



## MODULE DESCRIPTION FORM

### نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Network Switching and Routing		Module Delivery
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input checked="" type="checkbox"/> Seminar
Module Code	NSDC406		
ECTS Credits	5		
SWL (hr/sem)	125		
Module Level	4	Semester of Delivery	
Administering Department	NSD	College	CSIT
Module Leader		e-mail	
Module Leader's Acad. Title		Module Leader's Qualification	
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date		Version Number	

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	



### Module Aims, Learning Outcomes and Indicative Contents

#### أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p><b>Module Aims</b></p> <p>أهداف المادة الدراسية</p>	<ol style="list-style-type: none"> <li>1. Understand Network Switching: The aim of this module is to provide students with a comprehensive understanding of network switching technologies, including the operation, configuration, and management of network switches.</li> <li>2. Explore Routing Concepts: This module aims to introduce students to the fundamental concepts of network routing, including different routing protocols, routing algorithms, and the principles of efficient packet forwarding.</li> <li>3. Develop Routing Skills: The module aims to develop practical skills in configuring and managing routing protocols, including static routing, dynamic routing protocols such as RIP, OSPF, and BGP, and the implementation of routing policies.</li> <li>4. Study Network Switching Technologies: This module aims to explore various network switching technologies, including Ethernet, VLANs, Spanning Tree Protocol (STP), and Virtual Local Area Networks (VLANs), and their role in building scalable and resilient networks.</li> <li>5. Analyze Network Performance: The aim of this module is to enable students to analyze and evaluate the performance of network switches and routers, including factors such as latency, throughput, packet loss, and quality of service (QoS).</li> <li>6. Understand Network Security Considerations: This module aims to highlight the importance of network security in the context of switching and routing, including techniques for securing network devices, preventing unauthorized access, and mitigating common network attacks.</li> </ol>
<p><b>Module Learning Outcomes</b></p> <p>مخرجات التعلم للمادة الدراسية</p>	<ol style="list-style-type: none"> <li>1. Understand Network Switching: Students will be able to demonstrate a comprehensive understanding of network switching technologies, including the operation, configuration, and management of network switches.</li> <li>2. Apply Routing Concepts: Students will be able to apply fundamental concepts of network routing, including different routing protocols, routing algorithms, and the principles of efficient packet forwarding.</li> <li>3. Configure and Manage Routing Protocols: Students will gain practical skills in configuring and managing routing protocols, including static routing, dynamic routing protocols such as RIP, OSPF, and BGP, and the implementation of routing policies.</li> </ol>



	<ol style="list-style-type: none"> <li>4. Analyze Network Switching Technologies: Students will be able to analyze various network switching technologies, including Ethernet, VLANs, Spanning Tree Protocol (STP), and Virtual Local Area Networks (VLANs), and understand their role in building scalable and resilient networks.</li> <li>5. Evaluate Network Performance: Students will be able to evaluate the performance of network switches and routers, including factors such as latency, throughput, packet loss, and quality of service (QoS).</li> <li>6. Implement Network Security Measures: Students will understand the importance of network security in the context of switching and routing and be able to implement techniques for securing network devices, preventing unauthorized access, and mitigating common network attacks.</li> </ol>
<p><b>Indicative Contents</b> المحتويات الإرشادية</p>	<ol style="list-style-type: none"> <li>1. Introduction to Network Switching and Routing: <ul style="list-style-type: none"> <li>• Overview of network switching and routing concepts</li> <li>• Network topologies and architectures</li> <li>• OSI and TCP/IP network models</li> </ul> </li> <li>2. Network Switching Technologies: <ul style="list-style-type: none"> <li>• Ethernet fundamentals and switching operation</li> <li>• Virtual LANs (VLANs) and VLAN trunking</li> <li>• Spanning Tree Protocol (STP) and Rapid Spanning Tree Protocol (RSTP)</li> <li>• Inter-VLAN routing and Layer 3 switching</li> </ul> </li> <li>3. Routing Concepts: <ul style="list-style-type: none"> <li>• Routing fundamentals and packet forwarding</li> <li>• Routing tables and routing protocols</li> <li>• Distance Vector Routing Protocols (e.g., RIP)</li> <li>• Link-State Routing Protocols (e.g., OSPF)</li> <li>• Border Gateway Protocol (BGP) and external routing</li> </ul> </li> <li>4. Routing Protocol Configuration and Management: <ul style="list-style-type: none"> <li>• Configuring and managing static routing</li> <li>• Configuring and managing dynamic routing protocols</li> <li>• Route redistribution and route filtering</li> <li>• Routing protocol convergence and troubleshooting</li> </ul> </li> <li>5. Advanced Routing Concepts: <ul style="list-style-type: none"> <li>• Multicast routing and multicast protocols</li> <li>• IPv6 addressing and routing</li> <li>• Traffic engineering and Quality of Service (QoS)</li> <li>• Virtual Private Networks (VPNs) and tunneling protocols</li> </ul> </li> <li>6. Network Switching and Routing Security:</li> </ol>



