

CSCI 245

Programming II: Object-Oriented Design

Spring 2026

MFW 12:55–2:05 pm

MEY 184

<http://cs.wheaton.edu/~tvandrun/cs245>

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Contents

CATALOG DESCRIPTION. A gateway to the computer science major, introducing a range of themes in the field of computer science. Object-oriented programming in Java or a similar language: code reuse with composition and inheritance; generic types; design patterns. Software development: development tools, attributes of good design. Algorithm analysis; searching and sorting algorithms. Abstract data types: stacks, queues, trees, hashing; linked vs array-based implementation. Systems programming in C; pointers and dynamic allocation; model of machine memory, organization, and execution. Prerequisites: CSCI 235 or department approval.

TEXTBOOKS.

Savitch, Walter. *Absolute Java*, sixth edition, Pearson, 2016. (4th or 5th editions also OK.)

McDowell, Charlie. *C for Java Programmers: A Primer*. Lulu Press, 2007. (This text can be ordered very inexpensively from the publisher at lulu.com.)

PURPOSE OF THE COURSE. For students taking this as their final computer science course, this equips them with the tools they need for many programming tasks, and it abridges much of the content of other courses in the computer science program.

For students going on in the computer science program, this course prepares them for the programming tasks in later courses and introduces themes carried on throughout the curriculum. This course is the “super-prerequisite” for the computer science major.

THEMES. The content of this course is organized under a variety of themes which will be pursued concurrently throughout the semester. The themes are stated as learning outcomes.

Object-oriented programming in Java. (CSCI 235) *Describe and apply advanced object-oriented features such as nested classes and generics.*

- Review: classes, interfaces, polymorphism, and other basic OOP features.
- Review: Java Collections.
- Class extension (subclassing, inheritance).
- Nested classes.
- Generics.
- Enum types.

Software development. (CSCI 335) *Use professional software development tools and methodologies.*

- Software lifecycle.
- Documentation.
- IDEs.
- Revision control.

Object-oriented design. (CSCI 335) *Construct object-oriented solutions in a principled and idiomatic fashion.*

- Elements of good software design.
- UML.
- Refactoring.
- Design patterns

Analysis of algorithms. (CSCI 345) *Analyze and compare algorithms both analytically and empirically.*

- Loop invariants.
- Analyzing an iterative algorithm.
- Big-oh notation.
- Analyzing recursive algorithms.
- Empirical measurements of performance.
- Sorting.

Abstract data types and data structures. (CSCI 345) *Describe in detail the most common ADTs and data structures and evaluate the applicability of these structures to different problems.*

- Linked lists and other linked structures.
- Abstract vs concrete types.
- Stacks.
- Queues.
- Binary trees.
- Hashing.

C programming. (CSCI 351) *Recognize and describe parallels between operations in higher-level languages, such as Java, and lower-level languages, such as C.*

- C basics.
- Functions and prototypes.
- Compiling, linking, preprocessing.
- Structs.
- Pointers and dynamic allocation.
- C-style Strings.
- Bit operations.
- Function pointers.

Computer systems. (CSCI 351) *Appreciate how the low-level workings of computer systems support and affect high-level programming.*

- Model of computer memory.
- Model of execution.
- Programming in pseudo-assembly.
- Model of function call and return.

The above list is in no way chronological. See the course website for a schedule.

In addition to these, together we have the general objective of seeing programming and software construction as a way of knowing God's world and as a tool for doing good, to God's glory.

Course procedures

HOW WE DO THIS COURSE. Class time is used to introduce new ideas and to work through examples. I use a lot of handouts. Lab time is used to practice the ideas with help from peers. Most of your work outside of class is spent on projects (one project every week-and-a-half to two weeks). There also are occasional written assignments to reinforce concepts from class and prepare you for the next class; usually I will check them for completeness and go over the solutions in class. The textbooks are mainly languages references, though occasionally you may be asked to read something before class. Quizzes (administered through Canvas) enforce readings, measure student engagement, and communicate to the student what's important.

LAB PROTOCOL. Thursday, 1:15–3:05pm is our lab block. Our laboratory activity will follow a specific protocol called *pair programming*. Two students will work together at one computer, producing a single product, sharing two roles: The *driver* controls the mouse and keyboard and does the actual programming; the *navigator* watches the driver, catches simple mistakes, thinks of ways to test what is currently being programmed, and thinks ahead to the next task in the lab. Students in a pair switch roles between each sub-task, or approximately every ten minutes. The program is produced through discussion and collaboration; neither member of the pair should dominate. While you work, your computer will be logged in through a class account; do not log in as yourself during lab unless you are specifically instructed to do so.

