Capital University of Economics and Business
Overseas Chinese College
Course Syllabus

Year and Semester	2020 Fall (Aug 31, 2020 – 10, Jan, 2021)
Course Name	Computer Networking
Course Code	MIS225
Course Type	☐ General Education (Required) ☐ General Education (Elective) ☑ Professional Course (Required) ☐ Professional Course (Elective) ☐ Basic Disciplinary Course
Course Credits	3
Course Hours	48
Prerequisites	Fundamental of Computer Science
Instructor	Changjun Ru
Contact Information	Office: C217 Tele: (010)83951082 Email: ruchangjun@cueb.edu.cn
Office Hour	Wed.: 10:00-12:00, 13:30-16:30, Thur.: 8:00-9:00
Learning Centre	Mon.: 18:00-20:00, Tue.: 8:00-10:00
Grade/Section	2018 ACCA2 Y02
Course Time/Place	Mon. 8:00-09:50 & Thur. 11:10-12:00 (5#212)

Textbook

Kurose & Ross, *Computer Networking A top-down approach*, 7th edition*;* ISBN: 9780134312804

Reference Book

Computer Networks, fifth Edition by Andrew S. Tanenbaum and David J. F Wetherall

The textbook and reference book mainly cover the knowledge that instructor introduced in the class, but not limited to these books, students should have the ability to search and expose to the resources to support study.

Course Description

This course is an introductory course on computer networks. Using the Internet as a vehicle, this course introduces the underlying concepts and principles of modern computer networks with emphasis on protocols, architectures, and implementation issues. The main goal of this course is to understand layering in computer networks, understand different protocol stacks (OSI and TCP/IP), understand functions and protocols within a layer, understand how layers fit together and finally understand how the Internet works. In addition, you will also experience with (i) writing simple network applications and (ii) learning exactly what is going on inside the Internet by looking at frames/packets/segments and identifying each bit.

Student Learning Objectives

After completing this course, students will be able to:

1. Understand the structure and organization of computer networks; including the division into network layers, role of each layer, and relationships between the layers.
2. Understand the basic concepts of application layer protocol design; including client/server models, peer to

peer models, and network naming.

3. In depth understanding of transport layer concepts and protocol design; including connection oriented and connection-less models, techniques to provide reliable data delivery, and algorithms for congestion control and flow control.

4. In depth understanding of network layer concepts and protocol design; including virtual circuit and datagram network designs, datagram forwarding, routing algorithms, and network interconnections.

5. Understand the basic concepts of link layer properties; including error-detection and correction techniques, multiple access protocols, point to pint protocols, and characteristics of link layer media (including wireless links).

6. Understand the basic concepts of network security concepts, including authentication, integrity, key distribution, and system security design challenges.

Teaching Methods

This course contains lectures, class discussions, homework, quizzes, presentation and exams. Textbook content will be introduced first. Then real case and practice questions will be delivered to students as a way to test their understanding of the knowledge. This will require individual or group assignment in class.

Grade Criterion

Component	Weight	Description
Final Exam	20%	A cumulative final examination will be given based on all of the contents of the class. The exam paper may be composed of multiple-choice questions, short answer questions, essay questions and practice problems. Students should rely primarily on homework assignments to give them a sense of what they may see for material on exams.
Mid-Term Test	20%	A cumulative midterm test will be given based on all of the contents that have been taught in class. The test paper may be mainly composed of multiple-choice questions and it should be completed within 60 minutes in class.
Homework	10%	Most of the assigned homework is taken from the Exercises in the textbook. Assignments will be collected at the clearly stated date. Late assignments will not be accepted. The graded assignments will be kept by the tutor for reference and won't be returned to students.
Quizzes	10%	There will be at least 2 quizzes during the semester. Quizzes may or may not be announced in advance. It may also be used as a way to check the attendance. Quizzes will test your knowledge of both concepts and the application of those concepts.
Presentation	20%	The students will be divided into several groups to prepare a presentation. Each student is required to be involved in the presentation. The topics can be selected from the textbook or lectures. Each group need to finish a PPT related to the topic which is given and hand in the related resources to the teacher before the presentation.
Participation	10%	Individuals will be asked to participate individually in a question and answer at least 5 times during the semester. The performances should be counted in their participation.

