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University of Macau
Department of Computer and Information Science
CISB310 Computer Networks
Syllabus
1st Semester 2014/2015
Part A – Course Outline

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Compulsory course in Computer Science

Course description:
(2-2) 3 credits. This course provides a broad view 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, local area networks, internetworking techniques and protocols, network layer protocols, and the TCP/IP protocols.

Course type:
Theoretical with substantial laboratory/practice content

Prerequisites:
- CISB110, CISB222

Textbook(s) and other required material:
- Andrew Tanenbaum and David J. Wetherall. *Computer Networks*, 5th edition, 2011, ISBN-10: 0-1321-2695-8, Pearson Education, USA.

Major prerequisites by topic:
- Operating systems
- Programming skills

Course objectives:
- Provide students fundamental concepts of computer network architectures and protocols from a design and performance perspective. [a, b]
- Introduce students to techniques of data communication and local area network. [f, h]
- Train students to analyze and implement data link protocols and multiple access protocols. [c, d]
- Motivate students to investigate and solve the practical networking problems [e, i]
- Engage students to employ the programming tools for solving networking problems [g, j]

Topics covered:
- **Introduction (2 hours)**: Overview the uses of computer networks, network hardware and software, and reference models.
- **Physical Layer (4 hours):** Review the data communication theory. Briefly discuss public-switched telephone network. Study the techniques of digital modulation and multiplexing.
- **Data Link Layer (6 hours):** Review the design issues of data link layer. Study the theory of error detection and correction.
- **Medium Access Sub-layer (6 hours):** Study multiple access protocols, Ethernet, wireless local area networks and broadband wireless.
- **Network layer (10 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.

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**				
2	2	Nil	14	56	3	1 / 3 hours

Student study effort required:

Class contact:	
Lecture	28 hours
Tutorial	28 hours
Other study effort	
Self-study	20 hours
Homework assignment	20 hours
Project / Case study	14 hours
Total student study effort	110 hours

Student assessment:
Final assessment will be determined on the basis of:
Homework: 10%   Quiz: 10%   Project: 10%   Mid-term: 30%   Final exam: 40%

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	
2-3	**Physical Layer** theoretical basis for data communication; digital modulation and multiplexing; public-switched telephone network	Homework #1
4-6	**Data Link Layer** design issues; error detection and correction	Homework #2
7-9	**Medium Access Sub-layer:** multiple access protocols; Ethernet; wireless local area networks and broadband wireless	Midterm exam Homework #3
10-14	**Network layer**: design issues; routing algorithms; congestion control algorithms; quality of service; internetworking; network layer in the internet.	Project Homework #4

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 and mathematics appropriate to the programme outcomes and to the discipline.
(b) an ability to apply knowledge of a computing specialisation, and domain knowledge appropriate for the computing specialisation to the abstraction and conceptualisation of computing models.
(c) an ability to analyse a problem, and identify and define the computing requirements appropriate to its solution.
(d) an ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs with appropriate consideration for public health and safety, social and environmental considerations.
(e) an ability to function effectively on teams to accomplish a common goal.
(f) an understanding of professional, ethical, legal, security and social issues and responsibilities
(g) an ability to communicate effectively with a range of audiences.
(h) an ability to analyse the local and global impact of computing on individuals, organisations, and society
(i) Recognition of the need for and an ability to engage in continuing professional development.

(j) an ability to use current techniques, skills, and tools necessary for computing practice with an understanding of the limitations.

Course content distribution:

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

Persons who prepared this description:
Dr. Yicong Zhou

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Part B – General Course Information and Policies

1st Semester 2014/2015

Instructor: Dr. Yicong Zhou   Office: E11-4012
Office hour: Monday 16:00-18:00   Phone: 88228458
Email: yicongzhou@umac.mo

Time/Venue: Monday 14:00-15:50pm, E3-2043 (Lectures)
Thursday: 14:00-15:50, E3-2043 (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 the lectures are to explain and to supplement the text material. Students are responsible for the assigned material whether or not it is covered in the lecture. Students who wish to succeed in this course should read the textbook prior to the lecture and complete all homework and project assignments. You are encouraged to look at other resources (other texts, etc.) to complement 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 homework grade will be based on the average of all homework grades.

Quiz:
There are occasional quiz assignments which intend to check students' attendance and learning performance.
- Each quiz is a 10-minute in-class assignment.
- There will be approximately 8 quiz assignments.
- The quiz grade will average six of the highest quiz grades.

Project:
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. It also leads students to explore research topics in computer networking and enhance students' skills of presentation and collaboration.
- There will be one project.
- You are required to work with group of two students.
- An instruction handout for the project will be distributed in class.
- Report, demonstration and presentation are expected.

