CSCE 230 - Computer Organization

CSCE 230 Syllabus
Spring 2026

Class Schedule

- Lectures:
  - Section 150/250: Monday/Wednesday/Friday 9:30am-10:20am in Kiewit A253
- Recitations:
  - Section 151: Tuesday 3:30pm – 4:20pm in Avery 19
  - Section 251: Wednesday 3:30pm – 4:20pm in Avery 19
- Laboratories:
  - Section 161: Tuesday 4:30pm – 6:20pm in Avery 21
  - Section 262: Wednesday 4:30pm – 6:20pm in Avery 21

Instructor

- Jeffrey Falkinburg, Avery Hall 368, (402) 472-5120, jfalkinburg2@unl.edu
- Please check the Syllabus page on Canvas for office hours and TA information.

Canvas

- The lecture sections have been published on Canvas (https://canvas.unl.edu/)
  - For checking the class information (office hours, TA information).
  - For downloading course materials (e.g., lecture notes/slides/documents, homework and lab assignments, homework and exam solutions).
  - For submitting homework and lab assignments.
  - For taking on-line quizzes and exams.
  - For checking your grades.

Piazza

- Piazza will be used as an online discussion forum to ask questions and collaborate. We encourage you to ask questions when you're struggling to understand a concept—you can even do so anonymously.
- Class signup link: https://piazza.com/class/mjxhc774bxv2dl/

Catalog Description:

- Computer Organization (4 cr) Lecture 3 hours, recitation 1 hour, laboratory 2 hours. Introduction to organization and structure of computer systems. Boolean Logic, Digital Arithmetic, Processor Organization, Machine Language Programming, Input/Output, Memory Organization, System Support Software, Communication, and Ethics.

Prerequisites:

- A grade of 'P' or 'C' or better in CSCE 235, CSCE 235H, or RAIK 184H.

Prerequisites by Topic:

- *Mastery of:* mathematical problem solving skills, mathematical maturity and competence to the level of introductory calculus.
- *Familiarity with:* programming, logarithms, integer and floating point numbers.
- *Exposure to:* recursion, operating systems services.

Textbook:

- Computer Organization and Embedded Systems
- **6th edition**,
- C. Hamacher, Z. Vranesic, S. Zaky, and N. Manjikian
- McGraw Hill, 2011
- ISBN: 978-0073380650.

Course Objectives:

- *Mastery of:* Boolean algebra, logic equations, binary numbers (including negatives), fixed-point binary arithmetic, hexadecimal notation, logarithms, exponential numbers.
- *Mastery of:* I/O devices, processor organization, instruction set architecture (with hands-on experience in micro-processor design and implementation).
- *Familiarity with:* logic gates and diagrams, floating point arithmetic, memory devices and hierarchies, micro-operations & micro-architectures.
- *Familiarity with:* assembler language principles, flow of control, stacks, subroutines, assemblers, linkers, loaders, the syntax & semantics of short assembler programs.

Course Goals:

- How does a modern digital computer interpret programs written in a high-level programming language into the streams of electronic signals that actually do the thinking, the arithmetic, the keeping track of data, the sequencing of actions, and the input/output? What is the hardware-software interface? What system design considerations go into defining and designing it? In this course you will gain an understanding of the interface by first writing programs in a low-level assembly language that is close to the machine language, then developing the logic design of a workable processor and all its components. In the process you will gain practical experience with computer-aided design tools.

Topics Covered:

1. *Arithmetic and Logic Level:*
    a. Boolean algebra, truth tables, logic equations, logic gates, combinational logic, sequential logic & memory devices, clocks, waveform diagrams
    b. Signed and unsigned binary numbers, floating point numbers, BCD, Hexadecimal, ASCII
    c. Signed and unsigned fixed-point arithmetic, floating-point arithmetic, ALU structures
2. *System Level Organization:* CPU, memory systems (main memory, cache, virtual memory), storage technologies, I/O devices & processes (programmed, DMA, channel), busses.
3. *Micro-Architecture Level:* data paths and components, micro-operations, memory interfacing, the fetch/execute cycle, processor control & sequencing, interrupts, rudimentary pipelining.

4. *Instruction Set Architecture Level:* instruction types and formats, opcodes, operands, immediate values, addressing modes, flow of control, branching and procedure calls.
5. *Assembler Language Level:* syntax, directives vs. instructions, assemblers, linkers, loaders, semantics of simple programs, stack management, procedure calls, interrupt handling.

