

Scheme of work

Module Code and Module Name	ACCA6022 Switching, Routing and Wireless
Credits	20
Programme of study	BSc (Hons) Computing (Networks and Cybersecurity) & BSc (Hons) Applied Computing
Institute/Discipline	WISA/Applied Computing
Year / Semester	Year 3/ Semester 1
Lecturer	Dr Kapilan Radhakrishnan
Aim of the Module	To study the technical issues related to routing and switching techniques, to have an in-depth knowledge of architecture, components, and operations of routers and switches in a larger and more complex network.
Learning Outcome	Demonstrate a detailed understanding of theoretical and practical knowledge relating to routing and switching concepts. Implement routing and switching techniques within a network infrastructure, configure routing protocols, VLANs and perform network maintenance.
AHEP 4.0 Learning Outcome	2.1.5 Deploy theory in design, implementation and evaluation of systems 2.2.1 Specify, design or construct computer-based systems 3.2.2 Defining problems, managing design process and evaluating outcomes

Lecture	Content	Learning Outcome (upon successful completion of this lecture student will be able to....)	Activities	Resources
Week 1: Session 1	Recap: OSI/TCP/IP Model. IP Routing, Static & Dynamic routing EIGRP for IPv4	Demonstrate an in-depth understanding of static and dynamic routing concepts, EIGRP operation, and route selection within enterprise networks. (LO1: Develops theoretical understanding of routing concepts and dynamic routing protocols.)	• Lecture • Student Lecturer interaction	Teaching Materials, PPT, Smartboard, PT/Cisco devices for demo
Week 1: Session 2	Lab 5: Configuring Basic EIGRP for IPv4 Lab 6: Configuring Advanced EIGRP for IPv4 Features	Configure, verify and analyse basic and advanced EIGRP for IPv4 operation, including neighbour relationships, route propagation and route selection. (LO2: Applies EIGRP configuration, verification and troubleshooting techniques within a network infrastructure.)	Labs 1 to 4 (independent study practice labs) Lab 5 & 6	Cisco hardware and lab manual

Week 2: Session 1	EIGRP advanced features and EIGRP for IPv6	Demonstrate an in-depth understanding of advanced EIGRP features and the implementation of EIGRP for IPv6 networks. (LO1 : Develops theoretical understanding of advanced routing protocols and IPv6 routing concepts.)	• Lecture • Student Lecturer interaction • Hardware demonstration • Recap	Teaching Materials, PPT, Smartboard, PT/Cisco devices for demo
Week 2: Session 2	Lab 7: Configuring Basic EIGRP for IPv6 Lab 8: Troubleshooting Basic EIGRP for IPv4 and IPv6 Lab 9: Troubleshooting Advanced EIGRP	Configure and troubleshoot EIGRP for IPv6 and diagnose IPv4 and IPv6 routing issues using systematic troubleshooting techniques. (LO2 : Applies routing protocol implementation and troubleshooting skills within enterprise networks.)	Labs 7 -9	Cisco hardware and lab manual
Week 3: Session 1	OSPF v2	Demonstrate an in-depth understanding of OSPFv2 operation, configuration principles, and route selection within IPv4 networks. (LO1 : Develops theoretical knowledge of dynamic routing operations and design principles.)	• Lecture • Student Lecturer interaction • Hardware demonstration • Recap	Teaching Materials, PPT, Smartboard, PT/Cisco devices for demo
Week 3: Session 2	Lab 10: Configuring Basic Single-Area OSPFv2 Lab 11: Configuring OSPFv2 on a Multiaccess Network Lab 12: Configuring OSPFv2 Advanced Features	Configure, verify and optimise OSPFv2 operation in single-area and multiaccess network environments using advanced OSPF features. (LO2 : Applies OSPF routing implementation and verification techniques in complex network topologies.)	Lab 10 - 12	Cisco hardware and lab manual
Week 4: Session 1	OSPF v3	Demonstrate an in-depth understanding of OSPFv3 concepts and routing operations within IPv6 networks. (LO1 : Enhances understanding of IPv6 routing concepts and protocol operation.)	• Lecture • Student Lecturer interaction • Hardware demonstration • Recap	Teaching Materials, PPT, Smartboard, PT/Cisco devices for demo

