

INTRO TO COMPUTER ORGANIZATION

Fall 2024

Instructor:	Qixin Deng	Time:	Tues/Thur 9:45 AM - 11:00 AM
Email:	dengq@wabash.edu	Place:	Hays Science, 003
Office:	Goodrich Hall 108	Office Hour:	Open door policy

Office Hours: Open-door policy. Find me any time from 9:00 am to 5:00 pm on M/W/F. I will not be available on Tuesday and Thursday. A pre-schedule/appointment is required after 5:00 pm.

Course Description:

This course introduces the fundamental concepts of computer organization and architecture, covering essential C programming elements like conditional expressions, recursion, and pointers, alongside foundational assembly language topics such as memory access, processor flags, and low-level OS functions. Students will explore the organization of computers from transistors to functional units and busses, gaining hands-on experience with memory management, I/O operations, and the translation of high-level code into machine instructions. This course equips students with a solid foundation for advanced studies in computer systems and architecture.

Course Goal:

- Fundamentals of the C programming language, including conditional expressions, iterative expressions, recursion, functions, structs, data types and encodings, and pointers
- Fundamental assembly, such as load/store instructions, direct and indirect addressing, memory access and management, processor flags, branching, functions, parameter passing, low-level OS functions, basic user IO, iteration, recursion, and memory-mapped IO
- Organization of a computer at various levels: transistors, logic gates, functional units, cache, interrupts and busses/interconnects

Academic Credit Statement:

Because we have very limited class time, students are required to learn C, assembly and Logisim platform outside the class. There will be instructions and assignments designed to help you learn and test your proficiency in C programming, assembly programming and there will be instructions and projects for Logisim platform to help you learn and test your understanding of computer components design.

- Students will be assigned 6 extra C programming assignments, each of which includes notes and several C programming questions. Each assignment should take roughly 1 hour and will account for **6 additional 4th hours sessions** for the semester.
- Students will be assigned 5 extra Assembly programming assignments, each of which includes notes and several Assembly programming questions. Each assignment should take roughly 1 hour and will account for **5 additional 4th hours sessions** for the semester.
- Students will be assigned 2 logisim projects, each of which includes notes and one simulation task. Each assignment should take roughly 2 hours and will account for **4 additional 4th hours sessions** for the semester.

In total, the course includes 15 hours of additional structured activities outside of regular class meetings (equivalent to 1 hour per week for 15 weeks.)

Attendance:

- **Not Required** (be responsible for yourself). I will code during the lecture, and give some exercises for you to practice. If you want to learn it well, you should attend every class.
- **Missed Class.** This might happen for a variety of reasons: illness, family circumstances, travel for sports or other College-sponsored activities, or even oversleeping. If you know in advance that you'll be missing class, communicate this with me so we can discuss how to keep you on pace.

Prerequisites: CSC-111

Textbook: None.

Grading:

- 50% Assignments
- 50% Exams (quizzes and exams)
- I will apply the letter grade criteria as below:

Letter	A	A-	B+	B	B-	C+	C	C-	D+	D	D-
Total	≥ 93	≥ 90	≥ 87	≥ 83	≥ 80	≥ 77	≥ 73	≥ 70	≥ 67	≥ 63	≥ 60

Class rules: The student who shows discrimination, disrespect, bullying, and other bad behaviors during the lecture will immediately fail the course. And I will report to both the department and the college.

Exercises (Assignments): The total number of exercises ranges from 10 to 14 depending on the actual progress. Each exercise will have several programming questions formatted in PDF. I do not accept late submissions. Please submit the assignment on time.

Exam: There will be quizzes and two exams.

Important Dates:

Midterm ExamTBA
 Final Exam TBA

Guidelines for Ethical Computing and Working with Others

For the purposes of this course, adhering to the Gentleman's Rule means also adhering to the ACM Code of Ethics and Professional Conduct. The Code lays out the fundamental ethical principles that should guide all students and professionals in their study and work when computing and technology are involved. One major part of ethical computing is respecting the ideas and works of others, and only using them in an ethically appropriate and responsible manner. Computing, like almost all human endeavors, is a collaborative enterprise. We learn from each other and from the work of those who came before us, just as our descendants will learn from us. To not respect the works of others damages one's own learning, and ultimately damages human society as a whole.

