CSE 489/589
Modern Networking Concepts

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Today's Agenda

- Introduction of the Teaching Team
- Academic Integrity(AI) and the Quiz
- A brief overview of the course
  - Introduction of the Basic Information
  - Prerequisites
  - Grading Policies
  - Administrative aspects

Course Instructor

- Instructor: Yaxiong Xie, (Assistant Professor) Wireless Systems, Wireless Sensing, Mobile Systems, IoT, Next Generation Network
- Class Piazza:
  - Link: https://piazza.com/buffalo/spring2024/cse4589
  - Access Code: **vl8fd86r8ml**
    - You should find it under the Announcements tab in UBLearns Brightspace.
- Email (First contact Instructors on Piazza): yaxiongx@buffalo.edu
- Office: Davis Hall 321
- Office hours:
  - Tuesday 4:00 PM – 5:00 PM, in-person or Zoom
  - Thursday 4:00 PM – 5:00 PM, in-person or Zoom

Course TAs and Graders

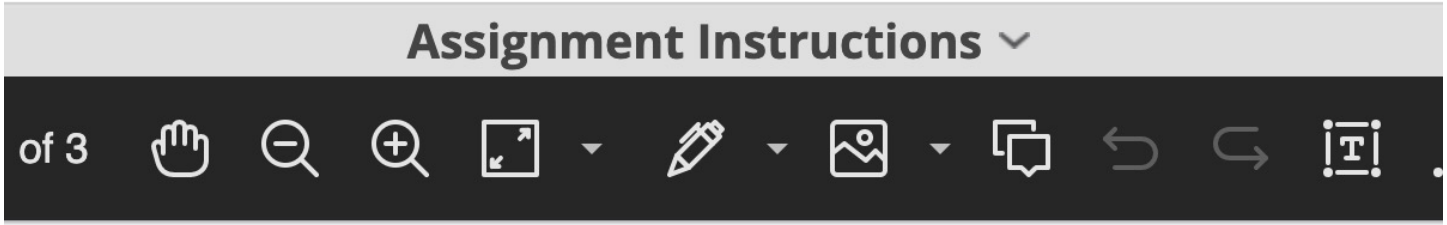
- TAs (Everything *Except* Programming Assignments)
  - Yuhao Wang (Office Hours: TBD)
  - Shahram Babaie (Office Hours: TBD)
- Graders (For Programming Assignments *Only)*
  - TBD

- The TA/Grader office hours will be held online using Zoom.

Grading: Academic Honesty

- **Zero tolerance** on cheating/plagiarism:
  - Must fully understand the Academic Integrity (AI) policy
  - Fail the course on any homework assignment/lab, project, or exam even for first attempt, & report to the department.
  - May result in having a note on your transcript or expulsion
- Group study/discussion is encouraged, but the submission must be your own work (except when teaming is explicitly allowed e.g, for a group project).
- Students who share their work with others are as guilty as those receiving the material.
- More in the mandatory AI Quiz on UBLearns
  - Must answer all (14) questions correctly to pass the course
  - You may take the Quiz many times before March 18, 2024.

Lack of detailed calculation process



1) **CRC:** 5-bit generator G=10011
CRC-4-ITU standard:

If we divide 10011 into 1010101010 0000, we get quotient as 1011011100, with a remainder of R=0100.

If we divide 10011 into 1001000101 0000, we get quotient as 1000100011, with a remainder of R = 0101.

Only with the final answer but without the detailed calculation procedure won't be allowed.

