CSE 473S:Introduction to Computer Networks

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Audio/Video recordings of this lecture are available on-line at:

http://www.cse.wustl.edu/~jain/cse473-21/

Student Questions

http://www.cse.wustl.edu/~jain/cse473-21/

Overview

- Why Study Computer Networking?
- Goal of This Course
- Instructor
- Grading
- Contents of the course
- Tentative Schedule

Student Questions

Networking = "Plumbing"

❑ Networking is the "plumbing" of computing

❑ Almost all areas of computing are network-based.
  ➢ Distributed computing
  ➢ Big Data
  ➢ Cloud Computing
  ➢ Internet of Things
  ➢ Smart Cities
❑ Networking is the backbone of computing.

We are in the Internet Age.

Student Questions

❑ what is the internet of things?

Networking is Fueling All Sectors of Economy

❑ Networking companies are among the most valued companies: Apple, AT&T, Samsung, Verizon, Microsoft, China Mobile, Alphabet, Comcast, NTT, IBM, Intel, Cisco, Amazon, Facebook, …

⇒ All tech companies that are hiring currently are networking companies

❑ Note: Apple became highly valued only after it switched from computing to communications (iPhone)

Networking = Economic Indicator

Student Questions

Selecting the Right Field

- Important question for **students**, academics, entrepreneurs, and companies
- Goal: To impact
- Follow the **paradigm shifts**:
  - 1980: Ethernet
  - 1990: ATM Networks
  - 2000: Optical Networks
  - 2005: Wireless Networks
  - 2008: Next Generation Internet/SDN
  - …
  - 2019: Whatever is being **hyped** this year?
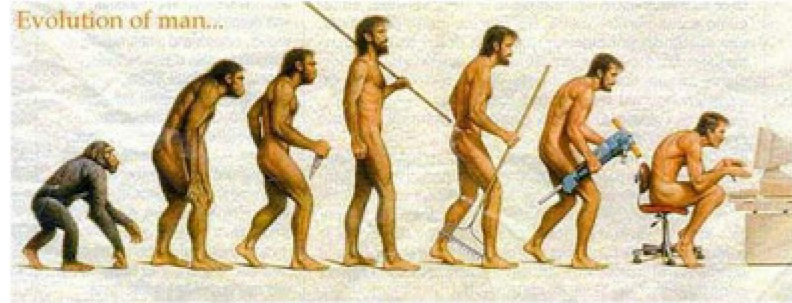
> Industries adopt by necessity.
> Academics continue to develop deeper expertise on what they already know.

Student Questions

- How long did it take your team to create the Ethernet?
- *Ethernet was invented by Robert Metcalfe in his MIT PhD thesis in 1973. He continued its implementation in Xerox. Xerox than formed DIX (Digital-Intel-Xerox) collaboration in 1979 to commercialize the Ethernet. DIX redesigned it to run at 10 Mbps instead of 3 Mbps and went to IEEE to get it standardized. It was standardized in 1983. I was part of the Digital team when the Ethernet was redesigned.*

Gartner Hype Cycle of Emerging Tech 2019

Hype ⇒ $$$

Biochips
AI PaaS
5G
Edge Analytics
Autonomous Driving Level 5
Low Earth Orbit Satellite Systems
Edge AI
Graph Analytics
Explainable AI
Personification
Knowledge Graphs
Next-Generation Memory
3D Sensing Cameras
Synthetic Data
Light Cargo Delivery Drones
Transfer Learning
Emotion AI
Flying Autonomous Vehicles
Augmented Intelligence
Autonomous Driving Level 4
Nanoscale 3D Printing
Decentralized Autonomous Organization
DigitalOps
Generative Adversarial Networks
Adaptive ML
Decentralized Web
AR Cloud
Immersive Workspaces
Biotech — Cultured or Artificial Tissue

As of August 2019

Peak o

VC investment

Acquisitions By large corporations

Mass Production

Student Questions

❑ What would the Hype Cycle of 2021 look like?

Many new technologies will appear on the left. Some will disappear. Some will move to the right.

❑ Could a decentralized web be combined with distributed computing to form a huge, connected A.I.?

All forecasts are best guesses. Your imagination is the limit.

Ref: B. Burke, D. Smith, "Hype Cycle for Emerging Technologies, 2019," Gartner Report G00370466, 6 Aug. 2019, 68 pp.

Internet Age

Evolution of man...

- Distributed Computing
- Cloud Computing
- Mobile Computing ⇒ Smart Phones
- Streaming Video ⇒ YouTube
- Social Networking ⇒ FaceBook
- Big Data
- Machine Learning ⇒ Artificial Intelligence
- Online Shopping ⇒ Amazon, Ebay, Google
- Most fields today – Education, Health, Environment – are advancing simply because of advances in networking

Student Questions

- What do you think will be age after Internet Age? Cyborg Age?

Future is everyone's guess. I don't know the future. I try to keep at the leading edge of the "present." Also, I think only about issues that I can impact.

Current Hot Topics in Networking

1. Internet of Things (IoT)
2. Cybersecurity
3. Cloud Computing
4. Software Defined Networking
5. Wireless Networking
6. Streaming Media

Student Questions

❑ What would the future hot topics in networking look like?

