

## CMSE 346 Computer Networks & Communications

**Department:** Software Engineering

**Instructor Information:**

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**Office:** CMPE 114

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**Assistant Information:**

Magret Oladunjoye : Office: CMPE 123

**Meeting Times and Places:**

Monday: 08:30-10:20 (Room 128)

Wednesday: 08:30-10:20 (Room 128)

Friday: 10:30-12:20 (Lab 134)

**Program Name:** Computer/Software Engineering

**Program Code:** 29

**Course Code:**

CMPE 344/CMSE 346

**Credits:**

4

**Year/Semester:**

2023-2024 Fall

Required Course     Elective Course    (click on and check the appropriate box)

**Prerequisite(s):**

CMPE 242 Operating Systems

MATH 322 Probability and Statistical Methods

**Catalog Description:**

Introduction to fundamental concepts of computer networks. Basic performance and engineering trade-offs in the design and implementation of computer networks. Network hardware/software, protocols and layers, OSI and TCP/IP reference models. Data link layer design issues including encoding, framing, error detection, reliable delivery, and multiple access. Multiplexing, switching, and routing. LANs, wireless LANs, cellular networks. TCP/IP protocol family. Network applications. New trends in computer-communication networks.

**Course Web Page:**

<https://staff.emu.edu.tr/muhammedsalamah/en/teaching/cmse346>

**Textbook(s):**

L. L. Peterson and B. S. Davie, *Computer Networks: A Systems Approach*, 6th ed., Morgan Kaufmann, 2021.

Available online at: <https://book.systemsapproach.org/>

**Supplemental Text:**

J. F. Kurose and K. W. Ross, *Computer Networking: A Top-Down Approach*, 8th ed., Pearson, 2021.

**Topics Covered and Tentative Class Schedule:**

**(4 hours of lectures per week)**

**Week 1**    *Foundations: Layering and protocols, multiplexing (Ch. 1: Read 1.1-1.5)*

**Week 2**    *Network performance, statistical multiplexing (Ch. 1 continued)*

**Week 3**    *Link layer services, effect of errors on communication (Ch. 2: Read 2.1, 2.5-2.8. For Sections 2.2-2.4, only essential concepts available in lecture notes)*

**Weeks 4-5**    *Ethernet: physical properties, multiple access (Ch. 2 continued)*

**Week 6**    *Wireless technologies: Bluetooth, Wi-Fi, cellular; Fiber optics: Passive Optical Networks (Ch. 2 continued)*

**Week 7**    *Packet switching concepts, bridges and LAN switches (Ch. 3: Read 3.1-3.2)*

**Weeks 8-9**    *MIDTERMS (16 April-30 April 2022)*

**Weeks 10-11**    *Internetworking with IP (Ch. 3: Read 3.3, 3.5. For Section 3.4, only essential concepts available in lecture notes)*

**Week 12**    *Address translation, host configuration, VPNs, IPv6 (Ch. 3 continued, Ch. 4: Read 4.1-4.2)*

**Week 13**    *End-to-end protocols: UDP, TCP, SCTP, QUIC, and RTP (Ch. 5: Read 5.1, 5.2.1, 5.2.2, 5.2.10, 5.4)*

**Week 14**    *A brief overview of the application layer, real-time multimedia communications, streaming, and content distribution networks (Ch. 9: Read 9.1-9.4)*

**Lab Schedule:**

There are no exemptions from labs. Consult the course Web site for details of lab assignments and other lab policies. (Read Textbook Chapter 1.5 for background information on socket programming.)

- Lab 1: *(A detailed schedule to be announced by the Assistant)*
- Lab 2:
- Lab 3:
- Lab 4:
- Lab 5:
- Lab 6:

**Course Learning Outcomes:**

Upon successful completion of the course, students are expected to have the following competencies:

- (1) use tools for evaluation of real-world network systems using Wireshark
- (2) describe factors affecting network performance (bandwidth, latency, delay-bandwidth product);
- (3) describe large scale network issues;
- (4) explain fundamental principles of layered network protocol architectures;
- (5) describe functions of layers in OSI and TCP/IP protocol stacks;
- (6) explain key networking concepts such as multiplexing, multiple access, switching, bridging, and addressing;
- (7) classify automatic repeat request (ARQ) protocols (stop-and-wait and sliding window);
- (8) describe protocols for wired/wireless medium access (CSMA/CD and CSMA/CA);
- (9) explain issues related to virtual circuit switching and packet switching;
- (10) classify addressing in IP networks, subnets, classless routing and longest prefix match;
- (11) classify connection-oriented and connectionless services provided by TCP/IP;
- (12) describe application layer protocols and domain name system (DNS)

	Method	No	Percentage
<b>Assessment</b>	Midterm Exam	1	35%
	Final Exam	1	45%
	Labs	6	20%

**Attendance and Participation:** Attendance to every lecture is mandatory.

**NG Policy:** Receiving zero from or missing any of the components (midterm, final, lab) used in determination of the letter grade or attending <50% of the lectures may result in an NG if the accumulated total mark in the course is <50%.

**Make-Up Policy:** Only one **comprehensive** make-up examination will be given for a missed midterm or final **only under exceptional/extenuating circumstances** (e.g., hospitalization, loss of a close relative, etc.). In these cases, students must submit a petition with related official reports to me within the next three working days following the missed exam. Note that minor ailments are not considered as exceptional/extenuating circumstances. Eligibility to take the make-up exam **will be subject to my final approval**.

**Academic Dishonesty:** Any conduct that attempts to gain unfair academic advantage is considered academic dishonesty. Copying labs and assignments, cheating during exams, substituting for another person are some examples of academic dishonesty. Cases of academic dishonesty will not be tolerated and will be punished according to EMU's disciplinary policies.

**Relationship of the course to Student Outcomes**

The course has been designed to contribute to the following student outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

**Prepared by:** Prof. Dr. Muhammed Salamah

**Date Prepared:** 02 October 2023