CS 2461
Computer Architecture 1
i.e., Introduction to Computer Systems

https://GW-CS2461-2021.github.io/

Fall 2021

Instructor: Dr. Bhagi Narahari

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CSCI 2416 Fall 2021 Instruction team

- You will learn more from them than from the Instructor!
- Undergraduate TAs:
  - Linnea Dierkshide – BS CS Class of 2022 (Senior)
  - Graham Schock – BS CS Class of 2022 (Senior)
  - Catherine Meadows – BS CS Class of 2022 (Senior)
- Learning Assistants (LAs):
  - Jonathan Lee – BS CS Class of 2023 (Junior)
  - Lauren Hahn – BS CS Class of 2023 (Junior)

  instruction team will have "office hours" and will be helping with in-class/in-lab activities

  UTAs will be leading/teaching the lab sections

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How is the course taught ?

- Lecture materials(Asynchronous) – Read/View **before** class
  - In some cases, videos of lecture topics
  - Slides, Notes, and examples (Circuits, Code,..)
- Synchronous lecture sessions
  - Some lectures will be taped and made available on Blackboard In-class discussions and exercises
  - Work on solving problems in teams with instruction team
- Lab sessions
  - Notes and Videos of lab tutorials posted – watch them before lab
  - labs will cover content/topics not covered in lecture (working with hardware, Unix tools,) and
    - Reviews
    - Exercises/Demos/Experiments
    - Will need to submit lab work for grading

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Course Logistics….Where do I go to get course information & materials ?

- Blackboard:
  - Quizzes, Exams, Homeworks & Grades
  - Online class (lecture and lab) – recordings from these sessions
- Website: https://gw-cs2461-2021.github.io/
  - Syllabus – schedule, grading criteria, contact info
    - Lecture notes(slides, exercises, code samples, circuits,…)
    - Tutorial Videos linked from website
- (Maybe Github: projects, and code submission..TBD)
- Slack:
  - General discussion channel – post questions to instructors or classmates
  - direct messaging to instructors
  - when working on problems during class, default privacy (direct messaging)

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Slack discussions

- Online discussion forum
  - The purpose of this:
    - to encourage students to ask well formed questions
    - To encourage students to answer each others questions
      - Most of the time, you do this better than we do!
    - *Be very careful not to border on plagiarism!*
    - *Don't post your HW solution to the world,*
  - Signup link will be sent…check, and sign up.
  - Do not expect instant response or substitute slack for TA office hours!
    - Slack is not manned 24 hours/7 days a week
    - sometimes answer may take more than 24 hours!
    - Mainly a way for students to help one another with common questions/misunderstandings
      - Not a substitute for office hours
  - NO TA can excuse you from anything/or give any extensions

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In-class exercises/activities

- This course is designed to help you learn through in-class exercises (lectures and labs)
  - For this to work, you must review the material and come to class
- We want you to complete the exercises while working as a group
  - We may ask a group to present solutions to class
- In-class questions/exercises counts towards your class participation grade
  - Includes the in-class exercises.

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Lab Section Logistics

- Most lab sessions will cover 'new' material not covered in the lecture
  - If you do not 'attend' the labs, you will miss this
- Lab section materials are focused on practical skills
  - Ranging from HW circuit design/testing to using Unix/Compiler tools
    - Ex: intro hardware circuits, GDB debugging C code, etc...
  - Concepts are covered in the lectures but we want you to learn both skills & concepts!
- Hardware design….
  - Each of you is provided a hardware kit…
  - **You will need to return the kit BEFORE Exam 1 – your course grade will not be posted until you return the kit.**
  - Familiarity with hardware design plays an important role in your next course – Systems Programming CS 3410.
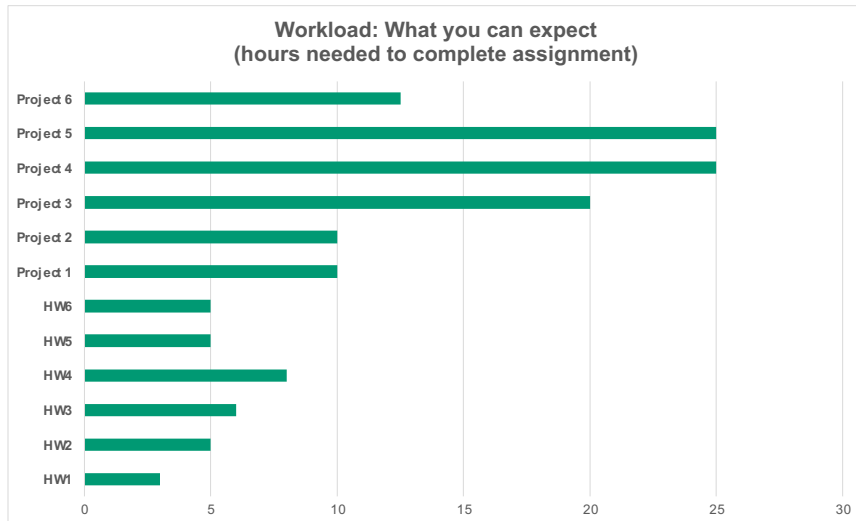
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Expectations