We are working on applying AI and Blockchains for Cybersecurity.

Trend: Smart Everything

Smart Watch	Smart TV	Smart Car
Smart Health	Smart Home	Smart Kegs
Smart Space	Smart Industries	Smart Cities
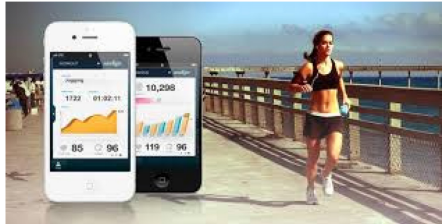
Student Questions

What's Smart?

❑ Old: Smart = Can think ⇒ Computation
                    = Can Recall ⇒ Storage

❑ Now: Smart = Can find quickly, Can Delegate
  ⇒ Communicate = Networking

❑ Smart Grid, Smart Meters, Smart Cars, Smart homes, Smart Cities, Smart Factories, Smart Smoke Detectors, …
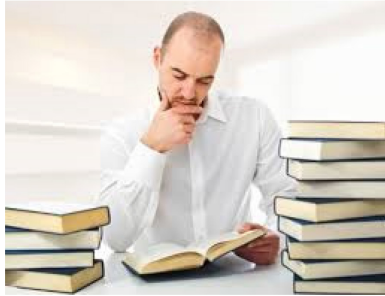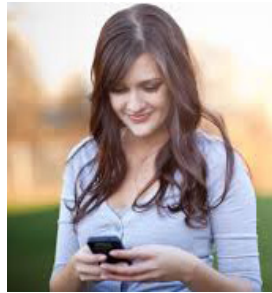
Not-Smart   Smart

❑ Smart = Apply the latest **technology** to solve problems

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Student Questions

Trend: Smart to Intelligent

Intelligent Clock	Intelligent TV	Intelligent Car
Intelligent Health	Intelligent Home Security	Intelligent Microwave
Intelligent Light	Amazon Alexa	Google Assistant

Student Questions

Trend: Security & Cyber Warfare

❑ Security of computers, companies, smart grid, and nations

❑ Nation States are penetrating other nations computers
5th domain of warfare (after land, sea, air, space)

❑ In 2010, US set up US Cyber Command

❑ UK, China, Russia, Israel, North Korea have similar centers

❑ Many cyber wars: North Korea vs. USA, Israel vs. Syria, South
Korea vs. North Korea, India vs. Pakistan, …

Old

New

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Ref: http://en.wikipedia.org/wiki/Cyber_war

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Internet of Harmful Things

Researchers at DEFCON 3, hacked a smart toilet, making it flush incessantly and closing the lid repeatedly and unexpectedly. Causing a **Denial of Service** Attack.

Student Questions

Ref: http://www.computerworld.com/article/2486502/security0/worm-may-create-an-internet-of-harmful-things--says-symantec--take-note--amazon-.html

DEFCON

- ❑ Hacker's conference
- ❑ Held in Las Vegas every July
- ❑ 20,000+ attendees
- ❑ All anonymous

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Student Questions

- ❑ Do you think Las Vegas is a good place for a conference like DEFCON?

Where else can you find hotels for 20,000 attendees?

