

**Birla Institute of Technology & Science, Pilani (Rajasthan) India**  
**Instruction Division**  
**Second Semester: 2009-2010**  
**Course Handout: Part-II**

**Date:** 01/01/2010

In addition to part-I (General handout for all courses appended to the timetable) this portion gives further specific details regarding the course:

**Course No. :** CS C461 / IS C 461  
**Course Title:** Computer Networks  
**Instructor-in-Charge:** RAHUL BANERJEE  
**Instructor:** Avinash Gautam

**1. Objective and Scope of the Course:** *This course aims at providing a sound conceptual foundation in the area of Computer Networks with emphasis on the design aspects. The course attempts to provide a balanced treatment of the state-of-the-art in the area and thus prepares the students for taking more rigorous and specialized courses in this and related fields. At the end of this course, students should be able to analyze, design and maintain commonly used network types.*

**2. Course Material:**

**A> Text Book:**

*Larry L. Peterson & Bruce S. Davie: Computer Networks: A Systems Approach, Fourth Edition, Morgan Kaufmann / Elsevier, New Delhi, 2007. <System design approach>*

**C> Course Home Page:**

*URL for the Webpage of the Course: <http://discovery.bits-pilani.ac.in/rahul/CompNet>*

*IntraBITS course page shall host additional material for local viewing, assignment upload facility, performance and grade details of all students and notices. IntraBITS page shall be enabled latest by January 21, 2010.*

**3. Course Plan:** *Interaction points corresponding to each lecture shall be up at least a day before at the course page / IntraBITS portal so as to allow interested students to come prepared for the class. Topics marked as self-study may also be covered, but in extra classes only, if the students feel the need for it.*

Lecture No.	Topic(s) to be discussed	Section Nos. of the Text Book / online reference
1.	<i>Introduction to Computer Networks and their applications</i>	1.1
2.	<i>What do the different people need of Computer Networks: Designer, Provider, Application Programmer and the User?</i>	1.2
3.	<i>Elements of Computer Networks, Concepts related to Switching, Resource Sharing, Services, Types of Networks, Reliability</i>	1.2
4.	<i>Network Architectures &amp; Reference Models: Layered versus End-to-End Approaches, Protocols, Services,</i>	1.3

3.	<i>Writing Networking Software : APIs, Protocol Implementation aspects, Best Current Practices</i>	1.4
4.	<i>Performance modeling, evaluation and monitoring aspects</i>	1.5
5	<b>Concept Summarization and discussions, part-1</b>	<b>1.6, On-line material at the course page</b>
6.	<i>Building Computer Networks by physical and logical linking: Nodes, Links, connectivity and media options, linking issues</i>	2.1
7.	<i>Data encoding requirements and related schemes</i>	2.2
8.	<i>Building Link Layer Protocol Data Units / Frames: Framing for Bit-oriented, Byte-oriented and other variant of Protocols</i>	2.3
<b>Self-study Topic: Error Detection mechanisms</b>		<b>2.4</b>
9.	<i>Reliable data transmission / reception schemes and protocols: Basics, Stop-and-Wait Protocols, Building Concurrent Logical Channels through multiplexing</i>	2.5, 2.5.1, 2.5.3
10.	<i>Sliding Window Protocols</i>	2.5.2
11.	<i>Network Topologies, The IEEE 802 Architecture and the IEEE 802.x family of L1/L2 Protocol Standards</i>	<i>On-line material at the course page, IEEE 802 standard</i>
12.	<i>Principles behind the Ethernet, IEEE 802.3 family of standards, current practices: Physical and Link Layer Perspectives</i>	2.6
<b>Self-study Topic: Ring Networks: IEEE 802.5, FDDI, RPR: A brief introduction</b>		<b>2.7</b>
<b>Self-study Topic: Select Wireless Networks: WPANs (Bluetooth / IEEE 802.15.1, ZigBee / IEEE 802.15.4) , WWANs (Satellite-Microwave-based: Regular &amp; Terrestrial Microwave-based)</b>		<b>2.8, 2.8.1</b>
13.	<i>The IEEE 802.11 / Wi-Fi WLANs</i>	2.8.2
<b>Self-study Topic: The IEEE 802.16 / Wi-Max WMANs</b>		<b>2.8.3</b>
<b>Self-study Topic: Brief Introduction to Cellular Networks: 2G / 2.5G/ 3G (GSM / GPRS / EDGE, CDMA, UMTS, WCDMA etc.)</b>		<b>2.8.4</b>
14.	<i>Satellite WANs: VSAT-based Satellite WANs</i>	<i>On-line material at the course page</i>
15.	<b>Case Study:</b> <i>Case study of the relevant aspects of the BITS-Pilani Intranet (and its external connectivity status) in contrast with the Intranets at any two major universities outside</i>	<i>On-line material at the course page, websites of respective Institutes</i>
16.	<b>Concept Summarization and discussions, part-2</b>	<b>2.9, On-line material at the course page</b>
17.	<i>Introduction to Packet Switching, Storing, Forwarding: Switching / Routing, An overview of Packet Switching Networks &lt;Focus on IP-type systems&gt;</i>	3.1, 3.1.1
	<i>An overview of Virtual Circuit Switching Networks &lt;Focus on ATM-type systems&gt;</i>	3.1.2, 3.3
18.	<i>Bridges, LAN Switches: Two-layer / three-layer and Multi-layer types &lt;focus on: L1/L2&gt;</i>	3.2

