

CSCE 462/862 – Communication Networks

Fall 2023

MWF 12:30PM – 1:20PM
Room 19, Avery Hall

Instructor

Dr. Massimiliano Pierobon
Associate Professor
Department of Computer Science and Engineering
University of Nebraska-Lincoln
Lincoln, NE 68588

Office: 104 Schorr Center
Office Hours: M W 11:00AM – 12:00PM or by appointment.
Tel: (402) 472-5021
Fax: (402) 472-7767
Web: <http://cse.unl.edu/~pierobon/>
E-mail: maxp@unl.edu

Teaching Assistants

Mohsen Bagheri
Office: TBD
Office Hours: TBD or by appointment.
E-mail: mbagheri2@huskers.unl.edu

Face Covering Requirement

An individual in this course has a documented need for face coverings to be required in this course. Without divulging personal or identifying information, such a documented need might be that a member of their household is unable to be vaccinated or has a health condition that makes vaccines less effective for them. As a result, **the College of Engineering has determined that face coverings will be required in this course.** If you are unwilling to comply with this requirement, please visit with your advisor about different sections or possible alternative courses that you might take in lieu of this one.

Description

This course will introduce the students to the architecture of communication networks, a voyage to the heart of our cyber society, revealing the under-the-hood secrets of one of the largest and most complex systems ever engineered: the Internet. We will delve into the fascinating world of the latest internet applications (VoIP, YouTube, Netflix) and see how they actually work. We will uncover the secrets of a transport protocol: how two entities can communicate reliably over a

medium that may lose and corrupt data. Then, we will look at how a piece of information (packet) from your home can take an intricate route around the world to go to your friend down the road. We will then study how a many computers connected to the same link can diligently transmit messages without interfering, and how a corrupted message can be restored to its original state through both simple and sophisticated techniques. We will finish by studying how a message is physically propagated between a transmitter and a receiver, and some of the principles of Wireless, Mobile, and Sensor Networks (WiFi, 3G, and 4G), keeping always an eye to everyday practical use cases.

Prerequisites

- Data Structures and Algorithms (CSCE 310/310H) or Data Structures and Algorithms for Informatics (CSCE 311) or Foundations of Computer Science (RAIK 283/283H, JDEP 283/283H)
- Computer Organization (CSCE 230/230H) or Foundations of Computer Systems (RAIK 284/284H, JDEP 284/284H)
- Statistics/Probability: STAT 380 or ELEC 305 or RAIK 270H

Or consult with the course instructor by email or appointment.

Required Textbook

Computer Networking: A Top-Down Approach
7th Edition, by James F. Kurose and Keith W. Ross
(ISBN-10: 9780133594140 • ISBN-13: 978-0133594140)

Optional Textbooks

Communication Networks: Fundamental Concepts and Key Architectures
by Alberto Leon-Garcia and Indra Widjaja

Computer Networks
by Andrew S. Tanenbaum, David J. Wetherall

Computer Networks: A Systems Approach
by Larry L. Peterson and Bruce S. Davie

Course Topics

1. Introduction to Communication Networks and the Internet
2. The Application Layer
3. The Transport Layer
4. The Network Layer
5. The Link Layer
6. The Physical Layer
7. Advanced Communication Network Topics

- a. Wireless Networks
- b. Multimedia Networking

462 Vs. 862

This course will not have major differences between the 462 and 862 versions in the delivery of the content. Instead, some selected questions in the homework assignments/exams and the course project will be mandatory for 862 students, and optional for 462 students.

Course Organization

- **Lectures**
 - Lectures will be in person following the course schedule.
- **TWO Exams**
 - Midterm Exam
 - Final Exam
- **6 Homework Assignments and Weekly Quizzes**
 - To be solved individually
- **4 Programming assignments**
 - Based on a network simulation environment
 - To be solved individually
 - Will help you consolidate the concepts seen in class in a more practical and engaging way
- **Course Project (optional for undergrads)**
 - Create small projects using simulators, code etc. applying the theory learned in class

or

 - Term papers on a hot topic of recent interest in the field
 - To be worked on by **groups of 2-3 people (for project)** and **individually (for term paper)**
 - Will help you consolidate the concepts seen in class in a more practical and engaging way

Grade Distribution

862 Students:

- **Quizzes (in class): 10%**
- **Assignments: 30%**
- **Project or Term Paper: 15%**
- **Midterm Exam: 20%**
- **Final Exam: 20%**
- **In-class Participation and Professionalism: 5%**

462 Students:

- **Quizzes (in class): 10%**
- **Assignments: 35%**
- **Midterm Exam: 25%**

- **Final Exam: 25%**
- **In-class Participation and Professionalism: 5%**

462 students who turn in the course project will receive a maximum bonus of 10% (10% of the project score) on the final grade.

