

CS2: Object-Oriented Programming and Data Structures

COMP 2150, Spring 2024

Tuesday, Thursday 9:05 am - 11:05 am
Psychology Bldg 204

<https://memphis.instructure.com/courses/114415>

Please send all emails to all instructors and TAs, and reply-all to all emails.

Please begin the subject line of all emails with the course number in square brackets, followed by the message subject (e.g., [COMP 2150] Request for office hours)

| | |
|--------------------|---|
| Instructor | Brodrick Stigall < blstgall@memphis.edu > |
| Office Hours | By appointment; no set hours, but I will make every effort to respond to messages within one business day |
| Office | Dunn Hall TBD; meetings held in MS Teams or Zoom, or in person by special appointment |
| Teaching Assistant | TBA |

1 Catalog Description

COMP 2150 - CS2: OOP and Data Structures (4)

Principles of object-oriented programming and software development; problem solving with recursion and abstract data types, including linked lists, stacks, queues, binary search trees, hash tables; basic GUIs. PREREQUISITE: MATH 1910 or MATH 1421 (or MATH 1830 for COMP minors) and COMP 1900.

This is not an introductory programming course! Python competency is expected before taking COMP 2150.

2 Course Outcomes

After completing this course, students should be able to:

1. Write object-oriented programs that combine functions and data.
2. Write code that reads from or writes to a file.
3. Write code that demonstrates effective use of error handling techniques, e.g., exceptions.
4. Read and write code to manipulate data structures including linked lists, stacks, queues, trees, heaps, priority queues, sets, maps, and hash tables.
5. Read and write code that uses recursion.
6. Apply an object-oriented programming language to develop software including programs utilizing multiple classes.

7. Analyze a problem statement to develop a mental model of objects necessary to translate abstract concepts into classes.

3 Required Equipment

Students will be required to bring a laptop computer to lecture and to have a computer to do the work required for the course.

It is the student's responsibility to have and maintain a working laptop development environment to use for this class.

4 Required Textbooks

This course will use a custom zyBooks textbook: 2150: Object Oriented Programming and Data Structures

To subscribe to the zyBooks textbook for the course:

1. Sign in or create an account at learn.zybooks.com. You must use your UofM email.
2. Enter zyBook code: MEMPHISCOMP2150StigallSpring2024
3. Subscribe

Students may begin subscribing on Dec 28, 2023 and the cutoff to subscribe is Apr 30, 2024. Subscriptions will last until May 31, 2024.

5 Evaluation

Grading weights are as follows:

- 10% In-class/Lab Assignments
- 20% zyBooks Assignments
- 20% Homework Assignments
- 30% Quizzes (3 test sessions @ 10% each)
- 20% Final Exam

To convert from percentages to letter grades, see the following table:

| | | | | | | | | | | | |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|
| ≥ 97% | 91–96% | 89–90% | 87–88% | 81–86% | 79–80% | 77–78% | 71–76% | 69–70% | 67–68% | 60–66% | ≤ 59% |
| A+ | A | A- | B+ | B | B- | C+ | C | C- | D+ | D | F |

I reserve the right to lower the percentage threshold for letter grades as I see fit (i.e., I may make the grading scale better for you but never worse).

6 Assignments

Throughout the semester, you will have various assignments to reinforce the concepts discussed in the lecture. This class does not have an assigned laboratory section. Instead, you will have exercises, both during the lectures and outside of class, to practice your understanding.

There are 3 kinds of assignments throughout the week:

- In-class assignments: Answer comprehension questions and complete code-along exercises to reinforce the current topic. Attendance is also indirectly taken through canvas submission. There is absolutely no makeup for the in-class activities.
- zyBooks assignments: Complete activities in the required zyBooks textbook. These are

done on your own, to further reinforce what was covered during lecture. There will be a zyBooks assignment given most weeks (posted on Canvas). You should complete all Participation, Challenge, and Lab activities from the assigned sections.

- Homework assignments: Complete complex coding exercises that will allow you to explore the topic more deeply than the zyBooks and in-class exercises.
- All assignments and due dates will be posted in Canvas.

