

2024 / 25

School of Science and Computing

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**SE
TU**

Ollscoil
Teicneolaíochta
an Oirdheiscirt

South East
Technological
University

Module Descriptor

Computer Systems and Networks (Computing and Mathematics)

Computer Systems and Networks (A24601)

Short Title: Computer Systems and Networks
Department: Computing and Mathematics
Credits: 10

Level: Advanced

Description of Module / Aims

This module introduces technologies and network protocols that underpin computer systems. Topics covered include core operating system functions such as process, memory and file management as well as an introduction to distributed systems and virtualisation. These core principles are then built on to explore key aspects of computer systems such as device interfacing, short range and low powered wireless protocols and higher level messaging protocols. There is an emphasis on applied exercises using physical prototyping devices, command line tools and scripting.

Programmes

stage/semester/status

COMP-0975 Higher Diploma in Science in Computer Science (WD_KCOSC_G)

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Indicative Content

- Number bases used in Computer Science
- Boolean logic
- Computer system architecture
- Operating systems: Components, services, and utilities
- Memory and file management
- Scripting and shell programming
- Virtualisation and hypervisors
- Internet protocol suite
- Physical/network addressing
- Transport layer protocols
- Application layer protocols
- Wireless network protocols: LAN and PAN

Learning Outcomes

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

1. Perform calculations using binary, octal, decimal, and hexadecimal number bases.
2. Apply Boolean logic
3. Describe memory, process and file management components of operating systems
4. Explain computer virtualisation and its relationship to operating systems
5. Install and configure contemporary operating systems, both physically and virtually
6. Write shell scripts for automating tasks, processing data and manipulating files
7. Explain the communication layers in data networks in context of related network protocols
8. Calculate a correct Internet Protocol addressing solutions for IP-based networks
9. Design and build a simple TCP/IP-based computer network using the Internet Protocol Suite
10. Analyse the operations and features of computer networks using a protocol inspection tool
11. Design and implement a connected solution that incorporates Personal Area Network(PAN) and Local Area Network(LAN) protocols.

Learning and Teaching Methods

- This module will be presented by a combination of lectures and computer-based practicals. The lectures will be used to introduce new topics and to underpin their related concepts. The lectures will use case studies as techniques for learning new skills. The practical element will provide the student with the skills, confidence and enthusiasm to be able to apply and reinforce skills learned. A student should be able to demonstrate use of social networking platforms as a form of online interaction
- This module adopts a hands-on practical approach with weekly laboratories that make use of computing devices, virtualisation and cloud-based platforms
- Self directed learning

Learning Modes

Learning Type	F/T Hours	P/T Hours
Lecture	48	
Practical	48	
Independent Learning	222	

Assessment Methods

	Weighting	Outcomes Assessed
Continuous Assessment	100%	
Assignment	25%	1,2,3,4,5
Assignment	25%	5,6,7
Assignment	50%	8,9,10,11

Assessment Criteria

- <40% – *Fail*: Cannot represent the conceptual design of the system components presented in class or explain operation principles at a basic level. Unable to describe the major functions and operation of a Computer Network. Poor understanding of role of communications protocols in computer networks.
- 40–49% – *Pass*: 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. Can describe TCP/IP and Internet Protocol Suite. Can provide overview of main computer network components and protocols.
- 50–59% – *2.2*: 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. Can describe in detail the data encapsulation process. Demonstrate an understanding of basic LAN implementation.
- 60–69% – *2.1*: Can demonstrate a comprehensive understanding of the material covered in the lectures. In addition, be able to design and demonstrate a network solution including LAN and PAN components.
- 70 – 100% – *1*: Excellent understanding of the presented material and displays value added knowledge as a result of independent learning. 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.

Supplementary Material(s)

- "Association for Computing Machinery." Association for Computing Machinery. <http://www.acm.org>
- "Cisco Networking Academy." <http://www.cisco.com/web/learning/netacad/index.html>
- "IEEE Communications Society." <http://www.comsoc.org>
- "Raspberry Pi Foundation." <https://www.raspberrypi.org/>
- Tanenbaum, A. *Computer Networks*. 5. London: Prentice Hall, 2010.

Requested Resources

- Computer Lab: BYOD Lab