Most labs will have a pre-lab reading on the course website. Make sure you read the pre-lab reading *ahead* of time. Quickly glancing over it as lab begins defeats the purpose. Pre-lab readings will be enforced through Canvas quizzes.

SOME ADVICE. In past semesters I have had some students stumble in this course—in many cases, I feel it could have been prevented. A lot of information needed in future CSCI courses is packed into this semester. The course needs to be taken seriously. Here are a few bits of advice on how best to manage this course:

- **Start your projects early.** The projects in this course are not sit-down/code-it-up/test-test-test/turn-it-in kind of projects. They are think-think-think/design-design-design/plan-tests/code/verify-tests kinds of projects.
- **Read the pre-lab readings.** They are there for a reason. They will make lab experiences much less frustrating.
- **Keep up with the material.** The material in this class keeps on building on itself. If you don't understand something, don't just shrug it off and move on. Even if it doesn't seem like last week's material is being used this week, last week's material is going to come back later.
- **Ask for help.** Your instructor, your TA, and many friendly lab rats are there to help you succeed.

GRADING. There will be two tests, scheduled for Friday, Feb 20, and Friday, Apr 10, subject to change. The final exam (which is cumulative) is Thursday, May 7, 10:30am.

<i>Item</i>	<i>Weight</i>
Projects	40
Labs	10
Quizzes and homework	5
Test 1	12.5
Test 2	12.5
Final exam	20

PROJECTS. There will be (about) 8 projects. Project descriptions and a general guide for managing projects can be found on Canvas. Some projects will overlap temporally. Each project is due at 11:59pm on the date indicated on that project assignment. See also project policies in the next section.

Policies etc

ATTENDANCE. Students are expected to attend all class periods. It is courtesy to inform the instructor when a class must be missed.

ELECTRONIC DEVICES. My intent is for class to be an electronic-device-free zone. **STUDENTS MAY AT NO TIME USE PHONES OR SIMILAR DEVICES FOR ANY PURPOSE DURING CLASS.** Moreover, phones should not be visible at any time during class—do not have your phone out on the table during class. Similarly, please keep all other devices (laptop, tablet, etc) put away. If you absolutely need to check your phone for something, please discreetly step out in to the hall.

EXAMINATIONS. Students are expected to take all tests, quizzes, and exams as scheduled. In the case where a test must be missed because of legitimate travel or other activities, a student should notify the instructor no later than one week ahead of time and request an alternate time to take the test. In the case of illness or other emergency preventing a student from taking a test as scheduled, the student should notify the instructor as soon as possible, and the instructor will make a reasonable accommodation for the student. The instructor is under no obligation to give any credit to students for tests to which they fail to show up without prior arrangement or notification in non-emergency situations. The final exam is Thursday, May 7, 10:30am. Students are not allowed to take the final exam at a different time (except for urgent reasons, approved by the department chair, as per the college's policy), so make appropriate travel arrangements.

ACCOMMODATIONS. If you have a documented need for accommodations, I will have received a letter on your behalf from the Learning and Accessibility Services Office. But *please talk to me*

about what accommodations are most useful to you. In particular, if you desire accommodations for test-taking, talk to me a reasonable amount time in advance (say, at least two class periods) so arrangements can be made. (See also the College's statement below.)

OFFICE HOURS. My *drop-in* office hours this semester are 3:30–4:30pm each day when classes are in session. Moreover, you can make an appointment through Calendly: <https://calendly.com/thomas-vandrunen/office-hours>.

ACADEMIC INTEGRITY. All forms of cheating are considered a breach of the Wheaton College Community Covenant, including, but not limited to, copying the work of another person without a proper citation (plagiarism), permitting your work to be copied by another person (which includes failure to take reasonable measures to protect your own work), discussing quiz and exam questions or answers with people who have not completed the assessment, and collaborating on the completion of graded assignments not explicitly designated as group projects.

Violations will result in a failing grade for the course. They will be reported to the Dean of Student Affairs, who may impose further sanctions and disciplinary action, including suspension or expulsion from the College. All instances of academic dishonesty remain on record in the student's file for the duration of his or her studies at the college and impact the student's ability to obtain references from the college in the future.

If you are unsure whether a particular action is a breach of academic honesty, please ask the instructor before it happens. As a general rule, you should always be able to explain any work or answers you submit (and, in theory, reproduce them) without consulting notes, comments, or references; you may be asked to do so.

