

CPE 400/600 Computer Communication Networks

Department of Computer Science & Engineering
UNR, Fall 2009

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Course Information

- **Credits:** 3.0
- **Class hours:** Tuesday & Thursday, 9:30 - 10:45am, SEM 261
- **Call numbers:**
 - CS 446: #28036 (max. enrollment 30)
 - CS 646: #32726 (max. enrollment 10)

- **Instructor:** Dr. Murat Yuksel
- **E-mail:** yukse@cse.unr.edu
- **Phone:** (775) 327-2246
- **Web page:** <http://www.cse.unr.edu/~yukse>
- **Office:** SEM 237 (Scrugham Engineering-Mines)
- **Office hours:**
 - Tuesday, 11am-12:30pm
 - Wednesday, 3-5pm
 - Thursday, 11am-12:30pm
 - or by appointment

Description

Digital modulation, transmission and synchronization, coding, error detection, interfacing, computer networks, ISO model, circuit/packet switching, local area networks.

Prerequisites

- Introduction to Computer Engineering (CPE 201).
- C/C++ or Java programming experience in UNIX-like environment

Textbooks

• Required Textbooks

- J. F. Kurose and K. W. Ross. (2010) [Computer Networking: A Top-Down Approach](#), 5th Edition. Addison-Wesley. (ISBN: 0-13-607967-9)

• Recommended Textbooks

- B. A. Forouzan. (2007) [Data Communications and Networking](#), 4th Edition. McGraw Hill. (ISBN: 0072967757).

Syllabus (Tentative)

This is a tentative list of topics, subject to modification and reorganization.

1. Introduction to Computer Networks

- Internet
- Delay, Loss, and Throughput
- Protocol Layers and Service Models

2. Application Layer

- Web: HTTP
- File Transfer: FTP
- Electronic Mail
- Domain Name Service
- Peer-to-Peer Applications
- Socket Programming

3. Transport Layer

- Multiplexing and Demultiplexing
- Connectionless Transport: UDP
- Reliable Data Transfer
- Connection-Oriented Transport: TCP
- Congestion Control

4. Network Layer

- Virtual Circuit and Datagram Networks
- Routers
- Internet Protocol
- Routing Algorithms

5. Link Layer

- Error-Detection and -Correction Techniques
- Multiple Access Protocols
- Ethernet
- Link-Layer Switches

6. Physical Layer

- Data and Signals
- Digital and Analog Data
- Encoding
- Bandwidth Utilization
- Transmission

Organization

- **WebCT** Except this web page, all course materials will be posted at the [WebCT](#).
- **Lab Assignments** There will be four network lab assignments where you will have hands-on experience with protocols. The lowest graded one will not affect your overall grade. These assignments will require you to use [Wireshark](#) packet sniffing tool to analyze communication between two nodes.
- **Project** There will be a project involving quite a bit of programming. It will require turning in code that compiles and runs properly and a report documenting the program (specifications, implementation, user manual, etc.). Note that knowledge of C/C++ or Java is required for the project.
- **Quizzes** There will be a few in-class quizzes. Exact date for some of these quizzes will not be exposed beforehand. These quizzes will be open book/notes and extremely time-constrained, i.e., 15-30mins. Questions in these quizzes will be designed to give you an opportunity to test and affirm your knowledge of the course content.
- **Activities** There will be three in-class activities. There will be a quiz associated with each of these activities. The activities will require participation from every student.
- **Homework** There will be homework assignments approximately one in every month. The lowest graded one will not affect your overall grade.

- **Late policy** Late assignments will be penalized according to the [sliding scale](#) below. If I am not available, ask department secretary to stamp late assignments and then place them in my mailbox. You are responsible to make sure the stamp has both the date and the time.
- **Exams** There will be one midterm exam and one final exam (see [Schedule](#) for tentative dates). All exams will be open book/notes.
- **Academic Integrity** There will be no team projects or reports in this class, therefore all assignments and exams must be prepared strictly *individually*. Any form of cheating such as plagiarism or ghostwriting will incur a severe penalty, usually failure in the course. Please refer to the [UNR policy on Academic Standards](#).
- **Disability Statement** If you have a disability for which you will need to request accommodations, please contact the instructor or someone at the Disability Resource Center (Thompson Student Services - 107) as soon as possible.

Grading (Tentative)

Both grading policy and scale are subject to change. **Failure in either the programming (i.e., lab assignments + project) or the tests (i.e., quizzes + homework + midterm exam + final exam) will result in failure in the course.**

• Grading Policy

Lab Assignments	15%
Project	15%
Quizzes	10%
Homework	10%
Midterm Exam	20%
Final Exam	25%

• Late Assignment Policy

less than 1 day late	25% deducted
between 1 and 2 days late	50% deducted
between 2 and 3 days late	75% deducted
over 3 days late	100% deducted

• Grading Scale (Tentative)

90% - 100%	A-, A
80% - 89%	B-, B, B+
65% - 79%	C-, C, C+
55% - 64%	D
0% - 54%	F

Note: Saturdays and Sundays do not count toward missed days. For example, there is 1 "day" between Friday, 2pm and Monday, 2pm. Similarly, there is 1 day between Monday, 2pm and Tuesday, 2pm.

Important Note: Re-grading requests can only be made within the first week after the graded assignments/tests are returned to the students.