Recent DEFCON Topics

- Hacking voting machines
- Hack connected vehicles
- Hacking the cloud
- Hacking travel routers
- Clone RFID in real time
- Breaking the Uber badge ciphers
- Counterfeit hardware security devices, RSA tokens
- Fool antivirus software using AI
- How to track government spy planes
- Break bitcoin hardware wallets
- DARPA Cyber Grand Challenge (2015, 2016)
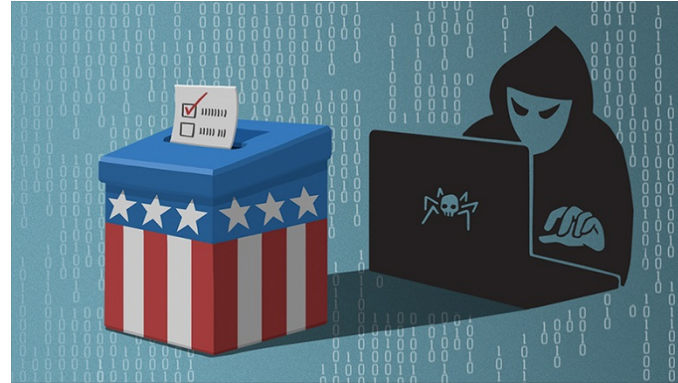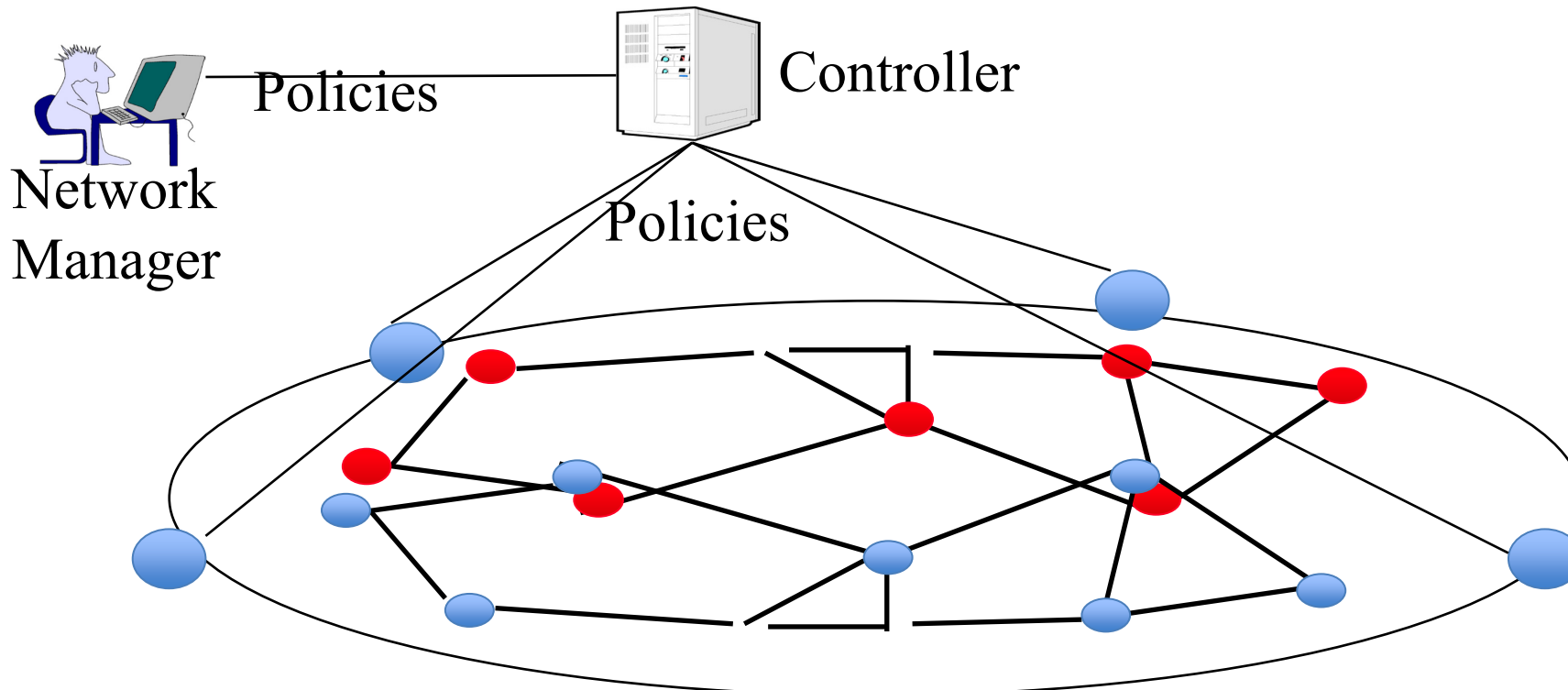
Student Questions

Trend: Cloud Computing

❑ August 25, 2006: Amazon announced EC2
$\Rightarrow$ Birth of Cloud Computing in reality
(Prior theoretical concepts of computing as a
utility)
$10 B in 2016, a growth rate of 49% with
17% margins, much higher than the overall
Amazon business

❑ Cloud Computing:
  ➢ Applications through Internet (Google Docs)
  ➢ Computing through Internet (Amazon EC3)
  ➢ Storage and backup through Internet (iCloud, Google Drive)

Student Questions

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Software Defined Networking

❑ Using standard networking hardware
  ⇒ Allows managing large networks using software

Student Questions

❑ Is software-defined networking a safe way to ensure cybersecurity by partitioning groups of computers?

Yes. Many competitors, such as, AT&T and Verizon can share the same hardware infrastructure.

Goal of This Course

❑ First course in networking

❑ Fundamentals

❑ Broad coverage of key areas of networking

❑ Networking background for networking applications in other areas of computing

❑ This is a course on Networking <u>Architecture</u>

❑ This is <u>not</u> a course on network building or usage

❑ You will be able to understand protocols

❑ An example of the difference between architecture and implementation is the computer architecture course and a course on Intel Pentium Chip.

❑ This is the <u>first</u> course on networking.

❑ Basis for more advanced networking courses

Student Questions

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What Will You Learn?