Found copied from the previous solution or online

Previous released solution

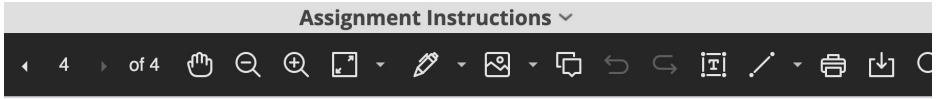
6) Multiple access protocols: voice-over-IP and data.

a) TDMA works well here since it provides a constant bit rate service of 1 slot per frame. CSMA will not work as well here (unless the channel utilization is low) due to collisions and variable amount of time needed to access the channel (for example, channel access delays can be unbounded) and the need for voice packets to be played out synchronously and with low delay at the receiver. Slotted Aloha has the same answer as CSMA. Token passing works well here since each station gets a turn to transmit once per token round, yielding an essentially constant bit rate service.

b) TDMA would not work well here as if there is only one station with something to send, it can only send once per frame. Hence, the access delays are long, and the throughput over a long period of time is only 1/N of the channel capacity. CSMA would work well since at low utilization, a node will get to use the channel as soon as it need to. Slotted Aloha has the same answer as CSMA. Token passing would work better than TDMA but slightly less well than CSMA and Slotted Aloha, since it must wait for the token to be passed to the other stations (who likely wouldn't use it) before sending again.

c) Here are two possible answers. One approach would be to divide the channel into two "pieces"-one for data packets and one for voice. This can be accomplished by assigning some number of TDMA slots for voice calls (for example, one slot to each user). Also, add some additional slots and allow the stations with data to send to perform random access (for example, slotted Aloha or CSMA) within those data slots only. A second approach would be to use token passing with priorities, and give priority to voice packets.

Problem answer submission



c) Now suppose the LAN must support both voice and data and you must choose one of these multiple access strategies in order to support both applications on the same network, with the understanding that voice calls are more important than data. How would voice and data be sent in this scenario? That is, which access protocol would you use, or adapt/modify, and why? (10 points)

Ans:

These are the two possible options. The channel could be split into two "pieces"—one for voice and one for data packets—as one tactic. To do this, a certain number of TDMA slots might be designated for voice calls (for example, one slot to each user). Additionally, add a few more slots and permit stations having data to send to only perform random access (for instance, slotted Aloha or CSMA) within those data slots. Using token passing with priorities and giving voice packets priority would be a second strategy.

Important URLs

- Use the class Piazza for almost everything, including announcement, homework, lab and project assignments, as well as Q&As:

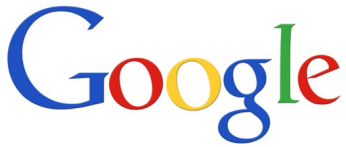
  https://piazza.com/buffalo/spring2024/cse4589

