

University of Macau
Faculty of Science and Technology
Department of Computer and Information Science
SFTW331 Distributed Systems
Syllabus
1st Semester 2012/2013
Part A – Course Outline

Compulsory course in Computer Science

Course description:

(3-2) 4 credits. This course provides a review of computer network architecture and protocols. Topics covered includes data communication and transmission techniques, switching techniques, layered network architectures, data link layer protocols, medium access control sublayer, network layer protocols, the TCP/IP protocols.

Course type:

Theoretical with substantial laboratory/practice content

Prerequisites:

- SFTW231

Textbook(s) and other required material:

- Andrew Tanenbaum and David J. Wetherall. *Computer Networks*, 5th edition, 2011, ISBN-10: 0-13-255317-1, Pearson Education, USA.

Reference:

- James F. Kurose and Keith W. Ross. *Computer Networking - A Top-Down Approach*, 5th edition, 2010. ISBN-10: 0-13-136548-7, Pearson Education, USA.

Major prerequisites by topic:

- Basic principles of operating systems.

Course objectives:

- Provide students fundamental concepts of computer network architectures and protocols from a design and performance perspective. [a]
- Introduce students to techniques of data communication and local area network. [a, e, k]
- Train students to model and analyze data link protocols and multiple access protocols. [a, e, k]
- Motivate students to investigate and solve the practical networking problems [a, e, k]
- Engage students to employ their programming skills for solving networking problems [a, e, k]

Topics covered:

- **Introduction (2 hours):** Overview the uses of computer networks, network hardware and software, and reference models. Briefly discuss several example networks.
- **Physical Layer (3 hours):** Review the data communication theory and guided transmission media. Briefly discuss wireless transmission, communication satellites, public-switched telephone network, mobile telephone system and cable television. Study the techniques of digital modulation and multiplexing.
- **Data Link Layer (7 hours):** Review the design issues of data link layer. Study the theory of error detection and correction. Introduce elementary data link and sliding window protocols. Discuss several examples of data link protocols.
- **Medium Access Sub-layer (9 hours):** Study the details of multiple access protocols, Ethernet, wireless local area networks and broadband wireless. Discuss data link layer switching.
- **Network layer (9 hour):** Overview the design issues of the network layer. Introduce the details of routing algorithms and congestion control algorithms. Discuss issues of the network layer in quality of service, internetworking, and the internet.
- **Transport Layer (9 hours):** Briefly review transport service and elements of transport protocols. Introduce two internet transport protocols of UDP and TCP.

- **Application Layer (3 hours):** Review three internet applications: DNS, electronic mail and world wide web.

Class/laboratory schedule:

Timetabled work in hours per week			No of teaching weeks	Total hours	Total credits	No/Duration of exam papers
Lecture	Tutorial	Practice				
3	2	Nil	14	70	4	1 / 3 hours

Student study effort required:

Class contact:	
Lecture	42 hours
Tutorial	28 hours
Other study effort	
Self-study	20 hours
Homework assignment	10 hours
Project / Case study	35 hours
Total student study effort	135 hours

Student assessment:

Final assessment will be determined on the basis of:

Homework	10%	Quiz	20%	Project:	10%
Mid-term	30%	Final exam	30%		

Course assessment:

The assessment of course objectives will be determined on the basis of:

- Homework, quiz, project and exams
- Course evaluation

Course outline:

Weeks	Topic	Course work
1	Introduction uses of computer networks; hardware and software; reference models; example networks	
2	Physical Layer theoretical basis for data communication; guided transmission media; wireless transmission; communication satellites, digital modulation and multiplexing, public-switched telephone network; mobile telephone system; cable television	Homework #1
3-4	Data Link Layer design issues; error detection and correction; elementary data link protocols; sliding window protocols; example data link protocols	Homework #2
5-7	Medium Access Sub-layer (9 hours): multiple access protocols; Ethernet; wireless local area networks and broadband wireless, data link layer switching	Project
8-10	Network layer (9 hour): design issues; routing algorithms; congestion control algorithms; quality of service; internetworking; network layer in the internet.	Midterm exam Homework #3
11-13	Transport Layer (9 hours): transport service; elements of transport protocols; UDP; TCP	Homework #4
14	Application Layer (3 hours): DNS; electronic mail; world wide web	

Contribution of course to meet the professional component:

This course provides students with the knowledge and ability to work professionally in the area of computer networks.