1. What messages and messages are exchanged when you fetch a web page?
2. What messages are used to send/receive emails?
3. How the names such as www.google.com gets translated to IP addresses such as 74.125.73.104?
4. What is done to avoid congestion under overload?
5. How is the path in the Internet determined?
6. What happens if bits in a packet get corrupted?
7. How WiFi or Ethernet works?
8. What is the difference between WiFi, Ethernet, IP, and TCP?
9. What is done to handle audio/video on the Internet?
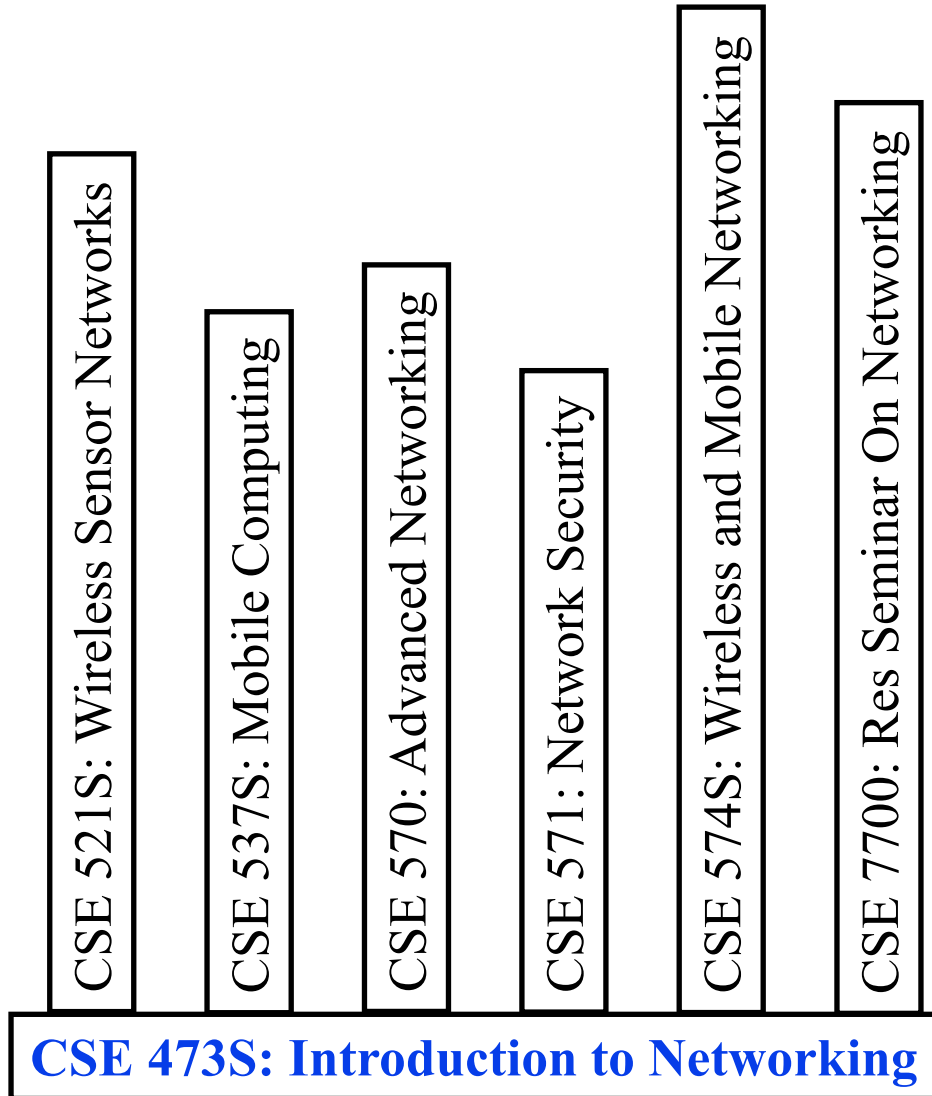10. How can you guarantee security on the Internet?

Student Questions

Networking Courses at WUSTL

1. **CSE 473: Introduction To Computer Networks** (Spring 2021) – Prerequisite for all other networking classes

2. CSE 521S: Wireless Sensor Networks

3. CSE 537S: Mobile Computing

4. **CSE 570S: Advanced Networking:** Clouds, Big Data, SDN, IoT (Fall 2021)

5. **CSE 574S**: **Wireless and Mobile Networking** (Fall 2022)

6. **CSE 571S: Network Security**

7. CSE 7700: Research Seminar On Networking and Communications

Student Questions

Networking Foundation

CSE 521S: Wireless Sensor Networks

CSE 537S: Mobile Computing

CSE 570: Advanced Networking

CSE 571: Network Security

CSE 574S: Wireless and Mobile Networking

CSE 7700: Res Seminar On Networking

CSE 473S: Introduction to Networking

Student Questions

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Textbook

❑ J.F. Kurose and K.W. Ross, "Computer Networking" **7th Edition**, Addison-Wesley, 2017, ISBN: 9780133594140 or 9780134296135, 864 pp. **Required**.

❑ Get the latest edition. Do not use older editions. If you use international edition, it should be dated later than 2016, should have 864 pages.

