MODULE DESCRIPTION FORM

Module Information			
Module Title	**Network Routing and switching**	**Module Delivery**	
Module Type	**Core**	☒ **Lecture**	
Module Code	**IT2201**	☒ **Practical**	
ECTS Credits	**6**		
SWL (hr/sem)	**150**		

Module Level	UG2	**Semester of Delivery**	2
Administering Department	Information Technology	**College**	College of Science
Module Leader	Ali Abdulhussein Ibrahim	**e-mail**	ali.abdulhussein19@uowa.edu.iq
Module Leader's Acad. Title	Asst. Lect	**Module Leader's Qualification**	M.Sc.
Module Tutor	Ali Abdulhussein Ibrahim	**e-mail**	ali.abdulhussein19@uowa.edu.iq
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Scientific Committee Approval Date	2025-01-20	**Version Number**	1.0

Relation with other Modules			
Prerequisite module	Computer Network	**Semester**	1
Co-requisites module	-	**Semester**	-

Department Head Approval

Dean of the College Approval

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	To introduce students to the fundamental concepts and principles of routing and switching in computer networks. To provide students with an in-depth understanding of network routing protocols and their role in efficient data transmission. To develop students' knowledge of network addressing and subnetting, enabling them to design and configure networks effectively. To familiarize students with switching concepts and technologies, including VLANs, spanning tree protocols, and virtualization. To equip students with the skills and techniques required to troubleshoot network connectivity and performance issues.
Module Learning Outcomes	Explain the basic principles and components of computer networks, including protocols, devices, and architectures. Understand the purpose and operation of routing protocols, such as RIP, OSPF, and BGP, and evaluate their suitability for different network environments. Design and implement IP addressing schemes and subnetting plans to efficiently allocate network resources. Configure and manage network switches, including VLANs, spanning tree protocols, and port security. Identify and resolve common network connectivity and performance issues using appropriate troubleshooting methodologies and tools.
Indicative Contents	Routing Protocols: Routing fundamentals and the role of routing protocols. Distance-vector routing protocols (e.g., RIP). Link-state routing protocols (e.g., OSPF). Border Gateway Protocol (BGP) for inter-domain routing. Network Addressing and Subnetting: IPv4 addressing and subnetting concepts. Address classes, subnet masks, and CIDR notation. Address allocation and hierarchical addressing. Switching Concepts and Technologies: Introduction to network switches and their role in local area networks (LANs). VLANs and their benefits in network segmentation. Spanning Tree Protocol (STP) and its variants. Virtual LAN Trunking Protocol (VTP) and its configuration.

Learning and Teaching Strategies	
Strategies	Lectures: In-class lectures will cover theoretical concepts, principles, and frameworks related to routing and switching. Lecturers will provide real-world examples and case studies to reinforce understanding.

	Practical Exercises: Hands-on lab sessions will allow students to apply their knowledge through network configuration and troubleshooting exercises. These practical sessions will utilize simulation software or physical network equipment. Group Discussions: Group discussions and collaborative activities will encourage students to analyze and discuss complex networking scenarios, fostering critical thinking and problem-solving skills. Online Resources: Access to online resources, including interactive tutorials, e-books, and video lectures, will supplement in-class learning and provide additional support for self-study. Assessments: Formative and summative assessments, such as quizzes, practical exams, and project assignments, will evaluate students' understanding of the concepts, their practical skills, and their ability to analyze and solve networking problems.

Student Workload (SWL)

Structured SWL (h/sem)	60	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	87	**Unstructured SWL (h/w)**	6
Total SWL (h/sem)	147 + 3 final = 150		

Module Evaluation

		Time/ Number	Weight (Marks)	Weekly Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	5	10% (8)	All Weeks	1,2,3,4,5
	Assignments	5	10% (5)	All Weeks	1,2,3,4,5
	Lab	5	10% (15)	All Weeks	1,2,3,4
	Home Work	5	10% (7%)	All Weeks	1,2,3,4,5
	Projects	1	5% (5)	All Weeks	1,2,3,4,5
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	
	Final Exam	3hr	50% (50)	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Introduction to Network Layer
Week 2	what's inside a router
Week 3	IP: Internet Protocol
Week 4	IP Subnetting
Week 5	DHCP and NAT
Week 6	Routing Algorithms: Link State
Week 7	Distance Vector
Week 8	Routing in the Internet: OSPF
Week 9	BGP
Week 10	Link Layer Services: Error detection, Correction
Week 11	Multiple Access Protocols
Week 12	LANs: Addressing, ARP, Ethernet and Switches
Week 13	VLANs
Week 14	Link Virtualization MPLS
Week 15	Data Center Networking
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Routing Protocol Configuration and Verification
Week 2	Subnetting and IP Address Allocation
Week 3	Dynamic Routing Protocol Comparison: RIP vs. OSPF
Week 4	Static Routing Configuration and Troubleshooting
Week 5	Network Address Translation (NAT) Implementation
Week 6	Virtual LAN (VLAN) Design and Routing
Week 7	Subnet Design and Optimization for Efficient IP Addressing
Week 8	Routing Metrics and Path Selection Analysis

Week 9	Implementing VLSM (Variable Length Subnet Masking)
Week 10	IPv6 Routing Configuration and Transition Techniques
Week 11	Inter-VLAN Routing with Router-on-a-Stick Topology
Week 12	Redundancy and Load Balancing using Routing Protocols
Week 13	Routing Protocol Redistribution and Route Filtering
Week 14	Routing Loop Detection and Prevention Strategies
Week 15	Troubleshooting Routing and Subnetting Issues in a Complex Network

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	James F. Kurose and KeithW. Ross. Computer Networking: A Top-Down Approach, Eighth edition, 2020.	Yes
Recommended Texts	• L. L. Peterson and B. S. Davie. Computer Networks, A Systems Approach. Morgan Kaufman, Fourth edition, 2006. • A. S. Tanenbaum. Computer networks. Prentice-Hall, Fifth edition, 2010	No
Websites	Jim Kurose Homepage (umass.edu)	

Grading Scheme

Group	**Grade**	Mark	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Fair / Average	60 - 69	Fair but with major shortcomings
	E - Sufficient	Pass / Acceptable	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	Fail (Pending)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.