

IT245 ROUTING AND SWITCHING I

For Classes Delivered Online, please see specific requirements in your online course header located at <http://classes.miller-motte.edu>

Course Objectives

Upon successful completion of this course, the student will be able to:

11. Describe how networks function, identifying major components using layered models;
12. Compare key characteristics of LAN environments;
13. Evaluate the rules for packet control, the TCP/IP communication process, and its associated protocols;
14. Design a simple LAN and simple internetwork using Cisco Technology;
15. Design an IP addressing scheme to meet design requirements;
16. Perform LAN and VLAN troubleshooting;
17. Execute troubleshooting a device as part of a working network, IP addressing and host configuration;
18. Implement an IP addressing scheme and IP Services to meet network requirements in a small branch office Enterprise network;
19. Demonstrate configuring, verifying, and troubleshooting basic router operation and routing on CISCO devices;
20. Implement basic router security.

Learning Unit 1

Objectives: 1, 2, 3, 4, 9

Time	In-Class	Time	Out-Of-Class
Hours 1-4	Course Introduction and Overview Lectures: Chapter 1: Networking in the Enterprise (Concepts) Chapter 2: Exploring the Enterprise Network Infrastructure (Concepts) Topics: • Enterprise Traffic Flow • Extranet vs. Internet • Telecommuting • Types of Network Documentation • Network Operations Center • Network Security Considerations • Useful Configuration and Verification Commands (Obj 1, 2, 3, 4, 9)	Hours 4-7	Preparation for Discussion: Chapter 1: Networking in the Enterprise (Concepts), (p. 3-20) Chapter 2: Exploring the Enterprise Network Infrastructure (Concepts), (p. 21-64) (Obj 1, 2, 3, 4, 9)
1	Class Discussion: Class Discussion topics may be pulled from your text, assigned websites, or other resources as determined by your instructor. Topics may include: enterprise networks, packet sniffers, Teleworking, virtual private network, data center, structured cabling, Power over Ethernet, in- and out-of-band, Port density (Obj 1, 2, 3, 4, 9)	3-4	Homework/Assignments: • Complete Check Your Understanding - all chapters • Complete Challenge Questions and Activities - all chapters (Obj 1, 2, 3, 4, 9)
3-8	Lab Activities: Lab 1-1: Capturing and Analyzing Network Traffic (1.2.2) Lab 2-1: Configuring Basic Routing and Switching (2.3.5) (Obj 1, 2, 3, 4, 9)	2	Project Research/Preparation: Lesson 1 – instructor will provide direction (Obj all)
1	Media Ancillaries Interactive Activities - CD-ROM Packet Tracer Activities - CD-ROM (Obj 1, 2, 3, 4, 9)	2	Media Ancillaries Interactive Activities - CD-ROM Packet Tracer Activities - CD-ROM (Obj 1, 2, 3, 4, 9)

1	Grading and Assessment Exam Unit 1 Participation Grade (discussion/group assignment or Lab participation) See Rubric (Obj 1, 2, 3, 4, 9)		Preparation for Assessment: Review Lecture and Chapters Review Completed Homework Create a Study Guide for Exam (Obj 1, 2, 3, 4, 9)
			Grading and Assessment Homework/Assignment/Activity Project / Portfolio submission (see rubric) Lesson 1–approval (Obj 1, 2, 3, 4, 9)

