

CS 5651: COMPUTER NETWORKS

Catalog Course Description

Introduction to computer networking and associated software protocols. Network reference models and layered architecture. Network services and applications. Design of computer networking software. Quality of service concepts.

Prerequisites: CS 2511, CS 2521

Course Outcomes

Students who finish this course satisfactorily will be able to:

1. Familiarity with networking fundamentals.
 - a. Understand layering and protocol principles.
 - b. Understand the distribution of network services among layers.
 - c. Describe Internet architecture.
 - d. Describe general communication performance.
2. Familiarity with Ethernet and wireless networks.
 - a. Describe standard mechanisms of media access control.
 - b. Describe the principles of reliable transmission.
 - c. Plan a local area network with different users, hosts and services.
3. Ability to deal with different communication services.
 - a. Establish the differences between data grams and virtual circuits.
 - b. Describe ATM networks and their possible use in the Internet.
4. Ability to implement routing mechanisms.
 - a. Describe the elements of addressing and routing.
 - b. Describe hierarchical addressing and its implementation in the Internet.
5. Ability to design and modify end-to-end protocols.
 - a. Develop software to establish and tear out a connection.
 - b. Handle TCP transmission rules.
 - c. Develop code for remote procedure calls.
6. Ability to apply network congestion reduction mechanisms.
 - a. Understand the principles of queuing.
 - b. Apply the mechanisms of congestion avoidance to specific scenarios.
7. Familiarity with end-to-end data standards.
 - a. Write scripts using XML markup language.
 - b. Write code to handle multimedia data in original and compressed formats.
8. Proficiency in applying network security mechanisms.
 - a. Analyze and design cryptographic algorithms.
 - b. Plan for the use of firewalls.

Relationship to Program Outcomes

Prerequisites to CS 5651 include systems analysis and design and computer organization and architecture. This course contributes to meeting the following program outcomes:

b. Students can design, develop, and analyze significant software systems.

Software and its implementation play an important role in a systems approach to understanding computer networks. Students gain depth in the field of software analysis, design and testing, while programming communication protocols and modifying existing code.

c. 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 studying communication protocols. Also, students apply computer organization concepts while studying an application-specific computer: the router, and network interface cards.

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

Students have the opportunity to apply graph theory, queuing, probabilities and combinational theory to several networking problems such as addressing, routing and congestion control.

e. Students can work independently and also work effectively in teams.

Students gain additional experience working independently, and in teams, on projects and presenting the results to the class as a whole.