CSCE 47503 Computer Networks (3 credits), Required CS, Selected Elective CE

Catalog Description: This course is an introductory course on computer networks. Using the Internet as a vehicle, this course introduces the underlying concepts and principles of modern computer networks, with emphasis on protocols, architectures, and implementation issues. Students cannot receive graduate credit for CSCE 47503 Computer Networks.

Prerequisites: CSCE 31903 Programming Paradigms or CSCE 319H3 Honors Programming Paradigms, each with a grade of C or better.

Corequisites: None

Textbook/required material: James F. Kurose and Keith W. Ross, *Computer Networking: A Top-down Approach*, 8th ed., Hoboken, New Jersey: Pearson, 2021.

Goals: The goal of the class is for students to understand the application, transport, network, link, and physical layers of a computer network.

Student Learning Outcomes. By the end of this course, students will be able to:
- Describe packet switching, circuit switching, datagram networks, and virtual circuit packet switching
- Define a protocol.
- Solve transmission delay and propagation delay problems.
- List attacks on computer networking systems.
- Describe the HTTP, SMTP, POP3, IMAP, and DNS protocols.
- Write a client-server socket program.
- Describe the UDP and TCP transport protocols.
- Describe NAT, IP version 4, and IP version 6.
- Calculate appropriate CIDER addresses, subnet addresses, and network masks for given network configurations.
- Classify different categories of routing algorithms.
- Describe media access control (MAC) protocols such as ethernet.

Topics covered: (2.5 hours = 1 week and total hours must equal 37.5 hours)
- Computer Networks and the Internet Introduction (5 hours)
- Client/server model, socket programming, and popular Internet application-layer protocols such as HTTP, SMTP, and DNS (10 hours)
- Principles of reliable data transfer and the two transport-layer protocols TCP and UDP (10 hours)
- Principles of datagram and virtual circuit packet networks, routing algorithms, IPv4, and IPv6 (10 hours)
- Principles of different types of multiple access protocols, Ethernet, bridges, and switches (2. 5 hours)

Grading
Course grades will be determined by these weights:
Homework:	20%
Quizzes:	30%
Exam 1:	25%
Final:	25%

The final class grade will be assigned according to the 10-point scale shown below. The grades may or may not be curved.
A	90 – 100%
B	80 – 89.9%
C	70 – 79.9%
D	60 – 69.9%
F	< 60%

Class/laboratory schedule: Meets either 3 times a week for 50 minutes or 2 times a week for 1 hour 15 minutes for 15 weeks.

Relationship of course to ABET Computer Engineering Student Outcomes:
- CE1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- CE2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- CE6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

Relationship of course to Computer Science Student Outcomes:
- CS1. An ability to analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
- CS2. An ability to design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
- CS6. An ability to apply computer science theory and software development fundamentals to produce computing-based solutions.

Relationship of course to ABET Computer Science Topics:
- T2. Principles and practices for secure computing.
- T8. Networking and communication.

Prepared by: Dale Thompson   **Date**: December 31, 2024