19.	<i>Select Schemes, Algorithms, Broadcasting and Multicasting related to Bridging / Switching</i>	3.2.1, 3.2.2, 3.2.3,
<b>Self-study Topic: ATM Networks</b>		<b>3.3</b>
20.	<i>Bridges versus Switches</i>	3.2.4
21.	<i>Implementation and Performance Aspects of Packet Switching Networks</i>	3.4
22.	<b>Concept Summarization and discussions, part-3</b>	<b>3.5, On-line material at the course page</b>
23.	<i>Introduction to Internetworking : basics, types, service models, IP-based internetworking fundamentals</i>	4.1, 4.1.1, 4.1.2,
24.	<i>Global Addressing, IP-packet forwarding , address resolution / translation schemes</i>	4.1.3, 4.1.5
25.	<i>Host Configuration, Error reporting, Virtualization, Tunneling, VPNs</i>	4.1.6, 4.1.7, 4.1.8
26.	<i>Elements of Routing</i>	4.2
27.	<i>Select Routing Metrics, Schemes and Protocols</i>	4.2.1, 4.2.2, 4.2.4
28.	<i>More Routing Metrics, Schemes and Protocols</i>	4.2.3, 4.2.4
29.	<i>Routing for Mobile Hosts</i>	4.2.5
30.	<i>Building / implementing a Router</i>	4.2.6
31.	<i>The Internet: basics, subnetting, supernetting, CIDR, Autonomous Systems,</i>	4.3, 4.3.1, 4.3.2,
32.	<i>Interdomain routing, Routing areas</i>	4.3.3, 4.3.4
33.	<i>IPv6, IP Multicasting: Basics , schemes and related protocols</i>	4.3.5, 4.4
<b>Self-study Topic: Multi-protocol Label Switching (MPLS)</b>		<b>4.5</b>
34.	<b>Concept Summarization and discussions, part-4</b>	<b>4.6, On-line material at the course page</b>
35.	<i>End-to-End Networking / Internetworking Protocol Basics: The TCP/UDP family</i>	5.1, 5.2
36.	<i>UDP, Its Design, Merits, Demerits, Applications, Performance</i>	5.1, 5.5
37.	<i>TCP: Basics, Design, Algorithms, Issues</i>	5.2
38.	<i>TCP: Algorithms, Issues, Merits, Demerits, Performance, Extensions, Applications, alternatives</i>	5.2, 5.5
<b>Self-study Topic: The Remote Procedure Call, Performance</b>		<b>5.3, 5.5</b>
<b>Self-study Topic: Real-Time Transport protocols, Performance</b>		<b>5.4, 5.5</b>
39.	<b>Concept Summarization and discussions, part-5</b>	<b>5.6, On-line material at the course page</b>
40.	<i>Select concepts in Congestion Control / Avoidance and Quality-of-Service &lt;IntServ / DiffServ etc.&gt;</i>	<i>Extracts of the Sections 6.1, 6.2, 6.3, 6.4, 6.5</i>
<b>Self-study Topic: Select concepts in End-to-End Data Presentation Formatting, Compression and Applications</b>		<b>Extracts of the Sections 7.1, 7.2</b>
41.	<i>Application Layer basics, related protocols, HTTP, FTP, Email systems: SMTP, IMAP, POP, MIME</i>	9.1.1,9.1.2
42.	<i>Naming Services: Basics and Systems: DNS, Select Elements of Network Security</i>	9.1.3, 8.1, 8.4 and 8.5

Self-study Topic: Web-Services fundamentals, Net-enabled Multimedia Applications	9.2, 9.3
Self-study Topic: Overlay Networks: Routing Overlay Networks, Peer-to-Peer, Networks Content Distribution Networks	9.4
<b>Special Session:</b> <i>Concept Summarization and discussions, part-6: Design Tutorial: Design methodology and verification techniques used for designing a simple but modern enterprise internetwork</i>	<i>On-line material at the course page</i>

#### 4. Evaluation Scheme:

Evaluation Component	Type	Duration & Notes	Weight	Date		
Assignments (take-home)	<i>Laboratory -oriented</i>	15 days from the date of respective announcement <i>Students may form their own groups of not more than four members within the first week itself and sign individually on the Group List Sheet at the Instructor-in-Charge's office)</i>	20%	Assignment	1	09/02/2010
				Assignment	2	23/02/2010
				Assignment	3	09/03/2010
				Assignment	4	07/04/2010
				<i>Last column shows submission deadline.</i>		
Surprise Quizzes	<i>Open Book</i>	10 Minutes	10%	<i>Not applicable</i>		
Test -1	<i>Closed book</i>	50 Minutes	15%	<i>February 19, 2010 (1000-1050 Hrs.)</i>		
Test -2	<i>Closed book</i>	50 Minutes	15%	<i>March 26, 2010 (1000-1050 Hrs.)</i>		
Comprehensive Exam.	<i>Open Book</i>	Three Hours <i>(any book, any handwritten notes, printed slides / handouts can be carried into the examination hall &lt;but no photocopied notes are allowed&gt;)</i>	40%	<i>May 12, 2010 (1500-1800 Hrs.)</i>		

**5. Notices:** All notices shall be electronically displayed only on the Course Home Page at *IntraBITS* and the *OnBoard* portals only.

**6. Make-up Policy:** Only in genuine cases, on a case-by-case basis, Make-ups shall be allowed.

**7. Chamber Consultation Hours:** Monday: 4:00 PM to 5:00 PM.

**Instructor-in-Charge: CS C461 / IS C461**