### **UNIVERSITY OF SARGODHA**

DEPARTMENT OF *CS & IT*

COURSE OUTLINE Fall 2018

Course Tittle: **Network Design and Management**

Course Code: CMP 2540

Credit Hours: *3*

Instructor: ***Waseem Ahmad***

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DESCRIPTION & OBJECTIVES

Network Design and best practices of managing the networks and this course is aimed to prepare students to design and manage various aspects of  
organizational network.

READINGS

1. *• Top-Down Network Design by Priscilla Oppenheimer, Cisco Press; 3rd Edition (September 3, 2010). ISBN-10: 1587202832 (TB1)*
2. Reference Material:• Networking Systems Design and Development by Lee Chao, CRC Press; 1st 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. Piliourasand  
   KornelTerplan, CRC Press (August 19, 1998). ISBN-10: 0849334047  
   • Network Warrior by Gary A. Donahue, O'Reilly Media; 2nd Edition (May 13, 2011).  
   ASIN: B004W8ZL3W  
   • Modeling and Tools for Network Simulation by Klaus Wehrle, MesutGünes, and  
   James Gross, Springer (September 23, 2010). ISBN-10: 3642123309  
   • The Practice of System and Network Administration by Thomas Limoncelli, ChrisRevised Curriculum of BSIT: Applicable from Fall 2013|Dept. CS & IT. UOS  
   tina Hogan, and Strata Chalup, Addison-Wesley Professional; 2nd 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: 81-3172-  
   759-9

CONTENTS

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 DesignTradeoffs. [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):

COURSE SCHEDULE

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| Week | Topics and Readings | Dates |
| 1. | Introduction to course, revision of basic network concepts, first reading assignment for top down approach. | Week 1 |
| 2. | Move towards Data Networks to intelligent information network, Analyzing Business Goals and Constraints: Using a Top-Down Network Design Methodology, Analyzing Business Goals, Analyzing Business Constraints. Analyzing ,SONA Methodologies. | Week 2 |
| 3. | Design Methodologies ,PPDIOO ,Technical constraints of network Design | Week 3 |
| 4. | Designing a Network Topology: Hierarchical Network Design, Redundant Network | Week 4 |
| 5. | 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. | Week 5 |
| 6. | Designing Models for Addressing and Numbering: Guidelines for Assigning Network Layer Addresses, Designing a Model for Naming | Week 6 |
| 7. | 3 layer Model ,explanation of each layer functionality | Week 7 |
| 8. | Enterprise Model/campus model and example discuss in class related enterprise model | Week 8 |
| 9. | Making Decisions as Part of the TopDown Network Design Process, Selecting Switching Protocols, Selecting Routing Protocols, IP Routing | Week 9 |
| 10. |  | Week 10 |
| 11. |  | Week 11 |
| 12. |  | Week 12 |
| 13. |  | Week 13 |
| 14. |  | Week 14 |
| 15. |  | Week 16 |
| 16. |  | Week 17 |

TERM PROJECT

Semester project

ASSESSMENT CRITERIA

Sessional: 20

Project: 10

Presentation: 3

Quizzes: 4

Class Participation: 3

Mid: 30

Final: 50

RULES AND REGULATIONS

*1. No Assignment submission after due date.*