Student Questions

http://www.cse.wustl.edu/~jain/cse473-21/
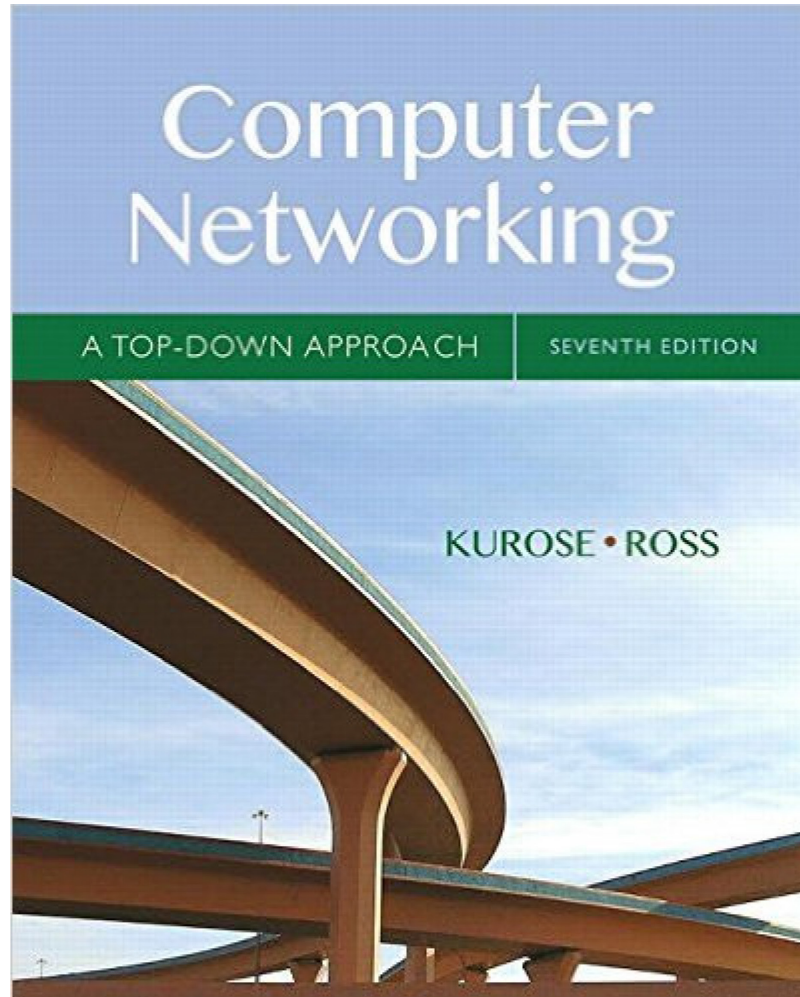
Textbook (Cont)

❑ It is recommended that you read the relevant chapter of the book chapter before coming to the class
⇒ Class time will be used for discussing and clarifying key concepts

❑ Only key concepts will be covered in the class.
You are expected to read the rest from the book.

❑ Please ask questions in the next class about any concepts that are not clear to you

❑ Material covered in the class will include some concepts from other textbooks. Please pay attention to the class lecture.

Student Questions

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Prerequisite

❑ General knowledge of computer systems organization
  ➢ Memory
  ➢ System bus
  ➢ Interrupt
  ➢ CPU
  ➢ Binary, decimal, hexadecimal representations
  ➢ Bits, bytes
  ➢ Storage: Memory and disk

❑ CSE 131: Computer Science I or equivalent

Student Questions

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Tentative Schedule

1/25	Course Overview	
1/27	Computer Networks and the Internet (Part 1)	1
2/1	Computer Networks and the Internet (Part 2)	1
2/3	Application Layer (Part 1): HTTP	2
2/8	Application Layer (Part 2): SMTP,DNS,P2P	2
2/10	Transport Layer (Part 1): Design Issues	3
2/15	Transport Layer (Part 2): UDP,Flow Control	3
2/17	Transport Layer (Part 3): TCP,TCP Congestion Control	3
2/22	The Network Layer: Data Plane (Part 1: Network Layer Basics)	4
2/24	Network Layer Data Plane (Part 2: IP Datagram,NAT,UPNP,DHCP)	4
3/1	**Exam 1**	

Student Questions

❑ Will the exams be offered only during class time? or will there be, say, a 24 hour window of time where we can begin the exam?

Fixed time 1:00PM to 1:50PM.

❑ The timing of the exams on the slides is different from what is said in the video (the video on the course website seems to be recorded in a previous semester), which is a little confusing to me since I joined the class after the first lecture. What is the expected timing of exams?

All recordings posted are live recordings of the previous lecture. Recordings take several days to prepare. Recordings of the class sometimes fail and so discussion recordings are not guaranteed. You have to attend the class to get the discussion and ask questions.

Tentative Schedule (Cont)

Date	Topic	Chapter
3/3	Wellness Day (No Class)	
3/8	Network Layer Data Plane (Part 3: SDN)	4
3/10	The Network Layer: Control Plane (Part 1: Dijkstra's, Bellman-Ford Algorithms)	5
3/15	The Network Layer: Control Plane (Part 3: SDN Controller + ICMP + SNMP)	5
3/17	The Link Layer and LANs (Part 1): Functions	6
3/22	The Link Layer and LANs (Part 2): CRC	6
3/24	The Link Layer and LANs (Part 3): Multiple Access,Ethernet,VLANs, MPLS,Data Centers	6
3/29	Wireless and Mobile Networks (Part 1): Wireless Characteristics,LANs and PANs	7
3/31	Exam 2	

Student Questions

☐ The Course Overview video linked through the course website uses the slides of Spring 2021 but audio from a different semester. Additionally, I could not access a direct recording of the first zoom meeting through Canvas. Will the raw zoom meetings be made available?

Recordings of the classes are provided on the best effort basis and are not guaranteed. Also, they take several days to finalize. We do not post "Raw" video.

You need to attend the discussions to benefit from the course.

This is a remote class. Not a virtual class. Remote = Instructor and students are present (even though at different places)

Virtual = Instructor or student may not even be a physical being.

