

Birla Institute of Technology & Science, Pilani (Rajasthan) India
Instruction Division
Second Semester: 2010-2011
Course Handout: Part-II

Date: 01/01/2011

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: Abhishek Rathore

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, 4th Edition, Morgan Kaufmann / Elsevier, New Delhi, 2007.

B> Reference Books:

1. *James D. McCabe: Network Analysis, Architecture and Design, 3rd edition, Morgan Kaufmann / Elsevier, New Delhi, 2008.*
2. *Jean Walrand & Pravin Varaiya: High-Performance Communication Networks, 2nd Edition, Morgan Kaufmann / Elsevier, New Delhi, 2000*
3. *Mohamed G. Gouda: Elements of Network Protocol Design, John Wiley & Sons, Singapore, 2004.*

C> Course Home Page:

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

3. Course Plan:

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 & Reference Models: Layered versus End-to-End Approaches, Protocols, Services,</i>	1.3
5.	<i>Writing Networking Software : APIs, Protocol Implementation aspects, Best Current Practices</i>	1.4
6.	<i>Performance modeling, evaluation and monitoring aspects</i>	1.5
	Concept Summarization and discussions, part-1	1.6

7.	<i>Building Computer Networks by physical and logical linking: Nodes, Links, connectivity and media options, linking issues</i>	2.1
8.	<i>Data encoding requirements and related schemes</i>	2.2
9.	<i>Building Link Layer Protocol Data Units / Frames: Framing for Bit-oriented, Byte-oriented and other variant of Protocols</i>	2.3
Self-study Topic: Error Detection mechanisms		2.4
10.	<i>Reliable data transmission / reception schemes and protocols: Basics, Stop-and-Wait Protocols, Building Concurrent Logical Channels through multiplexing, Sliding Window Protocols</i>	2.5
11.	<i>Network Topologies, The IEEE 802 Architecture and the IEEE 802.x family of L1/L2 Protocol Standards</i>	<i>On-line material, 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
Self-study Topic: Ring Networks: IEEE 802.5, FDDI, RPR: A brief introduction		2.7
Self-study Topic: Select Wireless Networks: WPANs (Bluetooth / IEEE 802.15.1, ZigBee / IEEE 802.15.4) , WWANs (Satellite-Microwave-based: Regular & Terrestrial Microwave-based)		2.8, 2.8.1
13.	<i>The IEEE 802.11 / Wi-Fi WLANs</i>	2.8.2
Self-study Topic: The IEEE 802.16 / Wi-Max WMANs		2.8.3
Self-study Topic: Brief Introduction to Cellular Networks: GSM / GPRS / EDGE, CDMA, UMTS, WCDMA, LTE etc.)		2.8.4
Concept Summarization and discussions, part-2		2.9
14.	<i>Introduction to Packet Switching, Storing, Forwarding: Switching / Routing, An overview of Packet Switching Networks <Focus on IP-type systems></i>	3.1, 3.1.1
15.	<i>An overview of Virtual Circuit Switching Networks <Focus on ATM-type systems></i>	3.1.2, 3.3
16.	<i>Bridges, LAN Switches: Two-layer / three-layer and Multi-layer types <focus on: L1/L2></i>	3.2
17.	<i>Select Schemes, Algorithms, Broadcasting and Multicasting related to Bridging / Switching</i>	3.2, 3.3
18.	<i>Bridges versus Switches</i>	3.2
19.	<i>Implementation and Performance Aspects of Packet Switching Networks</i>	3.4
Concept Summarization and discussions, part-3		3.5
20.	<i>Introduction to Internetworking : basics, types, service models, IP-based internetworking fundamentals</i>	4.1
21.	<i>Global Addressing, IP-packet forwarding , address resolution / translation schemes</i>	4.1
22.	<i>Host Configuration, Error reporting, Virtualization, Tunneling, VPNs</i>	4.1
23.	<i>Elements of Routing</i>	4.2
24.	<i>Select Routing Metrics, Schemes and Protocols</i>	4.2
25.	<i>More Routing Metrics, Schemes and Protocols</i>	4.2
26.	<i>Routing for Mobile Hosts</i>	4.2
27.	<i>Building / implementing a Router</i>	4.2
28.	<i>The Internet: basics, subnetting, supernetting, CIDR, Autonomous Systems,</i>	4.3
29.	<i>Interdomain routing, Routing areas</i>	4.3
30.	<i>IPv6, IP Multicasting: Basics , schemes and related protocols</i>	4.3, 4.4
Self-study topics: IP level security, IP VPNs, IP-level QoS, MPLS-VPNs		4.5
Concept Summarization and discussions, part-4		4.6

