CPSC 122 Computer Science II Syllabus

Fall 2023

Last Updated: 29 August 2023 (Note: syllabus subject to change, your instructor will make an announcement if changes occur)

Instructor information

Instructor	Email & Phone	Office location & hours
Daniel Olivares, PhD	olivares@gonzaga.edu 509-313-5753	BCISE 011 (& via Zoom upon request) Monday, Wednesday, Friday 11:00AM – 12:00PM Wednesday, Friday 8:30AM – 9:00AM

General information

Course Meetings Time & Location

Section 01: MWF 10:00am-10:50am – BCISE 003

Section 02: MWF 1:10pm-2:00pm – BCISE 003

Description

CPSC 122 is a continuation of the first course in computer science (CPSC 121) for majors. In this course, we use the C++ programming language to continue to explore the fundamental concepts, constructs, and techniques of modern computer programming, including (but not limited to) sorting and searching algorithms, pointers and dynamic memory management, classes and data types, and recursion. The primary aim of this course is to give you a thorough introduction into problem solving, algorithm discovery, and program design in C++.

Learning Objectives

Students who successfully complete this course will be able to:

1. Design and develop software using basic object-oriented programming techniques,
2. Define and implement basic linear data structures, including linked lists, stacks, and queues Analyze algorithms with stacks, queues, and lists,
3. Design and develop recursive solutions.

Outcomes:

- Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
- Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
- Apply computer science theory and software development fundamentals to produce computing-based solutions.

Course Topics

- Algorithms and analysis
  - i. Basic sorting algorithms (bubble sort and selection sort)
  - ii. Basic searching algorithms (linear search, binary search)
  - iii. Algorithm efficiency and informal introduction to Big O notation
- Programming in C++
  - i. File I/O
  - ii. Pointers

- Basic object-oriented programming in C++
  i. Definition of classes including data members, member functions, constructors, destructors, copy constructors, and copy assignment operators
  ii. Public vs. private data members and functions
  iii. Header files and multi-file compilation
  iv. Basic reuse mechanisms
     i) Composition (current class uses a pointer to a class as a member variable)
     ii) Simple inheritance (current class is a public subclass of another class, including virtual and pure virtual functions)
- Dynamic memory management in C++
  i. New and delete (primitives, arrays, objects)
  ii. Single, circular, and doubly linked lists
- Basic abstract data types and their implementation
  i. Lists
  ii. Stacks
  iii. Queues (conventional, priority, circular arrays)
- Recursion
  i. Recursively defined mathematical functions (e.g., exponentiation, factorial)
  ii. Recursively defined string functions (length, display contents forward and in reverse)
  iii. Classic recursive functions (Fibonacci and Towers of Hanoi or N-Queens)
  iv. Recursive traversal of lists Recursive implementation of binary search

Course Activities and Structure

Class Meetings. Class meetings will typically contain a mix of lectures, interactive examples, interactive group activities, and small and large group discussions. You are expected to read the assigned material *before* **class** *(see the course calendar for participation deadlines)*, and you are required to bring your laptop to every class, as you will use it to engage actively in course activities. Note that, in some cases, a Wi-Fi enabled smart device (phone, tablet) may be used to submit in-class participation responses hence the requirement to bring your laptop to every class. Additionally, you will be expected to bring your laptop to class in order to take in-class exams. **Note that the classroom may have lab machines that you can use to complete class activities as well for instances when you are unable to use your personal laptop.**

In addition, in many class meetings, you will engage in **small group activities** in which you (a) work on small design scenarios/problems with your peers for feedback and discussion; or (b) work on small design and problem-solving tasks in teams, and then present your progress to the class for feedback and discussion. These activities will provide opportunities to practice concepts and methods being explored in the class.

Canvas is the online presence for this course. You can access it at https://canvas.gonzaga.edu/ or through Zagweb. Once you log on to our course site, you can read course announcements, participate in online discussions, send e-mail to course participants, access course materials, hand in course deliverables, review peers' work, and access your grades.

Course materials

Required materials

- A laptop adhering to GU SEAS requirements. Click here to learn more about the requirements.
- *You are expected to bring your laptop to class regularly to complete and participate in in-class activities and assignments.*

Required text

- *Starting out with C++: From Control Structures through Objects* by Tony Gaddis. 9th Edition.
    i. *Print ISBN: 9780134498379*
    ii. *eText ISBN: 9780134443850*

    The required textbook can be found in various formats. If you prefer, you can purchase the paper version. For digital versions, you have a few options, e.g., a 180-day rental will be cheaper and if you choose to purchase through VitalSource there is a "lifetime" purchase option that will not expire once downloaded.

Required software

- *Development environments:*
    i. Windows, Linux, or MacOS with Visual Studio Code configured with g++ and the visual debugging extensions.
- Optional/backup environments:
    i. [VirtualBox](#), which is available for Windows, MacOS, and Linux if you want to use the CS department Linux image as your development environment. This image includes the g++ compiler, gedit, and/or Visual Studio Code.
    ii. CS50IDE. This is an externally hosted (non GU affiliated) development environment providing a simple text editor and command line compiler. Accessed via a web browser window.
- Guides will be available on the Canvas course home page for each of these methods (excluding MacOS, sorry, though there are links to official documentation).

Course schedule

See Canvas for a detailed course schedule.

Exam schedule

Please see the course calendar for your midterm and final exam dates. The official finals period is:

- Section 01: Tuesday, December 12 1:00 pm to 3:00 pm
- Section 02: Thursday, December 14 1:00 pm to 3:00 pm

Communication

We will use Canvas to communicate, submit assignments, and view grades. An invitation link should not be needed, you should automatically be enrolled in the Canvas course through your enrollment in my course via Zagweb.

