CNT 4704
Analysis of Computer Communication Networks

Lecture I: *Course Overview & Introduction*

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UCF

HOUSEKEEPING & ACKNOWLEDGEMENT

- An ample portion of the material is derived/borrowed from Copyrighted ppt. slides of J.F. Kurose, K.W. Ross 1996-2020. All Rights Reserved.
- Original material can be found on: https://gaia.cs.umass.edu/kurose_ross/ppt.htm

ABOUT MYSELF

- **Name:** Mesut Ozdag
- **Contact**: mesut.ozdag@ucf.edu
- **Office hours:** By appointment only
  - In person **(0R01)**: HEC-246C or via Zoom. Mo 3:00PM-4:00PM
  - Online **(0V61)**: Via Zoom meetings through Webcourses@UCF. In extreme situations, appointments can be made upon request through email or Webcourses at UCF.
  - For correspondence with instructor, if the student does not receive a reply within 48 hours, please resend it again.

ABOUT MYSELF

- **Education**
  - Ph.D., Computer Science at UCF, 2020
  - M.Sc., Computer Science at UCF, 2015
  - B.Sc., Mathematics and Computer Science at Istanbul Kultur University, 2010
- **Research Interests**
  - Algorithm Design and Deep Learning for Image Processing
  - Adversarial Attacks and Defenses in Deep Learning
  - Medical Image Analysis
  - Data Structures & Algorithm Design
  - Artificial Intelligence for FinTech
- **Other Experience**
  - Scientific Solutions Engineer at Flywheel.io, 2021-22
  - AI Algorithm Engineer at Roche Molecular Systems, 2020-21
  - Deep Learning Research Scientist Intern at Siemens Healthineers, 2018
- **Honors & Awards**
  - Best Paper Candidate AISafety at IJCAI, 2019
    - *On the Susceptibility of Deep Neural Networks to Natural Perturbations*
  - Graduated 3rd in department, Istanbul Kultur University, Mathematics and Computer Science, 2010

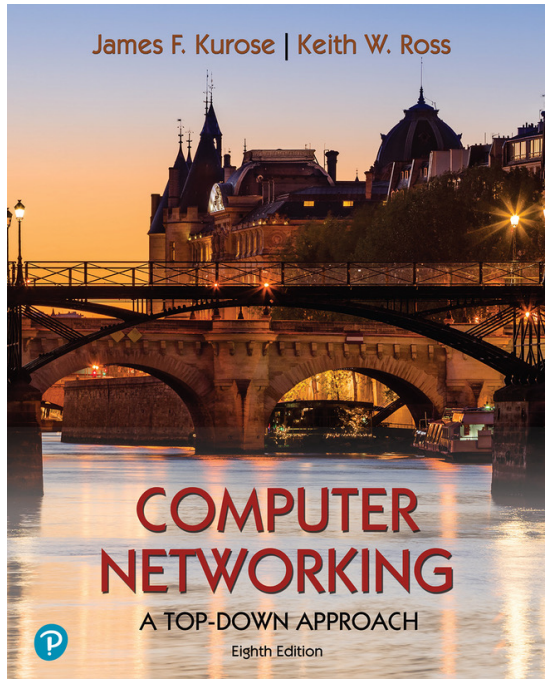
WHAT IS THIS COURSE ABOUT?

