MAKERERE UNIVERSITY BUSINESS SCHOOL
FACULTY OF COMPUTING AND INFORMATICS
Department of Computer Science & Engineering
Academic Year 2024/2025 - Semester I

COURSE OUTLINE

Programs	**Bachelor of Business Computing (BBC III)**
Year of study	**Three**
Course name	**Routing and Switching**
Course code	**BUC3128**
Credit units	**4** **Option** System Administration
Facilitators	**Main Campus** Dr. Abdul Male Ssentumbwe, Mr. Samuel Ssendi

Introduction

It is mentioned that the world has become a global village. A core reason for such is the existence of computer networks. Both the private and government sectors have realized the need to have their operations connected for efficient communication, monitoring, collaboration and resource sharing.

This course builds from the Computer Networks course covered in year one semester Two of this program. It describes the architecture, components, and operations of routers and switches in a small and medium-sized computer network, enabling shared resources which may be hardware, software or data. Students learn how to configure a router and a switch for basic functionality. By the end of this course, students will be able to practically configure and troubleshoot routers and switches and resolve common issues with LANs in both IPv4 and IPv6 networks.

Course Objectives

The course intends to;

- To provide students with both theoretical and practical skills in setting up, managing and troubleshooting enterprise IP data networks
- To provide students with knowledge in configuring and maintaining routers and switches.
- To teach students how to troubleshoot common issues with routing protocols, virtual LANs, and inter-VLAN routing in both IPv4 and IPv6 networks.
- To prepare students for industrial certifications like HCIA, HCIP, CCNA and CCNP

Learning Outcomes

At the end of the course, students should be able to:

- Learn the basic architecture of IP data networks
- Configure switches and routers (layer two and layer three devices)
- Troubleshoot and resolve common switch and router device day-to-day issues.

Detailed Course Content

No.	Topic	Content	Hours
1.	**Operation of IP Data Networks**	• Operation of IP Data Networks • Recognize the purpose and functions of various network devices such as Routers, Switches, Bridges and Hubs. • Select the components required to meet a given network specification. • Identify common applications and their impact on the network • Describe the purpose and basic operation of the protocols in the OSI and TCP/IP models. • Predict the data flow between two hosts across a network. • Identify the appropriate media, cables, ports, and connectors to connect Cisco network devices to other network devices and hosts in a LAN	8
2.	**IP addressing (IPv4 / IPv6)**	• Describe the operation and necessity of using private and public IP addresses for IPv4 addressing • Identify the appropriate IPv6 addressing scheme to satisfy addressing requirements in a LAN/WAN environment. • Identify the appropriate IPv4 addressing scheme using VLSM and summarization to satisfy addressing requirements in a LAN/WAN environment. • Describe the technological requirements for running IPv6 in conjunction with IPv4 such as dual stack	8
3.	**LAN Switching Technologies**	• Determine the technology and media access control method for Ethernet networks • Identify basic switching concepts and the operation of switches. • Configure and verify initial switch configuration including remote access management. • Verify network status and switch operation using basic utilities such as ping, telnet and ssh. • Identify enhanced switching technologies	8

		• Describe how VLANs create logically separate networks and the need for routing between them. • Configure and verify VLANs • Configure and verify trunking on Switches • Configure and verify PVSTP operation	
4.	**IP Routing Technologies**	• Describe basic routing concepts • Configure and verify utilizing the CLI to set basic Router configuration • Configure and verify operation status of a device interface, both serial and ethernet • Verify router configuration and network connectivity • Configure and verify routing configuration for a static or default route given specific routing requirements • Differentiate methods of routing and routing protocols • Configure and verify OSPF (single area) • Configure and verify EIGRP (single AS) • Configure and verify interVLAN routing (Router on a stick)	10
5.	**IP services**	• Configure and verify DHCP (IOS Router) • configuring router interfaces to use DHCP • Describe the types, features, and applications of • Configure and verify ACLs in a network environment • Identify the basic operation of NAT • Configure and verify NAT for given network requirements • Configure and verify NTP as a client	10
6.	**Networking device security**	Configure and verify network device security features Configure and verify Switch Port Security features Configure and verify ACLs to filter network traffic Configure and verify an ACLs to limit telnet and SSH access to the router	8
7.	**WAN technologies**	Identify different WAN Technologies Configure and verify a basic WAN serial connection	8

		Configure and verify a PPP connection between Cisco routers Configure and verify Frame Relay on routers	
	Total Hours		**60**

Delivery Methods:

- In-House Face to Face and Online Lectures
- Group & Class Discussions
- Practical demonstrations

Note: All class materials and examples will be delivered via Makerere University Business School eLearning Platform (Mubsep) accessible at https://mubsep.mubs.ac.ug

Assessment Methods

Course Works **30%**

a) Coursework Tests (Test1 => ***Sit-in*** and Test2 => ***Practical***)
b) Class Practical Exercises
c) Class Assignment Sessions
   i. Assignment 1: Take home
   ii. Assignment 2: Online real-time test (done in a controlled environment on campus)
   iii. Assignment 3: Practical test

Final Exam (Theory and Practical) **70%** **(from Nov 2024)**

Total Marks (Coursework and Final exam) **100%**

References

1) Kurose, J. F. & Ross, K. W. (2020). Computer Networking, A Top_Down Approach (8th edition), Harlow: Pearson Education
2) Odom, W., & Wilkins, S. (2017). CCNA Routing and Switching 200-125 Official Cert Guide and Network Simulator Library (1. ed), Cisco Press.
3) Wallace, K. (2017). CCNP Routing and Switching ROUTE 300-101 Official Cert Guide (1. ed), Cisco Press
4) Lacoste, R., & Wallace, K. (2017). CCNP Routing and Switching TSHOOT 300-135 Official Cert Guide (1. ed), Cisco Press.
5) Hucaby, D. (2015). CCNP Routing and Switching SWITCH 300-115 Official Cert Guide from Cisco Press