

TEACHING PLAN

Computer Networks

Subject	Computer Science	Paper Code	COM0500104MJ
Paper Name	Computer Networks	Credit / Total No. of Classes	3+1
Theory	45 Hours	Practical	30 Hours
Non-Contact Hours	5 Hours	Faculty	Dr. F. U. Ahmed

A. THEORY TEACHING PLAN

Sl. No.	Topic / Content	Mode of Teaching / Learning	Teaching Aids	Assessment Method
1	Data Communication system; Definition of networks	Receptive Learning	Computer system with overhead projector	Quiz
2	Types of network; Network topologies	Participative Learning	Computer system with overhead projector	Quiz
3	Network Protocols; Layered Network Architecture	Participative Learning	Computer system with overhead projector	—
4	Overview of OSI reference model	Interactive Learning	Computer system with overhead projector	—
5	Overview of TCP/IP protocol suite	Experimental Learning	Computer system with overhead projector	Home Assignment
6	Analog and digital signal; Definition of bandwidth	Interactive Learning	Computer system with overhead projector	Quiz
7	Maximum data rate of a channel; Line encoding schemes	Receptive Learning	Computer system with overhead projector	Quiz
8	Transmission modes; Modulation techniques	Participative Learning	Computer system with overhead projector	Quiz
9	Multiplexing techniques – FDM and TDM	Receptive Learning	Computer system with overhead projector	Quiz
10	Transmission media – Guided and Unguided	Receptive Learning	Computer system with overhead projector	Quiz
11	Switching techniques – Circuit switching, packet switching	Experimental Learning	Computer system with overhead projector	Quiz
12	Connectionless Datagram switching	Experimental Learning	Computer system with overhead projector	Quiz
13	Connection-oriented Virtual Circuit Switching	Experimental Learning	Computer system with overhead projector	Quiz
14	Definition of Framing; Framing Methods	Interactive Learning	Computer system with overhead projector	Home Assignment
15	Error Detection techniques	Experimental Learning	Computer system with overhead projector	Home Assignment
16	Error correction techniques	Experimental Learning	Computer system with overhead projector	Quiz
17	Flow control mechanisms – Simplex protocol	Participative Learning	Computer system with overhead projector	Quiz
18	Stop and Wait ARQ	Experimental Learning	Computer system with overhead projector	Home Assignment
19	Go-Back-N ARQ	Experimental Learning	Computer system with overhead projector	Home Assignment
20	Point-to-point protocol	Receptive Learning	Computer system with overhead projector	Quiz
21	Basics of ALOHA protocols	Receptive Learning	Computer system with overhead projector	Quiz
22	Basics of CSMA/CD protocols; Ethernet LANs	Receptive Learning	Computer system with overhead projector	Home Assignment

Sl. No.	Topic / Content	Mode of Teaching / Learning	Teaching Aids	Assessment Method
23	Connecting LAN and backbone networks – Repeaters, Hub	Participative Learning	Computer system with overhead projector	Home Assignment
24	Switches, Bridges, Routers and Gateways	Participative Learning	Computer system with overhead projector	Quiz
25	Connection-oriented vs. connectionless services	Interactive Learning	Computer system with overhead projector	Quiz
26	Definition of Routing	Receptive Learning	Computer system with overhead projector	Quiz
27	Routing Algorithms	Experimental Learning	Computer system with overhead projector	Quiz
28	IP Protocols; IP addresses	Participative Learning	Computer system with overhead projector	Quiz
29	ARP, RARP	Interactive Learning	Computer system with overhead projector	Quiz
30	Transport services	Receptive Learning	Computer system with overhead projector	Quiz
31	TCP vs UDP protocols	Participative Learning	Computer system with overhead projector	Home Assignment
32	TCP connection establishment – Three-way handshake; TCP Connection release	Experimental Learning	Computer system with overhead projector	Quiz
33	Overview of DNS; Overview of WWW	Receptive Learning	Computer system with overhead projector	Home Assignment
34	URL; Email architecture	Interactive Learning	Computer system with overhead projector	Quiz
35	HTTP protocol	Experimental Learning	Computer system with overhead projector	Home Assignment

B. PRACTICAL / LABORATORY PLAN

Sl. No.	Practical / Laboratory Work	Mode of Teaching / Learning	Assessment / Activity
36	Implement the data link layer framing methods such as Bit stuffing	Experimental Learning	Lab work
37	Study of Different types of Network cables	Experimental Learning	Lab work
38	Study of Network IP	Experimental Learning	Lab work
39	Connect the computers in LAN	Experimental Learning	Lab work
40	Study of basic network command and Network configuration commands	Experimental Learning	Lab work
41	Socket Programming in C language	Experimental Learning	Lab work
42	Configure a network topology using Packet Tracer software	Experimental Learning	Lab work
43	Simulate Cyclic Redundancy Check (CRC) error detection algorithm for noisy channel	Experimental Learning	Lab work
44	Simulate and implement Stop and Wait protocol for noisy channel	Experimental Learning	Lab work
45	Simulate and implement Go-Back-N sliding window protocol	Experimental Learning	Lab work
46	Simulate and implement Selective Repeat sliding window protocol	Experimental Learning	Lab work