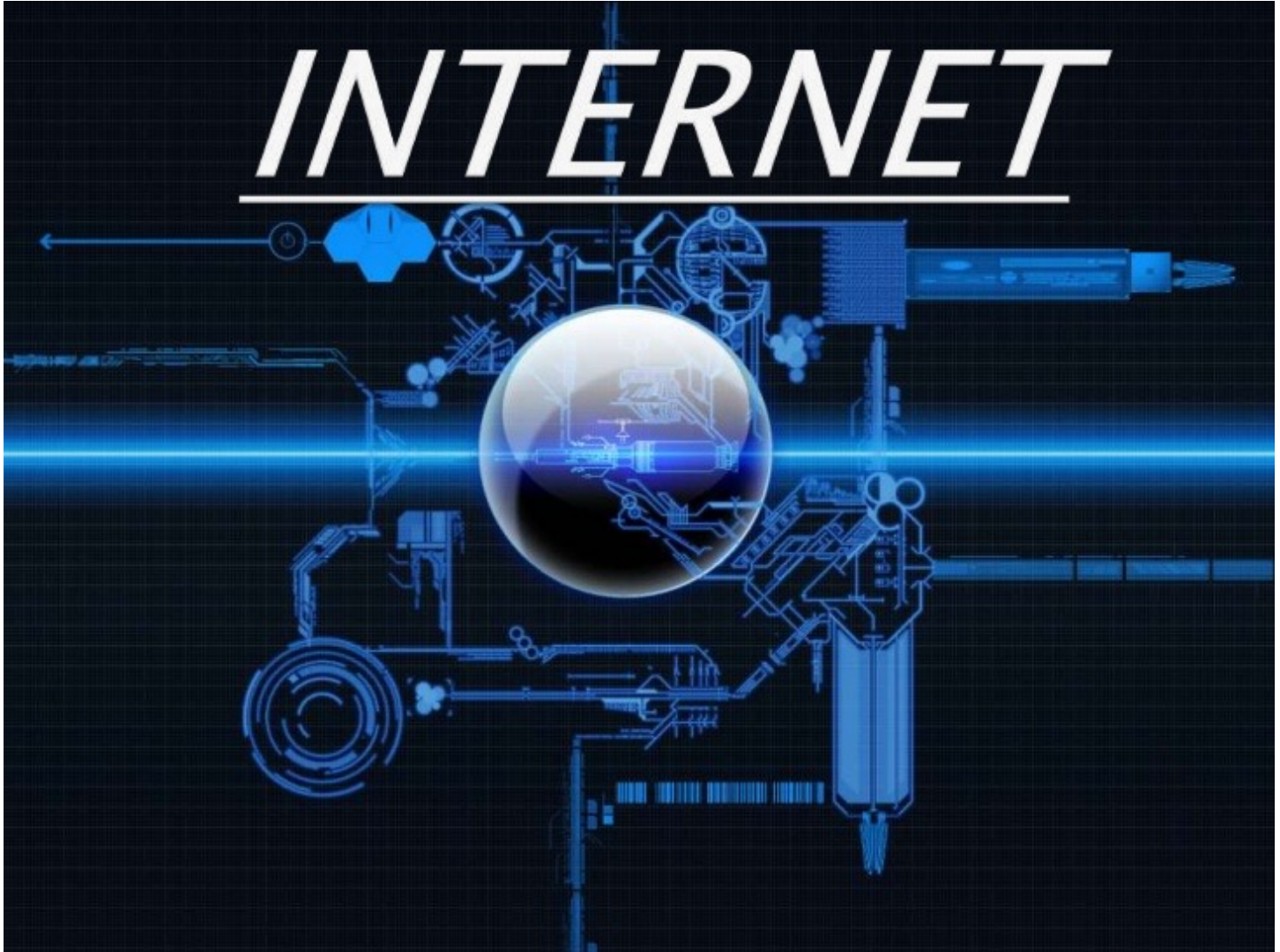
  - Make sure you receive email notifications for every new post/comment
  - Post in the right category
  - Mark a questions as "Resolved" when it is resolved
- UB Learns for the AI Quiz, recorded lectures and grades.

What is the course about?

MTU P2P 10BaseT WAN IMAP TDM
TDM ACM PCM NIC
TCP DES ARP
ESP QoS EIA
MTU FDDI DHCP
RTP MAN
HTTP MANET EGP PDU
RFC IP
ICMP RPF T3 WAP DCE
PIM HTTP
ABR ATM MAC OSPF MOSPF RSVP IGMP CGI
CDMA DSL IPv6 CIDR
SMTP UDP NAP FDM
PSTN LAN VBR
IRSG BGP CRC
IGMP PPP NAT CSMA/CD XNS
MIB ISP RIP COPS
TLI SNMP L2CAP SLIP
SVC DNS OC12
CBT DDN NIS SONET
BNC ARQ 10Base3
AUI RTSP

What is the course about?




INTERNET

What you'd achieve from this course

- Learn the fundamentals of Internet and general computer networking concepts
  - The technologies that make networking possible.
  - Software architectures integrating the technologies to build a computer network, the Internet in particular.
  - Network programming.
  - Shortcomings and challenges of current Internet architecture (technologically, politically).
- Have fun!