Learning Unit 2

Objectives: 1, 2, 4, 5, 8, 9

Time	In-Class	Time	Out-Of-Class
Hours 2-5	Review Homework and Unit 1 Exam Lectures: Chapter 3: Switching in an Enterprise Network (Concepts) Chapter 4: Addressing in an Enterprise Network (Concepts) Topics: - Importance of VPN - Types of Switches - Spanning Tree Protocol - Purpose of VLAN - Hierarchal IP Addressing Structure - VLSM IP Address Implementation - Planning a Network with Classless Routing - Static and Dynamic NAT (Obj 1, 2, 4, 5, 8, 9)	Hours 6-10	Preparation for Discussion: Chapter 3: Switching in an Enterprise Network (Concepts), (p. 65-108) Chapter 4: Addressing in an Enterprise Network (Concepts), (p. 109-156) (Obj 1, 2, 4, 5, 8, 9)
1	Class Discussion: Class Discussion topics may be pulled from your text, assigned websites, or other resources as determined by your instructor. Topics may include: multilayer switching, RSTP, management VLAN, VTP, hierarchal network, supernetting, NAT (Obj 1, 2, 4, 5, 8, 9)	3-4	Homework/Assignments: - Complete Check Your Understanding - all chapters - Complete Challenge Questions and Activities - all chapters - Challenge Lab 3-8: VTP Modes (Obj 1, 2, 4, 5, 8, 9)
4-8	Lab Activities: Lab 3-1: Applying Basic Switch Security (3.1.4) Lab 3-2: Building a Switched Network with Redundant Links (3.2.3) Lab 3-3: Verifying STP with show Commands (3.2.4) Lab 3-4: Configuring, Verifying, and Troubleshooting VLANs (3.3.2) Lab 3-5: Creating VLANs and Assigning Ports (3.4.1) Lab 3-6: Configuring a Trunk Port to Connect Switches (3.4.2) Lab 3-7: Part A: Configuring Inter-VLAN Routing (3.4.3) Lab 3-7: Part B: Configuring Inter-VLAN Routing (3.4.3) Lab 4-1: Designing and Applying an IP Addressing Scheme (4.2.3) Challenge Lab: 4-2: Calculating a Network	2	Project Research/Preparation: Lesson 2 – Instructor will provide direction (Obj all)

	IP Addressing Scheme Lab 4-3: Calculating a VLSM Addressing Scheme (4.2.5) Challenge Lab 4-4: Calculating VLSM Network IP Addressing Schemes Lab 4-5: Calculating Summarized Routes (4.3.3) Challenge Lab 4-6: Route Summarization Practice Lab 4-7: Configuring a LAN with Discontiguous Subnets (4.3.4) Lab 4-8: Configuring and Verifying Static and Dynamic NAT (4.4.3) Lab 4-9: Configuring and Verifying Dynamic NAT (4.4.3) Lab 4-10: Configuring and Verifying PAT (4.4.4) (Obj 1, 2, 4, 5, 8, 9)		
1	Media Ancillaries Interactive Activities - CD-ROM Packet Tracer Activities - CD-ROM (Obj 1, 2, 4, 5, 8, 9)	2	Media Ancillaries Interactive Activities - CD-ROM Packet Tracer Activities - CD-ROM (Obj 1, 2, 4, 5, 8, 9)
1	Grading and Assessment Exam Unit 2 Participation Grade (discussion/group assignment or Lab participation) See Rubric (Obj 1, 2, 4, 5, 8, 9)		Preparation for Assessment: Review Lecture and Chapters Review Completed Homework Create a Study Guide for Exam (Obj 1, 2, 4, 5, 8, 9)
			Grading and Assessment Homework/Assignment/Activity Project / Portfolio submission (see rubric) Lesson 2 – outline and sources (Obj 1, 2, 4, 5, 8, 9)

Learning Unit 3

Objectives: 3, 4, 5, 9

Time	In-Class	Time	Out-Of-Class
Hours 1-4	Review Homework and Unit 3 Exam Lectures: Chapter 5: Routing with a Distance Vector Protocol (Concepts) Chapter 6: Routing with a Link-State Protocol (Concepts) Topics: - Static, Dynamic, and Default Route - RIP Functions and Limitations - Purpose and Advantages of EIGRP - OSPF Routing Functionality - Single-Area OSPF - Multiprotocol Environments (Obj 3, 4, 5, 9)	Hours 4-8	Preparation for Discussion: Chapter 5: Routing with a Distance Vector Protocol (Concepts), (p. 157-206) Chapter 6: Routing with a Link-State Protocol (Concepts), (p. 207-244) (Obj 3, 4, 5, 9)
1	Class Discussion: Class Discussion topics may be pulled from your text, assigned websites, or other resources as determined by your instructor. Topics may include: network topology, RIPng, DUAL, parent and child routes, open standard, NBMA Networks, reference bandwidth	3-4	Homework/Assignments: - Complete Check Your Understanding - all chapters - Complete Challenge Questions and Activities - all chapters (Obj 3, 4, 5, 9)