- Basic "**analysis**" (don't be scared by the course's official name)
- "**Introductory**" course in "computer networking"
- Focus on Internet architecture/protocols
  - TCP/IP; one networking programming project
  - One lab assignment
  - Email (spam), Web, Ethernet, hub, wireless LAN
  - One chapter on Internet security introduction
- concepts on wireless security
  - Cellular and mobile technologies
  - Wireless security

COURSE INFORMATION

❑Course material

- Textbook**:** Computer Networking: A Top Down Approach (8th edition), J.F. Kurose and K.W. Ross, Addison-Wesley Longman, 2020.
  - 7^{th} and 6^{th} editions are also sufficient.
- Online resources
- Class notes
- Lecture Video recordings



Computer Networking: A Top Down Approach

8th edition

Jim Kurose, Keith Ross

Pearson/Addison Wesley

April 2020

COURSE INFORMATION

❑ Prerequisites:

- (COT 3100C: Introduction to Discrete Structures or MAD 2104: Foundations of Discrete Math) and,
- (STA 2023: Statistical Methods I)
  - Each with a grade of "C" (2.0) or better
- C, C++, and Python programming skills
- Basic knowledge on Algorithms and OS
- Basic usage of Linux
  - Eustis account for networking programming (will be created after Add/Drop)

COURSE INFORMATION

- In programming assignments, you may implement a client process on **eustis.eecs.ucf.edu** and a server process on **eustis3.eecs.ucf.edu**, respectively, to communicate with each other.
- If your computer is out of campus network, you need to first connect to the UCF VPN (using Cisco AnyConnect), then you will be able to connect to Eustis machines.
- For info on Eustis, check out Dr. Szumlanski's 2021 "*A Guide to Eustis and the Linux Command Line*".
- An older version, 2018, is also available at the following: https://usermanual.wiki/Document/cop3223eustisguide.1728131656/viewLinks to an external site.
- You can use either C, C++, Java, or Python to program this project. **Eustis** and **Eustis3** servers support all these programming languages.

COURSE INFORMATION (CONT'D)

❑ **Workload and grading policy**

Coursework	Approximate amount	Approximate percentage
Written homework	3	30%
Programming projects	1	15%
Lab assignments	1	15%
Midterm exam	1	20%
Final exam	1	20%

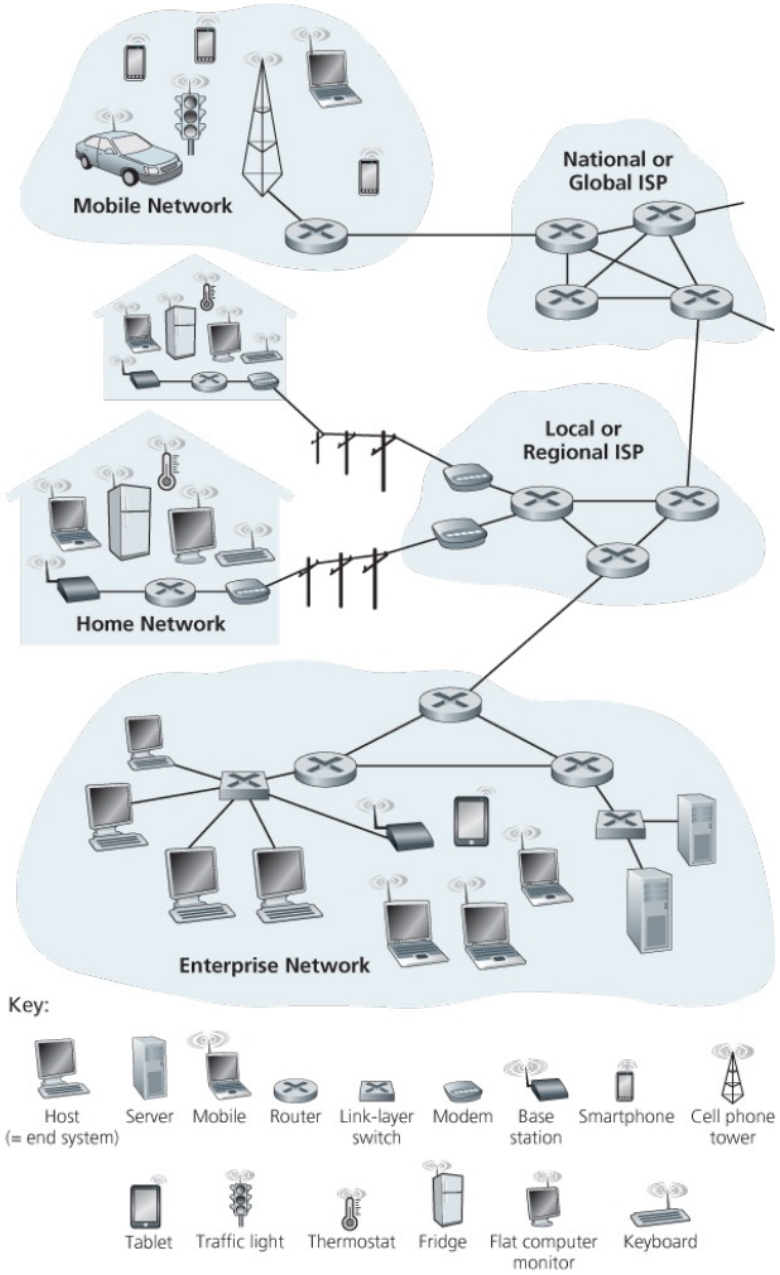
- Because this class has online sessions, the two exams are open book and similar to all regular homework assignments, except that they have a 24-hour submission constraint.

