

# **Course Title: Network Design and Management**

**Course Code:IT-3541**

**Course Structure: Lectures: 3 / Labs: 0**

**Credit Hours: 3**

**Prerequisites: CMP-2540 (Computer Communication and Networks)**

## **Course Objectives:**

This course is aimed to prepare students to design and manage various aspects of organizational network.

## **Course Syllabus:**

Analyzing Business Goals and Constraints.Top-Down Network Design Methodology.Characterizing the Existing Internetwork.Designing a Network Topology.Designing Models for Addressing and Numbering.Selecting Switching and Routing Protocols.Developing Network Security Strategies.Developing Network Management Strategies.Physical Network Design.Selecting Technologies and Devices for Enterprise Networks.Testing Network Design.Optimizing Network Design.Documenting Network Design. Network Management Standards & Models. SNMP Management.

## **Course Outline:**

1. Analyzing Business Goals and Constraints: Using a Top-Down Network Design Methodology, Analyzing Business Goals, Analyzing Business Constraints. Analyzing Technical Goals and Tradeoffs: Scalability, Availability, Network Performance, Security, Manageability, Usability, Adaptability, Affordability, Making Network Design Tradeoffs. [TB1: Ch. 1, 2]
2. Characterizing the Existing Internetwork: Characterizing the Network Infrastructure, Checking the Health of the Existing Internetwork. Characterizing Network Traffic: Characterizing Traffic Flow, Characterizing Traffic Load, Characterizing Traffic Behavior, Characterizing Quality of Service Requirements. [TB1: Ch. 3, 4]
3. Designing a Network Topology: Hierarchical Network Design, Redundant Network Design Topologies, Modular Network Design, Designing a Campus Network Design Topology, Virtual LANs, Wireless LANs, Redundancy and Load Sharing in Wired LANs, Server Redundancy, Workstation-to-Router Redundancy, Designing the Enterprise Edge Topology, Secure Network Design Topologies. [TB1: Ch. 5]
4. Designing Models for Addressing and Numbering: Guidelines for Assigning Network Layer Addresses, Designing a Model for Naming. [TB1: Ch. 6]
5. Selecting Switching and Routing Protocols: Making Decisions as Part of the TopDown Network Design Process, Selecting Switching Protocols, Selecting Routing Protocols, IP Routing. [TB1: Ch. 7]
6. Developing Network Security Strategies: Network Security Design, Security Mechanisms, Modularizing Security Design, [TB1: Ch. 8]
7. Developing Network Management Strategies: Network Management Design, Network Management Architectures, Selecting Network Management Tools and Protocols. [TB1: Ch. 9]
8. Physical Network Design: Selecting Technologies and Devices for Campus Networks: LAN Cabling Plant Design, LAN Technologies, Selecting Internetworking Devices for a Campus Network Design, Example of a Campus Network Design. [TB1: Ch. 10]

9. Selecting Technologies and Devices for Enterprise Networks: Remote-Access Technologies, Selecting Remote-Access Devices for an Enterprise, WAN Technologies, Example of a WAN Design. [TB1: Ch. 11]
10. Testing Network Design: Using Industry Tests, Building and Testing a Prototype Network System, Writing and Implementing a Test Plan for Network Design, Tools for Testing a Network Design. [TB1: Ch. 12]
11. Optimizing Network Design: Optimizing Bandwidth Usage with IP Multicast Technologies, Reducing Serialization Delay, Optimizing Network Performance to Meet Quality of Service Requirements, Cisco IOS Features for Optimizing Network Performance. Documenting Network Design: Responding to a Customer's Request for Proposal, Contents of a Network Design Document [TB1: Ch. 13, 14].

**Textbook(s):**

- Top-Down Network Design by Priscilla Oppenheimer, Cisco Press; 3<sup>rd</sup> Edition (September 3, 2010). ISBN-10: 1587202832 (TB1)

**Reference Material:**

- Networking Systems Design and Development by Lee Chao, CRC Press; 1<sup>st</sup> Edition (December 21, 2009). ISBN-10: 142009159X (TB2)
- Networks: Design and Management by Steven Karris, Orchard Publications (August 2002). ISBN-10: 0970951140
- Network Design: Management and Technical Perspectives by Teresa C. Piliouras and Kornel Terplan, CRC Press (August 19, 1998). ISBN-10: 0849334047
- Network Warrior by Gary A. Donahue, O'Reilly Media; 2<sup>nd</sup> Edition (May 13, 2011). ASIN: B004W8ZL3W
- Modeling and Tools for Network Simulation by Klaus Wehrle, Mesut Günes, and James Gross, Springer (September 23, 2010). ISBN-10: 3642123309
- The Practice of System and Network Administration by Thomas Limoncelli, Christina Hogan, and Strata Chalup, Addison-Wesley Professional; 2<sup>nd</sup> Edition (July 15, 2007). ISBN-10: 0321492668
- Network Management: Principles and Practice by Mani Subramanian; Timothy A. Gonsalves and N. Usha Rani, Pearson Education India (2010). ISBN-10: 81-3172759-9