

## Course outline of IT304: Computer Networks

1. *Title:* Computer Networks (Instructor: Prof. Laxminarayana Pillutla)
2. *Credit Structure (L-T-P-Cr):*        3        0        3        4.5
3. *Course Code:* IT 304
4. *Semester:* 5th
5. *Category:* B. Tech core
6. *Prerequisites:* Introduction to programming (IT 105), Data structures and algorithms (IT 205) and Systems software (IT 215)
7. *Foundation for:* Computer Networks specialization
8. *Abstract Content:*

### **Module 1: Introduction to internetworking**

- Overview of an internet, internet as a service, internet architecture, circuit switching, packet switching, network performance metrics (delay, packet loss and throughput), layered approach to internetworking (TCP/IP and OSI models for internetworking )

### **Module 2: Link layer**

- Introduction to link layer, link layer error detection and correction, multiple access protocols (channel partitioning protocols, random access protocols and CSMA protocols), Ethernet – IEEE 802.3, Token ring – IEEE 802.5, WiFi – IEEE 802.11, reliable link layer protocols (stop and wait, sliding window protocols), switches and bridges.

### **Module 3: Network layer**

- Introduction to network layer and routing, IP addressing, Ipv4, Ipv6 and ICMP header formats, intradomain routing protocols (distance vector and link state routing protocols), interdomain routing (BGP), routing for multicasting and broadcasting.

### **Module 4: Transport layer**

- Transport layer basics, principles of reliable data transfer, connection oriented transport: TCP connection, TCP timeout estimation, TCP RTT estimation, TCP congestion control, TCP flavors like Tahoe, Reno, New Reno and TCP Vegas and connectionless transport: UDP.

### **Module 5: Application layer**

- Principles of network applications, architectures for network applications, application layer protocols, socket programming for client-server applications.

### *9. Suggested Text/Reference books:*

- Computer Networks: A Systems Approach (Fifth edition) by L. L. Peterson and B. S. Davie, publisher: Morgan Kaufmann (**Preferred**).

- Computer Networking: A Top-Down Approach (Fifth edition) by J. F. Kurose and K. W. Ross, publisher: Pearson.
- Routing TCP/IP: Vol. I by Jeff Doyle and Jennifer Carroll, publisher: Cisco press.
- TCP/IP Illustrated Volume 1: The Protocols, Second edition, K. R. Fall and W. Richard Stevens, publisher: Pearson.

10. *Detailed Contents: Please see above.*

11. *Outcomes and Objectives:*

- This course lays a general foundation towards the understanding of network protocols.
- At the end of the course the student would be able to demonstrate a general understanding of internetworking and the associated network protocols at different layers.
- The course would be an excellent foundation course for students who intend to pursue further studies in the area of computer networks

12. *Comments:*

- All the students should enroll into the course web page available on the [courses.daiict.ac.in](http://courses.daiict.ac.in) website. All the course announcements such as labs, etc., will be made through the course web page.

13. *Grading Policy: The weightage given below for various grading components are only tentative and are subject to changes.*

- 1 – Insem examination: 15%
- 2 – Insem examination: 25%
- Final examination (comprehensive): 35%
- Surprise lab examinations/submissions: 10%
- Surprise lecture/lab quizzes: 15%

**(Note: The syllabus for all the three exams would be based on whatever that has been covered till that point in time.)**

14. *Policy on academic dishonesty:* Instances of academic dishonesty could entail a maximum penalty of Grade “F” in the course. These instances could include cheating during in class quizzes, lab exams and the three regular exams.

15. *Attendance policy:* Attendance to both the lectures and labs is mandatory. TAs may take attendance at random. The surprise quizzes also would be used for attendance. Under any circumstances the missed quizzes would not be re-administered.

16. *Leave exemption policy: As per the DA-IICT leave policy.*

17. *Lab Guidelines:*

- The purpose of lab is to complement the theoretical concepts covered in the class. For most part the lab would be based on the stuff covered in the class, although, occasionally you may be taken outside the syllabus to broaden your thinking horizon.
- To promote group work the lab sessions are done in teams of size no more than 2. Once you identify your team mate you are required to retain him/her for entire semester.

- You are requested to do your lab work on the designated day and time. Please do not shift your lab timings for any reason.
- Lab Attendance is compulsory, the TAs would take attendance for all the labs. **If your lab attendance is not 100%, then you may stand to loose the entire lab examination credit.**
- The software labs would be based on the open source network simulator NS2 and C++/Java. It is your duty to get accustomed to NS2 and brush up basic programming related to C/C++ and Java. The first lab would help you in getting started with NS2 (**Note: NS2 is an open source network simulator developed for Unix/Linux platform. Try to download and install as per the instructions available on the NS2 web site).**
- Every lab would be put one week before the corresponding date of the lab. It is your duty to go through the lab and do the required pre-lab preparation (both on the theoretical and software front).
- As mentioned in the grading policy, there can be surprise lab exams based on the labs that were done until then. The lab exam grading would be based on (i) viva-voce and (ii) experiment output.
- Some times I may ask you to submit lab reports which may be counted towards your lab credit for the course. The following are a few guidelines you need to follow in preparing your lab report (each report should have a cover page that contains following: Subject code and Name, Experiment Number and title, Experiment date and Your name, id and lab group):
  1. The report must have a lab objective.
  2. You need to state clearly the theoretical concepts and equations used.
  3. Lab results (in the form of plots, tabular columns, etc., as and where applicable) and the associated analysis.
  4. Conclusions.
  5. Appendices showing your source code.
- Always ensure you carry a pen drive with you to copy the data corresponding to a particular lab. The stored data can be used subsequently.