

**CS 4411: Computer Networks (4)****Catalog Description:**

In-depth experience with telecommunications fundamentals, including voice-video-data transmission in LAN and Internet. Network protocol analysis and implementation. Network layered architecture and abstractions. Installation, configuration, systems integration, and management of the technologies.

**Textbook:** James Kurose and Keith Ross, *Computer Networking: A Top-Down Approach Featuring the Internet*, 2<sup>nd</sup> Ed. Addison-Wesley, 2002.

**Course Goals:**

This course provides a top-down approach to the study of computer networking that begins with application-layer protocols and then works down the problem stack. It puts an emphasis on application-layer paradigms and application layer interfaces.

**Prerequisites by Course & Topic**

CS 3011: Information Technology Hardware and Software – principles of computer systems hardware and software.

**Major Topics Covered in the Course**

- Networking Foundation
- Application Layer
- Transport Layer
- Network Layer and Routing
- Link Layer and Local Area Networks
- Security in Computer Networks
- Network Management

**Class/Laboratory Schedule:** Lecture: 3 hours per week, Laboratory: 1

**Course Outcomes**

1. Familiarity with networking terms and symbols.
  - a. Provide a high level graphical description of the Internet architecture.
  - b. Describe general network performance.
  - c. Calculate transmission delays in different contexts.
  - d. Explain and apply service models.
2. Understanding of network layers and their respective functionality and protocols.
  - a. Describe the Internet layered architecture.
  - b. Describe network layers based on functionality.
3. Ability to handle technical details of different network applications.
  - a. Describe HTTP, DNS and e-mail protocol.
  - b. Write basic network code using sockets.
4. Capacity to implement reliable communication services.
  - a. Model client/server dynamics.
  - b. Describe typical message sequences.
  - c. Write client/sever basic code.
5. Familiarity with packet routing algorithms.
  - a. Estimate link state tables.
  - b. Estimate vector distances.
  - c. Describe router organization and functionality.
6. Ability to implement security mechanisms.
  - a. Evaluate reliability of network services.
  - b. Decide security requirements according to applications.
7. Ability to perform network management.
  - a. Configure network hardware and user groups.

- b. Assign access privileges.

### Relationship to Program Outcomes

Prerequisites to CS 3011 include information technology hardware and software. This course contributes to meeting the following program outcomes:

2. *Students can design, develop, and analyze significant software systems*

Students gain depth in the field of software analysis, design and maintenance, while implementing code that involves sockets. All course outcomes contribute to this program outcome.

3. *Students understand the fundamentals of computer organization and architecture, data structures and related algorithms, and programming languages.*

Students gain experience in data structures and algorithms while designing communication protocols. Also, students apply computer organization concepts while studying an application-specific computer: the router. All course outcomes contribute to this program outcome.

4. *Students can apply computer science principles and practices to a variety of problems.*

Students do programming assignments involving input parsing and event-driven organization. All course outcomes contribute to this program outcome.

5. *Students can work independently and also work effectively in teams.*

Students gain additional experience working independently, and in teams and on projects. Course outcome 6 contributes to this program outcome.

### Assessment Plan for Course:

This course is assessed every third year by the instructor and a course assessment document covering all of the course outcomes and their effect on the program outcomes is prepared.

### Estimate CSAB Category Content

	CORE	ADVANCED		CORE	ADVANCED
Data Structures		1	Computer Organization and Architecture Concept of Programming Languages		1
Algorithms		1			
Software Design		1			

**Coordinator/Prepared by:** G. Shute