Week 4: Session 2	Lab 13: Configuring Basic Single-Area OSPFv3 Lab 14: Troubleshooting Basic Single-Area OSPFv2 and OSPFv3	Configure and troubleshoot OSPFv3 and compare IPv4 and IPv6 OSPF implementations to maintain routing functionality. (LO2: Applies IPv6 routing configuration and troubleshooting skills within network infrastructures.)	Labs 13 & 14	Cisco hardware and lab manual
Week 5: Session 1	Switching concepts	Demonstrate an in-depth understanding of Layer 2 and Layer 3 switching concepts, switch operation, and forwarding mechanisms. (LO1: Develops theoretical knowledge of switching architectures and network operation.)	• Lecture • Student Lecturer interaction • Hardware demonstration • Recap	Teaching Materials, PPT, Smartboard, PT/Cisco devices for demo
Week 5: Session 2	Lab 15: Configuring Basic Switch Settings Lab 16: Configuring Switch Security Features Topology	Configure switch management and security features to support secure and efficient operation of switched network environments. (LO2: Applies switch configuration and security management techniques in network infrastructures.)	Labs 15 & 16	Cisco hardware and lab manual
Week 6: Session 1	VLANs and Dynamic Trunking protocol	Demonstrate an in-depth understanding of VLANs, trunking technologies, and Dynamic Trunking Protocol operations. (LO1: Develops understanding of network segmentation and trunking concepts.)	• Lecture • Student Lecturer interaction • Hardware demonstration • Recap	Teaching Materials, PPT, Smartboard, PT/Cisco devices for demo
Week 6: Session 2	Lab 17: Basic VLAN Configuration Lab 18: Configuring VLANs and Trunking Lab 19: Challenge VLAN Configuration	Configure, verify and troubleshoot VLANs, trunking, VTP and DTP to support logical network segmentation and administration. (LO2: Implements and maintains VLAN-based network infrastructures using switching technologies.)	Labs 17 to 21	Cisco hardware and lab manual

	Lab 20: Troubleshooting VLAN Configurations Lab 21: Configure Extended VLANs, VTP, and DTP			
Week 7: Session 1	Inter-VLAN Routing	Demonstrate an in-depth understanding of Inter-VLAN routing techniques and their role in network communication. (LO1 : Explores routing concepts that enable communication between VLANs.)	• Lecture • Student Lecturer interaction • Hardware demonstration • Recap	Teaching Materials, PPT, Smartboard, PT/Cisco devices for demo
Week 7: Session 2	Lab 23: Configuring 802.1Q Trunk-Based Inter-VLAN Routing	Configure and verify 802.1Q trunk-based Inter-VLAN routing to enable communication between multiple VLANs. (LO2 : Applies routing and switching techniques to support communication across segmented networks.)	Labs 23	Cisco hardware and lab manual
Week 8	Reading Week			
Week 9: Session 1	Switching concept recap Switch network with redundant links, STP, RSTP & PVST	Demonstrate an in-depth understanding of spanning tree protocols and their use in preventing switching loops and ensuring network resilience. (LO1 : Develops theoretical understanding of network redundancy and loop prevention.)	• Lecture • Student Lecturer interaction • Hardware demonstration • Recap	Teaching Materials, PPT, Smartboard, PT/Cisco devices for demo
Week 9: Session 2	Lab 24: Building a Switched Network with Redundant Links Lab 25: Configuring Rapid PVST+, PortFast, and BPDU Guard	Configure and verify Rapid PVST+, PortFast and BPDU Guard to create resilient switched networks with redundant links. (LO2 : Implements switching technologies to maintain network resilience and availability.)	Labs 24 & 25	Cisco hardware and lab manual

Week 10: Session 1	Etherchannel and DHCP	Demonstrate an in-depth understanding of EtherChannel technologies and DHCP services within enterprise networks. (LO1: Develops knowledge of network scalability and automated addressing services.)	• Lecture • Student Lecturer interaction • Hardware demonstration • Recap	Teaching Materials, PPT, Smartboard, PT/Cisco devices for demo
Week 10: Session 2	Lab session Lab 26: Configuring Basic DHCPv4 on a Router Lab 27: Troubleshooting DHCPv4 Lab 28: Configuring EtherChannel Lab 29: Troubleshooting EtherChannel	Configure and troubleshoot DHCPv4 services and EtherChannel implementations to improve address management and network performance. (LO2: Applies network service configuration and maintenance techniques within enterprise environments.)	Labs 26 - 29	Cisco hardware and lab manual
Week 11: Session 1	HSRP	Demonstrate an in-depth understanding of HSRP and first-hop redundancy concepts for network availability. (LO1: Develops understanding of high-availability and gateway redundancy concepts.)	• Lecture • Student Lecturer interaction • Hardware demonstration • Recap	Teaching Materials, PPT, Smartboard, PT/Cisco devices for demo
Week 11: Session 2	Lab 30: Configuring HSRP	Configure, verify and test HSRP operation to provide gateway redundancy and ensure network availability during device failure scenarios. (LO2: Implements and validates redundancy solutions to maintain network services.)	Lab 30	Cisco hardware and lab manual
Week 12: Session 1	Lab session: Consolidation Lab	Integrate and apply routing and switching techniques to troubleshoot and maintain a complex network infrastructure. (LO2: Demonstrates integrated implementation, maintenance and troubleshooting skills.)		

Week 12: Session 2	Mock Practical exam	Demonstrate the ability to implement, verify, and troubleshoot routing and switching technologies under assessment conditions. (LO2: Demonstrates practical competence in routing and switching implementation and maintenance.)		Cisco hardware
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Reference Number	Reference Material		
Essential 1	www.netacad.com username and password is required		
Essential 2	Switching, Routing, and Wireless Essentials Companion Guide (CCNAv7) Published Aug 18, 2020		
Further	Scaling Networks Essentials v6 Companion Guide by Cisco Networking Academy, Cisco Press. Published Aug 3, 2017		
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	