Since pair-programming is practiced in *labs*, students sometimes find it unclear what constitutes fair collaboration in *programming projects*. You are encouraged to discuss the problem in the abstract with your classmates; this may include working through examples, drawing diagrams, and even jotting down some pseudo-code. If you are really stuck on a compiler error or bug (meaning that you have tried to figure it out for a long time and are stumped), you may ask someone to look at your code to help you find the mistake. Sharing test cases is also a great way to help each other.

What is not allowed is sharing code. You may not program together, and you may not watch each other program for projects, either to give or receive help. Although it says above that erroneous code may be looked at if the student is stuck, *working* code should not be shown. Think in analogy with problems sets in a math or science course: while it is ok to help each other find the right place to look for the answer or discern why an answer is not working out, you should not give or receive the answer.

GETTING HELP (INCLUDES AI POLICY). In brief, *all* AI assistance for writing code in this class is *disallowed*; this includes using IDEs with AI modes or using LLMs to help with coding or debugging. But to put this policy in context with other means students use to get help—both allowed and disallowed—I have organized potential resources into tiers.

Tier 0. Recommended. These are your go-to resources for learning and getting help.

The course textbooks; your notes; other class material (handouts, slides, etc); code from labs; the official Java and C documentation (see links on Canvas); your instructor (office hours, email); your TA (Daniel Kao); evening lab assistants.

Tier 1. Use with caution. There may be some, limited use of these, but prefer Tier 0 resources and be sure to observe academic integrity rules.

A classmate's notes; classmates themselves; upperclass Wheaton CSCI majors and minors; tutors; unofficial Java references and guides; other textbooks that teach programming in Java or C.

Rules: See academic integrity policies above; do not share or look at working code for the projects; inform your instructor if you use a tutor; understand that unadopted textbooks and unofficial references may use different terminology or present material in a different order or with different emphases from what we do in class.

Tier 2. Not recommended. Avoid using these.

Stack overflow and similar websites; the “AI overview” from Google and similar search tools; online tutorials; people outside of Wheaton College’s CSCI program.

Rules: Resist the urge to Google for “How to XXX in Java” and similar searches. If you get any information from a Tier 2 resource, *verify that information with a Tier 0 resource*, especially the textbook, your notes, or the official Java documentation. Moreover, if you find you have received crucial help from any such source on a project, then cite the source (in your documentation) as you would in a research paper.

Tier 3. Disallowed. Do not use these under any circumstance.

Classmates’ code; code from students who took this course in past semesters; AI-assisted tools including IDE plugins and LLM chatbots; anything that provides a solution to a project or similar problem.

LATE ASSIGNMENTS. Aside from LAS accommodations, late projects will be accepted only according to the following policy: you have three allowed “late days” that you may use over the course of the semester. When a project is submitted after the due date, one late day will be deducted for each day that has elapsed since the deadline. Late days are counted in whole-day units—no partial days. Weekends are counted as a single day to encourage devoting one day to Sabbath rest. No submissions will be accepted after the last day of classes (Fri, May 1—**not** during finals week) without prior approval on account of extenuating circumstances. In other words, late days may not be used beyond the last day of classes, which implies that they cannot be used on the last project, which is due on the last day of classes.

No credit will be given for other homework or quizzes that are submitted late.

LAB RULES. The lab activities are subject to the following rules, which are consistent with other course policies for academic integrity and classroom behavior.

1. Cell phones, tablets, laptops, smartwatches, and similar devices should never be visible during the lab session. If a phone or similar device is ever visible during the lab session (including while the student is walking toward the door), the student will receive a 0 on that lab activity.
2. Students should never open their email or social media accounts during the lab session. Any student checking email or social media during lab will receive a 0 on that lab activity.
3. Students should never use StackOverflow or similar sites during the lab session. Any student who looks at websites other than official Java documentation for help during lab will receive a 0 on that lab activity.
4. Students should never use ChatGPT or similar tools during lab session (or any other time). Any student who has ChatGPT or similar tools open during lab will receive a 0 on that lab activity on a first offense and will fail the course on a second offense.
5. Students will receive a 0 for a missed lab without a reasonable excuse. Reasonable excuses include (a) college-related activities such as athletic participation, which the student has notified the instructor about ahead of time, and (b) illness. In the case of an excused miss, the student should make up the lab on his or her own time, sending a solution to the lab to the instructor by email, due by the Monday following the lab, unless otherwise approved.

All this, the Lord willing.

College syllabus statements

The “Academic Information” website referred to below is found at <https://catalog.wheaton.edu/undergraduate/academic-policies-information/academic-information/>

ACADEMIC INTEGRITY. (See “Integrity of Scholarship” on “Academic Information” website.)