Tentative Schedule (Cont)

Date	Topic	Chapter
4/5	Wireless and Mobile Networks (Part 2): Mobility Management	7
4/7	Wireless and Mobile Networks (Part 3): Mobility Management	7
4/12	Security in Computer Networks: Cryptography (Part 1)	8
4/14	Security in Computer Networks (Part 2)	8
4/19	Multimedia Networking (Part 1: Basic concepts)	9
4/21	Multimedia Networking (Part 2: VOIP,RTP,SIP)	9
4/26	TBD	
4/28	TBD	
5/3	**Exam 3**	

- **Note that the Exam 3 is on Monday, May 3, 2021.**
- **The dates for all exams are fixed. No substitute exams.**
- **Every one has to take the first two exams.**

Student Questions

❑ The final exam on last day of class 4/22, now the same as the last year schedule in the slide 5/3 right?

Slides are updated regularly. Video recordings are static. Whenever there is a difference, slides take precedence.

❑ The webstac page states we have a time slot for a final exam on May 13, 2021, but the last exam is on May 3rd. Is there some other assignment tied to the date May 13, 2021?

No. There are no activities after Exam 3. There is no final exam.

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Grading

- Exams (Best 2 of 3)   60%
- Class participation   5%
- Video Reviews   10%
- homeworks   15%
- Labs   10%
- Letter grade are assigned based on the entire class's performance. Break points very every year. Examples:
  - **2020:** 90+: A+, 85+: A, 80+: A-, 75+: B+, 70+: B, 65+: B-, 60+: C+, 55+: C, 50+: C-
  - **2019:** 90+:A+, 84-90:A, 78-84:A-, 72-78:B+, 66-72:B, 60-66:B-, 54-60:C+, 48-54:C, 42-48:C-
- **Pass/Fail:** Anyone getting over 70% of the highest achieved grade in the course will pass. For example, if 96 is the highest score, the passing grade will be 67.2

Student Questions

- Does asking question on this form count toward our class participation grade? How do I make sure I got participation points?

You get marks every class for completing the form not for individual questions. Class participation is for activities during the class.

- For class participation, do questions typed in chat on zoom count, and how many questions are we supposed to ask to get full points.

There is no quantitative metric to associate points with activities. Yes, if you ask constructive questions that help understanding of the material for everyone, you give a positive feeling.

- Is participation recorded during every lecture or a random subset of lectures?

- *Participation is not recorded.*

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Exams

❑ There are three exams.

❑ All exams are 50 minutes long.

❑ One note sheet of 8.5"x11" (both sides) is allowed along with a simple calculator (TI-30).

❑ Exams consist of numerical as well as multiple-choice (true-false) questions.

❑ There is a <u>negative</u> grading on incorrect multiple-choice questions. Grade: +1 for correct. -1/(n-1) for incorrect.

❑ Everyone including the graduating seniors are graded the same way.

❑ Your grade depends upon the performance of the rest of the class.

Student Questions

❑ It's said in the video that you receive zero points for not answering a quiz question. From class, my understanding was that we lose a point by not answering. What happens if we don't answer a quiz question?

For true/false questions, if you answer correctly, you get 1 point. If you answer incorrectly, you get -1 point. You get 0 points if you don't answer.

For all other questions, there is no negative grading. You get 0 points if you don't answer. The points depend upon the method and the final answer.

❑ Are exams during the normal class period?

Yes

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Lab Exercises

❑ Most modules will have a lab component

❑ Some labs require writing a short program to do what the protocol would do

❑ You should be able to do most labs on your own computer

❑ There are 11 labs. Of these 8 do not require any programming. Two (Lab 2B and 5B) require Python. One (Lab 3) requires C.

Student Questions

❑ Which language will the programming portion of the labs use?

Python and C.

❑ I don't have any experience with Python, it's never been required in any of my CS curricula. Should I learn Python for this class?

We follow the textbook as much as possible. Each chapter in the book has some lab exercises. Some exercises require programming. The author has selected common languages for those exercises.

❑ Are labs to be completed individually as well?

Yes.

Homework Submission

- All homeworks are due on the following Monday at the beginning of the class unless specified otherwise.
- Any late submissions, if allowed, will *always* have a penalty.
- All homeworks should be submitted to Canvas unless specified otherwise
- All homeworks are identified by the class handout number.
- All homeworks should be on a separate sheet.
  Your name should be on every page.
- Please write CSE473 in the subject field of all emails related to this course.
- Use word "Homework" in the subject field on emails related homework. Also indicate the homework number.

Student Questions
- Will we need any software for the homework?

Yes. Only free network utilities. It will be indicated in the homework or lab.
- Will the homework be coding? or writing paragraphs, like answering questions? what about the lab

Most homeworks are paragraphs and calculations. Most labs are network activities. Only some labs have coding.

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Homework Grading
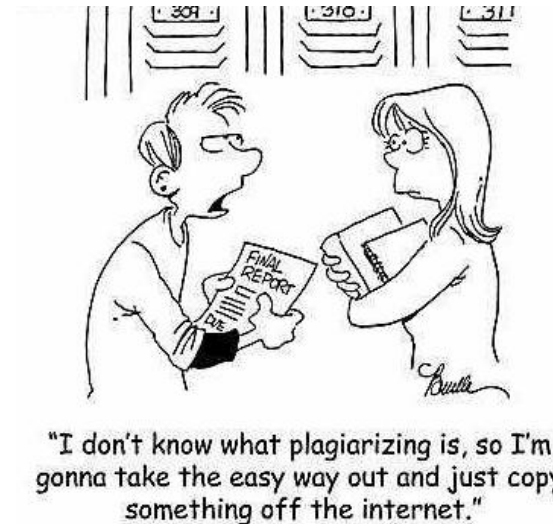
❑ Grading basis: Method + Correct answer

❑ Show how you got your answer

  ➢ Show intermediate calculations.

