East West University
Department of Computer Science and Engineering
Course Outline
Semester: Spring 2024

Course: CSE405 Computer Networks

Credits and Teaching Scheme

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th Week	2 Hours/Week for 13 Weeks	4.5 Hours/Week for 13 Weeks + Final Exam in the 14th Week

Prerequisite

CSE246 Algorithms

Instructor Information

Instructor: **Rabea Khatun**
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Course Objective

This course explores the field of computer networking and communication, emphasizing network architecture and software issues. Student will learn the basic performance and engineering trade-offs in the design and implementation of computer networks. Knowledge of this course will be needed as prerequisite knowledge for future courses such as CSE406 Internet of Things, CSE453 Wireless Networks, and CSE457 Cellular Networks.

Knowledge Profile

K4: Forefront engineering specialist knowledge for practice,
K5: Engineering design
K6: Engineering practice (technology)

Learning Domains

Cognitive - C2: Understanding, C3: Applying, C4: Analyzing, C6: Creating
Psychomotor - P3: Precision, P5: Naturalization
Affective - A2: Responding, A4: Organizing, A5: Internalizing.

Program Outcomes (POs)

PO2: Problem Analysis, PO3: Design/Development of Solutions
PO5: Modern Tool Usage, PO12: Lifelong Learning

Complex Engineering Problem Solution

EP1: Depth of knowledge required, EP2: Range of conflicting requirements.
EP3: Depth of analysis required, EP4: Familiarity of issues.

Complex Engineering Activities

None

Course Outcomes (COs) with Mappings

After completion of this course students will be able to:

CO	CO Description	PO	Learning Domains	Knowledge Profile	Complex Engineering Problem Solving/ Engineering Activities
CO1	**Identify, use** and **justify** algorithms, protocols and phenomena of different computer network layers for analyzing and designing functional networks	PO2	C2, C3	K4	
CO2	**Analyze**, **develop** and **justify** networking algorithms and protocol for effective design of computer networks	PO3	C2, C3, C4, A2, A4, A5	K5	EP1, EP2, EP3, EP4
CO3	**Apply** appropriate tools to **build** and simulate computer networks and **analyze** packet transmission	PO5	C3, C6, P3	K6	
CO4	**Identify** and **use** appropriate computer network solutions; and construct a complete computer network for coping with the evolving and changing technologies	PO12	P3, P5 A4, A5		

Course Topics, Teaching-Learning Method, and Assessment Scheme

Course Topic	Teaching-Learning Method	CO	CO Marks				Exam (Mark)
			C2	C3	C6		
Introduction to computer networks, layers, transmission media. Data link layer: introduction, design issues, framing.	Lecture, Class Discussion, Discussion Outside Class with Instructor/ Teaching Assistant	CO1, CO2				30	Midterm (30%)

Protocol verification: finite state machine & petri net models							
MAC, Channel allocation problem, CSMA/CD, Contention period, BEB, CSMA							
Collision-free protocols: bit-map, binary countdown, limited contention							
Internet Protocol (IP), IPv4 header, NAT IP addresses and subnets							
Static and dynamic routing algorithm, Distance vector routing, count-to-infinity problem, Link state routing		CO1, CO2				30	Final (30%)
Congestion and congestion control algorithms in network layer							
QoS, leaky bucket algorithm, Jitter, Internetworking, tunneling, fragmentation							
Transport layer: Introduction, transport services, connection establishment, data transfer & connection release, TCP segment header, Congestion control in Transport layer							
Application layer: Introduction, DNS, Web server, Optimization of Web server, Server farm							

Laboratory Experiments and Assessment Scheme

Experiment	**Teaching-Learning Method**	**CO**	**Mark of Cognitive Learning Levels**				**Mark of Psychomotor Learning Levels**	**Mark of Affective Learning Levels**	**CO Mark**
			C2	C3	C4	C6	P3	A2	
Familiarization with transmission media and orientation of CAT5	Lab Experiment, Result analysis and report	CO3							

