

<b>Unit Title: Computer Networking</b>	<b>Unit Code: CN</b>
<b>Level: 5</b>	<b>Learning Hours: 160</b>
<b>Learning Outcomes and Indicative Content:</b>	
Candidates will be able to:	
<ol style="list-style-type: none"> <li><b>1. Demonstrate an understanding of data communications principles and networking concepts.</b> <ol style="list-style-type: none"> <li>1.1 Describe the main components of data communications systems.</li> <li>1.2 Understand the difference between analogue and digital signals and describe the mechanism for converting between the two versions.</li> <li>1.3 Describe parallel and serial data transmission.</li> <li>1.4 Discuss the differences between synchronous and asynchronous transmission.</li> <li>1.5 Explain simplex, half and full duplex directions of data flow.</li> <li>1.6 Identify the physical structures of networks including connection types and physical topology.</li> <li>1.7 Describe the concepts of circuit switching and packet switching.</li> </ol> </li> <li><b>2. Discuss the major aspects of network models and communication protocols.</b> <ol style="list-style-type: none"> <li>2.1 Describe the key processes of a top-down approach for network analysis and design.</li> <li>2.2 Discuss in detail the five-layer Internet model (TCP/IP protocol suite).</li> <li>2.3 Provide a detailed analysis of the seven-layer OSI model in terms of architecture and functionality (by mapping OSI layers to the corresponding TCP/IP protocol layers).</li> <li>2.4 Evaluate User Datagram Protocol (UDP) and Transmission Control Protocol (TCP).</li> <li>2.5 Describe the simultaneous transmission of multiple signals (such as multiplexing, de-multiplexing).</li> <li>2.6 Describe the roles of the main standardisation bodies.</li> </ol> </li> <li><b>3. Identify and explain the purposes of network components and architectures.</b> <ol style="list-style-type: none"> <li>3.1 Describe the components of a network and their uses.</li> <li>3.2 Describe the different characteristics of the transmission media (twisted pair, coaxial cable, fibre optic, microwave).</li> <li>3.3 Describe the roles of interconnecting devices (such as hub, switch, router).</li> <li>3.4 Describe the common network topologies.</li> <li>3.5 Differentiate between the concepts of LAN and WAN.</li> </ol> </li> </ol>	

- 4. Present aspects of access control in the data link layer of the Internet model.**
  - 4.1 Describe the principles of access control.
  - 4.2 Understand and describe the concepts of Media Access Control (MAC) and Logical Link Control (LLC).
  - 4.3 Describe the various connection phases of the point-to-point protocol.
  - 4.4 Discuss the authentication protocols of point-to-point access with emphasis on Password Authentication Protocol (PAP) and Challenge Handshake Authentication Protocol (CHAP).
  - 4.5 Provide an overview of multiple-access protocols.
  
- 5. Demonstrate an understanding of data transmission error detection and correction.**
  - 5.1 Identify and explain the types of data transmission errors.
  - 5.2 Discuss the main error detection mechanisms.
  - 5.3 Evaluate common error correction techniques.
  
- 6. Demonstrate an understanding of wireless and mobile computing.**
  - 6.1 Describe the technologies used for wireless communications.
  - 6.2 Identify key points of the IEEE wireless LAN specification.
  - 6.3 Describe the functions of the main protocols for mobile stations (Mobile IP, Wireless Application Protocol (WAP), Bluetooth).
  - 6.4 Understand the range of applicability of each protocol.
  - 6.5 Demonstrate awareness of how mobile devices communicate with the Internet (GPRS protocol).
  - 6.6 Describe the main components of a satellite-based network.
  
- 7. Describe cryptography, security protocols and dominant technologies for connecting to the Internet.**
  - 7.1 Understand the main threats in networks (including sniffing and spoofing).
  - 7.2 Demonstrate an understanding of how to use cryptography for protecting networks.
  - 7.3 Discuss issues relating to security and authentication and describe the main security protocols.
  - 7.4 Differentiate between secret-key algorithms and public-key algorithms.
  - 7.5 Provide an overview of DSL technology.



