

King Fahd University of Petroleum and Minerals
College of Computer Sciences and Engineering
Department of Computer Engineering

CSE 550 Computer Network Design (3-0-3)

- Instructor:** Dr. Marwan Abu-Amara
Office: 22-148-1
Phone: 1632
E-mail: marwan@ccse.kfupm.edu.sa
Term: 052 (2nd term 2005-2006)
Day & Time: SM 06:30 PM – 07:45 PM
Location: 22-132
Prerequisite: COE 540 and (ICS 353 or Equivalent)
Description: Types of computer networks: LANs, VLANs, and WANs. Routing algorithms and routing protocols. The network development life cycle. Network analysis and design methodology. Network design issues: Manageability; Node placement and sizing; Link topology and sizing; Routing; Reliability. Data in support of network design. Structured enterprise network design. Hierarchical tree network design: Terminal assignment; Concentrator location. Mesh topology optimization. Traffic flow analysis. Analysis of loss and delay in networks. Network reliability issues.
- Objectives:** The aim is to teach students how to evaluate a network situation, and to help students identify the most important network aspects that need to be monitored and analyzed. Modeling and simulation techniques to describe the current network situation are covered.
- Outcome:** At the end of the course, the student should be able to:
- Describe and develop a network model using analysis and simulation
 - Design a new network model to meet requirements for new and/or existing networks
 - Use quantitative and qualitative techniques to design or upgrade a network
 - Making decisions on the proper network technologies, routing protocols, network topologies, node placement, etc.
 - Troubleshoot and diagnose network problems
 - Identify network issues, risks, bottlenecks, etc.
 - Proficiently use simulation tools such as OPNET, management and measurement tools, etc.
 - Learn how to be a good team player by working on a semester-long project
 - Write a technical report, technical essay describing a subject briefly or elaborately as required
 - Communicate design content, risk assessment, security issues and budgetary considerations to upper-management
- Textbook:** J. McCabe, "Practical Computer Network -- Analysis and Design," Morgan Kaufmann Publishers, Inc. 1998
T. Mann-Rubinson and K. Terplan, "Network Design: Management and Technical Perspectives," CRC Publisher, 1988.
R. Breyer and S. Riley, "Switched, Fast, and Gigabit Ethernet," Macmillan Technical Publishing, 3rd Ed, 1999
P. Oppenheimer, "Top-Down Network Design," Cisco Press, 2001
T. Quinn-Andry and K. Haller, "Designing Campus Networks," Cisco Press, 1998
- Contents:**
- Introduction to Network Design
 - The Science of Network Design:
 - Network Analysis (Delay, Throughput, Probability Loss, etc.)
 - Network Simulation and OPNET
 - Traffic Measurement Tools
 - The Art of Network Design:
 - Making Technology Choices
 - Ethernet vs. ATM

- Ethernet Switching, VLAN and Layer 3 Switching
- Cabling, Network Components
- Deployment and Migration
- Node Placement
- Reliability, Redundancy, & Routing
- Case Studies of LAN Network Design (CCSE, Wireless CCSE, KFUPM)
- WAN Network Design:
 - Centralized and Distributed Network Design
 - Star topology networks
 - Tree topology networks
 - Backbone Networks
 - Mesh networks

Office Hours: SMW 10:30 AM – 11:30 AM (or by appointment)

Web Site: <http://www.ccse.kfupm.edu.sa/~marwan/>

Grading Policy:

- Homeworks.....**20%**
- Final Exam.....**25%**
- Project using *OPNET*.....**55%**

IMPORTANT NOTES:

- All KFUPM regulations and standards will be enforced. Attendance will be checked each class. The KFUPM rule pertaining to a DN grade will be strictly enforced (i.e. > **6 absences** will result in a DN grade).
- General guidelines for grades:

Range	≥ 90 and ≤ 100	< 60
Minimum Grade	A	F