

University of Macau  
Faculty of Science and Technology  
Department of Electrical and Computer Engineering

**Part A: Course Outline**

Course Title:	Communication System and Data Network		
Course Code:	ELEC460	Year of Study:	4
Course Mode:	Theoretical with substantial laboratory/ practice content		
Compulsory/Elective:	Elective		
Course Prerequisites:	None		
Prerequisite Knowledge	Strong interest and basic knowledge for computer applications and networks		
Duration	One semester	Credit Units	3.5
Text Books and References:	<p>[1] "Data and Computer Communication", William Stalling, Pearson; 9th Ed          [2] "Data Communications and Networking", Forouzan, McGrawHill, 4th Ed          [3] "Data Communications, Computer Networks, and Open Systems", Fred Halsall, Addison Wesley, 4th Ed.</p>		
Course Description:	<p>This course covers fundamental concepts of data and computer communications, with problem-solving tutorials on networking related calculations and in-depth discussion and research on leading edge network technologies. The syllabus includes the basic understandings on computer networks and communication protocols as well as expanded coverage of WANs, including TCP/IP, ATM, frame relay, packet switching, and circuit switching, and LANs, including Fast Ethernet.</p>		
Topics Covered	<ol style="list-style-type: none"> <li>1. Introduction of Computer Networks</li> <li>2. Data Communications: Data Transmission, and Data Encoding</li> <li>3. Data Link Control: Protocol Principles and Data Link Layer Services</li> <li>4. Packet Switching and Wide Area Networking</li> <li>5. Introduction to Routing and Traffic Control</li> <li>6. Internetworking and ATM Technology</li> <li>7. Local Area network Technology</li> </ol>		
Course Objectives:	<ol style="list-style-type: none"> <li>1. To provide a solid foundation of the basics of data communication [a, e, k]</li> <li>2. To prepare students to know the characteristics and designs of types of computer networks and their applications [a, b, c, e, h, k]</li> <li>3. To encourage the students to research into the latest R&amp;D efforts in computer networking technologies and their impacts to our lives [h, i, j]</li> </ol>		
Course Assessment:	<p>Quiz :10%          Research Practice: 30%          Mid-term Exam. : 30%          Final Exam. : 30%</p>		
Relationship to Program	This course primarily contributes to ECE program outcomes that develop students'		

Objectives and Outcomes	<p>abilities to:</p> <p>a. Ability to apply knowledge of mathematics, science and engineering.</p> <p>e. Ability to identify, formulate and solve engineering problems.</p> <p>k. Ability to use the techniques, skills and modern engineering tools necessary for engineering practice.</p> <p>This course secondarily contributes to ECE program outcomes that develop students' abilities to:</p> <p>b. Ability to design and conduct experiments.</p> <p>c. Ability to design a system, component or process to meet desired needs.</p> <p>d. Ability to function on multidisciplinary teams.</p>																				
Course Contents and Relationship to Program Criteria:	<table border="1"> <thead> <tr> <th data-bbox="467 768 584 846">Week no.</th> <th data-bbox="584 768 1323 846">Topics</th> <th data-bbox="1323 768 1506 846">Program Criteria</th> </tr> </thead> <tbody> <tr> <td data-bbox="467 846 584 981">3</td> <td data-bbox="584 846 1323 981"><b>Overview of Computer Networks</b> Network Concepts, Principles of Communication Protocols, Introduction to Protocol Architecture, Introduction to Protocol Standards</td> <td data-bbox="1323 846 1506 981">BS, CS, ES</td> </tr> <tr> <td data-bbox="467 981 584 1081">3</td> <td data-bbox="584 981 1323 1081"><b>Data Communications</b> Data Transmission and Transmission Media, Data Encoding, Data Link Control, The Data Communication Interface, Multiplexing</td> <td data-bbox="1323 981 1506 1081">CS, ES, DM</td> </tr> <tr> <td data-bbox="467 1081 584 1182">3</td> <td data-bbox="584 1081 1323 1182"><b>Wide Area Networks</b> Circuit Switching and Packet Switching, ATM Technology, Internetworking</td> <td data-bbox="1323 1081 1506 1182">BS, CS, ES</td> </tr> <tr> <td data-bbox="467 1182 584 1283">2</td> <td data-bbox="584 1182 1323 1283"><b>Local Area Networks</b> LAN Technology, LAN Systems</td> <td data-bbox="1323 1182 1506 1283">BS, CS, ES</td> </tr> <tr> <td data-bbox="467 1283 584 1397">3</td> <td data-bbox="584 1283 1323 1397"><b>Advanced Computer Network Topics</b> Congestion Control and QoS, Routing Algorithms, Latest Developments in Computer Networks</td> <td data-bbox="1323 1283 1506 1397">PS, CS, ES</td> </tr> </tbody> </table>			Week no.	Topics	Program Criteria	3	<b>Overview of Computer Networks</b> Network Concepts, Principles of Communication Protocols, Introduction to Protocol Architecture, Introduction to Protocol Standards	BS, CS, ES	3	<b>Data Communications</b> Data Transmission and Transmission Media, Data Encoding, Data Link Control, The Data Communication Interface, Multiplexing	CS, ES, DM	3	<b>Wide Area Networks</b> Circuit Switching and Packet Switching, ATM Technology, Internetworking	BS, CS, ES	2	<b>Local Area Networks</b> LAN Technology, LAN Systems	BS, CS, ES	3	<b>Advanced Computer Network Topics</b> Congestion Control and QoS, Routing Algorithms, Latest Developments in Computer Networks	PS, CS, ES
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Contribution of Course to meet the professional component:	This course prepares students to work professionally in the area of computer networks and related data communication fields. Students should be able to apply knowledge of mathematics and engineering, and identify formulas to solve computer networks and data communication problems.																				
Course Instructor(s):	Dr. Simon Fong																				
Prepared by:	Dr. Simon Fong																				