	<ul style="list-style-type: none"> <li>• Network device security best practices</li> <li>• Access control and authentication mechanisms</li> <li>• Securing routing protocols and routing updates</li> <li>• Network threat mitigation and defense techniques</li> </ul>
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Theoretical Foundations Hands-on Practice Case Studies Collaborative Learning Assessment and Feedback

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	6,2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	32	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	2.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5,10	LO #1,2, 3 and 5
	Assignments	2	10% (10)	2,12	LO # 3, 4 and 5
	Projects / Lab.	2	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5,8 and 10



Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1/7
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

### Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
<b>Week 1</b>	Principles I: Benefits of Switching in Networks, Drawbacks of Switching in Networks, Benefits of Routing in Networks, Drawbacks of Routing in Networks, The Differences Between Switching and Routing in networks.
<b>Week 2</b>	Principles II: Why we use switching and routing, The internal structure of Switching, The internal structure of Routing, The work of Switching and Routing.
<b>Week 3</b>	Routing and Switching Strategies- Switching: Forwarding and Filtering Traffic.
<b>Week 4</b>	Routing and Switching Strategies- Forwarding Based on MAC Addresses.
<b>Week 5</b>	Routing: Finding Paths, Routing Devices, Static Routes, Default Routes, Dynamic Routes.
<b>Week 6</b>	Routing Protocols I: Single versus multipath, Interior versus exterior.
<b>Week 7</b>	Routing Protocols II: Flat versus hierarchical, Link state versus distance vector.
<b>Week 8</b>	Choosing or Installing a Route, Prefix length, Administrative distance Metric.
<b>Week 9</b>	Spanning Tree and Rapid Spanning Tree, the structure of spanning tree, Why Are Loops Bad? The Comparison Algorithm.
<b>Week 10</b>	Spanning Tree and Rapid Spanning Tree, Spanning Tree Addressing, Port States, Spanning Tree Timers
<b>Week 11</b>	Spanning Tree Messages, Problems with Spanning Tree, Switch to Switch: A Special Case.
<b>Week 12</b>	VLANs and Spanning Tree, The Rapid Spanning Tree Protocol.
<b>Week 13</b>	VLANs and Trunking: Big Broadcast Domains, What Is a VLAN? The Effect of VLANs
<b>Week 14</b>	Types of VLANs, VLANs Between Switches.
<b>Week 15</b>	What is a Trunk?, Trunking Protocol Standards Pruning, VLAN Design Consideration.
<b>Week 16</b>	Final Exam

### Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
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Week 1	Introduction to Packet Tracer
Week 2	Switching in Packet Tracer
Week 3	Routing in Packet Tracer
Week 4	Network Address Translation (NAT) in Packet Tracer
Week 5	Quality of Service (QoS) in Packet Tracer
Week 6	Wide Area Networks (WANs) in Packet Tracer
Week 7	Dynamic Host Configuration Protocol (DHCP) in Packet Tracer

### Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Bruse Hartpence, Packet guide to Routing and Switching, O'Reilly Media, Inc., 2012. Cisco Networking Academy, Routing and Switching Essentials Companion Guide. Pearson Education, 2014.	
Recommended Texts		
Websites		

### Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded



(0 – 49)	F – Fail	راسب	(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.