CS 356: Intro to Computer Networks

A.K.A. How the Internet Works

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Course Description: This course provides an introduction into the fundamentals of how electronic devices communicate with each other, and the various systems at play in the modern day internet. A student who completes this class should be able to understand the problems and protocol solutions that arise when devices need to communicate, as well as the various layers of such networks.

Course Prerequisites:

1. CS 280 – Programming Language Concepts: Not really very relevant for the course, mostly to gauge that you know how to program

Textbook: [Computer Networking: A Top-Down Approach (Kurose, Ross)](#)

ISBN-13: 978-9356061316

Grading: Exams are unfortunately a very necessary part of this course. As such unlike my previous class we will be using exams.

- Final Exam: 35%
- Midterm Exam: 30%
- Homework / Projects: 30%
- Attendance: 5%

Grade Scale: Standard grading distribution. This scale is inflexible as I already give you a ton of extra credit

- A: grade >=89.5%
- B+: 84.5% <= grade < 89.5%
- B: 79.5% <= grade < 84.5%
- C+: 74.5% <= grade < 79.5%
- C: 69.5% <= grade < 74.5%
- D: 64.5% <= grade < 69.5%
- F: grade < 64.5%

Course Policies:

- **Extra Credit**: I provide extra credit to students who participate in class, as well as +2 points per homework for assignments that are submitted in Latex
- **Group Homework**: Collaboration on homework is expected but plagiarism is not. If I believe a student blindly copied an assignment from a fellow classmate or the internet without an understanding, I may ask that student to explain their logic. If said student is unable to do so they will not receive credit for the assignment. Everyone must turn in an individual assignment. If two people submit the same file or image, then both get no credit.
- **Homework Deadlines**: Homework is due before class starts, because we go over it in class.
- **Grade Disputes**: Homework and exam grade concerns are to be discussed outside of class.
- **Chegg**: Any student caught using Chegg for anything will instantly be given a zero for the assignment. Should you wish to request online assistance for a problem, I suggest Math-StackExchange (math version of Stack Overflow) instead, which requires you to put in more effort to ask a question, as is not wrong as often as Chegg is.
- **Cheating**: Review NJIT's policy on academic integrity. I personally am taking measures to combat cheating, but in the event you are caught you will be reported to the school.
- **Lecture Jokes**: Interact with me in class because if y'all like me, I'll like you, and all of this stuff will be much more fun
- **ChatGPT**: *Can be used to assist on the homework; I use it at work so there's no reason you can't use it. You cannot use it on exams.*
- **Late Penalty:** *Submitting assignments late will induce a ramping late penalty of $-x^2$ where x is the number of days late (rounded up) points. Corrupted or blank files count towards the late penalty.*

Course Outline:

1. Introduction to the Internet: The life of your data
2. The Link Layer
   a. ARP
   b. Switched Networks
   c. The Multiple Access Problem
   d. Error Detection Methods
3. The Network Layer – Data Plane
   a. Internet Addressing
   b. IPv6 *(if time permits)*
   c. Dynamic Host Configuration Protocol
   d. Queuing
4. The Network Layer – Control Plane

a. Routing Algorithms
b. Border Gateway Protocol
c. Internet Control Message Protocol
5. Transport Layer
a. User Datagram Protocol
b. Reliable Data Transfer
c. Congestion Control
d. Transmission Control Protocol
e. Network Address Translation
6. Application Layer
a. Hypertext Transfer Protocol
b. Domain Name System
c. Peer-to-Peer
d. Video Streaming
7. Wireless Networks *(if time permits)*
8. Network Security *(if time permits)*