IT 341 Data Transmission & Computer Networks

Credits and contact hours: 3 Credits (3 Lecture,0 Lab,1 Tutorial))
Instructors: Dr. Shailendra Mishra, Jabeen Sultana

Textbook: B. Forouzan, Data Communication and Networking, Mc Graw hill, 5/e, 2012

Essential references:

- James F. Kurose, and Keith W Ross, Computer Networking: A Top-Down Approach, Addison-Wesley, 2012.
- Larry Patterson and Bruce Davis, Computer Networks: A systems Approach, Morgan Kaufmann, 2011.

Specific course information:

a. **Catalogue Description:** This course introduces students to evolution trend of computer networks. This course provides with practical knowledge and hands-on experience in transmitting data over the network Topics to be covered network architecture, transmission media, data encoding, error detection, MAC protocol, LAN standards, Internet Protocol (IP), Routing Algorithms, TCP and UDP and Application layer protocols.

b. **Prerequisite:** CS 240

Specific goals for the course:

a. Specific outcomes of instruction:

1. Understand the OSI model for computer networks protocols
2. Understand fundamentals of data transmission principles and identify the characteristics of the various transmission media.
3. Understand and implement data link (DL) layer protocols (Flow & error control)
4. Understand the principles of Network Layer Services & configure the network using IP address.
5. Understand and implement the principles of Delivery, Forwarding, and Routing.
6. Understand the principles of Transport Layer Services, as well as design principles of Transport Protocols (UDP & TCP).
7. Understand the principles of Application Layer Services & design principles of HTTP, TELNET, FTP, e mail.

b. ABET Criterion 3 Student Outcomes addressed by the course:

CAC (a): An ability to apply knowledge of computing and mathematics appropriate to the program's student outcomes and to the discipline

Students are able to solve Error Detection and Correction problem, calculate attenuation, power of transmission media etc, able to find throughput if the system uses Aloha Protocol etc.

CAC (b): An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution;

Students need to understand and analyze the requirement and convert it to a problem that can be solved by computer eg. configure network topology, where we use stop and wait and where we use stop and wait protocol etc.

CAC(c) An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs;
Construct and build different topology from class C network using sub netting, design, implement, and evaluate routing algorithms.

CAC (d): An ability to function effectively on teams to accomplish a common goal
Students in a group of 2 or 3 members need to design network and implement various networking protocol and submit them as Mini Project works.

CAC (f): An ability to communicate effectively with a range of audiences.
Students are required to deliver Seminar on latest topics of Networking, also give presentation of their Mini Project works.

CAC (i): An ability to use the current techniques, skills, and modern tools necessary for computing and engineering practice;
Students are able to use the current techniques, skills, and modern tools like; Network Simulator (OPNET,NS3), Packet tracer etc for design of network & Java programming for implementing the Network Protocol . Also, use and apply current technical concepts eg. Using shared tree approach construct and evaluate the performance of network. Find the Routing Table (such as using shared tree approach, construct the routing table for core router)

Topics covered:

- Introduction to computer networks, Network architecture, OSI reference model
- Transmission media, Transmission Impairments
- Data encoding; Data Link: Error Detection
- Medium Access control Protocols and standards, MAC Addressing
- Link layer Switches, LAN standards & Devices, Ethernet and IEEE standards for LANs
- Wireless networks
- Network Layer: Virtual circuit and Datagram Networks
- Router Structure, The Internet Protocol (IP), Routing Algorithms Broadcasting and Multicasting
- Transport Layer: TCP and UDP services
- Application layer Protocol: The Web and HTTP, FTP, Electronic Mail, and DNS Protocol