Attendance	10%	Refer to attendance policy listed below
Total	100%	

Detailed Grade Computation

	Before Midterm	After Midterm
Attendance	5%	5%
Participation	5%	5%
Homework	5%	5%
Quizzes	5%	5%
Presentation		20%
Midterm test	20% (5% of critical thinking)	
Final exam		20% (5% of critical thinking)
Total	40%	60%

Grading Policy

A+ 97-100	A 93-96	A- 90–92	B+ 87-89	B 83-86	B- 80–82
C+ 75-79	C 70-74	C- 67–69	D+ 63–66	D 62-60	F 0- 59

Exam Schedule

Midterm Test: October 26-30

Final Exam Review and Exam: December 23-1st, January, 2021

Assessment of Student Performance

☞ ***Self-Study and Reading ability Practice***

Instructor will give out the chapters or the reference books to read and use class hours to have discussion; students should be able to show a proactive attitude and ability for self-study and reading. Knowledge and oral English will be elements of homework or presentation score.

☞ ***Homework***

Students should finish their homework by themselves. Copying from others will be treated as cheating and the homework scores will be lowered. Students should hand in all assignments on time. Late assignments will be accepted at the discretion of the instructor (i.e., when the student was ill or had an excused absence). Late assignments without reasonable proof will be reduced in score by 50%.

☞ ***Attendance***

Because the course covers a great deal of material, attending every class session is very important for performing well.

- Being late for 15 minutes or more is considered an absence.
- Five hours or above of unexcused absences will result in the lower level of the final grade by one grade band (e.g. from C – to D +). Any excused absence must be discussed directly with the teacher.
- Absence which is more than 1/3 of the total teaching hours will cause an F (a failing grade) directly. but students are welcome to continue attending classes.
- An incomplete grade (I) will be considered in case of medical or family emergencies.

☞ ***Participation***

- Students should participate in classes actively. Half of participation grade is determined by their presentation in class. They are encouraged to ask questions relevant to the subject and express their own opinions. Every student should respect the ideas, opinions, and questions of their classmates.
- Students should also use office hours to ask questions or talk with the instructor for good communication and effective learning.
- Frequent visiting the instructor and chatting in English during office hours is highly recommended.
- Any misbehavior and non-class related activities in class will result in the lower level of the participation grade, including ringing cell phones.
- All above behaviors will be solely evaluated by the instructor for scoring.

☞ ***Textbook***

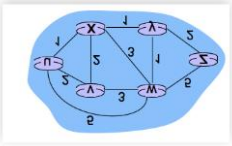
Students must bring the textbook to class.

Topical Course Outline

Week	Date	Topics	Homework
1	August 31	● Course Introduction and Syllabus ● Introduce the textbook and how to read it ● Course Overview ● 1.1 What Is the Internet? ● 1.2 The Network Edge	- Read Chapter 1.1-1.3 Computer Networks and the Internet
	September 3	● 1.3 The Network Core ✓ Packet-switching ✓ Store and forward ✓ Queueing delay, loss ✓ Network-core functions ✓ Circuit switching ✓ Network of networks	- Ake student to look for Network Core examples, and show up on paper - Comparison of Packet-switching and Circuit switching - Read Chapter 1.3
2	September 7	● 1.4 Delay, Loss, and Throughput in Packet-Switched Networks ✓ Four sources of packet delay ✓ Packet loss ✓ Throughput ● Wireshark Lab: Getting Started	- Read Chapter 1.4 and Chapter 1.5 - Will cars arrive to 2nd booth before all cars serviced at first booth?
	September 10	● 1.5 Protocol Layers and Their Service Models ✓ Why layering? ✓ Internet protocol stack ✓ ISO/OSI reference model ✓ Encapsulation	- Benefits of layers -Protocol examples of each layers - Unit of each layer - Responsivity of each layer
3	September 14	● 1.6 Networks Under Attack ✓ Virus, worm, spyware malware, botnet ✓ DDoS ● Summary of chapter1 ● Wireshark Lab: Getting Started	- List 3 different protocols that appear in the protocol column - What is time difference between HTTP GET, HTTP OK?
	September 17	● 1.7 History ● 2.1 Principles of Network Applications ✓ Popular application-level protocols ✓ Some network apps	- Chapter 1 test - Review Chapter 1 - Preview Chapter 2