### **Part B: General Course Information and Policies**

Instructor: Dr. Simon Fong

Office: N410

Office Hour: Monday-Friday, 10:30~19:30, by appointment

Phone: 4460

e-mail: [ccfong@umac.mo](mailto:ccfong@umac.mo)

### Programme Educational Objectives

1. **Problem Solving:** Graduates have the ability to think in a critical and evaluative manner and to consider a broad perspective, in order to solve technical and nontechnical problems.
2. **Leadership and Communication:** Graduates will provide effective leadership, act in an ethical manner and skills will include the ability to communicate well and to work successfully within diverse groups.
3. **Market Acceptance:** Graduates will have successful careers in the academic environment, industrial and government organizations.
4. **Technical Competence:** Graduates will be technically competent and have a thorough grounding in the fundamentals of math and science in electrical and electronics engineering and experience in engineering design. They will be able to use modern engineering techniques, skills, and tools to fulfill societal needs.

Scale: 1 (Highest) to 4 (Lowest)

	<b>Problem Solving</b>	<b>Leadership and Communication</b>	<b>Market Acceptance</b>	<b>Technical Competence</b>
Power Electronics	1	3	3	1

Remark:

- Objective for “Problem Solving” can be achieved by assignments, quizzes, mid-term exam, final exam and projects.
- Objective for “Leadership and Communication” can be achieved by report writing and presentation. However, leadership training is not given by this course.
- Objective for “Market Acceptance” can be achieved by the course subject that is related to network design which is trained via practice classes.
- Objective for “Technical Competence” can be achieved by using fundamentals of math and science in electrical and electronics engineering and experience in engineering project design and computer simulation.

### Program Criteria Policy:

Course VS Program Criteria

Scale: 1 (Highest) to 4 (Lowest)

Course	PS	DI C	BS	CS	ES	DE	LA	CV	D M
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Course	PS	DIC	BS	CS	ES	DE	LA	CV	DM
Power Electronics		3		3	1	3		4	

Terms:

Probability and Statistics (PS), Differential and Integral Calculus (DIC), Basic Science (BS), Computer Science (CS), Engineering Science (ES), Differential Equation (DE), Linear Algebra (LA), Complex Variables (CV), Discrete Mathematics (DM)

### **Program Criteria Policy:**

Course VS Program Criteria

Scale: 5 (Highest) to 1 (Lower)

Course	PS	DIC	BS	CS	ES	DE	LA	CV	DM
Communication System and Data Network	1		3	5	1				1

Terms:

Probability and Statistics (PS), Differential and Integral Calculus (DIC), Basic Science (BS), Computer Science (CS), Engineering Science (ES), Differential Equation (DE), Linear Algebra (LA), Complex Variables (CV), Discrete Mathematics (DM)

### **Program Outcome Policy:**

Course VS Course Outcomes

(H= Highly Related, S = Supportive, N = None)

Course	a	b	c	d	e	f	g	h	i	j	k
Communication System and Data Network	H	H	H	N	H	N	N	H	S	S	S

The electrical and electronics engineering program outcomes are:

- Ability to apply knowledge of mathematics, science and engineering.
- Ability to design and conduct experiments.
- Ability to design a system, component or process to meet desired needs.
- Ability to function on multidisciplinary teams.
- Ability to identify, formulate and solve engineering problems.
- Understanding of professional and ethical responsibility.
- Ability to communicate effectively.
- Broad education necessary to understand the impact of engineering solutions in global and societal context.
- Recognition of the need for and an ability to engage in life-long learning.
- Knowledge of contemporary issues.
- Ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

### Curriculum Detail

#### ELEC 460 Communication System and Data Network

Timetabled work in hours per week			No of teaching weeks	Total hours	No /Duration of exam papers	Max marks available from:	
Lecturer	Tutor	Practice				Exams	Course
2	0.5	1.5	14	56	2/4 hours	100	100

**Term:** 6<sup>th</sup>

Hours			Percentage content of					
Lecturer	Lab/tut	Other	Maths	Basic Science	Engineering Science	Engineering Design and Synthesis	Complementary Studies	Computer Studies
28	20/8	0	20	0	35	35	0	10

### Design Elements

% of Design Content	Design Content in Course Work	Design Project	Design Content in Laboratories
35%	X	0	X

### Course Assessment Policy:

- Homework exercise in the form of supplementary reading materials will be given to students according to the course progress; homework will be not marked and will not be counted towards the course assessment
- 1 Quiz will be held during the semester.
- 1 Research project will be performed during the semester. Up to 3 students form one group for doing information research, report writing and oral presentation, and group reports should be submitted for assessment.
- 1 mid-term exam and 1 final exam will be performed with 2 hours each.