

**BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI GOA CAMPUS**  
**INSTRUCTION DIVISION**  
**FIRST SEMESTER 2019-2020**  
**Course Handout**

01/08/2019

Course Number : IS C462/IS F462  
Course Title : Network Programming  
Instructor In-Charge : Raj K Jaiswal (raj@goa.bits-pilani.ac.in)

### 1. Scope and Objective of the Course

The objective of the course is to teach the concepts, and APIs that are required to enable one to develop and maintain network-aware applications. The course involves the students to practically demonstrate the key concepts and techniques learnt in the class room. The course scope is limited to working with the network programming techniques offered by UNIX platform.

### 2. Text Book

1. W. R. Stevens, UNIX Network Programming, Vol I, Networking APIs: Sockets and XTI, Pearson Education, 3rd Edition.

### 3. Reference Books

2. Unix System V Network Programming by Stephen A. Rago, AWL
3. Internetworking with TCP/ IP Volume III, Comer, Stevens
4. W.R. Stevens, Advanced Programming in the UNIX Environment, AWL, 1998
5. Adventures in Unix Network Applications Programming, Bill Riekan & Iyle Weiman
6. Data Communications & Networking, Behrouz Forouzan, 4th Edition TMH,
7. W.R. Stevens, UNIX Network Programming, Interprocess Communication, Vol II Pearson Education, 2nd Edition.
8. Internetworking with TCP/ IP Volume I, Comer, PHI

### 4. Course Plan:

Sl. No.	Title	No. of lectures	References
1	<b>Overview:</b> Introduction to Networking, OSI reference model, Client/Server Architecture.	02	T1
2	<b>Unix processes and signals:</b> creation & usage	02	R3
3	<b>Unix IPC:</b> Pipes, FIFOs, Message queues.	02	R3, R6
4	<b>Unix IPC:</b> Semaphores and Shared Memory.	02	R3, R6
5	<b>TCP/IP:</b> TCP/IP Basics, Why IP Addresses? Logical Addresses, Concepts of IP Address, ARP RARP and ICMP	02	
6	<b>Data link &amp; Transport Layer:</b> Ethernet, TCP, UDP, SCTP, Connection Establishment and Termination, TIME_WAIT, Port Nos, TCP port Nos. And concurrency, Buffer sizes	02	T1

7	<b>Socket Programming:</b> Socket address Structure, Value Result args, Socket functions.	02	T1
8	<b>TCP C/S examples:</b> Start up & Termination, Handling SIGCHLD, wait and waitpid, SIGPIPE handling, Echo C/S example	02	T1
9	<b>TELNET and HTTP, case studies</b>	02	R2, R7, RFCs, Class Notes
10	<b>I/O Multiplexing:</b> I/O models, select, pselect, and poll with examples	02	T1
11	<b>UDP C/S examples:</b> recvfrom, sendto, lost datagrams, verifying recved response, server not running, connected UDP, Flow control	02	T1
12	<b>TFTP case study</b>	01	R7, T1, RFCs, Class Notes
13	<b>SCTP Socket &amp; SCTP C/S examples:</b> elementary SCTP Sockets calls, SCTP client server example, head of line blocking, controlling termination and no. Of streams	02	T1
14	<b>DNS &amp; Address Conversion:</b> Domain name system, gethostbyname, RES USE INET6, gethostbyaddr	02	T1
15	<b>Daemons and inetd:</b> syslogd, daemonizing a process, inetd super server	02	T1
16	<b>SMTP and FTP case study</b>	01	R7 RFCs, Class Notes
17	<b>Advanced I/O, Unix Domain Sockets, and Non Blocking I/O:</b> Timeouts, all types of I/O functions, standard I/O functions, Unix domain C/S, Passing descriptors and Credentials, Non blocking Connect	03	T1
18	<b>Broadcasting and Multicasting:</b> Broadcast vs Unicast, socket option, race condition, multicast address structure, Multicasting on a LAN, and WAN, join, sending and receiving.	02	T1
19	<b>Threads Programming :</b> Creation & Termination(Posix), Mutexes and Conditions	02	T1
20	<b>Client Server Design Alternatives:</b> Client alternatives, server alternatives	01	T1

### 5. Evaluation Scheme:

Component	Weightage (%)	Remarks
Mid term	30	Closed Book
Assignment-I	10	

Assignment-II	10	
Comprehensive Examination	50	Closed Book

**6. Self study:** C/ C ++ programming language, JAVA, .NET, Telnet, ftp, NS2/NS3.

**7. Make-up Policy:** No makeup will be given for Assignment components. For tests, however, make-up will be granted strictly on prior permission and on justifiable grounds only.

**8. Chamber Consultation Hours:** To be announced in the class.

**Instructor-in-charge**  
**IS C462**