31.	<i>End-to-End Networking / Internetworking Protocol Basics: The TCP/UDP family</i>	5.1, 5.2
32.	<i>UDP, Its Design, Merits, Demerits, Applications, Performance</i>	5.1, 5.5
33.	<i>TCP: Basics, Design, Algorithms, Issues</i>	5.2
34.	<i>TCP: Algorithms, Issues, Merits, Demerits, Performance, Extensions, Applications, alternatives</i>	5.2, 5.5
35.	<i>Remote Procedure Calls, Performance</i>	5.3, 5.5
36.	<i>Real-Time Transport Protocols, Performance</i>	5.4, 5.5
37.	Concept Summarization and discussions, part-5	5.6
	<i>Self-study topics: SCTP, RTP, Security issues and approaches</i>	
38	<i>Congestion Avoidance, Congestion Control & QoS basics</i>	Extracts from 6.1-6.5
39.	<i>Application Layer Protocols-I</i>	8.1-8.5
40.	<i>Application Layer Protocols-II</i>	9.1
	<i>Self- study topics: Web-Services, Overlay Networks</i>	9.2, 9.3, 9.4
	<i>Self-study topics: Application-level QoS, Application-level Security</i>	Online slides
Special Session:	Concept summarization, part-6 & Discussions on a Design Problem / Case-study covering all major aspects of Networking covered during the semester	Online summary slides

4. Evaluation Scheme:

Evaluation Component	Type	Duration & Other Details	Weight	Date												
Mini-project	Laboratory-oriented	Duration: 12 weeks	30%	Last column below submission deadline.												
<p><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></p> <p><i>All submissions must be made online at IntraBITS as well as at Nalanda portals in form of a single zipped file carrying name of the form: fxxxxyy-n.zip where xxxxyy are the digits signifying your Id. No. and n is the component number.</i></p> <p><i>Each such submission must have a Readme.txt, Report in PDF format, source code (if any), make files (if any) and any other files you wish any inside the zipped archive. Submissions should NOT exceed 8 MB per component.</i></p>				<table border="1"> <tr> <td>Proposal with work-plan</td> <td>1</td> <td>01/02/2011</td> </tr> <tr> <td>Detailed Requirement Specification with due justification</td> <td>2</td> <td>15/02/2011</td> </tr> <tr> <td>Interim Progress report with design and code, if any</td> <td>3</td> <td>15/03/2011</td> </tr> <tr> <td>Complete project report with code, if any</td> <td>4</td> <td>07/04/2011</td> </tr> </table>	Proposal with work-plan	1	01/02/2011	Detailed Requirement Specification with due justification	2	15/02/2011	Interim Progress report with design and code, if any	3	15/03/2011	Complete project report with code, if any	4	07/04/2011
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Detailed Requirement Specification with due justification	2	15/02/2011														
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Complete project report with code, if any	4	07/04/2011														
Test -1	Closed book	50 Minutes	20%	31/01/2011, 10:00 AM												
Test -2	Closed book	50 Minutes	20%	07/03/2011, 10:00 AM												
Comprehensive Exam.	Open Book	Three Hours	30%	11/05/2011 AN												

5. Notices: All notices shall be electronically displayed only on the Course Home Page at *IntraBITS* and the *Nalanda* 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: Tuesday: 3:00 PM to 4:00 PM.

Instructor-in-Charge: CS C461 / IS C461