ECE422 Computer Communication Networks (3-0-3)

T: 1:00 pm -2:20 pm (KUPF 209) and R: 4:00 pm - 5:20 pm (KUPF 209)

Instructor: Roberto Rojas-Cessa;

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Room: ECEC 323

Zoom: Provided in class and on Canvas
Website for access to materials: NJIT Canvas

Office hours: M: 10:00-11:00am (Zoom) and R: 5:30 pm- 6:30 pm (Zoom/ECEC 323)

Other times by appointment.

Textbook: Computer Networks: A System Approach, Larry Peterson and Bruce Davie, 6th Edition, Morgan Kaufmann, **SBN-10:** 0128182008

Course Description:

Introduction to the fundamental concepts of computer communication networks. Topics include the OSI reference model, and schemes, algorithms, protocols, and standards used at the physical, data link, network, and transport layers, TCP/IP and more.

Corequisite: none (however, ECE429 Lab can be taken at the same time).

Computer Usage in course: Various freeware software packages needed in the class projects, and personal laptops (tablets and cellphones may be useful for e-quizzes).

Specific Course Learning Outcomes (CLO):

The student will be able to

1. Define and recognize the basic elements of communication networks
2. Recognize modeling of packet networks
3. Know and understand of layering, and the utilization of some interfacing devices such as bridges, switches and routers
4. Be familiar with TCP/IP suite
5. Understand the effect of network topologies and how packet networks work

6. Distinguish different cyber threats to networking, and preventive measures
7. Discuss the need and formats of wireless communications in networking
8. Define and select among the many encoding techniques used to minimize errors in networking
9. Present in front of peers a practical implementation of the knowledge acquired in the course (implementation of servers, programming of routers suitable for a given application, and other topics of networking)

Relevant Student Outcomes:

1. An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics (CLOs 2, 4, 7, 8, 9, 10).
2. An ability to apply both analysis and synthesis in the engineering design process, resulting in designs that meet desired needs (CLOs 2, 5, 10).
3. An ability to recognize the ongoing need for additional knowledge and locate, evaluate, integrate, and apply this knowledge appropriately. (CLOs 3, 6, 7, 8, 9, 10)
4. An ability to function effectively on teams that establish goals, plan tasks, meet deadlines, and analyze risk and uncertainty. (CLO 10).

Tentative Outline (contents and time spent may vary according to the response of the class).

Week	Content
1	Historical Review of Communication Networks and Internet
2	Layered Model -Open System Interconnection and TCP/IP Suite Protocols and Standards
3	Properties of Communication Networks Parameters and evaluation of network performance
4	Data-Link Layer

5	Control information in L2 /ARP/Midterm 1
6	Network Layer (L3): Addressing and Network Planning
7	Routing and Forwarding
8	Routing Protocols
9	Control Protocols in Network Layer - ICMP
10	Midterm 2/ Multicast
11	User Defined Protocol (UDP) and TCP (I)
12	TCP– flow control – congestion avoidance methods
13	Application Layer – HTTP, DNS, Email
14	Project
15	Final Exam

Grading Policy:

Exams: Exam 1: 15%, Exam 2: 15%, Final: 20% (Total: 50%)

Quizzes, Homework: 15%

Participation, contribution to the class, presentations: 10%

Project: 20%

Initiative and leadership: 5-10%

Honor Code: The NJIT Honor Code will be upheld, and any violations will be brought to the immediate attention of the Dean of Students.

The following may be examples of violations:

Academic misconduct: it may include misrepresentation, deception, dishonesty, or any act of falsification committed by a student to influence a grade or other academic evaluation. Academic dishonesty also includes intentionally damaging the academic work of others or assisting other students in acts of dishonesty. Common examples of academically dishonest behavior include, but are not limited to, the following:

1. **Cheating:** intentional use of unauthorized materials, such as notes, books, electronic media, or electronic communications in an exam; talking with fellow students, a person affiliated or not affiliated to the class about an evaluation tool or exam, or looking at another person's work during an exam; submitting work prepared in advance for an in-class examination; having someone take an exam for you or taking an exam for someone else; violating other rules governing the administration of examinations. The same applies to homework and quizzes. The instructor may indicate whether an activity is to be performed individually or by teams.
2. **Fabrication of information:** including but not limited to, falsifying experimental data and/or citations, or write/state a knowingly incorrect claim.
3. **Plagiarism:** intentionally or knowingly representing the words or ideas of another as one's own in any academic exercise; failure to attribute direct quotations to original work, to paraphrased or borrowed facts or information without proper citation. Citation means to indicate where and who provided the original source of ideas, data, phrases, or information. Copying somebody else homework is considered plagiarism (and duplication of work), and misleading.
4. Unauthorized collaboration: working together on work that was meant to be done individually. e. Duplicating work: presenting for grading the same work for more than one project or in more than one class, unless expressed by the instructor. In this class, no homework from different students is expected to be the same. Teams of students working together per assignment will submit a single document in all cases.