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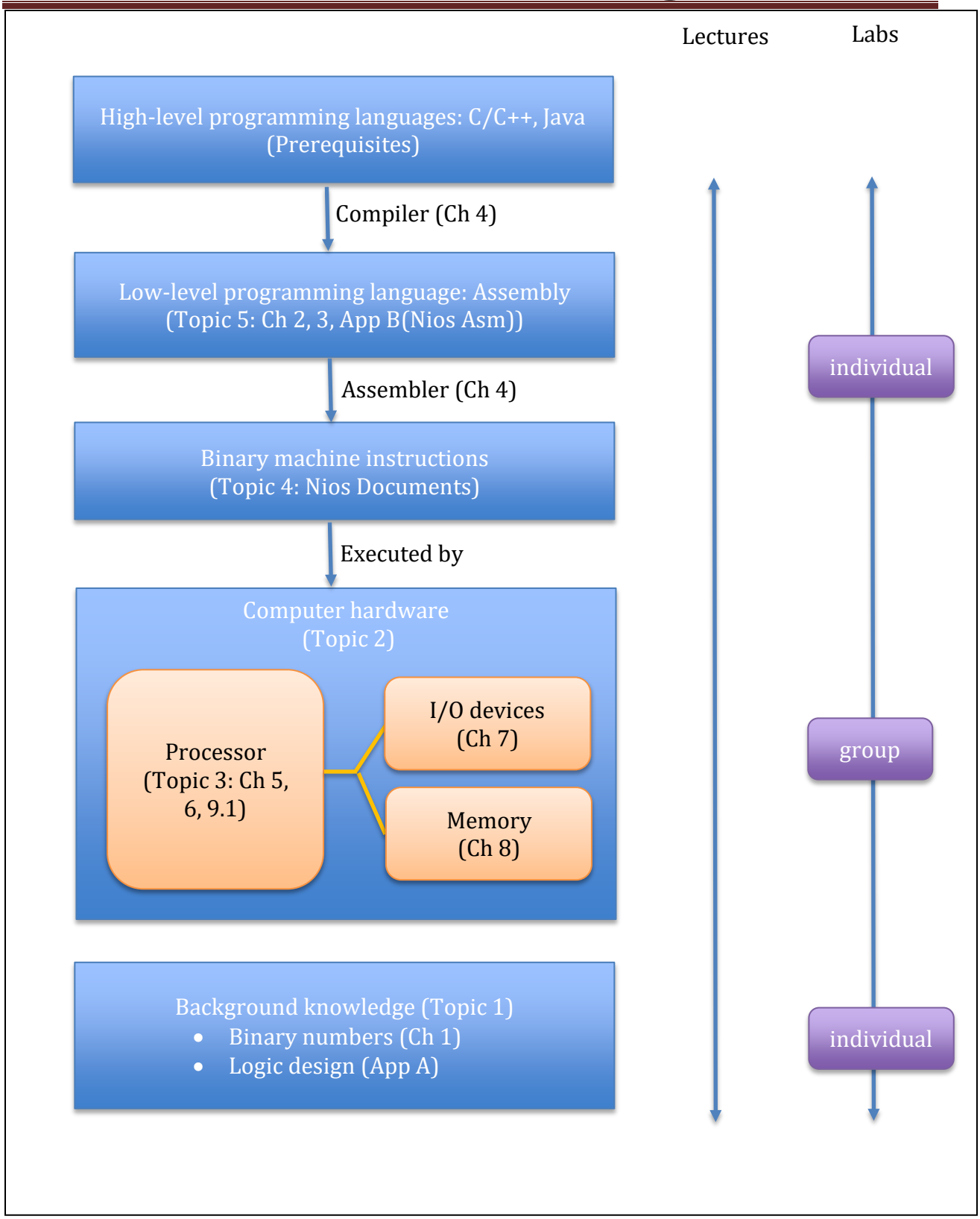

Policies:

- *Communication policy*
  - You will be notified of any course changes or communication via Canvas.
- *Instructional Continuity Plan*
  - If in-person classes are canceled, then class will be conducted via the course Zoom web conference link found on Canvas.
- *Submission policy*:
  - All assignments including homework, labs, quizzes, and exams will be based in Canvas. Specifically, all homework and lab assignments should be submitted electronically on Canvas, and all quizzes and exams will be taken online on Canvas.
- *Late Work policy:*
  - All assignments including homework and labs must be completed by the due date, and all quizzes and exams must be taken on the specified dates. **Late homework or labs may be accepted for partial credit as long as the Canvas quiz was not opened**.
  - If you have a valid excuse (e.g., sick with a doctor's note, out of town for a conference, and job interview), your homework/lab/quiz/midterm score can be replaced by your final exam score.
- *Attendance policy:*
  - Because this is a very challenging course and it is very hard for you to study the textbook by yourself, **it is very important for you to attend in-person or review the recorded lectures**.
  - Synchronous attendance is required. I will be taking attendance, and we will have many quizzes (possibly once per week).
- *Academic Integrity policy:*
  - All students must read, understand, and follow the policies stated in http://computing.unl.edu/academic-integrity-policy. The Department requires the instructor to report every offense to the Director for further consideration. Violations will be dealt with on a case by case basis and may result in a failing assignment, a failing grade for the course, or expulsion from the program.
  - Recognizing that peer study is an effective learning tool, you are encouraged to work in groups to discuss the homework and labs, but **be sure to write your own solutions and clearly indicate with whom you worked together and discussed the homework and labs**. The key to avoiding cheating is to be totally open and transparent about any and all collaborations.

