

ECE 6607 Syllabus

Computer Communication Networks (3-0-3)

August 19, 2019 - November 1, 2019, MW 9:30-11:30 (?), Classroom(?)

Instructor Information

Instructor
Prof. Min Luo

Email
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Office Hours & Location
[Location, Hours, Days - TBD]

General Information

Description

This course introduces the underlying concepts and principles of modern computer networks, with emphasis on protocols, architectures and implementation issues in the modern computer networking, especially the Internet.

Course Goals and Learning Outcomes

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 learn how/why these protocols and architectures work while understanding the principles and tradeoffs involved in building such protocols and architectures. The course also covers advance topics with latest developments such as software defined networking, wireless and mobile network, especially evolution to 4G and 5G technologies and beyond, multimedia networking.

Prerequisites

Basic understanding of computer systems, and proficiency in programming in C/C++/Java/Python.

Course Requirements & Grading

Required Text Book: *Computer Networking: A top-down approach featuring the Internet*, Kurose and Ross, 7th edition, Pearson, 2017.

Supplemental Material: Will be distributed to students on certain topics

Grading: Your final grade will be based on the following

- 30 % Midterm
- 40% Final
- 25% Homework
- 5% Class Participation

Extra Credit Opportunities: TBD

Grading Scale: Your final grade will be assigned as a letter grade according to the following scale:

A	90-100%
B	80-89%
C	70-79%
D	60-69%
F	0-59%

Course Expectations & Guidelines

Students shall treat their classroom obligations as they would any serious professional engagements:

- Preparing thoroughly for each session in accordance with the course calendar and instructor's request.
- Notifying the instructor in advance if missing a class.
- Staying on task during work sessions.
- Participating fully and constructively in all course activities and discussions.
- Adhering to deadlines and timetables established by the instructor.
- Displaying appropriate courtesy to all involved in the class sessions.
- Providing constructive feedback to the instructor regarding the class.

Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. For information on Georgia Tech's Academic Honor Code, please visit <http://www.catalog.gatech.edu/policies/honor-code/> or <http://www.catalog.gatech.edu/rules/18/>.

Any student suspected of cheating or plagiarizing on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services at (404)894-2563 or <http://disabilityservices.gatech.edu/>, as soon as possible, to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

Attendance and/or Participation

The instructor can observe and will record incidents of inattention, which will seriously impact the Homework/Attendance/Participation portion of your grade.

Collaboration & Group Work

You are welcome to collaborate with other students in this class on your homework assignments, but you must write up your own solutions to problems, based on your own understanding of the material.

Extensions, Late Assignments, & Re-Scheduled/Missed Exams

No late homework will be accepted without prior approval and arrangements.

Exams can be rescheduled if students have to deal with unexpected events with pre-approval from instructors.

Student-Faculty Expectations Agreement

At Georgia Tech we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. See <http://www.catalog.gatech.edu/rules/22/> for an articulation of some basic expectation that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

Disclaimer

This syllabus is provided for informational purposes regarding the anticipated course content and schedule of this course. It is based upon the most recent information available on the date of its issuance and is as accurate and complete as possible. The instructor reserves the right to make any changes deemed necessary and/or appropriate. The instructor will make his or her best efforts to communicate any changes in the syllabus in a timely manner. Students are responsible for being aware of these changes.

Course Topics and Schedule

Introduction - Networks and Internet

Reading: Kurose and Ross, Chapter 1

- What is Internet
- Edge and Core in modern intergalactic networks
- Delay, Loss and Throughputs
- Protocol Layers (OSI vs. Internet) and Network Service Models
- Brief History of Networking

Application layer

Reading: Kurose and Ross, Chapter 2

- Principles of Network Applications
- Web and HTTP
- SMTP and Email
- DNS
- Content Distribution Networks (CDN)
- Socket Programming (optional)

Transport layer

Reading: Kurose and Ross, Chapter 3

- Multiplexing and demultiplexing
- UDP
- Reliable data transfer
- TCP
- Congestion Control

Network layer - Data Plane

Reading: Kurose and Ross, Chapter 4

- Forwarding and routing
- Router
- IP, Ipv4 and Ipv6
- Data Plane in Software defined networking (SDN)

Network layer - Control Plane

Reading: Kurose and Ross, Chapter 5

- Routing Algorithms
- OSPF
- BGP
- Control plane in SDN
- ICMP and SNMP

Midterm Exam

Link layer and LAN

Reading: Kurose and Ross, Chapter 6

- Error Detection and Correction
- Multiple access links and protocols
- Switched LAN and VLAN
- Link Virtualization and MPLS
- Data center Networking

Wireless and mobile networks

Reading: Kurose and Ross, Chapter 7

- CDMA
- Wireless LANs and 802.11
- From 3G, 4G, to 5G and Beyond

Security

Reading: Kurose and Ross, Chapter 8

- Cryptography
- Message integrity and digital signature
- End-point authentication
- Securing Network Applications
- Securing Wireless LANs

Multimedia networking

Reading: Kurose and Ross, Chapter 9

- Streaming stored video
- Voice-over-IP
- Real time Conversational applications

Final Overview

Reading: Kurose and Ross, Chapter 1-9.

Final Exam