F/T Hours	P/T Hours
Independent Learning	87	
Lecture	24	
Practical	24	

Supplementary Material(s)

- "Association for Computing Machinery." <http://www.acm.org>
- "Institute of Electrical and Electronics Engineers." <http://www.ieee.org>
- Dale, N. and J. Lewis. *Computer Science Illuminated*. 6th ed. MA. USA: Jones & Bartlett Learning, 2016.
- Garrido, J.M., R. Schlesinger and K. Hoganson. *Principles of Modern Operating Systems*. 2nd ed. MA. USA: Jones & Bartlett Learning, 2013.
- Silberschatz, A., P.B. Galvin and G. Gagne. *Operating System Concepts with Java*. 8th ed. NJ. USA: John Wiley & Sons, 2010.
- Stallings, W. *Operating Systems: Internals and Design Principles*. 8th ed. NY. USA: Pearson, 2014.

Requested Resources

- Computer Lab: BYOD Lab