The Wheaton College Community Covenant, which all members of our academic community affirm, states that, “According to the Scriptures, followers of Jesus Christ will... be people of integrity whose word can be fully trusted (Psalm 15:4; Matt. 5:33-37).” It is expected that Wheaton College students, faculty and staff understand and subscribe to the ideal of academic integrity and take full personal responsibility and accountability for their work. Wheaton College considers violations of academic integrity a serious offense against the basic meaning of an academic community and against the standards of excellence, integrity, and behavior expected of members of our academic community. Violations of academic integrity break the trust that exists among members of the learning community at Wheaton and degrade the College’s educational and research mission.

ACCOMMODATIONS. (See “Learning and Accessibility Services” on the “Academic Information” website).

Wheaton College believes that disability is an indispensable part of the diversity of God’s Kingdom. We work to provide equal access to College programs and activities as well as spaces of belonging for students with disabilities. Students are encouraged to discuss with their professors if they foresee any disability-related barriers in a course. Students who need accommodations in order to fully access this course’s content or any part of the learning experience should connect with Learning and Accessibility Services (LAS) as soon as possible to request accommodations <http://wheaton.edu/las> (Student Services Building - Suite 209, las@wheaton.edu, phone 630.752.5615). The accommodations process is dynamic, interactive, and completely free and confidential. Do not hesitate to reach out or ask any questions.

STUDENT WELLNESS. Wheaton College professors are often among the first to witness, observe, or become aware of a matter that a student is navigating, which has disrupted their communication pattern, course workflow, and concerning behaviors. If you need support, use the student resource and request form found on the student portal through the Wheaton Gateway. If your faculty believes you need support and care, they will submit a CARES referral form for us to reach out to you. We offer coordinated care, advocacy, resources, encourage engagement, and ongoing support for acute matters you may navigate. Aligning with the attendance policy as outlined in the student handbook, Student Wellness can provide notices of absences when applicable. Likewise, we are here to work with you through circumstances beyond your control. We welcome the opportunity to meet and come alongside you to share information that will keep you well-informed about campus and community resources to aid your holistic health, retention, and academic student success. We are located in the Student Service Building – Suite 218. You may contact us via email at student.wellness@wheaton.edu or by phone at 630-72-5941. We are also available by walk-ins or scheduled appointments with either the Resource and Support Specialist, Kedisha Kelly, the Associate Dean, Dr. Carrie Williams, or the Dean, Dr. Toussaint Whetstone.

BEHAVIOR POLICY(See “Classroom Demeanor” on the “Academic Information” website).

Appropriate classroom demeanor is expected of all students. A faculty member may remove any student from a class if the student exhibits uncivil conduct, which includes behavior that is disinterested, disengaged, disrespectful, disruptive, defiant, or disturbing. **Gender Inclusive Language Policy** (See “Gender Inclusive Language” on the “Academic Information” website). Please be aware of Wheaton College’s policy on inclusive language, “For academic discourse, spoken and written, the faculty expects students to use gender inclusive language for human beings.”

EQUITY AND TITLE IX: Wheaton College instructors help create a safe learning environment on our campus. The College requires employees to report incidents of discrimination, harassment, and sexual misconduct to the Title IX Coordinators/Equity Officers. When they learn of an

incident that may be a crime or may be a violation of the College Nondiscrimination Policies, instructors at the college have a duty to report and are required to share all relevant information with the College. Confidential resources available to students include Confidential Advisors, the Counseling Center, Student Health Services, and the Chaplain's Office. More information on these resources and College Policies is available <http://www.wheaton.edu/equityandtitleIX>.

WRITING CENTER: See <https://www.wheaton.edu/academics/services/writing-center/>. The Writing Center is a free resource that equips undergraduate and graduate students across the disciplines to develop effective writing skills and processes. This academic year, the Writing Center is offering in-person consultations in our Center in Buswell Library, as well as synchronous video consultations online. Make a one-on-one appointment with a writing consultant here. <https://wheaton.mywconline.com/>.

MANDATORY REPORTING: All employees of the College are mandatory reporters of suspected child abuse and neglect as required by the State of Illinois. Mandated reporters are required to call the Department of Children and Family Services Hotline (1-800-25-abuse) when they have reasonable cause to believe that a child known to them in their professional or official capacity may be an abused or neglected child. Mandated reports should call the Hotline if the alleged victim is a child under the age of 18; the alleged perpetrator is a parent, guardian, relative, caregiver, or any person who lives resides in the same home or who came to know the child through an official capacity or position of trust (ie: teacher, coach or healthcare provider) and; there must be an incident of harm or set of circumstances that would lead a reasonable person to suspect that child was abused or neglected.