

COMPUTER ENGINEERING DEPARTMENT

COE 444 (3-0-3)

Internetwork Design and Management

Catalog Description

Types of computer networks. Principles of internetworking. Internetworking hardware. OSI internetworking. Connectionless and Connection-oriented internetworking. Routing strategies. The network development life cycle. Network analysis and design methodology. Network design and backbone design. Structured cabling systems. Topology design and Network design algorithms. Traffic flow analysis. Network reliability. Network management (SNMP). Network security and firewalls. Network administration. Case studies.

Prerequisite: COE 344

Text Book

- There is no textbook for this course. Several references are provided to students

Course Objectives

After successfully completing the course, students will be able to:

- Describe bridging/switching technologies and apply them to network design.
- Differentiate between switching/bridging and routing.
- Analyze and design an enterprise network.
- Compare and contrast the different options in designing a network.
- Apply algorithms to solve network design problems.
- Analyze network traffic flow and evaluate its performance.
- Demonstrate understanding of network management standards, e.g., SNMP.

Course Topics

- 1. Overview of Computer Networks** **1 week**
Types of computer networks. LANs and WANs. Protocols and protocol families. The OSI reference model. The TCP/IP protocol.

- 2. Internetworking** **4 weeks**
Basic terminology. Principles of internetworking. Types of internetworking devices. Repeaters, hubs, bridges, routers, switches and gateways. Transparent and source-routing bridges. Multilayer switches. VLANs. Routing strategies. Addressing.

- 3. The Network Development Life Cycle** **1 week**
Network analysis. Network design methodology. Writing of a Request For Proposal (RFP) and quotation analysis. Prototyping/simulation. Implementation.

- 4. Enterprise Network Design** **3 weeks**
Enterprise Network Design Model. Backbone design concepts. Network security and firewalls. Structured cabling systems. Case studies.

- 5. Topology design and analysis** **3 weeks**
Topology design. Network design algorithms. Terminal assignment. Concentrator location. Traffic flow analysis and performance evaluation. Network reliability.

- 6. Network Management** **2 weeks**
Network management standards & models. ISO Functional areas of management. Network management tools and systems. SNMP architecture & operations. Network administration.

- 7. Project Presentations** **1 week**
More details will be posted on the course web site about the project.

Course Outcomes

Course Learning Outcomes	Outcome Indicators and Details
1. Ability to apply knowledge of mathematics, probability, and statistics to model and analyze some network design problems.	<ul style="list-style-type: none"> • Spanning tree • IP addressing • Traffic flow analysis • Performance evaluation • Network reliability
2. Ability to analyze and design an enterprise network that meets desired requirements.	<ul style="list-style-type: none"> • Network Development Life Cycle • Request for Proposal (RFP) • Network Analysis and Design methodology and process • Requirement analysis phase • Logical design phase (hierarchical model, backbone, redundancy, security, etc) • Physical design phase (structured cabling, etc.) • Assessment of the design • Project and case studies
3. Ability to function as an effective team member in the analysis and design of an enterprise network.	<ul style="list-style-type: none"> • Some assignments are done by teams • Project of an enterprise network analysis and design is assigned to teams
4. Ability to identify, formulate, and solve network design problems	<ul style="list-style-type: none"> • Network topology design problems • Terminal assignment problem • Concentrator location problem • Project and case studies
5. Ability to demonstrate self-learning capability.	<ul style="list-style-type: none"> • Ability to learn a course topic alone (e.g. concentrator location) • Assignment(s) on different design methodologies • Course Project may involve topics not studied in the course (e.g., requirement analysis, market survey)
6. Ability to use techniques, skills, and modern networking tools necessary for network analysis, design, and management.	<ul style="list-style-type: none"> • Guidelines and best practices for network analysis and design • SNMP protocol for managing a network