7 Quizzes & Exams

Tentative Quiz and Exam Topics:

- Quiz 1: Searching and sorting, recursion, basic OOP.
- Quiz 2: Inheritance, linked lists, stacks, queues.
- Quiz 3: Trees, heaps, priority queues.
- Final Exam (comprehensive).

8 Academic Integrity

- a. The University of Memphis expects all students to behave honestly. The [Student Code of Rights and Responsibilities](#) explains what constitutes a violation of our Academic Integrity policy. For more information, please see the Office of Student Accountability's website:
 - i. <https://www.memphis.edu/osa/>. Plagiarism, cheating, and other forms of academic dishonesty are prohibited. Students who violate the academic misconduct policy, either directly or indirectly, through participation or assistance, are immediately responsible to the instructor of the class in addition to other possible disciplinary sanctions which may be imposed through the regular institutional disciplinary procedures.
- b. Examples of academic dishonesty include, but are not limited to:
 - i. • Cheating – A student uses a smart phone to access the internet while taking a quiz.
 - ii. • Copyright infringement – A student uses a photograph found on the internet in a presentation without obtaining permission from the photographer.
 - iii. • Deception – A student gives a dishonest excuse when asking for a deadline extension.
 - iv. • Denying access to information or material – A student makes library or shared resource material unavailable to others by deliberately misplacing those resources.
 - v. • Fabrication – A student invents data in an academic work.
 - vi. • Facilitating academic misconduct – A student knowingly allows a portion of their work to be used by another student.
 - vii. • Plagiarism – A student represents the ideas of another in a paper without citing and referencing the work or a student turns in the same or nearly the same assignment for credit in more than one class.
 - viii. • Sabotage – A student prevents others from completing their work by opening a window to affect a temperature-controlled experiment.
 - ix. • Unauthorized collaboration – A student works with other students on a paper without the specific permission of the instructor.

9 Course-Specific Policies

Any student caught cheating in the course will receive an F grade and be reported to the [Office of Student Accountability](#) (full stop).

By the end of this course, you are expected to be a competent programmer. This is important for success in future courses, and more importantly so that you can get a job later! To improve your programming skills, you must get plenty of practice yourself. As such, all grade items (unless specifically indicated otherwise) must be individual efforts. Although you are welcome to work in study groups, NEVER submit any code that you did not write yourself.

You CAN:

- Discuss the general solution approach to an assignment with other students, then write the code to solve the problem individually.
- Use Internet resources to help with an assignment, then write your own code that incorporates what you've learned.

You CANNOT:

- Submit someone else's code for an assignment, quiz, or exam. Making trivial changes like changing variable names and/or order of functions does not hide this.
- Submit a solution/code that you found on the Internet. 📶

10 AI Tools (e.g., ChatGPT, Github Copilot) Policies

Appropriate use of AI tools and/or ChatGPT is permitted on some assignments in this class. We will be discussing what constitutes appropriate use of AI as the semester progresses, and I reserve the right to modify this policy at any time. For now, I believe that it is appropriate to use AI as a tool to help you improve your programming ability. However, it is not appropriate to use it as a substitute for the critical thinking, reasoning, and logic skills that are required to create a program to solve a given problem. This course is designed to help you improve these skills which will be critical to your success, both during college and in your future career.

a. Quizzes and Final Exam

All AI tools are prohibited on assessments, and their use will constitute academic dishonesty.

b. In-class, Homework, and zyBooks Assignments

Since AI tools cannot be used on assessments, be careful not to rely too heavily on them when completing the practice assignments. However, you may use them according to the following rules if you wish.

c. You CANNOT use AI tools to:

- Generate a complete code or pseudocode solution to the question.
- Automatically correct or complete a partial or broken solution.
- Evaluate the efficiency or correctness of your solution.
- Automatically add comments to your solution.
- Contribute any logic to your solution.

d. You CAN use AI tools to:

- Find unrelated/generic examples of the language-specific syntax for a programming construct you wish to use in your solution (e.g., "python if statement example", "python class example")
- Find common errors or "gotchas" related to a programming construct (e.g., "python read file gotchas") which you can check for in your debugging process.

- Find common mathematical formulas or unit conversion rates (e.g., “area of a triangle”, “feet to meters”), but you must write the code to use the formula yourself.
- Perform calculations using common mathematical formulas or unit conversion rates (e.g., “area of triangle with base=2 and height=2”) to verify the output of your test cases.

