

Scheme of work

Module Code and Module Name	ACCA5024 Advanced Networking
Credits	20
Programme of study	HN/BSc (Hons) Computing (Networks and Cybersecurity) & HN/BSc (Hons) Applied Computing
Institute/Discipline	WISA/Applied Computing
Year / Semester	Year 2/ Semester 1
Lecturer	Dr Kapilan Radhakrishnan
Aim of the Module	To provide the student with a systematic knowledge of OSI reference model and TCP/IP protocol model. Students will gain a detailed understanding of the various hardware devices used in modern network design and will understand the essential technical principles of protocols used in various layers of OSI model and IP Addressing.
Learning Outcome	Demonstrate a knowledge and understanding of network principles and protocols used in OSI and TCP/IP model. Implement simple LANs, perform basic configurations for routers and switches, and implement IP addressing schemes.
AHEP 4.0 Learning Outcome	2.1.1 Knowledge and understanding of facts, concepts, principles & theories 2.1.2 Use of such knowledge in modelling and design 2.1.5 Deploy theory in design, implementation and evaluation of systems 2.2.1 Specify, design or construct computer-based systems 3.1.3 Knowledge of systems architecture 3.2.3 System Design

Lecture	Content	Learning Outcome (upon successful completion of this lecture student will be able to....)	Activities	Resources
Week 1: Session 1	Recap: Networks concepts and principles. Networks: Intermediate and End Devices	Demonstrate an understanding of network components, device types, network topologies, and fundamental security measures used within modern computer networks. (LO1: Develops knowledge of network architecture, devices and basic networking concepts.)	• Lecture • Student Lecturer interaction	Teaching Materials, PPT, Smartboard, PT/Cisco devices for demo

Week 1: Session 2	Lab 1: Navigate the IOS by Using Tera Term for Console Connectivity	Access and navigate the Cisco IOS command-line interface using console connectivity and execute basic device management commands. (LO2 : Applies practical skills in accessing, configuring and managing network devices.)	Lab 1	Cisco hardware and lab manual
Week 2: Session 1	Protocols and Models, Physical Layer Overview	Demonstrate an understanding of networking protocols, reference models, and the functions of the physical layer in network communications. (LO1 : Develops knowledge of OSI/TCP-IP models and protocol operation.)	• Lecture • Student Lecturer interaction • Hardware demonstration • Recap	Teaching Materials, PPT, Smartboard, PT/Cisco devices for demo
Week 2: Session 2	Lab 2: Basic Switch and End Device Configuration Lab 3: View Network Device MAC Addresses	Configure basic switch settings and identify MAC addresses on network devices to verify Layer 2 communication within a LAN. (LO2 : Applies switch configuration and device identification techniques in a local network environment.)	Labs 2 & 3	Cisco hardware and lab manual
Week 3: Session 1	L2 - Data Link Layer	Demonstrate an understanding of Data Link Layer functions, Ethernet operations, MAC addressing, frame structure, and switch forwarding methods. (LO1 : Develops knowledge of Layer 2 protocols and switching concepts.)	• Lecture • Student Lecturer interaction • Hardware demonstration • Recap	Teaching Materials, PPT, Smartboard, PT/Cisco devices for demo
Week 3: Session 2	Lab 4: View the Switch MAC Address Table	Examine and interpret switch MAC address tables to analyse frame forwarding decisions and switch operation. (LO2 : Applies practical switching concepts to verify network connectivity and communication.)	Lab 4	Cisco hardware and lab manual
Week 4: Session 1	L3 – Network Layer	Demonstrate an understanding of network layer operations, IPv4 and IPv6 packet structures, routing tables, addressing mechanisms, and neighbour discovery processes. (LO1 : Develops knowledge of Layer 3 protocols and packet forwarding principles.)	• Lecture • Student Lecturer interaction • Hardware demonstration	Teaching Materials, PPT, Smartboard, PT/Cisco devices for demo

			Recap	
Week 4: Session 2	Lab 5: Configuring Basic Router Settings with IOS CLI	Configure and verify basic router settings using Cisco IOS CLI, including interface configuration and device management functions. (LO2 : Applies router configuration and administration techniques within a network infrastructure.)	Lab 5	Cisco hardware and lab manual
Week 5: Session 1	IPv4 Addressing	Demonstrate an understanding of IPv4 addressing, subnetting principles, address classifications, and VLSM design concepts. (LO1 : Develops knowledge of IPv4 addressing and subnet design.)	- Lecture - Student Lecturer interaction - Hardware demonstration - Recap	Teaching Materials, PPT, Smartboard, PT/Cisco devices for demo
Week 5: Session 2	Lab 7: Design and Implement a VLSM Addressing Scheme	Design and implement a Variable Length Subnet Masking (VLSM) addressing scheme to satisfy network addressing and subnetting requirements. (LO2 : Applies IP addressing design and implementation skills within a network environment.)	Labs 6 & 7	Cisco hardware and lab manual
Week 6: Session 1	IPv6 Addressing	Demonstrate an understanding of IPv6 addressing architecture, addressing types, and address configuration methods. (LO1 : Develops knowledge of IPv6 addressing and deployment concepts.)	- Lecture - Student Lecturer interaction - Hardware demonstration - Recap	Teaching Materials, PPT, Smartboard, PT/Cisco devices for demo
Week 6: Session 2	Lab 8 - Identify IPv6 Addresses Lab 9 - Configure IPv6 Addresses on Network Devices Lab 10 - Build a Switch and Router Network IPv4 and IPv6	Identify IPv6 addressing structures, configure IPv4 and IPv6 addresses on network devices, and implement connectivity within a dual-stack network. (LO2 : Applies IPv4 and IPv6 addressing and configuration techniques to support network communication.)	Labs 8 to 10	Cisco hardware and lab manual

