

CS350 Intro Computer Systems - Course Syllabus - Fall 2024

- **Class Web page:** <http://web.njit.edu/~sohna/cs350>
- **Homework submission page:** <http://canvas.njit.edu>
- **Instructor**
 - Andrew Sohn, GITC 4209, (973)596-2315, email: sohna -at- njit -dot- edu
Office hours: M,W 2:30-3:30 pm, and by appointment
 - You can visit any time during the office hours. No need to tell me you are coming.
 - Please, DO NOT use your cell phone in my office.
- **TAs and office hours**
 - Jason Lew, jl247 -at- njit -dot- edu; office hours TBA
 - TBA
 - TBA
- **Class time and location:** See the registrar's page <https://uisnetpr01.njit.edu/courseschedule>
- **Textbooks - required. Get a hardcopy. You will find it useful in your computing career:**
 - Computer Systems: A Programmer's Perspective, 3/E (CS:APP3e), Randal E. Bryant and David R. O'Hallaron, Pearson (July 6, 2015), ISBN-13: 978-0134123837, ISBN-10: 0134123832.
See <http://csapp.cs.cmu.edu/3e/home.html> for lecture notes.
 - The C Programming Language, Kernighan and Ritchie, Prentice Hall, 2nd ed., ISBN: 978-0131103627, and a Bash book of your choice.
- **Platform:** Linux and C. You need access to a Linux box for this course. Use the school's Linux boxes if you don't have access to a Linux box. It's best if you get your machine multibooted along with your native OS such as windows or mac. For Linux installation-related issues, check the Web or ask the TAs when announced. Those who are not proficient in using Linux/Unix will be at a serious disadvantage, to say the least.
- **Grading:**
 - Attendance (4%) - I am required to verify your presence for financial aid.
 - Weekly homework and programming assignments (10%) - submit on Canvas
 - Test 1 (25%), Wed, 10/2/2024, for an hour and 15 mins. You will receive a message an hour or two before the exam on seating assignment.
 - Test 2 (25%), Wed, 11/6/2024, for an hour and 15 mins. You will receive a message an hour or two before the exam on seating assignment.
 - Final exam (36%) - See the registrar's page for date, time and location. You will receive a message an hour or two before the exam on seating assignment. Final exam is cumulative and comprehensive. Failure on the final will result in failure in the course.
 - Grades are determined based on a combination of both absolute and relative performance of class compared against many years in the past. In general average performance will likely get you a C. However this is not the only and absolute metric so don't rely solely on this metric.
- **Homework:**
 - Homework is posted on <http://web.njit.edu/~sohna/cs350>
 - See Canvas for HW due dates and submission.
 - Homework is due at 11:59 pm of the posted due date.
 - Homework will not be accepted after the due date. Submit on time. Do not ask for exceptions. If you ask for an exception, I will apply that to everyone in class.
 - Do your homework from scratch and on your own. Be prepared to spend an hour or two a day on homework. You'll be glad you did, not just for the course but rather more importantly for your computing career. You'll realize that in the next 10 years.
 - Homework must be your own work. Do not show your code and/or copy other's code.
 - Copying homework will be referred to the University for disciplinary actions.
- **Attendance:** I am required to verify your presence. Make sure to put your name on the sign-up sheet circulated during each lecture. No sign-up no-show.

- **NJIT policy on recording class materials:** You may not record anything in class in any form with any device. You may not put any video/audio recorded class materials on the Web/Internet. You are breaking the policy. Please, honor the policy.
- **Exam related. Read carefully:**
 - **Procedure for exams:** An hour or two before the exam, you will receive an email regarding seating assignment based on NJIT ID number. Make sure to take a seat according to the seating assignment. *Numbered exams will be distributed to the matching seats.* Make sure your numbered exam paper matches your seat assignment. Leave your NJIT ID card on the table. IDs will be checked during the exam. Do not take someone else's exam paper. You both are taking someone else's exam.
 - **Disagreement with exam marking/scores:** If you disagree with your exam scores/marks, you may dispute within a week of receiving/seeing the graded exam paper. After a week, no exams will be contested.
 - **Grading dispute:** If you disagree with your grade, you may contest after the first day but within a week of the following semester. After a week of the first day of the following semester, no grading dispute will be considered.
 - **NJIT policy on missed exams:** There will be no make-up exam(s). You must plan your semester accordingly, especially if you work. Should you miss the exam(s) due to emergency, (a) go to/contact the Dean of students, (b) explain your situation as to why you had to miss, and (c) ask to issue a memo to me. If and when I receive a memo from the Dean verifying that your absence was for a good reason, I will copy your next exam score to the missing one. Those who miss the final exam will fail in the course unless you demonstrate a true emergency again through the office of the Dean of students. No other policy will be applied. No exceptions will be made.
- **Email Policy: I read email and respond between 9 am to 5 pm, Monday through Friday.**
 - I read email and respond between 9 am to 6 pm, Monday through Friday. I do not read emails on weekends and holidays. Do not expect to receive my response on weekends and holidays.
 - Do not expect to receive my immediate email response.
 - Do not make important decisions based on the assumption that you would get my immediate response.
 - I will try to respond within 24 hours. In most cases, I respond sooner than 24 hours. However, often times there are situations where I am simply unable to respond to your email within 24 hours for various reasons, including school committees, health, inclement weather, traveling, etc, in which case your patience is appreciated.
 - Keep your email succinct, short, to the point. You don't need to write profuse pleasantries, thanking in anticipation of my replies for finding your programming bugs, etc.
 - Emails of half to a page containing programming questions, in particular assembly code, will take hours to even days for me to respond as I have to read carefully and actually execute to make sure you get useful comments from me.
 - You'll get no response if you ask questions that are answered in the syllabus, on the course web page, or on Canvas, such as office hours, locations, TA/Grader names, their hours, exam dates and locations, the URL of lecture notes, etc.
- **Academic Integrity:** I am required to post this on the course syllabus.
 "Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: <http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf>. Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu"

