Savitribai Phule Pune University
S.Y.B.Sc. (Computer Science)
Computer Science Paper -II
Course Code: CS 232
Title : Software Engineering

Teaching Scheme	No. of Credits	Examination Scheme
3 lectures / week (50 mins duration)	**2**	IE : 15 marks UE: 35 marks

Prerequisites
ER Modeling

Course Objectives

1. To get knowledge and understanding of software engineering discipline.
2. To learn analysis and design principles for software project development.

Course Outcomes
On completion of the course, student will be able to-

1. Compare and chose a process model for a software project development.
2. Identify requirements analyze and prepare models.
3. Prepare the SRS, Design document, Project plan of a given software system.

Course Contents

Chapter 1	**Title : Introduction To Software Engineering and Process Models**	**8 lectures**

1.1 Definition of Software
1.2 Nature of Software Engineering
1.3 Changing nature of software
1.4 Software Process
- 1.4.1 The Process Framework
- 1.4.2 Umbrella Activities
- 1.4.3 Process Adaptation

1.5 Generic Process Model
1.6 Prescriptive Process Models
- 1.6.1 The Waterfall Model
- 1.6.2 Incremental Process Models
- 1.6.3 Evolutionary Process Models
- 1.6.4 Concurrent Models
- 1.6.5 The Unified Process

Chapter 2	**Title : Agile Development**	**5lectures**

2.1 What is Agility?
2.2 Agile Process
- 2.2.1 Agility Principles
- 2.2.2 The Politics Of Agile Development
- 2.2.3 Human Factors

2.3 Extreme Programming(XP)
- 2.3.1XP Values
- 2.3.2XP Process
- 2.3.3 Industrial XP

2.4 Adaptive Software Development(ASD)
2.5 Scrum
2.6 Dynamic System Development Model (DSDM)
2.7 Agile Unified Process (AUP)

Chapter 3	**Title : Requirements Analysis**	**7 lectures**

3.1 Requirement Elicitation,
3.2 Software requirement specification (SRS)
3.2.1 Developing Use Cases (UML)
3.3 Building the Analysis Model
3.3.1 Elements of the Analysis Model
3.3.2 Analysis Patterns
3.3.3 Agile Requirements Engineering
3.4 Negotiating Requirements
3.5 Validating Requirements

Chapter 4	**Title : Requirements Modeling**	**10 lectures**

4.1 Introduction to UML
4.2Structural Modeling
4.2.1 Use case model
4.2.2Class model
4.3Behavioral Modeling
4.3.1 Sequence model
4.3.2 Activity model
4.3.3 Communication or Collaboration model
4.4 Architectural Modeling
4.4.1 Component model
4.4.2 Artifact model
4.4.3 Deployment model

Chapter 5	**Title :Design Concepts**	**6lectures**

5.1 Design Process
5.1.1 Software Quality Guidelines and Attributes
5.1.2 Evolution of Software Design
5.2 Design Concepts
5.2.1 Abstraction
5.2.2 Architecture
5.2.3 Patterns
5.2.4 Separation of Concerns
5.2.5 Modularity
5.2.6 Information Hiding
5.2.7 Functional Independence
5.2.8 Refinement
5.2.9 Aspects
5.2.10 Refactoring
5.2.11 Object Oriented Design Concepts
5.2.12 Design Classes
5.2.13 Dependency Inversion
5.2.14 Design for Test
5.3 The Design Model
5.3.1 Data Design Elements
5.3.2 Architectural Design Elements

5.3.3 Interface Design Elements
5.3.4 Component-Level Diagram
5.4.5 Deployment-Level Diagram

Reference Books:

1. Software Engineering : A Practitioner's Approach - Roger S. Pressman, McGraw hill(Eighth Edition) ISBN-13: 978-0-07-802212-8, ISBN-10: 0-07-802212-6
2. A Concise Introduction to Software Engineering - Pankaj Jalote, Springer ISBN: 978-1-84800-301-9
3. The Unified Modeling Language Reference Manual - James Rambaugh, Ivar Jacobson, Grady Booch ISBN 0-201-30998-X

