香 港 科 技 大 學
THE HONG KONG UNIVERSITY OF
SCIENCE AND TECHNOLOGY

ISOM 3180 Telecommunications and Computer Network Management

COURSE INSTRUCTOR
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COURSE OVERVIEW

This course includes lecture 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. Provide examples of modern products useful in daily life. Students would have chance to do hands on experiments with real Cisco network devices. This course provides solid knowledge and technique that would be an advantage for internship and future career. Students could also progress to get CCNA industrial certification after the course.

Internetworking Basics:

Introduction to Internetworking	Reviews the components that make up a computer network and some common numbering systems used in computing
Internetworking Devices	Explores the different components used to interconnect various computer networks
Common Types of Networks	Describes many of the common network topologies and media used in today's network environments

The Internetworking Layers:

Network Media (The Physical Layer)	Looks at the different media used to connect network devices and describes where each should be deployed in an internetwork
Layer 2 Switching Fundamentals (The Data Link Layer)	Discusses the process used to forward frames in a Layer 2 environment and the problems caused by Layer 2 forwarding and the solutions that contain these problems

TCP/IP (The Transport and Internetworking Layer Protocol)	Describes the basics of the TCP/IP protocol, including the use of ICMP, ARP, UDP and TCP in internetwork environments
IP Addressing and Routing (The Internetworking Layer)	Describes How IP addresses are assigned and how Layer 3 devices use these address structures for the delivery of packets throughout the internetwork

Administering Network Devices:

Using WAN Technologies	Provides an overview of WAN connectivity. We will discuss methods of connecting to remote sites using leased lines, circuit-switching, and frame-switching services
Operating the Configuring Cisco IOS Devices	Describes how a router and switch boots and how to use the command-line interpreter to configure a Cisco IOS switch or router
Managing Your Network Environment	Describes how to use tools like CDP, ping and tracerroute to discover, map and troubleshoot devices in the internetwork

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 3180 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

- Plan components of any data network.
- Explain the function of protocols in network communications.
- Explain the advantages of using a layered model to describe network functionality.
- Compare and Contrast the role of each layer in two recognized network models: The TCP/IP model and the OSI model.

- Outline the importance of addressing and naming schemes in network communications.
- Explain the structure IP addressing and demonstrate the ability to convert between 8-bit binary and decimal numbers.
- Explain the purpose of encapsulating packets into frames to facilitate media access.
- Compare and contrast several common logical network topologies and describe how the logical topology determines the media access control method for that network.
- Compare and contrast Ethernet hubs and switches
- Describe the Layer 2 frame structure and identify generic fields.
- Explain the fields of the Ethernet Frame
- Describe the function and characteristics of the media access control method used by Ethernet protocol
- Compare and Contrast the role of two TCP/IP Transport layer protocols: TCP and UDP.
- Explain the key functions of the Transport layer, including reliability, port addressing, and segmentation.
- Compare and Contrast how TCP and UDP each handle key functions.
- Recommend when it is appropriate to use TCP or UDP and provide examples of applications that use each protocol.
- Identify the role of the Network layer as it describes communication from one end device to another end device.
- Examine the most common Network layer protocol, Internet Protocol (IP), and its features for providing connectionless and best-effort service.
- Understand the fundamentals of routes, next-hop addresses, and packet forwarding to a destination network.
- Given an IPv4 address, classify by type and describe how it is used in the network.
- Design how addresses are assigned to networks
- Determine the network portion of the host address and explain the role of the subnet mask in dividing networks.
- Given IPv4 addressing information and design criteria, calculate the appropriate addressing components.
- Explain the Address Resolution Protocol (ARP)
- Design an addressing scheme for an internetwork and assign ranges for hosts, network devices, and the router interface.
- Define the role of the Internetwork Operating System (IOS).
- Define the purpose of a configuration file.
- Identify the IOS modes of operation.
- Identify the basic IOS commands.
- Compare and contrast the basic show commands.

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	15%
Final Exam	45%
Lab Assignment 1	10%
Lab Assignment 2	10%
Lab Assignment 3	10%
Lab Assignment 4	10%

COURSE MATERIAL

Book Name:	Introduction to Networks Companion Guide
Author:	Mark A. Dye, Allan D. Reid
ISBN:	978-1-58713-316-9
Published:	Dec 2013

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/

Lecture

Date	Class	
3/9		Course Introduction
5/9 10/9 12/9	Module 1	Exploring the Networking
17/9 19/9	Module 2	Networking Protocols and Communication
24/9 26/9	Module 3	Ethernet Part I
3/10 8/10	Module 3	Ethernet Part II
10/10 15/10 17/10 22/10	Module 4	Network Layer and IP Addressing
24/10 29/10		Mid-term Exam Guidelines Mid-term Exam Review Mid-term Exam Review Questions Mid-term Exam Review Answers
31/10	Mid-term Exam	Time: 0900-1000 Venue: TBC
5/11 7/11	Module 5	Transport Layer
12/11 14/11 19/11	Module 6	Subnetting IPv4 Networks Subnet Questions Subnet Questions Answers
21/11 26/11		Final Exam Review Final Exam Review Questions Final Exam Review Questions Answers
28/11	Module 7	Final Exam Q&A IPv6 Addressing
TBC	Final Exam	Time: TBC Venue: TBC

Lab

Date	Class
16/9	Lab 1
23/9	Lab 2
30/9	Lab 3
7/10	Lab 4
14/10	Lab 5
21/10	Lab 6
8/10	Lab 7
4/11	Lab 8
11/11	Lab 9