If you choose to use an AI tool like ChatGPT, you must include the following in your submission:

- a statement that you used an AI tool,
- the name of the tool used, and
- an export of or link to the conversation which includes all question prompts and AI responses.

This information will help me better understand how students use these tools and offer better support for them in the future.

If you are not sure if a given question or use case would be an acceptable use of an AI tool, do not assume it is, and ask the instructor first.

11 Classroom Behavior

Students should be aware of the [Student Code of Rights and Responsibilities](#) which describes examples of unacceptable classroom behavior. Disruptive classroom behavior will not be tolerated. Instructors are empowered to remove students from class and refer behaviors for sanctioning to the Office of Student Accountability.

12 Equity, Inclusion, and Accommodations

Our class respects all forms of diversity. The University of Memphis embraces the diversity of students, faculty, and staff, honors the inherent dignity of each individual, and welcomes their unique perspectives, behaviors, and worldviews. In this course, people of all races, religions, national origins, sexual orientations, ethnicities, genders and gender identities, cognitive, physical, and behavioral abilities, socioeconomic backgrounds, regions, immigrant statuses, military or veteran statuses, size and/or shapes are strongly encouraged to share their rich array of perspectives and experiences. Course content and campus discussions will heighten your awareness to each other's individual and intersecting identities. In accordance with [UofM Policy GE2004](#), the University will ensure students receive consistent and fair treatment and affirmation of the University's commitment to diversity. The University prohibits discrimination and harassment based on protected characteristics as stated in [UofM Policy GE2030](#).

Please see the instructor if you need accommodations for a disability, or to fulfill cultural or religious obligations. Students with requests for accommodations should contact [Disability Resources for Students](#) to register and learn about the services available to support their learning. Students with disabilities are encouraged to speak with us privately about academic and classroom accommodations. It is strongly encouraged that you register with Disability Resources for Students (DRS) to determine appropriate academic accommodations. Disability Resources for Students is located in 110 Wilder Tower, their phone number is (901) 678-2880 (V/TTY), their email is drs@memphis.edu, and their website is <https://www.memphis.edu/drs/>.

Disability Resources for Students coordinates all accommodations for students with disabilities. Qualified students with disabilities will be provided reasonable and necessary academic accommodations if determined eligible by the appropriate Disability Resources for Students staff at the University. Prior to granting disability accommodations in this course, the instructor must receive written verification of a student's eligibility for specific accommodations from the Disability Resources for Students staff at the University. It is the student's responsibility to initiate contact with University's Disability Resources for Students staff and to follow the established procedures for having the accommodation notice sent to the instructor.

13 Mental Health

As a student you can sometimes feel overwhelmed, lost, experience anxiety or depression, and struggle with relationship difficulties or diminished self-esteem. Mental health challenges can interfere with optimal academic performance. However, many of these issues can be effectively addressed with some help. If you find yourself struggling with your mental or physical health this semester, please feel free to approach me. I will try to be flexible and accommodating. As your instructor, I am not qualified to serve as a counselor, but UofM offers confidential counseling services on-campus and via telehealth that are available to students taking six or more credits at no cost. UofM Counseling Center is staffed by experienced, professional psychologists, clinical social workers, and counselors, who are attuned to the needs of college students. I strongly encourage you to take advantage of this valuable resource. To connect with Counseling Center services, please visit 211 & 214 Wilder Tower, or call 901.678.2068. To know more about their services, you can visit their website at <https://www.memphis.edu/counseling>. In a crisis situation, please call 901.678.HELP (4357) to speak to the On-call counselor. Remember, getting help is an intelligent and courageous thing to do -- for yourself and for those who care about you.

14 Personal or Academic Challenges including Food & Housing Insecurity

If you are experiencing personal or academic challenges including, but not limited to food or housing issues, family needs, or other stressors, please visit the [Dean of Students Office](#) to learn about resources that can help. Any student who faces personal challenges including, but not limited to securing their food or housing and believes this may affect their performance in the course is urged to contact the [Dean of Students Office](#) at 901.678.2187 located in the University Center, Suite 359 for assistance. If you are comfortable doing so, please also let the instructor know you are experiencing challenges as they may be able to assist you in connecting with campus or community supports.

