ISOM 3380 Advanced Network Management (CISCO - ICND)

COURSE INSTRUCTOR

Prof. Percy Dias
percy@ust.hk
Room: LSK4037
Ph: 2358 7654
Office Hours: By appointment

TA

Tommy Ng
imtng@ust.hk
LSK4065
2358 7638

COURSE OVERVIEW

In an interconnected economy, management of network applications becomes increasingly important. This course helps students develop theoretical and practical network administration and management skills. ISOM 3380 provides solid knowledge and technique that would be an advantage for internship and future career.

The material in this course encompasses a broad range of technologies that facilitate how people work, live, play, and learn by communicating with voice, video, and other data. Networking and the Internet affect people differently in different parts of the world. Students could also progress to get CCNA industrial certification after the course.

Key Conceptual areas:

·   Determining IP Routes
·   Configuring IP Routing Protocols (RIP, IGRP, EIGRP, OSPF and VLSM)
·   Basic IP Traffic Management with Access Control Lists (ACL)
·   Network Address Translation and Port Address Translation (NAT/PAT)
·   Extending Switched Networks with Virtual LANs
·   Configuring Catalyst Switch Operations

Interconnecting LANs :

Catalyst Switch Operations	Introduce the major concept involved Layer 2 switching and other functional aspect that influence switch environment. Layer 2 switching technologies (e.g. Address learning, Packet forwarding/filtering, Loop avoidance, Spanning tree protocol).
Extending Switched Network with Virtual LANs	Discus VLAN operation. The benefits of VLANs in a network to provide enhanced network services. Using VLANs to controlling brodcast propagation throughout the network. Introduce VLANs Trunking (VLAN trunking protocol) to enable switches to send VLAN frames to each other.

Controlling Traffic Between LANs:

Determining IP Routes	Introduce the way that router determines the path to send packets by static route and dynamic route (e.g. RIP, IGRP, OSPF, EIGRP). It talks about the the looping problem that could happen in dynamic routes and the ways of routing loop avoidance. And the use of InterVLAN routing to enable communications between layer 2 VLANs behind routers.
IP Routing Protocols	Discus the process of manually configuring static and default routes to provide connectivity between networks with dynamic routes. Implementing routing protocols and their properties (e.g. RIP, IGRP, OSPF, EIGRP).
Basic IP Traffic Management and Translation with Access Lists	Discuse the functions and processes of TCP/IP access lists (e.g. standard access list, extended access list) in identifying traffic and their features in network security. Implementing TCP/IP access lists, e.g. to limit Telnet access to network devices. Scaling the network with NAT and PAT to conserving registered IP addresses in large networks and simplifying IP addressing management tasks.

Interconnecting WANs:

Establishing Serial Point-to-Point Connections	Introduce the concepts, terminology and procedures for installing and connecting to WAN service providers. Introduce different WAN connection options. Understanding different WAN layer 2 encapsulations (e.g. HDLC, PPP).
Establishing a Frame Relay PVC Connection	Overview of frame relay components and terminology. Frame relay is a connection-oriented data link technology. It is streamlined to provide high performance and efficiency. Also discus the use of Frame relay in different network environments (e.g handling multiple PVCs).

TEACHING APPROACH

This course includes lectures and practical training of the foundation concepts and techniques of computer network. It introduces interesting and useful things you can do on the computer network. Students will have hands on experiments with real Cisco network devices.

ISOM 3380 provides students with practical knowledge in classroom and laboratory experience in current and emerging networking technology. It covers fundamental configuration, and trouble-shooting of routers. Students will have hands on experience with a variety of network layouts in the lab.

This course includes a special tool called Packet Tracer. Packet Tracer is a networking learning tool that supports a wide range of physical and logical simulations. It also provides

visualization tools to help you to understand the internal workings of a network. You can also use Packet Tracer to create your own experiments and networking scenarios. The online course materials have embedded Packet Tracer activities that will launch on computers running Windows® operating systems, if Packet Tracer is installed.

LEARNING OUTCOMES

BBA(IS) Program Learning Goals and Objectives

Global Learning outcomes
1. Configure EIGRP Routing Protocol
2. Configure and troubleshoot software or hardware problems associated with Virtual LANs on switches in a network topology. (Goal 4, 7)
3. Explain the processes for maintaining accurate routing tables used by distance vector routing protocols. (Goal 4, 7)
4. Explain the basic features and concepts of link-state routing protocols. (Goal 4, 7)
5. Configure Network Address Translation and Port Address Translation (NAT/PAT) to conserve IP address space in a network (Goal 4, 7)
6. Approach Network Management problems from alternative and innovative perspectives. (1.3)
7. Demonstrate how Access Control Lists (ACL) are used to secure a medium-size network (Goal 4, 7)
8. Analyze the core Network Management issues for business decision-making. (Goal 1.1)

This course will also provide you with opportunities to develop your ability to:
9. Produce professional quality business documents in English. (Goal 2.1)
10. Deliver a professional quality presentation in English. (Goal 2.2)
11. Contribute to the successful and timely completion of a group project in line with their roles in teams. (Goal 5.2)
12. Collaborate positively by actively seeking and engaging in discussion of the views of others while showing sensitivity to opposing views. (Goal 5.3)