		✓ CS, P2P architecture ✓ Sockets, Addressing processes ✓ App-layer protocol defines ✓ TCP, UDP	
4	September 21	● 2.1 Principles of Network Applications ✓ Popular application-level protocols ✓ Some network apps ✓ CS, P2P architecture ✓ Sockets, Addressing processes ✓ App-layer protocol defines ✓ TCP, UDP ● Wireshark Labs: HTTP ✓ The Basic HTTP GET/response interaction ✓ The HTTP CONDITIONAL GET/response interaction	- example port numbers - Is HTTP "stateless"
	September 24	● 2.2 The Web and HTTP ✓ web page consists of objects ✓ request, response ✓ general format ✓ Cookie ✓ proxy server	- Benefits of cookie - proxy server - FTP port number
5	September 28	● Wireshark Labs: HTTP ✓ Retrieving Long Documents ✓ HTML Documents with Embedded Objects ✓ HTTP Authentication	- Why not centralize DNS? - HTTP version - IF-MODIFIED-SINCE How many data-containing TCP segments were needed to carry the single HTTP response and the text of the Bill of Rights?
	October 1	● 2.3 File Transfer: FTP ● 2.4 Electronic Mail in the Internet ✓ Three major components ✓ Sample SMTP interaction ● Mail access protocols	
6	October 5	● 2.5 DNS—The Internet's Directory Service ✓ DNS services ✓ DNS: a distributed, hierarchical database ✓ DNS name resolution example ✓ DNS record, protocol, messages ● Wireshark Labs: DNS	- Revise the report
	October 8	● 2.6 Peer-to-Peer Applications ✓ P2P architecture ✓ File distribution: client-server vs P2P ✓ Distributed Hash Table (DHT)	- examples of p2p - What if peer 13 wants to join?
7	October 12	Chapter 3 Transport Layer ● 3.1 Introduction and Transport-Layer Services ✓ Transport vs. network layer ✓ Household analogy ● 3.2 Multiplexing and Demultiplexing	- Read Chapter 3 Transport Layer - how many fields there are in the UDP header

		✓ How demultiplexing works	
	October 15	● Wireshark Labs: UDP	- Continue revising the report - Preview Chapter 3.3, 3.4
8	October 19	● 3.3 Connectionless Transport: UDP ✓ UDP: segment header ✓ UDP checksum ✓ Internet checksum ● 3.5 Connection-Oriented Transport: TCP ✓ TCP segment structure ✓ EstimatedRTT ✓ TCP reliable data transfer ✓ Retransmission ✓ **Flow control** ✓ Connection Management	- Preview Chapter 4 The Network Layer
	October 22	● Quiz	
9	October 26	● Mid-Term Test	
	October 29	● Solution to Mid-Term Test	
10	November 2	● Wireshark Lab：TCP	TCP SYN， SYNACK HTTP POST
	November 5	● Wireshark Lab：TCP	
11	November 9	● Wireshark Lab：TCP	first 6 segments buffer space throughput
	November 12	● Wireshark Lab：TCP	TCP congestion control in action
12	November 16	● 3.7 TCP congestion control ✓ additive increase multiplicative decrease ✓ P296 P40	P296, P40
	November 19	● Exercise of TCP congestion control	
13	November 23	● 4.1 Introduction ✓ Two key network-layer functions ✓ Interplay between routing and forwarding ✓ Network service model ● 4.2 What's inside a router ✓ Head-of-the-Line (HOL) blocking	- three functions of network layer - routing vs forwarding
	November 26	● 4.3 The Internet Protocol (IP) ✓ IPv4, IPv6 ✓ network address translation ✓ datagram format ✓ IP addressing ✓ fragmentation	
14	November 30	● Subnets exercises （subnets, network address）	IP addressing assigns an address to 223.10.198.250/29, the

			network address
	December 3	Subnets exercises （broadcast address）	
15	December 7	● 5.2 routing protocols ✓ Dijkstra's algorithm: example	 Self-study for chapter5
	December 10	Presentation	Grade for each group
16	December 14	Presentation	Grade for each group
	December 17	Presentation	Grade for each group
17	December 21	Review	
	December 24	Final Examination	
18	December 28-January 1	Final Examination	

Note: *Some chapters or sections may leave for self-study, this is the students' duty to learn and understand, they may also be included in the quizzes or exams. A review in Chinese may be held during L.C. and O.H. in the semester.*

Teacher's Office Hour

- The instructor's office hour is shown in the front of the office door.
- Students are suggested to use the instructor's office hour and learning center to ask questions or talk with the instructor once at least per week for good communication and effective learning, which is recorded in the students' participation.
- The time can be scheduled by instructors or students, or both.

Cheating and Plagiarism

Cheating is not tolerated. Any student caught cheating on a quiz; test or exam will be given a mark of zero (0) for the particular work. At the beginning of the semester the definition of plagiarism will be carefully explained, when any thoughts or writings of another person are used, they must be clearly identified (usually one uses quotation marks) and the source notes. **If any student is caught cheating on any homework assignment, the highest score the student can earn in that course is a "C".**

Important Dates

Fall Semester, 2020	August 31, 2020— January 10, 2021
Aug. 29	Registration
Aug.31	Classes Begin
Sep.28	Classes Begin（Freshmen）
Nov. 2 - 6	Mid-term Test
Jan.1, 2021	New Year's Day Holiday (tentative)

Note: *This syllabus is tentative and may be changed or modified throughout the semester. All students will be notified and a new syllabus will be given.*

Instructor: Changjun Ru **Department Head: Jingning Li**