15 Personal Relationships

There are special problems in any personal relationship between individuals where one party possesses direct academic, administrative, supervisory, evaluative, counseling or extracurricular authority over the other party. Such positions include, but are not limited to, teacher and student or assistant, supervisor and employee, senior faculty and junior faculty, mentor and trainee, advisor and advisee, counselor and client, teaching assistant and student, coach and athlete, and the individuals who supervise the day-to-day student living environment and student residents. In accordance with [UofM Policy HR5050](#), no University employee shall enter into or maintain any personal relationships

with students or with employees over whom they exercise or, reasonably can expect to exercise, direct or indirect control in areas such as academics, administration, supervision, evaluation, counseling or extracurricular authority or influence. No University employee shall exercise any direct or indirect control in the areas of academics, administration, supervision, evaluation, counseling or extracurricular authority over any student or employee with whom that employee had previously been involved in a personal relationship.

Any employee, including faculty, who is currently in a personal relationship or becomes involved in a personal relationship that might be covered by terms of this policy, must disclose the relationship immediately to Human Resources-Employee Relations and Engagement so that any and all steps are taken to comply with this policy.

Tentative Course Schedule

| Week | | Topic | Text | Quiz | Assignments |
|------|--------|---|---------------------------|--------|---------------------------------|
| 1 | 16-Jan | Course intro, env setup, COMP 1900 review & practice | 1 – 5 | | |
| | 18-Jan | COMP 1900 review & practice | 1 – 5 | | |
| 2 | 23-Jan | COMP 1900 review & practice | 6 – 8 | | Z1: Review due by 01/26 |
| | 25-Jan | Recursion | 14.1 – 14.6 | | |
| 3 | 30-Jan | Searching and sorting | | 16 | Z2: Recursion, sort due 02/02 |
| | 1-Feb | Review of OOP, inheritance | 9, 13 | | HW1: Recursion due |
| 4 | 6-Feb | Visualizing OOP (UML) | | | Z3: OOP due 02/09 |
| | 8-Feb | Exception handling | 10.1 – 10.6 | | HW2: OOP due |
| 5 | 13-Feb | File I/O | 12.1 – 12.7 | | Z4: Exceptions, files due 02/16 |
| | 15-Feb | | | Quiz 1 | |
| 6 | 20-Feb | Linked lists | 34.1 – 34.15 | | |
| | 22-Feb | Linked lists | 34.1 – 34.15 | | |
| 7 | 27-Feb | Stacks and queues | 34.16 – 34.22 | | Z5: LL, stack/queue due 03/02 |
| | 29-Feb | Stacks and queues | 34.16 – 34.22 | | HW3: LLs, stacks, queues due |
| 8 | 5-Mar | SPRING BREAK NO CLASS | | | |
| | 7-Mar | SPRING BREAK NO CLASS | | | |
| 9 | 12-Mar | Trees | 36.1 – 36.9, 36.12 | | |
| | 14-Mar | | | Quiz 2 | |
| 10 | 19-Mar | Trees | 36.1 – 36.9, 36.12 | | |
| | 21-Mar | Trees | 36.1 – 36.9, 36.12 | | Z6: Trees due 03/27 |
| 11 | 26-Mar | Heaps and priority queues | 38.1 – 38.6 | | |
| | 28-Mar | Heaps and priority queues | 38.1 – 38.6 | | Z7: Heaps, PQs due 04/03 |
| 12 | 2-Apr | Sets and maps | 39.1 – 39.4 | | HW4: Trees, heaps, PQs due |
| | 4-Apr | Hash tables | 35.1 – 35.4 | | |
| 13 | 9-Apr | Hash tables | 35.1 – 35.4 | | Z8: Sets, hashing due 04/12 |
| | 11-Apr | | | Quiz 3 | |
| 14 | 16-Apr | Graph representations | 40.1 – 40.4, 40.7 – 40.9 | | |
| | 18-Apr | Graph algorithms | 40.5, 40.6, 40.10 – 40.13 | | Z9: Graphs due 04/24 |
| 15 | 23-Apr | Review | | | |
| | 25-Apr | FINAL EXAM TBD | | | |