4-8	Lab Activities: Lab 5-1: Designing and Creating a Redundant Network (5.1.2) Lab 5-2: Configuring RIPv2 with VLSM and Default Route Propagation (5.2.3) Lab 5-3: Implementing EIGRP (5.4.1) Lab 5-4: EIGRP Configuring Automatic and Manual Route Summarization and Discontiguous Subnets (5.4.2) Lab 6-1: Configuring and Verifying Single-Area OSPF (6.2.1) Lab 6-2: Configuring OSPF Authentication (6.2.2) Lab 6-3: Controlling a DR/BDR Election (6.2.3.2) Lab 6-4: Configuring OSPF Parameters (6.2.3.5) Lab 6-5: Configuring and Verifying Point-to-Point OSPF (6.2.4) Lab 6-6: Configuring and Propagating an OSPF Default Route (6.3.1) Lab 6-7: Configuring OSPF Summarization (6.3.2) <i>(Obj 3, 4, 5, 9)</i>	2	Project Research/Preparation: Lesson 3 –instructor will provide direction <i>(Obj all)</i>
1	Media Ancillaries Interactive Activities - CD-ROM Packet Tracer Activities - CD-ROM <i>(Obj 1, 2, 3, 4)</i>	2	Media Ancillaries Interactive Activities - CD-ROM Packet Tracer Activities - CD-ROM <i>(Obj 1, 2, 3, 4)</i>
1	Grading and Assessment Exam Unit 3 Participation Grade (discussion/group assignment or Lab participation) See Rubric <i>(Obj 3, 4, 5, 9)</i>		Preparation for Assessment: Review Lecture and Chapters Review Completed Homework Create a Study Guide for Exam <i>(Obj 3, 4, 5, 9)</i>
			Grading and Assessment Homework/Assignment/Activity Project / Portfolio submission (see rubric) Lesson 3 – Peer review <i>(Obj 3, 4, 5, 9)</i>

Learning Unit 4

Objectives: 2, 3, 9, 10

Time	In-Class	Time	Out-Of-Class
Hours 1-4	Review Homework and Unit 4 Exam Lectures: Chapter 7: Implementing Enterprise WAN Links (Concepts) Chapter 8: Filtering Traffic Using Access Control Lists (Concepts) Topics: - WAN Connectivity Options - WAN Advantages and Limitations - CHAP vs. PAP - Frame Relay and Congestion - Traffic Filtering - Access Control Lists - Best Practices <i>(Obj 2, 3, 9, 10)</i>	Hours 5-8	Preparation for Discussion: Chapter 7: Implementing Enterprise WAN Links (Concepts), (p. 245-278) Chapter 8: Filtering Traffic Using Access Control Lists (Concepts), (p. 279-326) <i>(Obj 2, 3, 9, 10)</i>

1	Class Discussion: Class Discussion topics may be pulled from your text, assigned websites, or other resources as determined by your instructor. Topics may include: STDM, virtual circuits, point-to-point, challenge message, standard ACL, stakeholders, logging (Obj 2, 3, 9, 10)	1-3	Homework/Assignments: - Complete Check Your Understanding - all chapters - Complete Challenge Questions and Activities - all chapters (Obj 2, 3, 9, 10)
4-8	Lab Activities: Lab 7-1: Configuring and Verifying a PPP Link (7.2.3) Lab 7-2: Configuring and Verifying PAP and CHAP Authentication (7.2.5) Lab 8-1: Configuring and Verifying Standard ACLs (8.3.3) Lab 8-2: Planning, Configuring, and Verifying Extended ACLs (8.3.4) Lab 8-3: Configuring and Verifying Extended Named ACLs (8.3.5) Lab 8-4: Configuring and Verifying VTY Restrictions (8.3.6) Lab 8-5: Configuring an ACL with NAT (8.4.3) Lab 8-6: Configuring and Verifying ACLs to Filter Inter-VLAN Traffic (8.4.5) Lab 8-7: Configuring ACLs and Verifying with Console Logging (8.5.1) Lab 8-8: Configuring ACLs and Recording Activity to a Syslog Server (8.5.2) (Obj 2, 3, 9, 10)	3	Project Research/Preparation: Lesson 4 – instructor will provide direction (Obj all)
1	Media Ancillaries Interactive Activities - CD-ROM Packet Tracer Activities - CD-ROM (Obj 1, 2, 3, 4)	2	Media Ancillaries Interactive Activities - CD-ROM Packet Tracer Activities - CD-ROM (Obj 1, 2, 3, 4)
1	Grading and Assessment Exam Unit 4 Participation Grade (discussion/group assignment or Lab participation) See Rubric (Obj 2, 3, 9, 10)		Preparation for Assessment: Review Lecture and Chapters Review Completed Homework Create a Study Guide for Exam (Obj 2, 3, 9, 10)
			Grading and Assessment Homework/Assignment/Activity Project / Portfolio submission (see rubric) Lesson 4 – Final (Obj 2, 3, 9, 10)