Grading:

- *(15%) Homework*:
  - We will have about five to eight homework assignments
  - In the past semesters, many students did very well in the homework assignments (e.g. 90+) but did poorly in the exams (e.g., <60). An important reason is that they solved the homework problems using their laptops or calculators (e.g., use a laptop to run a program to find the correct output, or use a calculator to find the binary numbers), but laptops and calculators are not allowed in the exams. Therefore, my suggestion is **that**

  - **you first try to solve the homework problems by yourself manually without using a laptop or a calculator, and**
  - **then you may use your laptop or calculator to check whether your answers are correct or not.**

- *(15%) Individual Labs:*
  - The labs will provide supplemental learning to the material covered in lectures, and give you hands-on practices along with better understanding of what you've learned at lectures.
  - There are two types of individual labs: assembly programming and logic design. Note that, all lab sections will have the same due date and time.

- *(15%) Group Labs (called the project):*
  - The group labs will involve the design, implementation, and testing of a simple processor. It provides an excellent opportunity to put into practice what you will learn in this course and the associated labs.
  - You can work alone or with a partner (i.e., at most two students per group).

- *(10%) Quizzes:*
  - These very short pop quizzes are intended to provide quick feedback to me and to you about how well you are understanding the material being discussed in the class.
  - **Please bring your laptop with you to every class, as you need to take the quizzes online using UNL Canvas.**
  - All quizzes are open books and open notes.
  - Among all your quiz scores, the lowest one will be dropped.
  - We will have quizzes about once per week, at the beginning or the end of a class.

- *(25%) Midterm Exams:*
  - There will be about three midterm exams, and the exam dates will be announced at least one week in advance.
  - These will be open-book, open-note, required computer exams. More details will be announced closer to the exam dates. You will be on your own honor to complete these exams alone and without collaboration.
  - All exams are individual effort so no internet searches or group collaboration is allowed.
  - **We will likely have the midterm exams during class and will be administered via Canvas at the DLC. Please see Canvas for more information on dates.**

- *(20%) Final exam:*
  - It is a comprehensive final exam that covers all the topics studied in the course.
  - Typically the final exam is closed book/notes. No calculator/laptop/smartphone. You may bring one sheet of notes (letter size, double sided, printed or manually written). More details will be announced closer to the exam date.
  - **According to UNL final exam schedule, we will have the final exam at a specific time of the final exam week based on the lecture section time.** Specifically

- Section 150 (M/W/F lecture): 10:00-12:00, Tuesday, Dec 14, in Hamilton 112

Below is the grade distribution for those who like tables:

All homework	15%
All individual labs	15%
All group labs	15%
All quizzes	10%
All midterm exams	25%
Final exam	20%
Total	100%

Final grades will be assigned based on the following cutoff percentages

Grade	A+	A	A-	B+	B	B-	C+	C	C-	D	F
Score	97	93	90	87	83	80	77	73	70	60	<60

UNL Course Policies and Resources

Students are responsible for knowing the university policies and resources found on this page (https://go.unl.edu/coursepolicies):

- University-wide Attendance Policy
- Academic Honesty Policy
- Services for Students with Disabilities
- Mental Health and Well-Being Resources
- Final Exam Schedule
- Fifteenth Week Policy
- Emergency Procedures
- Diversity & Inclusiveness
- Title IX Policy
- Other Relevant University-Wide Policies

Other Items:

- The School of Computing has an anonymous contact form that you may use to voice your concerns about any problems in the course or department if you do not wish to be identified. See https://computing.unl.edu/anonymous-department-feedback-form.
- It is School of Computing policy that all students in CSE courses are expected to regularly check their emails, so they do not miss important announcements.
- TA office hours will be hosted via Zoom at the following link: https://unl.zoom.us/j/638639879
- Additionally resources may be available in the Virtual SRC in Canvas. See http://cse.unl.edu/src for more information.
- This syllabus may be updated and expanded as the semester progresses.