Exam:
One 2-hour mid-term exam will be held during the semester. Both the mid-term and final exams are closed book examinations.

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.

Student Disabilities Support Service:

The University of Macau is committed to providing an equal opportunity in education to persons with disabilities. If you are a student with a physical, visual, hearing, speech, learning or psychological impairment(s) which substantially limit your learning and/or activities of daily living, you are encouraged to communicate with your instructors about your impairment(s) and the accommodations you need in your studies. You are also encouraged to contact the Student Disability Support Service of the Student Counseling and Development Section (SCD), which provides appropriate resources and accommodations to allow each student with a disability to have an equal opportunity in education, university life activities and services at the University of Macau. To learn more about the service, please contact SCD at scd.disability@umac.mo, or 8822 4901 or visit the following website: http://www.umac.mo/sao/scd/sds/aboutus/en/scd_mission.php

Appendix - Measurement Dimensions and Rubric for Program Outcomes (d), (h), (i), and (j)

(d) An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs with appropriate consideration for public health and safety, social and environmental considerations

Measurement Dimension	Excellent (80-100%)	Average (60-79%)	Poor (<60%)
1. An ability to implement and design data link protocols and multiple access protocols.	Students understand how to properly implement and design data link protocols and multiple access protocols	Students understand how to implement and design data link protocols and multiple access protocols, but have trouble in evaluating them.	Students do not know how to implement and design data link protocols and multiple access protocols
2. An ability to understand the design requirements and the realistic constraints of designing data link and multiple access protocols	Students understand the design requirements and the realistic constraints of designing data link and multiple access protocols.	Students understand the design requirements; but they are not clear about the realistic constraints of designing data link and multiple access protocols.	Students have trouble in understanding what needs to be designed and the realistic constraints of designing data link and multiple access protocols.

(h) An ability to analyse the local and global impact of computing on individuals, organisations, and society

Measurement Dimension	Excellent (80-100%)	Average (60-79%)	Poor (<60%)
1. An ability to analyse the local and global impact of data communication techniques.	Students understand the local and global impact data communication techniques, and can analyze such impact in terms of scope and depth.	Students understand the local and global impact of data communication techniques, but have trouble in analyzing such impact in terms of scope and depth.	Students cannot understand the local and global impact of data communication techniques
2. An ability to analyse the local and global impact of techniques of local area network.	Students understand the local and global impact of techniques of local area network, and can analyze such impact in terms of scope and depth.	Students understand the local and global impact of techniques of local area network, but have trouble in analyzing such impact in terms of scope and depth.	Students cannot understand the local and global impact of techniques of local area network

(i) Recognition of the need for and an ability to engage in continuing professional development

Measurement Dimension	Excellent (80-100%)	Average (60-79%)	Poor (<60%)
1. An ability to recognize the need for investigating and solving the practical networking problems	Students understand the practical networking problems, and recognize the need for investigating and solving the practical networking problems	Students understand the practical networking problems, but have trouble in recognizing the need for investigating and solving the practical networking problems	Students cannot understand the practical networking problems, and cannot recognize the need for investigating and solving the practical networking problems
2. An ability to engage in investigating and solving the practical networking problems	Students actively engage in investigating and solving the practical networking problems, and achieve satisfactory results.	Students engage in investigating and solving the practical networking problems, but the performance achieved is not satisfactory.	Students do not engage in investigating and solving the practical networking problems.

(j) An ability to use current techniques, skills, and tools necessary for computing practice with an understanding of the limitations.

Measurement Dimension	Excellent (80-100%)	Average (60-79%)	Poor (<60%)
1. An ability to use the programming tools for solving networking problems, and understand their limitations.	Students can correctly identify the programming tools relevant to networking problems, and understand their limitations. They can also apply these tools to solve practical networking problems.	Students can correctly identify the programming tools relevant to networking problems, and understand their limitations. But they have trouble in applying these tools to solve practical networking problems.	Students cannot correctly identify the programming tools relevant to networking problems, and understand their limitations. They have trouble in applying the appropriate tools to solve practical networking problems.
2. An ability to use the programming tools to model and analyse network problems, and understand the limitations.	Students understand the programming principles and tools. They can also use these principles and tools to model and analyse networking problems, and understand the limitations.	Students understand the programming principles and tools. But they have trouble in applying these principles and tools to model and analyse networking problems, and understand the limitations.	Students have trouble in understanding programming principles and tools. They do not know how to apply these principles and tools to model and analyse networking problems, and understand the limitations.