Sl. No.	Practical / Laboratory Work	Mode of Teaching / Learning	Assessment / Activity
47	Simulate and implement Dijkstra Algorithm for shortest path routing	Experimental Learning	Lab work
48	Simulate and implement Distance Vector routing algorithm	Experimental Learning	Lab work

Practical Note: 30 practical problems given in the syllabus are to be solved and the codes are to be uploaded in GitHub repository.

TEACHING PLAN

Software Engineering

Subject	Computer Science	Paper Code	COM050404
Paper Name	Software Engineering	Credit / Total Classes	4+0
Theory	60 Hours	Practical	0 Hours
Non-Contact Hours	5 Hours	Faculty	Department of Computer Science

A. THEORY TEACHING PLAN

Sl. No.	Topic / Content	Mode of Teaching / Learning	Teaching Aids	Assessment Method
1	Concept and definitions of Software Engineering; Difference from Computer Science and System Engineering	Receptive Learning	Computer system with overhead projector	Quiz
2	Programs vs. Software Products; Necessity of software engineering approach	Participative Learning	Computer system with overhead projector	Quiz
3	Exploratory style vs. modern style; Evolution of software development and Software Crisis	Interactive Learning	Computer system with overhead projector	Home Assignment
4	Key attributes of software quality (maintainability, dependability, efficiency, usability)	Interactive Learning	Computer system with overhead projector	Quiz
5	Introduction to SDLC; Concept, necessity, and life cycle stages	Receptive Learning	Computer system with overhead projector	Quiz
6	Classical Waterfall Model; Stages, merits, and limitations	Receptive Learning	Computer system with overhead projector	Quiz
7	Iterative Waterfall Model and Prototyping Model	Experimental Learning	Computer system with overhead projector	Home Assignment

8	Evolutionary / Incremental Model	Participative Learning	Computer system with overhead projector	Quiz
9	Spiral Model; Risk-driven development cycle	Experimental Learning	Computer system with overhead projector	Quiz
10	Agile Methodology principles; Comparison between Agile and Traditional SDLC	Participative Learning	Computer system with overhead projector	Home Assignment
11	Deep dive into SCRUM framework (Roles, Sprints, Backlogs, Ceremonies)	Experimental Learning	Computer system with overhead projector	Quiz
12	Requirement Analysis overview, Elicitation techniques, and Stakeholder interaction	Participative Learning	Computer system with overhead projector	Home Assignment
13	Feasibility Analysis: Technical, Economical, and Operational feasibility	Receptive Learning	Computer system with overhead projector	Quiz
14	Software Requirement Specification (SRS); Purpose and structure	Interactive Learning	Computer system with overhead projector	Home Assignment
15	Functional vs. Non-Functional requirements; Characteristics and users of SRS	Interactive Learning	Computer system with overhead projector	Quiz
16	Representing complex logic using Decision Trees	Experimental Learning	Computer system with overhead projector	Home Assignment
17	Representing complex logic using Decision Tables	Experimental Learning	Computer system with overhead projector	Quiz
18	Practical drafting of SRS components and logic simplification	Participative Learning	Computer system with overhead projector	Home Assignment
19	Fundamentals of Software Project Management and Project Manager responsibilities	Receptive Learning	Computer system with overhead projector	Quiz
20	Software Project Management Plan	Receptive Learning	Computer system with overhead projector	Home Assignment

	(SPMP) document structure and contents			
21	Software Documentation: Internal vs. External documentation	Interactive Learning	Computer system with overhead projector	Quiz
22	Size estimation metric: Lines of Code (LOC) and its limitations	Receptive Learning	Computer system with overhead projector	Quiz
23	Function Point (FP) metric: Five functional categories	Participative Learning	Computer system with overhead projector	Quiz
24	Calculating Unadjusted FP and Value Adjustment Factors; 3D Metrics	Experimental Learning	Computer system with overhead projector	Home Assignment
25	Empirical Estimation: Expert judgment and Delphi technique	Interactive Learning	Computer system with overhead projector	Quiz
26	Heuristic Estimation: Basic COCOMO Model calculations for Organic, Semidetached, and Embedded software	Experimental Learning	Computer system with overhead projector	Home Assignment
27	Intermediate COCOMO Model calculations and Cost Drivers	Experimental Learning	Computer system with overhead projector	Quiz
28	Project Scheduling concepts; Work Breakdown Structure (WBS)	Participative Learning	Computer system with overhead projector	Home Assignment
29	Activity Networks / Task Graphs and Gantt Charts	Experimental Learning	Computer system with overhead projector	Quiz
30	Critical Path Method (CPM) theory: ES, LS, EF, LF, and Float	Experimental Learning	Computer system with overhead projector	Quiz
31	Critical Path Method (CPM) numerical problem solving	Experimental Learning	Computer system with overhead projector	Home Assignment
32	Software Team Structures: Chief Programmer vs. Democratic teams	Participative Learning	Computer system with overhead projector	Quiz
33	Review of Project Management	Interactive Learning	Computer system with overhead projector	Quiz