Savitribai Phule Pune University
S.Y.B.Sc. (Computer Science)
Computer Science Paper - I Semester II
Course Code: CS 242 Title : Computer Networks-I

Teaching Scheme	No. of Credits	Examination Scheme
3 lectures / week (50 mins. duration)	**02**	IE : 15 marks UE: 35 marks

Prerequisites
Principles of Digital Electronics
Communication Principles

Course Objectives
To prepare students with basic networking concepts: data communication, protocolsand standards, various topologies and applications of network.

Course Outcomes

1. Have a good understanding of the OSI and TCP/IP Reference Models and in particular have a good knowledge of Layers.
2. Understand the working of various protocols.
3. Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies

Course Contents

Chapter 1	**Introduction to Networks and Network Models**	**4 lectures**

1.1 Data communication, components, data representation
1.2 Networks, network criteria, network types - LAN, WAN, Switching, The Internet, Accessing the Internet
1.3 Network Software- Protocol hierarchies, Design Issues of the layer, Connection Oriented and Connectionless Services,
1.4 Reference models - OSI Reference Models, TCP/IP Reference model, Connection devices in different layers, Comparison of OSI and TCP/IP Reference Models.

Chapter 2	**Lower Layers**	**10 lectures**

2.1 Communication at the physical layer, data rate limits - Noiseless channel (Nyquist bit rate), noisy channel (Shannon capacity), Performance - bandwidth, throughput, latency, bandwidth-delay product, jitter
2.2 Design issues of Data Link Layer, Services - Framing, flow control, error control, congestion control, Link layer addressing
2.3 Framing Methods - Character Count, Flag bytes with Byte Stuffing, Flags bits with Bit Stuffing, Physical Layer Coding Violations
2.4 The Channel allocation problem, Static and dynamic allocation, Media Access Methods - Taxonomy of multiple-access protocols
2.5 Switching and TCP/IP layers, Types - circuit switching, packet switching and message switching
2.6 Wired LANs - Standard Ethernet characteristics, Addressing, Access method, implementation, Fast and Gigabit Ethernet
2.7 Wireless LANs - Architectural comparison, Characteristics, Access control, IEEE 802.11

architecture, Physical layer, MAC sublayer, Bluetooth architecture, Layers

Chapter 3	**Network Layer**	**12 lectures**

3.1 Network layer services - Packetizing, Routing and forwarding, other services
3.2 Open and closed loop congestion control
3.3 IPv4 addressing- Address space, classful addressing, Subnetting, Supernetting, classless addressing, Network address resolution (NAT)
3.4 Forwarding of IP packets- based on destination address, based on label
3.5 Network Layer Protocols- Internet Protocol (IP), IPv4 datagram format, Fragmentation, options
3.6 Mobile IP-addressing, agents, Three phases
3.7 Next Generation IP- IPv6 address representation, address space, address types, IPv6 protocol, packet format, extension header, Difference between IPv4 and IPv6
3.8 Routing - General idea, Algorithms - Distance vector routing, link state routing, path-vector routing

Chapter 4	**Transport Layer**	**10 Lectures**

4.1 Transport layer Services- Process-to-process communication, Addressing, Encapsulation and decapsulation, Multiplexing and demultiplexing, Flow control, Pushing or pulling, Flow control, Buffers, Sequence numbers, Acknowledgements, sliding window, congestion control
4.2 Connectionless and Connection-oriented service, Port numbers
4.3 Transport layer protocols- User datagram protocol, user datagram, UDP services
4.4 Transmission Control Protocol - TCP Services, TCP Features, TCP Segment format, three-way handshake for connection establishment and termination, State transition diagram, windows in TCP.

Reference Books:

1. Computer Networks-Andrew S. Tanenbaum, 5th Edition, Pearson Education
2. Data Communication and Networking- BehrouzFourouzan, 5th Edition, McGraw Hill Pvt. Ltd.