  ➢ Show equations or formulas used.

  ➢ If you use a spreadsheet, a statistical package, or write a program, print it out and turn it in with the homework.

  ➢ For Excel, set the print area and scale the page accordingly to fit to a page. (See Page Setup)

Student Questions

Academic Integrity

❑ Academic integrity is expected in homework's, quizzes, and exams.

❑ All solutions submitted are expected to be yours and not copied from others or from solution manuals or from Internet

❑ School requires us to report all integrity violations to the department

"I don't know what plagiarizing is, so I'm gonna take the easy way out and just copy something off the internet."

Student Questions

http://www.cse.wustl.edu/~jain/cse473-21/

Office Hours

- By Appointment: Office: Zoom
- Teaching Assistants:
    - Dean Yu xiaobing at wustl.edu
    - Gan Xu, gan.xu at wustl.edu
- TA Hours:
    - Friday   3:00 PM to 4:00 PM   Dean Yu
    - Saturday   3:00 PM to 4:00 PM   Gan Xu
    - Sunday   1:00 PM to 2:00 PM   Dean Yu
    - Sunday   3:00 PM to 4:00 PM   Gan Xu
- All meetings with TA will be via zoom
    - Gan Xu, https://wustl.zoom.us/my/ganxu
    - Dean Yu, https://wustl.zoom.us/my/deanyu

Student Questions

After-Class Discussions

❑ We will use Piazza for in-between class <u>urgent</u> questions.

❑ No participation points for questions on Piazza

❑ If a question is not urgent and can wait till the next class, please bring it up in the class ⇒ Get points
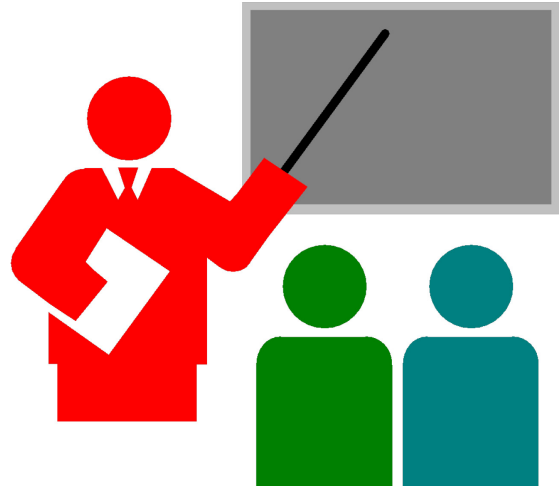
❑ Find our class page at:
http://piazza.com/wustl/spring2021/cse473s

Student Questions

❑ Why is piazza not included in participation?

We want to encourage discussions in class as much as possible. Offline activities (such as Google forms) have specific marks assigned to them.

Summary

- Computer networking is important for all areas of computing
- First course in computer networking
- Goal: To prepare you for a career in networking
- Get ready to work hard

Student Questions

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Reading

❑ Read Chapter 1 of Kurose and Ross

Student Questions

Quiz 0: Prerequisites

❑ True or False?

❑ T   F

1. ☐ ☐ Transmitting 100 bytes @ 800 bit/sec will take 1 sec.

2. ☐ ☐ A system with 32kB memory can hold only 16000 ASCII characters

3. ☐ ☐ A system with 2GB memory is same as that with 2GB disk.

4. ☐ ☐ Interrupts are used by CPU to stop an ongoing I/O.

5. ☐ ☐ Binary representation of 9 is 1001

6. ☐ ☐   0A in Hexadecimal is 11 in decimal system.

7. ☐ ☐ For I = A Sin (2πft+ φ), the frequency is f.

8. ☐ ☐   5 modulo 2 is 1

9. ☐ ☐   Two entries "P" and "Q" are pushed sequentially on a stack.
           A "pop" operation on the stack will produce P.

10. ☐ ☐ If x is 0, then after x++, x will be 1.

Marks = Correct Answers _____ - Incorrect Answers _____ = _____

Student Questions

Remote Classes

❑ All classes of this course throughout this semester will be remote using Zoom.

❑ The class is flipped: you review the material in video before the class and submit your questions on a form.

❑ Class time will be used to answer those questions and any additional ones that come up.

Student Questions

❑ Where can we view the uploaded lecture videos? I can't find it on Canvas now.

Videos are on the course webpage. The URL is on every slide.

❑ Are most of the class resources through your website, canvas, or is it mixed?

Most resources are on the website. Reminders for assignments, homeworks, labs are on Canvas.

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Attending Classes via Zoom

❑ Add your photo to your zoom profile.
There is no need to start your video.
Photo is sufficient. Keep your microphone mute.

❑ All questions should be broadcast on the chat.
All answers to my questions should be either private to me or broadcast to the class depending on the situation.

