

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

**COE 444 - Internetwork Design and Management (3-0-3)**

UT: 8:30-9:45 AM, Room: 24-108

**Spring 2008 (Term 072)**

**Syllabus**

**Catalog Description**

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

*Prerequisite: COE 344 or consent of instructor.*

**Instructor:** Dr. Mohammed Houssaini Sqalli

**Office:** 22-149      **Phone:** 1725      **Email:** [sqalli@kfupm.edu.sa](mailto:sqalli@kfupm.edu.sa)

**Office hours:** UT 10:00-11:30AM, SM 8:00-8:30PM, and by appointment.

**Course URL:** <http://www.ccse.kfupm.edu.sa/sqalli/072/coe444>

**Course Material:** WebCT will be used for discussions and for posting any course-related information.

**Text Book:** *There is no textbook for this course. Handouts from several references will be provided throughout the course.*

**Grading Policy:**

**Exam dates**

Attendance	5%	
Assignments/Quizzes	15%	
Project	15%	
Exam 1	20%	Tuesday, March 25, 2008, 7:00-9:00 PM
Exam 2	20%	Tuesday, May 6, 2008, 7:00-9:00 PM
Final Exam	25%	Monday, June 9, 2008, 7:30-10:30 AM

**Attendance:** attendance is required by all students. Official excuse for an authorized absence must be presented to the instructor no later than one week following the absence. More than 6 unexcused absences lead to a “DN” grade.

## 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 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"> <li>• Spanning tree</li> <li>• IP addressing</li> <li>• Traffic flow analysis</li> <li>• Performance evaluation</li> <li>• Network reliability</li> </ul>
2. Ability to analyze and design an enterprise network that meets desired requirements.	<ul style="list-style-type: none"> <li>• Network Development Life Cycle</li> <li>• Request for Proposal (RFP)</li> <li>• Network Analysis and Design methodology and process</li> <li>• Requirement analysis phase</li> <li>• Logical design phase (hierarchical model, backbone, redundancy, security, etc)</li> <li>• Physical design phase (structured cabling, etc.)</li> <li>• Assessment of the design</li> <li>• Project and case studies</li> </ul>
3. Ability to function as an effective team member in the analysis and design of an enterprise network.	<ul style="list-style-type: none"> <li>• Some assignments are done by teams</li> <li>• Project of an enterprise network analysis and design is assigned to teams</li> </ul>
4. Ability to identify, formulate, and solve network design problems	<ul style="list-style-type: none"> <li>• Network topology design problems</li> <li>• Terminal assignment problem</li> <li>• Concentrator location problem</li> <li>• Project and case studies</li> </ul>

5. Ability to demonstrate self-learning capability.	<ul style="list-style-type: none"> <li>• Ability to learn a course topic alone (e.g. concentrator location)</li> <li>• Assignment(s) on different design methodologies</li> <li>• Course Project may involve topics not studied in the course (e.g., requirement analysis, market survey)</li> </ul>
6. Ability to use techniques, skills, and modern networking tools necessary for network analysis, design, and management.	<ul style="list-style-type: none"> <li>• Guidelines and best practices for network analysis and design</li> <li>• SNMP protocol for managing a network</li> </ul>

## 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.