COURSE INFORMATION (CONT'D)

- ❑ In-class style: interaction, questions
- ❑ Hands on experiences: packet trace, email spam, Wifi attack…
- ❑ Flexible:
  - Teaching difficulty/speed/contents based on your feedback
  - So please tell me freely your thinking and interests!
- ❑ SPI

A TOP-DOWN APPROACH

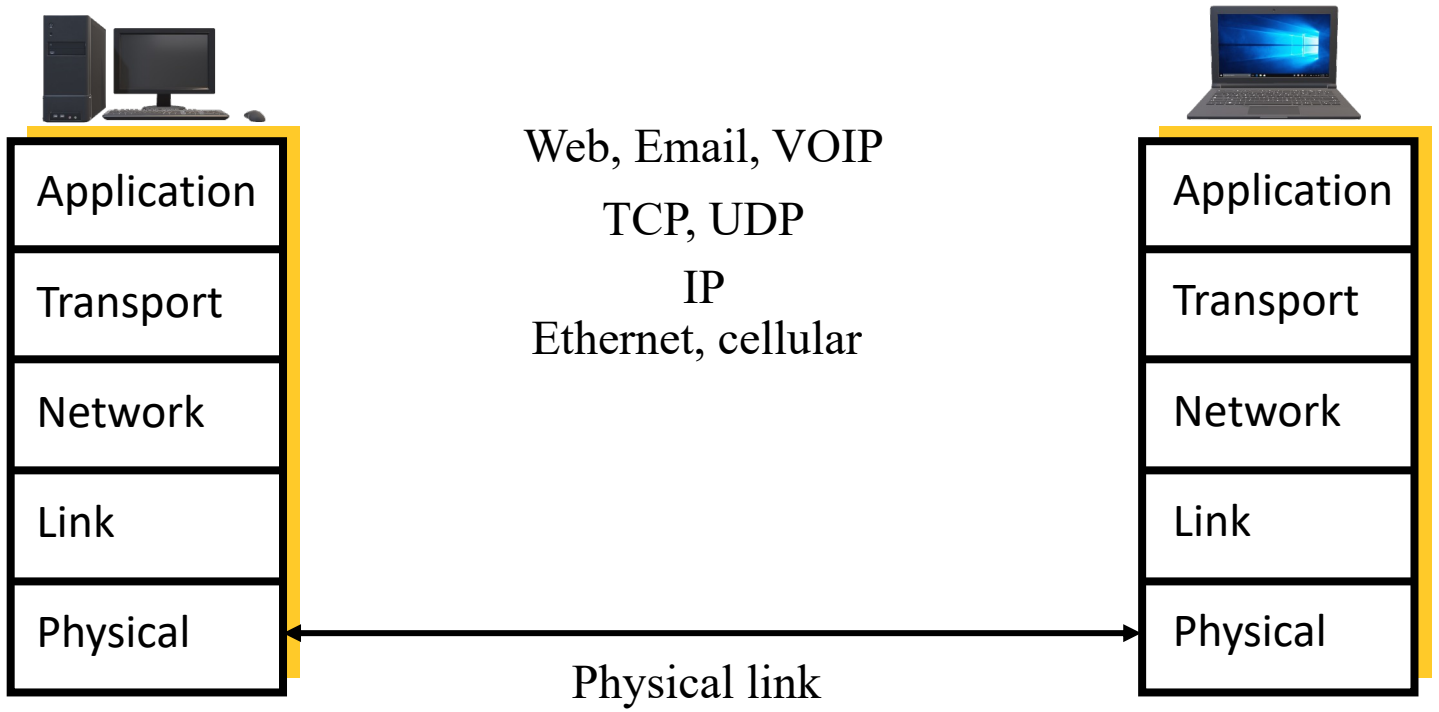
- ❑ We'll cover networking top-down
  - "End-system" applications, end-end transport
  - "Network core": routing, hooking nets together
  - "Link-level" protocols, e.g., Ethernet
- ❑ Other interesting stuff
  - ❑Security
  - ❑wireless