Learning Unit 5

Objectives: 7, 9

Time	In-Class	Time	Out-Of-Class
Hours 1-4	Review Homework and Unit 4 Exam Lectures: Chapter 9: Troubleshooting an Enterprise Network (Concepts) Topics: - Uptime - Failure Domain - Issues with Networks - Isolation and Correction	Hours 3-6	Preparation for Discussion: Chapter 9: Troubleshooting an Enterprise Network (Concepts), (p. 327-382) (Obj 7, 9)

	(Obj 7, 9)		
1	Class Discussion: Class Discussion topics may be pulled from your text, assigned websites, or other resources as determined by your instructor. Topics may include: proactive maintenance, network monitoring plan, transceivers, rogue switching (Obj 7, 9)	1-3	Homework/Assignments: - Complete Check Your Understanding - all chapters - Complete Challenge Questions and Activities - all chapters (Obj 7, 9)
4-8	Lab Activities: Lab 9-1: Troubleshooting RIPv2routing Issues (9.3.1) Lab 9-2: Troubleshooting OSPF Routing Issues (9.3.3) Lab 9-3: Troubleshooting Default Route Redistribution with EIGRP Lab 9-4: Troubleshooting OSPF Default Route Redistribution (9.3.4) Lab 9-5: Troubleshooting Wan and PPP Connectivity (9.4.2) Lab 9-6: Troubleshooting ACL Configuration and Placement (9.5.2) (Obj 7, 9)	3	Project Research/Preparation: Lesson 5 – instructor will provide direction (Obj all)
1	Media Ancillaries Interactive Activities - CD-ROM Packet Tracer Activities - CD-ROM (Obj 1, 2, 3, 4)	2	Media Ancillaries Interactive Activities - CD-ROM Packet Tracer Activities - CD-ROM (Obj 1, 2, 3, 4)
1	Grading and Assessment Exam Unit 5 Participation Grade (discussion/group assignment or Lab participation) See Rubric (Obj 7, 9)		Preparation for Assessment: Review Lecture and Chapters Review Completed Homework Create a Study Guide for Exam (Obj 7, 9)
			Grading and Assessment Homework/Assignment/Activity Project / Portfolio submission (see rubric) Lesson 5 – Final (Obj 7, 9)

Learning Unit 6

Objectives: all

Time	In-Class	Time	Out-Of-Class
Hours 1-3	Review Homework and Unit 5 Exam Lectures: Chapter 10: Putting It All Together Topics: - Analyzing Network Design - Configuring Switches and Routers - Configuring WAN links - Configuring ACLs - Verifying Connectivity (Obj all)	Hours 1	Preparation for Discussion: Chapter 10: Putting It All Together, (p. 383-384) (Obj all)

3	Class Discussion: Class Discussion topics may be pulled from your text, assigned websites, or other resources as determined by your instructor. Topics may include: putting all the information together, careers as a network support technician <i>(Obj all)</i>	4-8	Homework/Assignments: - Part A: Review the Work Order and Develop the VLSM Subnet Scheme - Part B: Physically Construct the Network and Perform Basic Device Configuration - Part C: Routing, ACLs, and Switch Security Configuration <i>(Obj all)</i>
3-4	Project/Lab Presentations <i>(Obj all)</i>	4	Project Research/Preparation: Lesson 6 – Presentation preparation <i>(Obj all)</i>
	Media Ancillaries	2	Media Ancillaries
1	Grading and Assessment Final Exam Participation Grade (discussion/group assignment or Lab participation) See Rubric <i>(Obj all)</i>		Preparation for Assessment Review Lecture and Chapters Review Completed Homework Create a Study Guide for Final Exam <i>(Obj all)</i>
			Grading and Assessment Homework/Assignment/Activity Final Exam Project / Portfolio submission (see rubric) Lesson 6 – Review and/or Presentation <i>(Obj all)</i>