Final letter grades will be assigned tentatively based on the following scale:

A+: ≥ 100	A: 97% to 100%	A-: 94% to 96%
B+: 90% to 93%	B: 87% to 89%	B-: 84% to 86%
C+: 80% to 83%	C: 77% to 79%	C-: 74% to 76%
D+: 70% to 73%	D: 67% to 69%	D-: 64% to 66%

F: $\leq 63\%$

Assessment Plan

Exams

There will be TWO exams.

The exams will be OPEN NOTES: students are allowed to use class notes on your computer but are not allowed to use Internet (Google, etc.). The exam will include both open-ended, and multiple-choice questions.

Assignments and quizzes

Assignment submissions will be through **Canvas**.

Late assignment is penalized 10% per day, and no homework will be accepted after the solution is posted online (a week from the homework submission deadline).

Project

There will be half-semester-long projects, focused on the research of material from the available literature, analysis and presentation to the class (at the end of the semester) of a specific topic chosen from those introduced in the class. The project will be assigned to students divided into teams according to the class size and should be executed through a review-style paper and an oral presentation at the end of the course. The presentation will be performed within the dead week, and it will be followed by technical questions from the instructors (oral exam).

Make-up Exam Policy

Students who cannot participate to an exam at the scheduled date should contact the instructor ahead of time to plan for a make-up exam.

Students who wish to make up for a low score in the Midterm

Exam can do so at the time of the Final Exam by completing the Make-up Midterm Exam portion during the allotted time.

Additional Materials

All the following additional materials will be available in Canvas:

- Lecture slides
- Additional reading resources
- Homework assignments and quizzes
- Programming assignments and software

Attendance

Attendance at all officially scheduled class meetings (class and lab sections) is expected. Students are responsible for knowing all material discussed in class meetings. Changes to class lectures and assignments will be announced in class and Canvas.

Academic Integrity

All homework assignments, quizzes, exams, etc. must be the student's own work. No direct collaboration with fellow students, past or current, is allowed unless otherwise stated. The Computer Science & Engineering department has an **Academic Integrity Policy**:

http://cse.unl.edu/ugrad/resources/academic_integrity.php

All students enrolled in any computer science course are bound by this policy. You are expected to read, understand, and follow this policy. Violations will be dealt with on a case-by-case basis and may result in a failing assignment or a failing grade for the course itself.

Dealing with Stress and Adversity

UNL offers a variety of options to students to aid them in dealing with stress and adversity. [Counseling and Psychological Services](#) (CAPS) is a multidisciplinary team of psychologists and counselors that works collaboratively with Nebraska students to help them explore their feelings and thoughts and learn helpful ways to improve their mental, psychological and emotional well-being when issues arise. CAPS can be reached by calling 402-472-7450. [Big Red Resilience & Well-Being](#) provides fun events, innovative education, and dynamic services to help students understand emotions, manage stress, build strength, connect with others, develop grit and navigate transitions.

Students with

Students with disabilities are encouraged to contact the

Disabilities

instructor for a confidential discussion of their individual needs for academic accommodation. This includes students with mental health disabilities like depression and anxiety. It is the policy of the University of Nebraska-Lincoln to provide individualized accommodations to students with documented disabilities that may affect their ability to fully participate in course activities or to meet course requirements. To receive accommodation services, students must be registered with the Services for Students with Disabilities (SSD) office, 232 Canfield Administration, 472-3787.

Suggestion Box

The CSE Department has an **anonymous suggestion box** (<http://cse.unl.edu/department/suggestion.php>) that you may use to voice your concerns about any problems in the course or department if you do not wish to be identified.

Stay Up-to-date

It is CSE Department policy that all students in CSE courses are expected to regularly check their email so they do not miss important announcements.

CSE Resource Student Center

The CSE Student Resource Center (Avery Hall 13A) is intended to provide UNL Computer Science and Computer Engineering majors who are new to the program with a set of resources that will help them assimilate to college life and encourage them to continue their study of Computer Science and Computer Engineering (<http://cse.unl.edu/src>).

This syllabus will be updated and expanded as the semester progresses.