What you will not learn from this course

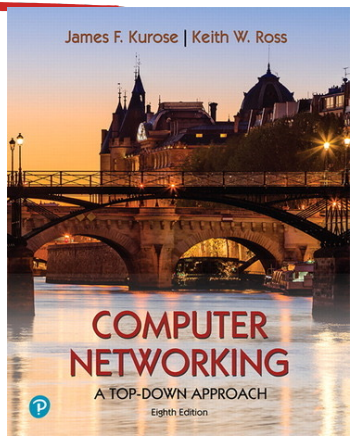
- A lot!!!
- Why?
  - There are many things we don't know
  - The field is enormous
  - Technologies evolve super-fast

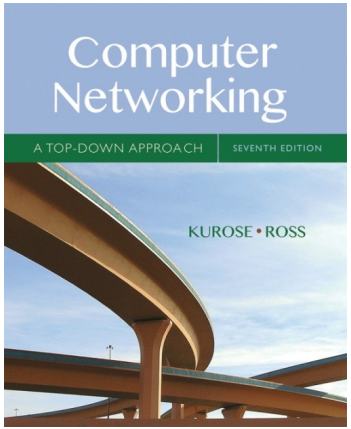
Prerequisites

- Elementary calculus and probability
- Elementary computer architecture, operating system, data structures and algorithms
- Basic Communication Theory (helpful)
- **Strong C / C++ programming skills** in Unix/Linux
  - You need to be proficient in order to do the project assignments!
  - No other programming language will be allowed!
  - No other OS will be allowed!

Course Material

- Textbook
  - James F. F. Kurose and Keith W. Ross, "***Computer Networking: A Top-Down Approach***", 8th edition, 2020
  - https://gaia.cs.umass.edu/kurose_ross/index.php
- Recommended reference
  - James F. F. Kurose and Keith W. Ross, "***Computer Networking: A Top-Down Approach***", 7th edition, 2017
  - W. Richard Stevens, "**UNIX Network Programming : *Networking APIs : Sockets and XTI : Volume 1, Second Edition***", Prentice Hall.
- Other references (including slides)
  - Piazza and UB Learns





Lectures

- Will follow the textbook
  - Read relevant chapters before and after lectures
  - Preview the slides (available most of the time before each class)
- Lectures will be recorded and available at UBLearns (I hope)

Grading: Academic Honesty

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- More in the mandatory AI Quiz on UBLearns
  - Must answer all (14) questions correctly to pass the course
  - You may take the Quiz many times before March 18, 2024.

Grading Policy

- Complete the mandatory AI Quiz before March 18
  - Study the Department and UB policies on AI carefully
  - You must answer all questions correctly in order not to receive "F".

- 4 Homework
- 4 Wireshark Labs
- Two Programming Assignments (PAs)
- Mid term and Final

Homework and Wireshark Labs

- 4 Homework : Best 3 towards final grade (4% each)
- 4 Wireshark Labs : 2%
- All done individually
- Counts 20% towards the final grade.
- Submitted electronically, late submissions for up to 7 days are accepted
  - With a fixed daily penalty of 10 out of 100 points
  - Latest submission (7 days late) will receive at most 30 points even if it's all correct; 0 points if more than 7 days late;

Programming Assignments (Projects)

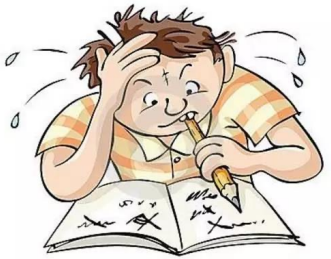
- Two Programming Assignments:
  - (PA1) Text Chat Application (early Feb to early April) (30%) – split into two parts/stages:
    - PA1 Stage 1 Due in early March – roughly 42%
    - PA1 Stage 2 Due in early April – roughly 58%
  - (PA2) Reliable Transport Protocols (early April. to early Dec.) (10%)
- Students in 589 will have earlier due dates than those in 489.
- Projects can be done in a group of 2 students, (or individually).
- Late submissions will receive penalties.

