College of Sciences
Department of Computer Science
CS 170: Introduction to Computer Architecture I

Syllabus – Fall 2025
Dr. Soad Ibrahim

Instructor Contact Information

Instructor: Dr. Soad Ibrahim

Office: Dragas 1100A

Office Hours: I plan to use Zoom for my office hours every week. *Please use the following link to book a meeting with me "Book an Appointment"*. Also, you can contact me at sfibrahi@odu.edu to set a meeting in a different day/time.

Email: sfibrahi@odu.edu – Please make sure to include your name and CS 170 in the subject line of your email.

Course Readings

David A. Patterson and John L. Hennessy, Computer Organization and Design MIPS Edition: The Hardware/Software Interface, 6th Edition, 2020

ISBN: 978-0-12-820109-1

Course Description

Fundamentals of the architecture and operation of modern computers. Basic computer logic: logic equations; gates; combinatorial logic. Basic computer arithmetic: binary numbers; floating point representation. System hierarchy, overview of a computer; integrated circuit technology. Performance: metrics; choosing benchmarks; Amdahl's law. Instruction Sets and Operations: assembly language; machine language; examples of other instruction sets. Prerequisites: MATH 162M and a grade of C or better in any one of: CS 150, CS 151, CS 153, or ENGN 150

Goals and Objectives

This is the first course in a two-semester sequence consisting of CS 170 and CS 270. CS 170 is a prerequisite for CS 270. In this course you will study the architectural and operational basics of modern computers. At the end of this course, students will be able to:

1. Describe instruction set architecture
2. Identify and explain the role and purpose of computer hardware components
3. Describe common representations of data in computer memory and convert among them.
4. Describe how programs are translated into machine language.
5. Describe and interpret common measures of computer performance
6. Identify the basics of logic design

Topics covered:

List topics covered:

- Introduction to the computer revolution
- Introduction to classes of computers
- Technologies for Building Processors and Memory
- Eight Great Ideas in Computer Architecture
- The Switch from Uniprocessors to Multiprocessors
- The power wall
- Benchmarking the Intel Core i7
- Binary numbers
- Binary numbers addition, subtraction, multiplication, and division
- Hexadecimal numbers
- Logic gates and truth tables
- Boolean equations
- Boolean Algebra
- Programmable Logic Array
- Multilevel combinational logic
- Karnaugh Maps
- Combinational Building Blocks: multiplexers and Decoders
- Arithmetic Logic Unit
- Faster Addition: Carry Lookahead
- Clocks
- Flip-Flops, Latches, and Registers
- Memory Elements: SRAMs and DRAMs
- Signed and Unsigned Numbers
- MIPS instruction set
- MIPS R-format Instructions
- MIPS I-format Instructions
- MIPS J-format Instructions
- Logical operations
- Instructions for making decisions
- Supporting procedures in computer hardware
- Translating and starting a program: compiler, assembler, linker, and loader
- Multiplication hardware
- Division hardware
- Floating-point representation
- Floating-point addition, subtraction, multiplication, and division

How the Course Works

Methods of Delivery/Learning Activities

This online course employs several methods of delivery and learning activities including online lectures and presentations, threaded discussions, Web sites, video clips, assignments, self-assessment checks, examinations, and electronic access of information.

Rules for emails:

- Identify yourself
- email to sfibrahi@odu.edu
    - Please make sure to include the class name "CS170" in the subject of your email, otherwise I will not be able to know which class you are talking about
    - Use your university e-mail account to send emails
    - Sign with your full name and course number
- We will use email to discuss issue that cannot be discussed on the discussion board.

Grading Criteria

Each of the following components will contribute the indicated percentage to your overall grade.

Homework	50%
Test1	10%
Test2	10%
Test 2	10%
Final Exam	20%
Total	100%

Letter Grade:

Percent Scored	Grade
93-100	A
90-92	A-
87-89	B+
83-86	B
80-82	B-
77-79	C+
73-76	C
70-72	C-
67-69	D+
63-66	D
60-62	D-
0-59	F

Student Responsibilities

Expectations: Students are expected to:

- check Canvas regularly
- Grades will be posted on Canvas. It is the student's responsibility to inform the instructor of misreported grades within **three** days after they are posted on Canvas.
- read the selected chapters from textbook
- read supporting material and watch supporting videos

- complete and submit the homework before the due date
- attend all tests and exams
- use time wisely and be organized
- participate actively in the class discussion, post questions, comments and responses - please post your questions on the discussion forum instead of sending emails so other students can benefits from the posted discussion
- have the motivation to work independently, e.g. solve review problems at the end of each section from the textbook
- follow the rules of sending email
- discuss private issues by email
- follow the course polices and guidelines

Time Management

Students are expected to spend 14 hours per week on the course materials and homework. Out of 14 hours, students are expected to spend approximately 3 hours per week to read the material and another 3 hours/week for the homework and discussions.

Attendance

Since this is an on-line course, there is no mandatory attendance policy. However, students are expected to actively participate in the discussions and homework submissions.

General submission rules

- Late submission will not be permitted.
- There are no 'make-ups' for the homework/tests/exams.

Course Policies

Online Classroom Conduct (Netiquette)

Students are expected to follow good Netiquette rules. Netiquette is the accepted behavior for online participation. The following is a list of general guidelines for this course:

- Check your grammar and spelling
- Keep your comments focused on the topic
- Strive to write succinctly and clearly
- Share your knowledge and include supportive evidence for your comments
- Do not use all capital letters as that is viewed as shouting
- Avoid flaming—disrespectful language is unacceptable

Select the link to find more information on Netiquette.
http://www.albion.com/netiquette/corerules.html

Tests and Make-ups

The same information for homework will apply for tests and make-up work: If a situation has occurred that requires your time and attention which will prevent submitting your work on time, please notify your instructor 24 hours before the scheduled due date.