	estimations, scheduling, and team dynamics			
34	Software Design Approaches: Top-down vs. Bottom-up; Architectural vs. Detailed design	Receptive Learning	Computer system with overhead projector	Quiz
35	Modularization principles and Introduction to Cohesion	Receptive Learning	Computer system with overhead projector	Quiz
36	Classification of Cohesion (Coincidental, Logical, Temporal, Procedural, Communicational, Sequential, Functional)	Interactive Learning	Computer system with overhead projector	Home Assignment
37	Coupling concept and classification (Content, Common, Control, Stamp, Data)	Interactive Learning	Computer system with overhead projector	Quiz
38	Structured Analysis and Structured Design (SA/SD) methodology	Participative Learning	Computer system with overhead projector	Quiz
39	Data Flow Diagrams (DFDs): Symbols, Context Diagrams, and Level-0 DFDs	Experimental Learning	Computer system with overhead projector	Home Assignment
40	Level-1 and Level-2 DFDs; DFD Balancing rules	Experimental Learning	Computer system with overhead projector	Quiz
41	Transforming DFDs to Structure Charts: Transform vs. Transaction Analysis	Experimental Learning	Computer system with overhead projector	Home Assignment
42	Object-Oriented Analysis & Design (OOAD) overview and UML fundamentals	Receptive Learning	Computer system with overhead projector	Quiz
43	Structural UML Diagrams: Use Case Diagrams, Class Diagrams, and Object Diagrams	Experimental Learning	Computer system with overhead projector	Home Assignment
44	Behavioral UML Diagrams: Sequence	Experimental Learning	Computer system with overhead projector	Quiz

	Diagrams and Collaboration Diagrams			
45	Comprehensive system design integrating SA/SD and OOAD principles	Interactive Learning	Computer system with overhead projector	Home Assignment
46	Coding Standards and Guidelines; Walkthroughs vs. Formal Inspections	Participative Learning	Computer system with overhead projector	Quiz
47	Software Testing fundamentals: Test cases, Test suites, and Test oracles	Receptive Learning	Computer system with overhead projector	Quiz
48	Levels of Testing: Unit, Integration (Top-Down, Bottom-Up), System, and Acceptance testing	Participative Learning	Computer system with overhead projector	Quiz
49	Verification vs. Validation concepts	Interactive Learning	Computer system with overhead projector	Home Assignment
50	Black-Box Testing: Equivalence Class Partitioning and Boundary Value Analysis	Experimental Learning	Computer system with overhead projector	Home Assignment
51	White-Box Testing: Statement, Branch, Condition, and Path coverage	Experimental Learning	Computer system with overhead projector	Quiz
52	Cyclomatic Complexity: Control Flow Graphs (CFG) and McCabe's Metric calculations	Experimental Learning	Computer system with overhead projector	Home Assignment
53	Specialized System Testing: Smoke, Stress, Volume, and Compatibility testing	Receptive Learning	Computer system with overhead projector	Quiz
54	Hands-on test case design and CFG construction exercises	Experimental Learning	Computer system with overhead projector	Home Assignment
55	Software Reliability definitions; Failure modes and reliability growth	Receptive Learning	Computer system with overhead projector	Quiz
56	Reliability Metrics: ROCOF, MTTF, MTTR, MTBF, POFO, and Availability	Experimental Learning	Computer system with overhead projector	Home Assignment

57	Quality Standards: ISO 9000 certification processes and relevance to software	Interactive Learning	Computer system with overhead projector	Quiz
58	Software Maintenance categories: Corrective, Adaptive, and Perfective maintenance	Participative Learning	Computer system with overhead projector	Quiz
59	Software Maintenance Cost Estimation models and Re-engineering	Experimental Learning	Computer system with overhead projector	Home Assignment
60	Comprehensive syllabus review and examination preparation	Interactive Learning	Computer system with overhead projector	Quiz

B. PRACTICAL / LABORATORY PLAN

Sl. No.	Practical / Laboratory Work	Mode of Teaching / Learning	Assessment / Activity
—	N/A (Paper Code COM050404 is a pure theory course with 0 practical credits)	—	—