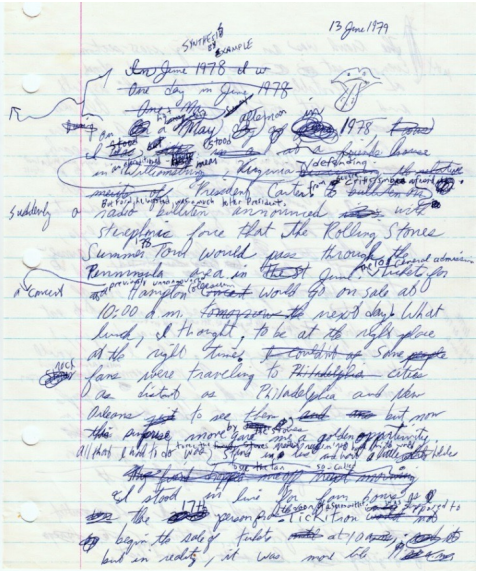
More on Grading Policy (Tentative)

- Mid-term Exam (20%)
  - March 26th
  - (after Fallbreak)
- Final Exam (20%)
  - 5/9/2023, Tue, 7:15PM – 10:15PM
- No make up exam will be given without a valid excuse

No handwritten work

- All assignments and exams must be typed.
- Handwritten work is not allowed.





Grade Expectation

- On the curve
- Just for reference:
  - **A**: top 15-20%
  - **A-**: next 10-15%
  - **B+, B, B-**: next 25-40%
  - **C+,C,C-**: next 10-20%
  - **D and below**: you don't want to know
- We reserve the right to assign grades based on the overall performance.

No lame excuses, please!!!

- I have to go home early, Can I take the exam on December 1st? (no long valid)
- I had a fight with my girlfriend/boyfriend.
- I've studied very hard, I understood the stuff very well, but I got a C- please consider giving an A-.
- I will graduate this semester and won't be able to graduate unless I get at least a B+.

Academic Honesty

Important Enough to be Repeated

- **Zero tolerance** on cheating/plagiarism:
  - Fail the course on any homework assignment/lab, project, or exam even for first attempt, & report to the department
  - Consult the University Code of Conduct for details on other consequences of academic misconduct
- Group study/discussion is encouraged, but the submission must be your own work, or in the case of a team programming project, your teammate's work.
- Team members are equally responsible for any AI violation! (don't let your teammate violate AI policy)
- For individual assignments, students who share their work are equally responsible for AI violation as those receiving the material.

More on Academic Honesty

- Homework
  - No collaboration across teams!
  - Use of reference material is allowed as long as you explicitly state the reference
    - Exception: hw/lab solutions from past years or Internet
- Course Projects:
  - Discussion of ideas is welcome but **no sharing of code!**
  - Use of code found online is allowed as long as you explicitly state the reference
    - Exception: code from past years
  - We will use **MOSS** to detect cheating.
- No lame excuses!
  - I did not know/I was not sure/I forgot

Use of AI Tools

- **No use of AI Tools for any submissions**
  - AI Tools like ChatGPT, Google Bard, etc. are not allowed.
- They can be used to understand the concepts and for clarifications.
- Use of AI Tools for the submissions in any class work
  - Homeworks/Wireshark Labs/Programming Assignments

will not be acceptable.

How to do well?

- Preview the textbook, attend lectures and review notes
- Start early on homework/labs/programming assignments
- Do homework, labs and projects yourself
- Use Piazza often and effectively
- Ask TAs questions during office hours

Where Do I Ask Questions About

- Lectures
  - Piazza
  - Instructors (office hours, email)
- Homework and Labs
  - Piazza
  - TAs (office hours, email)
  - Instructor (office hours, email)
- Programming Assignments
  - Piazza
  - Grader(s) (office hours, email)
  - TAs (office hours, email)

Questions?