You may not make up homework/tests/exams without prior arrangements, a written medical excuse or a documented emergency. Such arrangements must be made with the Student Ombudsperson Services Office. Please follow the university rules at the following links:

https://www.odu.edu/about/monarchcitizenship/class-attendance/absences

Course Disclaimer

Every attempt is made to provide a syllabus that is complete and that provides an accurate overview of the course. However, circumstances and events may make it necessary for the instructor to modify the syllabus during the semester. This may depend, in part, on the progress, needs, and experiences of the students.

University Policies

Academic Integrity

Old Dominion University is committed to students' personal and academic success. In order to achieve this vision, students, faculty, and staff work together to create an environment that provides the best opportunity for academic inquiry and learning. All students must be honest and forthright in their academic studies. Your work in this course and classroom behavior must align with the expectations outlined in the Code of Student Conduct, which can be found at www.odu.edu/oscai. The following behaviors along with classroom disruptions violate this policy, corrupt the educational process, and will not be tolerated.

Cheating: Using unauthorized assistance, materials, study aids, or other information in any academic exercise.

Plagiarism: Using someone else's language, ideas, or other original material without acknowledging its source in any academic exercise.

Fabrication: Inventing, altering or falsifying any data, citation or information in any academic exercise.

Facilitation: Helping another student commit, or attempt to commit, any Academic Integrity violation, or failure to report suspected Academic Integrity violations to a faculty member.

Academic dishonesty will be reported to the Office of Student Conduct & Academic Integrity and may result in sanctions up to and including expulsion from the University.

By attending Old Dominion University, you have accepted the responsibility to abide by the honor code. If you are uncertain about how the honor code applies to any course activity, you should request clarification from the instructor. The honor code is as follows: *"I pledge to support the honor system of Old Dominion University. I will refrain from any form of academic dishonesty or deception, such as cheating or plagiarism. I am aware that as a member if the academic community, it is my responsibility*

to turn in all suspected violators of the honor system. I will report to Honor Council hearings if summoned."

Any evidence of academic dishonesty will be submitted to the Office of Student Conduct & Academic Integrity for further review. Evidence of academic dishonesty may include a student being unable to satisfactorily answer questions asked by the instructor about a submitted solution. For class files kept in UNIX space, students are expected to use UNIX file permission protections (chmod) to keep other students from accessing the files. Failure to adequately protect files may result in a student being held responsible for giving unauthorized assistance, even if not directly aware of it.

Students may still provide legitimate assistance to one another. You are encouraged to form study groups to discuss course topics. Students should avoid discussions of solutions to ongoing assignments and should not, under any circumstances, show or share code solutions for an ongoing assignment.

Please see the ODU Honor Council's webpage for other concrete examples of what constitutes cheating, plagiarism, and unauthorized collaboration. All students are responsible for knowing the rules. If you are unclear about whether a certain activity is allowed or not, please contact the instructor.

You can read more the code of student conduct at the following website:

https://ww1.odu.edu/content/dam/odu/offices/bov/policies/1500/BOV1530.pdf

Important Notes:

a) Use of ChatGPT and similar such tools is strictly prohibited.
b) Use of ChatGPT and such tools may be used to get some ideas, but the work submitted must be students' own.
c) Use of ChatGPT and such tools is permitted, but students must properly cite the sources of that, and any other code found on the Internet, according to the guidelines provided below. [followed by examples of using comments in code to cite sources of both quoted and paraphrased sections].

Special Needs:

Old Dominion University is committed to ensuring equal access to all qualified students with disabilities in accordance with the Americans with Disabilities Act. **The Office of Educational Accessibility (OEA)** is the campus office that works with students who have disabilities to provide and/or arrange reasonable accommodations.
The Office of Educational Accessibility is located at 1021 Student Success Center and their phone number is (757)683-4655. Additional information is available at the OEA website: http://www.odu.edu/educationalaccessibility/

- If you experience a disability which will impact your ability to access any aspect of my class, please present me with an accommodation letter from OEA so that we can work together to ensure that appropriate accommodations are available to you.

- If you feel that you will experience barriers to your ability to learn and/or testing in my class but do not have an accommodation letter, please consider scheduling an appointment with OEA to determine if academic accommodations are necessary.

Students are encouraged to self-disclose disabilities that have been verified by the Office of Educational Accessibility by providing Accommodation Letters to their instructors early in the semester in order to start receiving accommodations. Accommodations will not be made until the Accommodation Letters are provided to instructors each semester.

ODU's Office of Counseling Services

ODU's Office of Counseling Services (OCS, 1526 Webb University Center) is a university agency with competent, diverse, and multidisciplinary professional staff. We are committed to supporting the emotional well-being, social development, and academic progress of all students at Old Dominion University.

College life can be a wonderful time of self-discovery, but for many, it is also a time when the awareness of mental health conditions increases. OCS services are available to assist with addressing mental health concerns that a student may be experiencing. You can learn more about the broad range of confidential mental health services available on campus via our website at: http://www.odu.edu/counselingservices. All services are free to ODU students.

NOTICE/disclaimer: This syllabus is intended to give the student guidance in what may be covered during the semester and will be followed as closely as possible. These plans may change depending on factors outside of the faculty member's control. **The instructor reserves the right to modify, supplement and make changes as course needs arise**.