Lecture schedule - Topics may change according to class pace

See <http://csapp.cs.cmu.edu/3e/home.html> for lecture notes.

| Week | Chapter | Lecture | Date | Section | Homework |
|------|--|---------|--|---|--|
| 1 | Ch.1 A Tour of Computer Systems | 1 | Wed,9/4 | About the course | |
| | | 2 | Mon,9/9 | Intro to computers | |
| 2 | Ch.2 Representing and Manipulating Information | 3 | Wed,9/11 | Binary, octal, decimal, hexa numbers, integer representation | HW1 on reality |
| | | 4 | Mon,9/16 | Binary to integer to unsigned and back | |
| 3 | | 5 | Wed,9/18 | Integer addition, integer multiplication | HW 2 on ints |
| | | 6 | Mon,9/23 | Floating point representation and operations | |
| 4 | | 7 | Wed,9/25 | Floating point continues. Data types, registers, | HW 3 on floats |
| 4 | Ch.3 Machine-Level Representation of Programs - Linux assembly and machine languages | 8 | Mon,9/30 | C to assembly to machine code, Data movement instructions | |
| 5 | | 9 | Wed,10/2 | Test 1, for an hour and 15 mins | |
| | | 10 | Mon,10/7 | Data movement instructions, address computation | |
| 6 | | 11 | Wed,10/9 | Control: jump instructions, conditional branches | HW 4 on basic assembly |
| | | 12 | Mon,10/14 | Loops and switch statements, push, pop | |
| 7 | | 13 | Wed,10/16 | Procedures and recursions | HW 5 on control |
| | | 14 | Mon,10/21 | Array allocation and access, pointers | |
| 8 | | 15 | Wed,10/23 | Multi-dimension arrays, matrix, structs, | HW 6 on procs, recurs |
| | | 16 | Mon,10/28 | Stack overflow detection and prevention, variable stack | |
| 9 | | 17 | Wed,10/30 | Floating point instructions, Intel AVX, GPU programming using Nvidia CUDA | HW 7 on stack overflow |
| 9 | Ch.4 Processor Architecture | 18 | Mon,11/4 | Sequential computers - instruction set, add, mov | |
| 10 | | 19 | Wed,11/6 | Test 2, for an hour and 15 mins | |
| | | 20 | Mon,11/11 | Sequential computers - add, mov, load, store | |
| 11 | | 21 | Wed,11/13 | Sequential computers - load, store, push, pop, call, ret | HW 8 on instr exec |
| | | 22 | Mon,11/18 | Pipelined computers - data and branch hazards | |
| 12 | | 23 | Wed,11/20 | Pipelined computers - solutions to the hazards | |
| 12 | Ch.6 Memory Hierarchy | 24 | Wed,11/25 | Main memory, cache memory, locality of reference | HW 9 on issues |
| | | 25 | Mon,12/2 | Cache memory - mapping, placement | |
| 13 | | 26 | Wed,12/4 | Cache memory - placement, replacement, memory mountain, matrix multiplication | HW 10 on cache |
| 14 | Ch.9 Virtual Memory | 27 | Mon,12/9 | Paging, page tables, address translation, example 1 | |
| | | 28 | Wed,12/11 | Address translation example 2, dynamic memory allocation | HW 11 on virtual mem |
| 15 | --- | Final | See the registrar's page for the time and location | | |