❑ Zoom report also shows when a student joined, when they left, and how much attention they were paying (probably based on your other activities on the same computer). ⇒ Please pay full attention

❑ Students should join with their full name and email. That way I can associate your participation.

❑ The class discussions are being recorded. Videos will be posted whenever possible.

Student Questions

❑ Will we lose points if we don't add a profile picture to Zoom?
No.

❑ What if I switched windows to look up what the internet of things is? will it say I'm not paying attention?
Yes.

❑ About Zoom's report on attention, what should I do if I want to look at some course-related materials?
Is there any way to pull up the slides with zoom simultaneously which will not flag us for not paying attention?
Just look it up if urgent. But try to pay attention to the current discussion as much as possible.

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Video Features

❑ Our videos have embedded quizzes, table of contents, closed captions, and full screen capability.

➢ Click CC on the bottom of the video to enable or disable closed captions.

➢ Click on the menu symbol to see a table of contents. This allows you to jump to any particular slide.

➢ The square symbol allows you to switch to/from full screen mode.

➢ When a quiz appears, answer it correctly. This generates an email that is used for part of your score for video review homework.

❑ Some of these features may not be available on some recordings. Many may not be available on the same video played from YouTube.
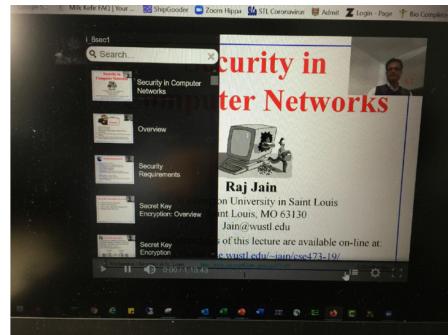
ToC

Student Questions

Video Review Task

- ❑ You are required to view the video and do the following:
  - ➢ Video quizzes: Need to answer a few simple questions to ensure that you have seen the video. This will get you 10 points.
  - ➢ Google Form: To ask questions on each slide. If you do not have a question about a slide, leave the corresponding question on Google form blank. This gets you 4 points.
- ➡ ❑ Both activities must be done by midnight before the class day.
- ➡ ❑ You are supposed to read the book also and ask any relevant questions in the Google form as the last question on each form.
- ❑ If you do not have any questions on a slide, you should leave it blank. You can leave the entire form (except your name and email) blank if there are no questions.

Student Questions

- ❑ Can you clarify what the "Video Reviews" are? Is that the google form to be filled out after viewing the lecture?

The quizzes during the video viewing count for 10 points for each video, and submitting the Google form counts for 4 points for that video.

- ❑ I found the google form for questions, but where are the video review form? I am having some trouble finding them.

In the past, the quiz questions were on canvas. This time, we tried and succeeded at the last minute in embedding the questions in the video itself. So we updated the Canvas Video Review form with nothing to submit.

http://www.cse.wustl.edu/~jain/cse473-21/   ©2021 Raj Jain

Exams

❑ All exams are **closed book**.

❑ You are permitted **one** cheat sheet of 8.5'x11" written or printed on both sides.

❑ You should have several blank sheets of paper to write details of your answers. You email these right after the exam.

❑ We use Respondus system to monitor the exam remotely.

❑ You will need a webcam with a stand separate from the one in the laptop. Low-cost examples:
http://www.amazon.com/dp/B088829MV3
http://www.amazon.com/dp/B088BK488W

❑ No calculators, smart phones, smart pads allowed in the exam. Respondus has a built in scientific calculator for your use.

Student Questions

❑ Why is it required we have a rotating camera? Will a laptop camera do?

We have a "closed book" exam and need a full view of your desk not of your face.

❑ If we use a desktop, is mounting the camera on the monitor ok?

Yes. As long as it has a view of your entire work surface.

❑ Is there a way to use our phones or an actual camera for the Respondus webcam thing?
Could you use another computer as the camera for Respondus?

No smart devices, phones, pads, calculators, other computers allowed in the work area.

❑ Is a microphone also required for Respondus?

No.

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Raj Jain

http://www.cse.wustl.edu/~jain/cse473-21/i_0int.htm

Student Questions

❑ *You have already experienced the benefits of a "flipped" class.*
❑ *You have seen the recording of a live class. There were hardly any questions.*
❑ *Flipping the class resulted in more questions than the number of slides.*
⇒ *You get more from a flipped class.*
❑ *You will start liking it more as we go along.*

Related Modules

CSE567M: Computer Systems Analysis (Spring 2013),

https://www.youtube.com/playlist?list=PLjGG94etKypJEKjNAa1n_1X0bWWNyZcof

CSE473S: Introduction to Computer Networks (Fall 2011),

https://www.youtube.com/playlist?list=PLjGG94etKypJWOSPMh8Azcgy5e_10TiDw

Wireless and Mobile Networking (Spring 2016),

https://www.youtube.com/playlist?list=PLjGG94etKypKeb0nzyN9tSs_HCd5c4wXF

CSE571S: Network Security (Fall 2011),

https://www.youtube.com/playlist?list=PLjGG94etKypKvzfVtutHcPFJXumyyg93u

Video Podcasts of Prof. Raj Jain's Lectures,

https://www.youtube.com/channel/UCN4-5wzNP9-ruOzQMs-8NUw

Student Questions

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