COURSE OVERVIEW

Part 1: Introduction (text: Ch. 1)

❑ What is the Internet?



COURSE OVERVIEW (CONT'D)

Part 2: Application Layer (text: Ch. 2)

- ❑ Principles of application-layer protocols
- ❑ World Wide Web: HTTP
- ❑ Electronic mail: Email
- ❑ The Internet's directory service: DNS
- ❑ Socket programming
- ✓ **PROGRAMMING ASSIGNMENT 1**

COURSE OVERVIEW (CONT'D)

Part 3: Transport Layer (text Ch. 3)

- ❑ Transport-layer services and principles
- ❑ Connectionless transport: UDP
- ❑ Principles of reliable of data transfer
- ❑ TCP case study

- ❑ TCP congestion control

COURSE OVERVIEW (CONT'D)

Part 4: Network Layer (text: Ch. 4)

- ❑ What's inside a router?
- ❑ Routing principles (algorithms)
- ❑ Hierarchical routing
- ❑ IP: the Internet Protocol
- ❑ Internet routing: RIP, OSPF, BGP

COURSE OVERVIEW (CONT'D)

Part 5: Link Layer, Local Area Networks (text: Ch. 5)

- ❑ Introduction, services
- ❑ Error detection, correction (CRC code)
- ❑ Multiple access protocols, LANs
- ❑ LAN addresses, ARP
- ❑ Ethernet

COURSE OVERVIEW (CONT'D)

Part 6: Cellular, Wireless and Mobile technologies

- ❑ Extension of Chapter 6
- ❑ Overview of smart phone technologies
- ❑ Overview of iOS and Android operating systems
- ❑ Mobile protocols
- ❑ Mobile logical channel descriptions, registration procedures, encryptions standards
- ❑ Mobile identifiers, and Location-based Services

COURSE OVERVIEW (CONT'D)

Part 7: Wireless security and Network Security (extension of Chapter 8)

- ❑ What is network security?
- ❑ Introduction of cryptography
  - Classical and modern cryptography
  - Public key cryptography and its applications
- ❑ Cellular network vulnerabilities and security protocols
- ❑ WiFi vulnerabilities and security protocols

SUMMARY

- ❑ Introductory, practical
- ❑ Know basic networking programming
- ❑ All (almost) you need to know about Internet, and applications
- ❑ Important concepts that you will need (or to know of) in future
- ❑ Many acronyms, don’t be frustrated
  - If you don’t know an acronym, just google it
  - Wikipedia can get you up to speed with concepts!

Questions?