For the purpose of this course, I will add the following guidelines. In general, unless specifically authorized for a particular assignment, you should refrain from providing program code or solutions to another student, or receiving program code or solutions from another student. More concretely: providing code or solutions to another student or receiving code or solutions from another student, unless specifically authorized, constitutes academic dishonesty and a violation of the Gentleman's rule. This applies also to both past and future students in this course.

For the purpose of this course, I am happy for students to work in collaborative partnerships. You can discuss it together, but you have to finish your exercises by yourself! Collaborative means learn from each other, do not copy-paste! You should not turn in anything unless you fully and completely understand it and can fully and completely explain it.

In order to foster your ability to communicate about technical matters, any assignment may include an interview with me, during which I will ask you to explain your code or solution and the process by which you came to it. While I acknowledge that technical communication is a skill that must be practiced to be improved, exceptionally poor performance during an interview will raise my suspicions that you may be in violation of the Gentleman's Rule and the ACM Code.

Academic Credit Policy

This course complies with the [Wabash College Academic Credit Policy](#) stated in the Academic Bulletin. In addition to regular class meetings, direct instruction takes place in this course through: faculty office hours, advising for group and individual projects, technical interviews, through Canvas, online videos, and public facing activities.

The Syllabus as a Living Document

A syllabus is a living document and can be amended. I will communicate any syllabus changes; it is your responsibility to be aware of course policies at all times.

Quantitative Skills Center (QSC)

Is biology shredding your brain into fine particulate matter? Does chemistry have your anxiety level reacting negatively? Do you have bugs in your computer science code that you just can't squash? Are the demands of your economics homework far outpacing your supply? Is math leaving you feeling irrational or derivative? Has your last physics exam, not gravity, been pulling you down? If you have questions about biology, chemistry, computer science, economics, mathematics, or physics, visit the Quantitative Skills Center (QSC)! Our department-selected tutors will work with you to answer your questions and deepen your understanding of each subject. The QSC operates Sundays, Tuesdays, and Thursdays from 7- 11pm on the second floor of the Library. Please check out the QSC webpage <https://www.wabash.edu/ace/qsc> for specific tutor availability. If you have any questions, please email Vic Lindsay at lindsayv@wabash.edu.

Writing Center

Do you have questions about how to start a paper? Are you struggling to get all of your ideas to fit? Do you have a draft but want someone to review it? Are you unsure of how to incorporate comments from your professor? Head to the Writing Center! No matter what your writing questions or needs, the Wabash Writing Center. Consultants are eager and able to help you! Please visit the webpage, <https://www.wabash.edu/ace/writing> to schedule an appointment. If you have any questions, please email the director, Dr. Koppelman, at koppelmz@wabash.edu.

The Office of Student Enrichment

Succeeding at Wabash College takes a great deal of effort and planning. Life is complex, assignments are time consuming, and staying involved keeps you running. When you have questions about how to make everything fit into your schedule, how to study more efficiently, how to take better notes, or any other question about developing your college skills, visit the Office of Student Enrichment (OSE). Go to <https://www.wabash.edu/ace/office> and follow the "Make an Appointment" link to arrange a one-on-one, personalized meeting with Dr. Koppelman or one of the OSE Advisors. No matter your questions, we will work with you to find a solution that helps you achieve your goals.

Disability and/or Special Accommodations

Students with disabilities (apparent or invisible) are invited to confidentially discuss their situation with the disability coordinator, Heather Thrush, Associate Dean for Student Engagement and Success. If a student wishes to receive an academic accommodation, it is required that his documentation of the disability be on

file with Dean Thrush, who can, in confidence, provide information and guidance. Early notification helps us all work together in the most effective ways. To make an appointment with Dean Thrush, call (x6347), or email thrushh@wabash.edu. Appointments can be available via Zoom, if needed.

This is a tentative schedule, I will adjust it a little bit based on the feedback. Considering there will be holidays and exams during the semester, I only prepare and list 12 weeks of course content arrangement.

Course Content Arrangement	
Week #	Course Content
Week 01	Course Introduction & Overview
Week 02	Basic C Programming Concepts
Week 03	Advanced C Programming Concepts
Week 04-05	Introduction to Assembly Language
Week 06-07	Memory Access and Management; Branching and Functions in Assembly
Week 08-09	Low-Level Operating System Functions; Memory-Mapped I/O and Iteration
Week 10-11	Computer Organization at the Hardware Level
Week 12-13	Busses, Interconnects, and Interrupts