Creating straight through and cross over cable and data transmission between hosts	Do	CO3							
The basic of Linux networking commands, administrative commands and analyzing parameters	Do	CO3							
Creating networks with Linux	Do	CO3							
Analyzing packets with Wireshirk I		CO3							
Creating network (LAN) with Packet tracer (Simulator)	Do	CO3							
Creating networks with LAN segments and networks with servers (client-server)	Do	CO3							
Creating multiple networks, configuring and implementing routing protocols	Do	CO3							
Lab Exercises		CO3							10%
Lab Exam	Exam	CO1							5%
		CO3							5%
Total									**20%**

Mini Project Assessment Scheme

Mini Project	Teaching-Learning Method	CO	EP	Mark of Cognitive Learning Level			Mark of Psychomotor Learning Levels		Mark of Affective Learning Level		CO Mark
				C2	C3	C4	P3	P5	A4	A5	
Lab-based Mini Project including Report and Presentation	Group-based moderately complex network design project with report writing and oral/poster presentation	CO4		1	1	1	2	1	2	2	10

Overall Assessment Scheme

Assessment Area	CO Marks					PO Marks			
	CO1	CO2	CO3	CO4		PO2	PO3	PO5	PO12
Class Participation									
Class Test/Quiz	5	5	0	0		5	5	0	0
Midterm Assessment	18	12	0	0		18	12	0	0
Final Exam	12	18	0	0		12	18	0	0
Laboratory Performance and Lab Exam	5	0	15	0		5	0	15	0

Mini Project	0	0	0	10		0	0	0	10
Total	**40**	**35**	**15**	**10**		**40**	**35**	**15**	**10**

Mark distribution:

Class Test	10%
Midterm Assessment	30%
Final Exam	30%
Lab Performance	10%
Lab Test	10%
Mini Project	10%
Total	100%

Teaching Materials/Equipment

Text book:

- Computer Networks, Forth /Fifth edition, Andrew S. Tanenbaum, Prentice Hall

References:

- Computer Networking: A Top-Down Approach Featuring the Internet by James Kurose and Keith Ross, Addison Wesley
- Data and Computer Communications by William Stalling

Teaching-Learning Method: Lecture Notes and extensive interactive sessions

Grading System

Marks (%)	Letter Grade	Grade Point	Marks (%)	Letter Grade	Grade Point
80 - 100	A+	4.00	50 - <55	C+	2.50

75 - <80	A	3.75	45 - <50	C	2.25
70 - <75	A-	3.50	40 - <45	D	2.00
65 - <70	B+	3.25	Below 40	F	0.00
60 - <65	B	3.00			
55 - <60	B-	2.75			

Exam Dates

Section	Mid Assessment	Final
Sec 5	TBA	TBA
Sec 6	TBA	TBA

Academic Code of Conduct

Academic Integrity:
Any form of cheating, plagiarism, personification, falsification of a document as well as any other form of dishonest behavior related to obtaining academic gain or the avoidance of evaluative exercises committed by a student is an academic offence under the Academic Code of Conduct and **may lead to severe penalties as decided by the Disciplinary Committee of the university.**

Special Instructions:

- For plagiarism, the grade will automatically become zero for that exam/assignment.
- Normally there will be **NO make-up exam**. However, in case of **severe illness, death of any family member, any family emergency, or any humanitarian ground**, if a student miss any exam, the student MUST get approval of makeup exam by written application to the Chairperson through the Course Instructor **within 48 hours** of the exam time. Proper supporting documents in favor of the reason of missing the exam have to be presented with the application.

- For **final exam**, there will be NO makeup exam. However, in case of **severe illness, death of any family member, any family emergency, or any humanitarian ground**, if a student misses the final exam, the student MUST get approval of **Incomplete Grade** by written application to the Chairperson through the Course Instructor **within 48 hours** of the final exam time. Proper supporting documents in favor of the reason of missing the final exam have to be presented with the application. **It is the responsibility of the student to arrange an Incomplete Exam within the deadline mentioned in the Academic Calendar in consultation with the Course Instructor**.

- There is **zero tolerance for cheating** in exam. Students caught with cheat sheets in their possession, whether used or not; writing on the palm of hand, back of calculators, chairs or nearby walls; copying from cheat sheets or other cheat sources; copying from other examinee, etc. would be treated as cheating in the exam hall. The only penalty for cheating is **expulsion for several semesters as decided by the Disciplinary Committee of the university**.