Schedule (Tentative), Notes & Assignments

This is a tentative schedule including the exam dates. It is subject to readjustment depending on the time we actually spend in class covering the topics. Slides presented in class and assignments will be posted at the [WebCT](#). See the [acknowledgment](#) for the course materials. **Permanent reading assignment: it is assumed that you are familiar with the contents of the slides of all past meetings.**

Date	Lectures	Assignments & Notes
Tue, Aug 25	Lecture #1 : Introduction	
Thu, Aug 27	Lecture #2 : Basic Network Concepts	
Tue, Sep 1	Lecture #3 : Protocol Layers & Service Models	
Thu, Sep 3	Lecture #4 : Application Layer (1) – Introduction, HTTP	
Tue, Sep 8	Lecture #5 : Application Layer (2) – FTP, E-mail, DNS	
Thu, Sep 10	Lecture #6 : Application Layer (3) – DNS, Peer-to-Peer	• Homework 1 out
Tue, Sep 15	Lecture #7 : Application Layer (4) – Socket Programming	• Lab Assignment 1 out

Thu, Sep 17	Project Discussion	<ul style="list-style-type: none"> • Homework 1 due • Project out
Tue, Sep 22	<u>Lecture #8</u> : Transport Layer (1) – Multiplexing, UDP	
Thu, Sep 24	<u>Lecture #9</u> : Transport Layer (2) – Reliability	• Lab Assignment 1 due
Tue, Sep 29	<u>Lecture #10</u> : Transport Layer (3) – TCP	• Homework 2 out
Thu, Oct 1	<u>Lecture #11</u> : Transport Layer (4) – Congestion Control	• Lab Assignment 2 out
Tue, Oct 6	<u>Lecture #12</u> : Transport Layer (5) – TCP Congestion Control	• Homework 2 due
Thu, Oct 8	Midterm Exam (in-class)	
Tue, Oct 13	<u>Lecture #13</u> : Network Layer (1)	
Thu, Oct 15	<u>Lecture #14</u> : Network Layer (2) – Virtual Circuits, Datagrams	• Lab Assignment 2 due
Tue, Oct 20	<u>Lecture #15</u> : Network Layer (3) – Routers, IP	
Thu, Oct 22	<u>Lecture #16</u> : Network Layer (4) – IP, ICMP	• Lab Assignment 3 out
Tue, Oct 27	<u>Lecture #17</u> : Network Layer (5) – Routing Algorithms	• Homework 3 out
Thu, Oct 29	<u>Lecture #18</u> : Network Layer (6) – Routing Protocols	
Tue, Nov 3	<u>Lecture #19</u> : Network Layer (7) – Broadcast, Multicast	
Thu, Nov 5	<u>Lecture #20</u> : Link Layer (1) – Error Detection and Correction	<ul style="list-style-type: none"> • Lab Assignment 3 due • Homework 3 due • Homework 4 out
Tue, Nov 10	<u>Lecture #21</u> : Link Layer (2) – MAC, ARP	
Thu, Nov 12	<u>Lecture #22</u> : Link Layer (3) – Ethernet, Switching	• Lab Assignment 4 out
Tue, Nov 17	<u>Lecture #23</u> : Link Layer (4) – Virtual Link	<ul style="list-style-type: none"> • Homework 4 due • Homework 5 out
Thu, Nov 19	<u>Lecture #24</u> : Physical Layer (1)	
Tue, Nov 24	<u>Lecture #25</u> : Physical Layer (2) – Data and Signals	• Lab Assignment 4 due
Thu, Nov 26	Thanksgiving Break – NO CLASSES	
Tue, Dec 1	<u>Lecture #26</u> : Physical Layer (3) – Digital Transmission	• Homework 5 due
Thu, Dec 3	<u>Lecture #27</u> : Physical Layer (4) – Analog Transmission	
Tue, Dec 8	Review	
Thu, Dec 11 (at 7:30am)	Final Exam (in-class)	

Acknowledgment

The slides and other materials for this course are in-part based upon the materials from a number of people/sources, including:

- Official website for the Kurose & Ross text: [Computer Networking: A Top-Down Approach](#)
- Mehmet H. Gunes from UNR: <http://www.cse.unr.edu/~mgunes/cpe400>

ABET Criteria

ABET Criterion 3 Outcomes	Course Outcomes	Assessment Methods/Metrics
c, e	Knowledge of the fundamental	<ul style="list-style-type: none"> • Define and explain the followings in written assignments and exams: <ul style="list-style-type: none"> ○ the origins and challenges of self-configuring communication network operation,

	components of a computer network.	<ul style="list-style-type: none"> ○ strategies and components of modern computer communication network systems, and ○ various tradeoffs between resource management techniques.
a, c, e	Ability to quantitatively evaluate different network protocols and applications.	<ul style="list-style-type: none"> • Solve and model quantitative performance evaluation methods of a communication network in written assignments and exams. • Design and implement resource management and scheduling algorithms of a computer network in programming assignments.

ABET Criterion 3 Outcomes:

- a) an ability to apply knowledge of mathematics, science, and engineering
- b) an ability to design and conduct experiments, as well as to analyze and interpret data
- c) an ability to design a system, component, or process to meet desired needs
- d) an ability to function on multi-disciplinary teams
- e) an ability to identify, formulate, and solve engineering problems
- f) an understanding of professional and ethical responsibility
- g) an ability to communicate effectively
- h) the broad education necessary to understand the impact of engineering solutions in a global and societal context
- i) a recognition of the need for, and an ability to engage in life-long learning
- j) a knowledge of contemporary issues
- k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

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