

Course No.	Course Title	No. of Credits	Credit Hours
<b>CSE 2111</b>	<b>Computer Networking</b>	<b>Theory: 3</b>	<b><math>28 \times 1.5 = 42</math></b>
<b>CSE 2111L</b>		<b>Lab: .75</b>	<b><math>14 \times 1.5 = 21</math></b>

\*\* (1 Credit Theory = 14 Credit Hours) and (1 Credit Lab = 28 Credit Hours)

### Introduction of the Course:

In this era of Internet, knowledge of computer networking is an invaluable asset for prospective software engineers. This course aims to provide an introduction to fundamental concepts in the design and implementation of computer networks, their protocols, and applications. Major topics to be covered include: computer networking architecture, applications, transport, congestion, routing, and data link protocols, addressing, local area networks and wireless networks. After completing the course, students will be familiar with the fundamental concepts of data communications and computer networking. With Internet as an example, a student should get an in depth knowledge on the operations of different protocols of TCP/IP protocol suites and how they interact with each other.

### Specific Objective:

- Learn know about the Internet structure
- Know the details of the protocols that are used for successful communication using Internet.
- Should be able to understand how using the Layered approach a packet traverse from source to destination with the help of different protocols used in different layers.

### Course Contents: Theory:

**Course Outline:** Overview of the Internet, Overview of Networking Protocols, Network Edge, Network Core, Protocol Layers / Service Model, General Networking Example; Application Layer: Principles of Networking Applications, Web and HTTP, FTP, E-mail, DNS; Transport Layer: Transport Layer Services, Multiplexing and De multiplexing, Connectionless Transport: UDP, Principles of Reliable Data Transport, Connection-Oriented Transport: TCP, Principles of Congestion Control, TCP Congestion Control; Network Layer: Datagram Networks, Inside a Router, Details of the Internet Protocol (IP), IP Sub netting, Routing Algorithms (Link State, Distance Vector), Routing in the Internet (Routing Information Protocol (RIP), Open Shortest Path First (OSPF), Border Gateway Protocol (BGP)).

### Unit-wise Course Curriculum: Theory:

Unit Name	Topics	Learning Outcomes	Classes
Introduction : Computer Networks and Internet	<p>Syllabus, Course outline, Course objective, grading policy and introduction to the nuts-and-bolts view of Internet.</p> <p>Network edge and network core, packets switching versus circuit switching, Internet Structure.</p> <p>Performance: delay, loss, throughput. Layered architecture. Encapsulation</p>	<p>Get to know about the course and should be able to define Internet.</p> <p>Students will be able the know basic hardware and software components that make up a network.</p> <p>Will learn that Internet of a Network of Networks</p> <p>Know about the network performance metrics</p> <p>Learn about the concepts of</p>	Lec 1     Lec2     Lec3-4

		layered architecture and encapsulation.	
Application Layer	Network Application Architecture, Process Communicating, Transport Layer Services, Application Layer Protocols	conceptual, implementation aspects of network application protocols	Lec5
	Overview of HTTP, Non-Persistent and Persistent Connections, HTTP Message Format  User-Server Interaction: Cookies Web Caching Conditional GET Application  SMTP, Mail Message Format, Mail Access Protocols (POP3, IMAP)  Overview, DNS Services, How DNS works	learn about protocols by examining popular application-level protocols like HTTP, SMTP, DNS etc.	Lec6  Lec7  Lec8  Lec9
Transport Layer:	Introduction, Relationship between Transport and Network layer  User datagram protocol (UDP), Segment Structures and UDP Checksum  Principle of Reliable Data Transfer, Pipelined Data Transfer Protocol, Go-back-N, Selective Repeat  TCP Connection Management, Segment structure, Relationship between Seq and Ack, TCP Timeout Calculation.  TCP Congestion Control	Understand principles behind transport layer services like: multiplexing, de-multiplexing  reliable data transfer, flow control  Learn about Internet transport layer protocols:  UDP: connectionless transport  TCP: connection-oriented reliable transport , TCP congestion control	Lec9-10  Lec11  Lec12-13  Lec14-15  Lec16
Mid-term examination			
Network Layer	Introduction, Forwarding and Routing, Whats inside a router  Datagram Format, Fragmentation,	Students will learn exactly how the network layer implements the host-to-host communication service.	Lec17  Lec18
	IPv4 addressing and Subnetting,  Routing Algorithms: Link-state routing  Routing Algorithms: Distance-vector routing	Get to know about IP addressing and routing	Lec19  Lec20  Lec21
Data Link Layer	Multiple Access Links and Protocols (ALOHA,slotted ALOHA,CSMA, CSMA/CD)  Wireless LAN(WiFi) Architecture, Medium Access Control for Wireless Lan (CSMA/CA)	Students will learn how packets are sent across the individual links that make up the end-to-end	Lec22  Lec23

	Switched Local Area Network: Link Layer Addressing, ARP, Ethernet, Switches	communication path.	Lec24
	Retrospective: A day in the life of a Web Page Request	Should be able to demonstrate how protocols of different layers learned in the course so far, can be used in conjunction to respond to a simple web request.	Lec25
Physical Layer	Data and Signals, Transmission Impairments, Transmission Media: Twisted Pair Cable, Fiber Optic Cable, Coaxial Cable, Wireless Medium	Students will learn about data, signals and different transmission mediums used in data communication.	Lec26 Lec27 Review Class Lec 28
Total Number of Credit hours / classes			28

#### Unit-wise Course Curriculum: Lab:

Unit	Title of the Topics	Learning Outcome	Number of Credit Hours
1.	Introductions with system console; Getting current network configurations parameters.	Student will use different network related utility program.	3
2.	Configuring IP address and static route.	Student will configure IP address, static route and build a home Internet Gateway.	3
3.	Installation, configuration and testing of the DNS server	Student will configure and test the DNS server	3
4.	Installation, configuration and testing of the HTTP server	Student will configure and test the HTTP server	3
5.	Installation, configuration and testing of the SMTP server	Student will configure and test the SMTP server	3
6.	Installation, configuration and testing of the routing daemon; Implementation of OSPF and BGP routing.	Student will apply different methods to solve the different parts of a mathematical problem.	6

<b>Unit</b>	<b>Title of the Topics</b>	<b>Learning Outcome</b>	<b>Number of Credit Hours</b>
	Total Number of classes		14

**Instructional Strategies:**

- The medium of instruction is English
- Lecture materials: recommended books, ppt files, and documents
- Discuss experimental results to learn analyzing techniques (using lab results)

**Assessment (Theory):**

Continuous	40%
Final	60%
<b>Total</b>	<b>100%</b>

**Assessment (Lab):**

Continuous	70%
Final	30%
<b>Total</b>	<b>100%</b>

**Prerequisite:** N/A

**REFERENCES:**

**Text Books:**

1. Computer Networking- A top down Approach ( 6<sup>th</sup> Edition) -Kurose and Ross
2. Data Communication & Networking - Behrouz Forouzan- McGraw Hill Education
3. Computer Network -Tannenbaum - Pearson Education
4. Computer Networks a System Approach - Larry L. Peterson and Bruce S. Davie - MK Education