Week 7: Session 1	Routing Concepts Fundamentals and Static Routing	Demonstrate an understanding of routing concepts, routing table operation, path determination, packet forwarding, and static routing principles. (LO1 : Develops knowledge of router operation and routing concepts.)	• Lecture • Student Lecturer interaction • Hardware demonstration • Recap	Teaching Materials, PPT, Smartboard, PT/Cisco devices for demo
Week 7: Session 2	Lab 13: Configuring IPv4 Static and Default Routes Lab 14: Configuring IPv6 Static and Default Routes Lab 15: Troubleshooting 1Pv4 and 1Pv6 Static Routes	Configure, verify and troubleshoot IPv4 and IPv6 static and default routes to enable packet forwarding across interconnected networks. (LO2 : Applies routing configuration, verification and troubleshooting techniques within a routed infrastructure.)	Labs 13 to 15 Labs 11 & 12 practice at independent study time.	Cisco hardware and lab manual
Week 8	Reading Week			
Week 9: Session 1	Dynamic Routing Concepts	Demonstrate an understanding of dynamic routing concepts and the operation of routing protocols used to exchange network information. (LO1 : Develops knowledge of dynamic routing principles and routing protocol operation.)	• Lecture • Student Lecturer interaction • Hardware demonstration • Recap	Teaching Materials, PPT, Smartboard, PT/Cisco devices for demo
Week 9: Session 2	Lab 19 - Configuring Basic RIPv2 Lab20: Configuring Basic RIPv2 and RIPv6	Configure and verify RIPv2 and RIPv6 routing protocols to establish dynamic route exchange in IPv4 and IPv6 networks. (LO2 : Applies dynamic routing protocol implementation and verification techniques.)	Labs 19 & 20	Cisco hardware and lab manual
Week 10: Session 1	Transport Layer	Demonstrate an understanding of transport layer functions, TCP and UDP characteristics, and end-to-end communication processes. (LO1 : Develops knowledge of transport layer protocols and services.)	• Lecture • Student Lecturer interaction • Hardware demonstration • Recap	Teaching Materials, PPT, Smartboard, PT/Cisco devices for demo

Week 10: Session 2	Lab 16 - Secure Network Devices Lab 17 - Configure Network Devices with SSH	Implement device hardening measures and configure secure remote administration using SSH to protect network infrastructure. (LO2 : Applies network security and remote access configuration techniques.)	Labs 16 & 17	Cisco hardware and lab manual
Week 11: Session 1	Application Layer	Demonstrate an understanding of application, presentation and session layer functions, and the operation of common application layer protocols. (LO1 : Develops knowledge of upper-layer protocols and network services.)	• Lecture • Student Lecturer interaction • Hardware demonstration • Recap	Teaching Materials, PPT, Smartboard, PT/Cisco devices for demo
Week 11: Session 2	Lab 18: Configuring Switch Security Features Topology	Configure and verify switch security features to protect Layer 2 network infrastructure from unauthorised access and attacks. (LO2 : Applies network security configuration techniques within a LAN environment.)	Lab 18	Cisco hardware and lab manual
Week 12: Session 1	Lab session: Consolidation Lab	Integrate networking principles, device configurations, routing and addressing techniques to configure, verify and troubleshoot a small network infrastructure. (LO2 : Demonstrates integrated implementation and troubleshooting skills across networking technologies.)		Cisco hardware and lab manual
Week 12: Session 2	Mock Practical exam	Demonstrate the ability to configure, verify and troubleshoot network devices, addressing schemes and routing solutions under assessment conditions. (LO2 : Demonstrates practical competence in network implementation and maintenance.)		Cisco hardware. A mock exam paper will be provided on the day.

Reference Number	Reference Material
Essential 1	www.netacad.com username and password is required
Essential 2	Introduction to Networks v6 Companion Guide by Cisco Networking Academy (2016), Cisco Press
Further	W Odom (2019) CCNA 200-301 Official Cert Guide Library, Cisco Press part of the Official Cert Guide series

Resources requires	Teaching Materials, PPT, Smartboard, Computer hardware, Packet Tracer software	
Mode of Assessment	Weightage	Assessment Description
Practical	75%	Students will complete practical works as an in-class tests or as a workshop journal
Coursework	25%	1 hr: Online test