Presentation Learning outcomes
1. Configure EIGRP Routing Protocol
  1.1. Explain the features and operation of EIGRP
  1.2. List the basic EIGRP configuration commands and identify their purposes.
2. Configure and troubleshoot software or hardware problems associated with Virtual LANs on switches in a network topology. (Goal 4, 7)
  2.1. Explain the role of VLANs in a network.
  2.2. Explain the role of trunking VLANs in a network.
  2.3. Explain the role of VTP in a converged switched network.
  2.4. Configure VTP on the switches in a converged network.
3. Explain the processes for maintaining accurate routing tables used by distance vector routing protocols. (Goal 4, 7)
  3.1. Determine the administrative distance of a route and describe its importance in the routing process
  3.2. Identify the characteristics of distance vector routing protocols
  3.3. Explain the network discovery process of distance vector routing protocols using Routing Information Protocol (RIP)

3.4. Explain the conditions leading to a routing loop and explain the implications for router performance

3.5. Identify the types of distance vector routing protocols in use today

3.6. Configure a device for using RIPv1

3.7. Configure, verify, and troubleshoot RIPv2

4. Explain the basic features and concepts of link-state routing protocols. (Goal 4, 7)

4.1. List the benefits and requirements of link-state protocols

4.2. Explain how link state routing information is maintained

4.3. Configure OSPF routing process

4.4. Explain OSPF Hello Protocol

5. Configure Network Address Translation and Port Address Translation (NAT/PAT) to conserve IP address space in a network (Goal 4, 7)

5.1. Configure NAT on a Cisco router. Explain key features and operation of NAT and NAT Overload

5.2. Explain advantages and disadvantages of NAT.

6. Approach Network Management problems from alternative and innovative perspectives. (1.3)

6.1. Compare and contrast classful and classless IP addressing

6.2. Describe the role of the Classless Inter-Domain Routing (CIDR) standard in making efficient use of scarce IPv4 addresses.

7. Demonstrate how Access Control Lists (ACL) are used to secure a medium-size network (Goal 4, 7)

7.1. Configure standard ACLs in a medium-size enterprise branch office network, including defining filtering criteria, configuring standard ACLs to filter traffic, and applying standard ACLs to router interfaces.

7.2. Configure extended ACLs in a medium-size enterprise branch office network, including configuring extended ACLs and named ACLs, configuring filters, verifying and monitoring ACLs, and troubleshooting extended ACL issues.

COURSE GRADING POLICY

Teaching mode is subjected to change depending on the situation and the University decision. The grade for the course will be based on the following weight:

DISTRIBUTION	%
Mid-term Exam	20%
Final Examination	45%
Assignments 1	9%
Assignments 2	9%
Assignments 3	9%
Assignments 4	8%

COURSE MATERIAL

Book Name:	Cisco Networking Academy Program
	CCNA 1 and 2 Companion Guide
	Revised Third Edition
ISBN:	1-58713-150-1
Published by:	Cisco Press

Book Name:	Cisco Networking Academy Program
	CCNA 3 and 4 Companion Guide
	Third Edition
ISBN:	1-58713-113-7
Published by:	Cisco Press

ACADEMIC HONESTY

Students are required to act truthfully and honestly in their academic pursuit, and acquaint themselves with the University's policy on academic integrity and discipline. It is the policy of the University that there should be zero tolerance for academic dishonesty. Students who are found to have violated the principle of academic integrity will be subject to academic disciplinary actions. The University Administration will regularly issue to members of the university community information about the nature and action taken on individual academic disciplinary cases.

The HKUST academic integrity site can be accessed at the following URL:

http://www.ust.hk/vpaao/integrity/

COURSE SCHEDULE

Lecture

Date	Class	
31/1		Introduction
5/2 7/2 14/2 19/2	Module 1	Determining IP Routes
21/2 26/2	Module 2	Configuring IP Routing Protocols (RIP and IGRP)
28/2 4/3	Module 3	Configuring IP Routing Protocols (EIGRP)
6/3 11/3	Mid Term Exam Review	Mid-term Review Mid-term Exam Review Question Mid-term Exam Review Answer
13/3	Mid Term Exam	
18/3 20/3 25/3	Module 4	Basic IP Traffic Management and Translation with Access Lists (ACL)
27/3 8/4 13/4	Module 5	Extending Switched Networks with Virtual LANs
18/4	Module 6	Basic IP Traffic Management and Translation with Access Lists (NAT/PAT)
17/4 22/4 24/4	Module 7	Configuring IP Routing Protocol (VLSM)
29/4 6/5	Course Final Exam Review	Final Exam Review Guideline Final Exam Review Question Final Exam Review Question with Answer
8/5	Module 8	IPv6
TBC	**Final Exam**	Time: TBC Venue: TBC

Lab

Date	Class
19/2	Lab 1
26/2	Lab 2
4/3	Lab 3
11/3	Lab 4
18/3	Lab 5
25/3	Lab 6
8/4	Lab 7
15/4	Lab 8
22/4	Lab 9
29/4	Lab 10