- Come prepared to class
  - Read the notes/textbook and watch tutorial videos
- Use class time to work on problems, ask questions
  - This is when you make sure you have learned the concept correctly
- You will need to spend at least 5 hours outside class time each week
  - If you do not, then you will encounter rough seas
- This is considered a hard course – mostly because you will be seeing a lot of new concepts/topics
  - But **easy** to handle if you spend the required time
  - Practice, practice, practice…especially your programming skills
  - As a CS major, I am assuming you spend 6-10 hours each week programming _outside_ class
- You will be expected to learn some materials on your own…
  - This is only the beginning..things get more demanding when you get to your junior year….ask the TA team (they have been through this 'journey')

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Course workload: What you've signed up for….

Workload: What you can expect
(hours needed to complete assignment)

Project 6	▇▇▇▇ (~12.5)
Project 5	▇▇▇▇▇▇▇▇ (~25)
Project 4	▇▇▇▇▇▇▇▇ (~25)
Project 3	▇▇▇▇▇▇ (~20)
Project 2	▇▇▇ (~10)
Project 1	▇▇▇ (~10)
HW6	▇ (~5)
HW5	▇ (~5)
HW4	▇▇ (~8)
HW3	▇ (~6)
HW2	▇ (~5)
HW1	▇ (~3)

Axis: 0, 5, 10, 15, 20, 25, 30

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Textbooks/Software

- Intro. to Computing Systems, by Patt and Patel
  - Easy to read – fairly comprehensive.
- Other useful books: Unix for Programmers, C Programming

- LC3 simulator and C to LC3 compiler
  - Links on the course webpage

- C compiler – gcc (need to use cygwin/Linux/Mac or SEASCF)
- Basic Unix Programming
- Hardware Simulators:
  - Logic simulators: CedarLogic (free S/W for Windows) or LogiSim(for Mac)

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Course Schedule

- Part 1 (8-9 weeks) of the course spent on hardware (HW stack) and HW/SW Interface
  - From transistors to the design of a simple processor
    - o Implementation of a simple processor ISA
  - Assembly programming
- Part 2 of the course (5-6 weeks) spent on C Prog Lang. and translation to Assembly
  - Quick review of C (you will cover some C in CS2113)
  - How are C constructs compiled into (LC3 assembly) machine language
  - Managing Memory
    - o Stack
    - o Heap
  - How to make your programs run faster

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Requirements and Grading: Read website for details on how grade is computed

- 40% Exams: Two exams
  - Will be held approximately Weeks 7,12
  - Exam will also have an 'interview' (oral exam) component
    - o Conducted by instructor and TA
- 20% Homework and Lab assignments
  - Lab assignments may require completion within lab time
    - o No late submissions….except a "one time pass" of 36 hours
- 10% Class participation and Quizzes
  - 9 quizzes, will drop lowest score
    - o **Start of class** – if you join late, you miss the quiz
  - Class participation – includes inclass activities.
- 30% Projects: about 6 projects
  - One or two of them will have a teamwork component.
  - You may be asked to demo and explain some of your projects – be prepared to be examined on any (random) aspect of your solution (code, design, etc.)

Academic Intigrity

- You are here to learn – so keep that in mind
- Strictly enforced!
  - "no collaboration" means none of any kind
  - No asking friends
  - No searching on web for answers
- Violations will lead to at least a zero on the work and a grade lower than final grade..and formal report to the Integrity council.
  - A 2nd violation goes on your transcript
- Stay on top of your work – come ask me/TAs questions!
- PDT: Plagiarism detection software tool
  - I will be running code submissions through a software tool
  - Any pair of submissions with more than 25% similarity will be closely examined and reported to the acad. integrity panel

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Logistics Summary

- Website with all the lecture materials
  - Videos, Notes, links to software
- Slack for discussion forums
- Blackboard for assignments and quizzes (and exams?)
- Some videos from synchronous (i.e., during the official lecture and lab times) lectures on Blackboard
- Discussion of questions and in-class activities/exercises
  - Work in groups with a member of instruction team

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