National University

of Computer & Emerging Sciences

Tentative Course Outline of BS (CS) Degree Program

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Course Title	Computer Networks	**Course Code**	CS307
Pre-Req.		**Credit Hrs.**	3+1

Text Book	**Title**	**Computer Networking: A Top-Down Approach (7th Ed. 2017)**
	Author	Kurose and Ross
	Publisher	Pearson Education (**ISBN 978-0-13-359414-0**)
Ref. Books	**Title**	Computer Networks (5thEd. 2011)
	Author	Tanenbaum and Wetherall
	Publisher	Pearson Education (ISBN 978-0-13-212695-3)
	Title	Computer Networks: A Systems Approach(5th Ed. 2012)
	Author	Larry Peterson and Bruce Davie
	Publisher	Morgan Kaufmann (ISBN 978-0-12-385059-1)

Objectives:	The learning and skill based objectives of this course resolve around the following questions: • How does the global network infrastructure work and what are the design principles on which it is based? • In what ways are these design principles compromised in practice? • How should Internet applications be written, so they can obtain the best possible performance both for themselves and for others using the infrastructure? • How do we ensure that it will work well in the future in the face of rapidly growing scale and heterogeneity? The course will focus on the design & undergraduate level analysis of large-scale networked systems and GNS3 based implementation and evaluation of small-scale networked

Week	**Tentative course topics**	**Chapter**
01	L1: Introduction, Course L2: Network Edge, Network Core (ISPs, internet Vs. intranet, Internet) L3: Process to Process and Host to Host connectivity	1.1, 1.2, 1.3.3, 1.5.1
02	L1: Network Core: Packet and Circuit Switching. Statistical Multiplexing L2: ISPs and Internet Backbones (Tiers of ISPs) L3: What are the Requirements for building a Network?	1.3, BK2-1.2
03	L1: Delay, Loss and Throughput in Packet- Switched Networks, L2: Delay-Bandwidth Product, End-to-End delay, Application Performance, Traceroute L3:Protocols Layers and Their Service Model,	1.4, BK2-1.5 1.5,1.6
04	L1: Network Applications Architecture: Client-Server and Peer-to-Peer L2: Transport Services: Reliability, Throughput, Timing, Security L3:Internet Transport Services: TCP, UDP, HTTP (2.2.1 – 2.2.6)	2.1.1 to 2.1.5
05	L1: DNS (2.5.1 – 2.5.3) L2: BitTorrent L3: BitTorrent (DHT) **Semester Project Part-II Due before Midterm # 2**	2.2 2.5

06	**Mid Term 1**	-
07	L1: Socket Programming Basics L2: JAVA socket programming (TCP). Example and DEMO L3: Writing a multi-threaded server in Java. Example and DEMO	2.6 2.7
08	L1:Internet Transport Layer Protocol, Multiplexing & Demultiplexing L2: Connection Less Transport: UDP L3:Principle of Reliable Data Transfer, rdt 1.0, rdt 2.0	3.1, 3.2 3.3 3.4.1
09	L1: Principle of Reliable Data Transfer 3.0 L2: Pipelined Data Transfer L3: Go-Back-N and Selective Repeat	3.4.2 3.4.3 3.4.4
10	L1: Connection Oriented Transport: TCP L2: TCP Connection and Segment structure L3: Round tip time estimation and Timeout	3.5.1 3.5.2 3.5.3
11	L1: TCP Reliable data transfer mechanism L2: Flow and Congestion Control L3: Principle of Congestion Control **Semester Project Part-II Due before Midterm # 2**	3.5.4 3.5.5
12	**Mid Term 2**	-
13	L1: Forwarding and Routing, Network Service Models, Datagram Networks L2: Router Vs. Switch, Architecture and working of a Router (Part # 1) L3: Architecture and working of a Router (Part # 2)	3.6, 3.7
14	L1: Internet Protocol (IPv4) detailed coverage as per text book. L2: New improvements in IPv6 L3: Network Address Translation (NAT)	4.1, 4.2 4.3
15	L1: Routing Algorithms, IP routing in the Internet L2: RIP (Distance Vector), OSPF (Link State) L3: Overview of BGP (Modified Distance Vector ~ Path Vector) **Semester Project Part-III and grading**	4.4
16	1. Datacenter Networking (**Optional coverage**) 2. IoT Networks and Protocols 3. Networking issues in High-Performance Compute Clusters 4. Security in Computer Networks	4.5

Pre-Requisites:

Students enrolled in this course are expected to have completed following course tracks:

1. Digital Logic Design, COAL, Computer Architecture
2. Computer Programming, Object Oriented Analysis and Design

Theory Marks Distribution (out of 100):

Mid Terms (1 & 2) ……. 30%
Quiz / Assignment / Project ……..... 25%
Class Participation& Notes / Attendance … 5%
Final Examination ……. 40%

Plagiarism:

Mark will be detected and the case shall be reported to the HOD and/or DC.

Rules & Regulation:

Rules and regulations related to attendance, all type of exams, class work, homework and others shall be observed as per FAST-NU policy and/or communicated by the HOD CS department or in absence of the same as communicated by the course instructor during the semester. **See Lecture # 1 slides for more coverage**.