Relationship to CS program objectives and outcomes:

This course primarily contributes to the Computer Science program outcomes that develop student abilities to:

- (a) an ability to apply knowledge of computing, mathematics, science, and engineering.
- (e) an ability to analyze a problem, and identify, formulate and use the appropriate application requirements for obtaining its computing solution.
- (k) an ability to use the techniques, skills, and modern computer tools necessary for engineering practice.

Relationship to CS program criteria:

Criterion	DS	PF	AL	AR	OS	NC	PL	HC	GV	IS	IM	SP	SE	CN
Scale: 1 (highest) to 4 (lowest)			4			1								

Discrete Structures (DS), Programming Fundamentals (PF), Algorithms and Complexity (AL), Architecture and Organization (AR), Operating Systems (OS), Net-Centric Computing (NC), Programming Languages (PL), Human-Computer Interaction (HC), Graphics and Visual Computing (GV), Intelligent Systems (IS), Information Management (IM), Social and Professional Issues (SP), Software Engineering (SE), Computational Science (CN).

Course content distribution:

Percentage content for			
Mathematics	Science and engineering subjects	Complementary electives	Total
0%	100%	0%	100%

Coordinator:

Dr. Yicong Zhou

Persons who prepared this description:

Dr. Yicong Zhou

Part B – General Course Information and Policies

1st Semester 2012/2013

Instructor: Dr. Yicong Zhou
Office hour: Tue & Thu 10am-12pm, or by appointment
Email: yicongzhou@umac.mo

Office: B2-A304
Phone: 83978458

Time/Venue: Tue 16:30 – 17:30pm, WLG104 (Lectures)
Thu 16:30 pm – 18:30 pm, WLG104 (Lectures)
Tue 14:30 pm – 16:30 pm, J311 (Tutorial)
Sat 15:30 pm – 17:30 pm, U106 (Tutorial)

Grading distribution:

Percentage Grade	Final Grade	Percentage Grade	Final Grade
100 - 93	A	92 - 88	A–
87 - 83	B+	82 - 78	B
77 - 73	B–	72 - 68	C+
67 - 63	C	62 - 58	C–
57 - 53	D+	52 - 50	D
below 50	F		

Comment:

The objectives of lectures are to explain and to supplement the text material. Students are responsible for the assigned material whether or not it is covered in lectures. Students who wish to succeed in this course should read the textbook prior to lectures and should work all homework, and project assignments. You are encouraged to look at other sources (other texts, etc.) to complement the lectures and text.

Homework policy:

The completion and correction of homework is a powerful learning experience; therefore:

- There will be approximately 4 homework assignments.
- Homework is due one week after assignment unless otherwise noted, no late homework is accepted.
- The course grade will be based on the average of the HW grades.

Projects:

The project is probably the most exciting and challenge part of this course. It provides students with meaningful experience to use programming skills to solve the practical networking problems. The project leads students to explore research topics in computer networking and enhance students' skills of presentation and collaboration.

- There will be only one project.
- You are required to work with group of two students.
- An instruction handout for the project will be distributed in class.
- A report and demonstration are expected for the project.

Exam:

One 2-hour mid-term exam will be held during the semester. Both the mid-term and final exams are closed book examinations. Quiz will be signed in class frequently.

Note:

- Check UMMoodle (<https://ummoodle.umac.mo/>) for announcement, homework and lectures. Report any mistake on your grades within one week after posting.
- No make-up exam is given except for CLEAR medical proof.
- Cheating is absolutely prohibited by the university.

Appendix:

Rubric for Program Outcomes

Rubric for (a)	5 (Excellent)	3 (Average)	1 (Poor)
Understand the theoretic background	Students understand theoretic background and the limitations of the respective applications.	Students have some confusion on some background or do not understand theoretic background completely.	Students do not understand the background or do not study at all.
Rubric for (e)	5 (Excellent)	3 (Average)	1 (Poor)
Identify applications in engineering systems	Students understand problem and can identify fundamental formulation.	Students understand problem but cannot apply formulation, or cannot understand problem.	Students cannot identify correct terms for engineering applications.
Rubric for (k)	5 (Excellent)	3 (Average)	1 (Poor)
Use modern principles, skills, and tools in engineering practice	Student applies the principles, skills and tools to correctly model and analyze engineering problems, and understands the limitations.	Student applies the principles, skills and tools to analyze and implement engineering problems.	Student does not apply principles and tools correctly and/or does not correctly interpret the results.