*Note: Please use Canvas as the primary communication method for course-related messages. I will monitor email as well but using Canvas is the preferred communication method. This will increase your message visibility and reduce likelihood of emails getting flagged as spam or getting lost in transit. Further, **any course-related emails should be sent from your official zagmail.gonzaga.edu student email**.*

Additionally, [Discord](#) (free to use) will be used to augment class communication and facilitate digital office hours–ask questions and discuss topics with other students in the class, TAs, and the instructor. Discord supports voice and text communication as well as screen sharing capabilities (*see Canvas for server invite URL*).

Finally, I will also be using Zoom to augment office hours and to teach remote lectures as necessary. You will find the Zoom URL details (lecture and office hours) on the Canvas home page for the course.

Course (and Digital) Classroom Etiquette

- Please respect the food and drinks policy in the classroom and use common sense (i.e., don't' damage lab equipment!)
- Please be conscious of appropriate behavior and background while communicating via digital modes.

Grading

Your grade for the course will be based on the following items (weights are in parentheses):

- **Participation Activities (10%).** Class participation is expected and is a vital part to successful completion of this course. I understand that you may need to miss class occasionally for valid reasons. For this reason, your **three lowest participation activity scores will be dropped**—that is, you will receive three free attendance/participation credits. Any discrepancies in participation need to be brought to my attention within a week of the posted grade.

  Participation activities are credit/no credit and will be scored based on submission effort. I understand that sometimes there are difficulties understanding/completing participation tasks. Submissions that display **minimal/no effort will not receive credit!** Make an honest effort to complete the given tasks for participation credit. For any incomplete participation you must comment on your submission with 1) a description of what you are struggling with, 2) what you tried that didn't work, and 3) which specific resources (e.g., that day's lecture slides, book chapter(s), etc.) you used to attempt to understand/solve the participation activity.

- **Group Challenges (5%).** In addition to the expected class participation activities, there will be a number of separately graded group challenge activities that take place during class as described in the **Course Activities and Structure** section above.

- **Quizzes (10%).** For frequent practice with memory-retrieval and problem solving, there are regular quizzes. The quizzes are individual quizzes: You come up with the solution to the problem on your own and submit your solution to the problem individually.
  Note: *I will drop your 2 lowest quiz scores*. This means that you are given 2 quiz "freebies" that excuse your failure to submit a quiz for any reason.

- **Programming Assignments (30%).** You will be given at least six (6) programming assignments (PAs) to complete. All C++ code written in assignments must adhere to the recommended CPSC 121 C++ Style and Coding Standards (see Canvas files for this document). Please upload assignments as directed on each assignment to the corresponding assignment in Canvas. The default late policy is 10% penalty for 24hrs late and 20% penalty for 48 hours late with no late submissions accepted after the final cutoff unless otherwise stated on an assignment. Refer to each assignment late policy set in Canvas for any variation of this policy. Your lowest one (1) PA score from PAs 1-4 will be dropped from grade calculation.

- **Exams (45%).** We will have two exams and one lab final exam in this course. **Please see the course calendar for your midterm and final exam dates.** See the **Exam schedule** section above for the official finals period for your section in this class.

Grading Scale

The following scale will be used to convert your course percentage into a grade.

93-100	A	73-76.99%	C
90-92.99	A-	70-72.99%	C-
87-89.99%	B+	67-69.99%	D+
83-86.99%	B	60-66.99%	D
80-82.99%	B-	0-59.99%	F
77-79.99%	C+		

Suggestions for Getting the Most out of this Course

- **Adopt a growth mindset.** On the first day of class, I introduced the concept of a "growth" vs. a "fixed" mindset, and cited research a legacy of research that demonstrates the positive impact a "growth" mindset can have on learning and success. Revisit those slides and/or view Carol Dweck's Ted Talk on the power of the growth mindset. The structure of this course, and my approach to teaching, aim to create a learning environment that promotes a growth mindset. By being aware of the concept and principles, you can positively contribute to that environment.

- **Attend class.** You can only benefit from this course if you show up! This is especially true of the group activities. Therefore, you are expected to attend every class session. In addition, I expect you to participate actively in class by asking questions, answering questions, and engaging in the collaborative design and problem-solving activities. Remember, part of your grade is based on attendance and participation (see above).

- **Put in enough time.** My rule of thumb is that students need to put in 3-4 hours of work outside of class for every hour they spend in class. This translates to roughly **6-8 hours per week.** You may need to put in only a fraction of 6 hours during some weeks, while you will find yourself putting in more than 6 hours during other weeks—especially during weeks in which pieces of your final design project are due.

- **Take initiative to get help**. You cannot get help if you do not ask for it! You can do this in two ways. First, I recommend that you find students in the course with whom to meet and discuss course material. Second, take the initiative to contact myself or other students if you begin to struggle. The sooner you ask for help, the better! Please do not wait until it is "too late" before asking for help.

- **Have reasonable expectations**. You get what you put into this course! Your success is dependent upon your own efforts (growth mindset!). If you take an active role in your own learning, you will excel in this course, and have fun doing so. If, in contrast, you expect to show up to lectures and your effort ends there you will likely not get much out of the course, and your grade will suffer.

Additional Policies

Please familiarize yourself with the following course policies. By following them, you will get the most out of this course, and you will not encounter any unwelcome surprises down the road.

- **Attendance**: The Gonzaga attendance policy on absences stipulates that the maximum allowable absence is two class hours (100 minutes) for each class credit. For three-credit classes, the maximum absence is, therefore, six class hours (300 minutes). Classes scheduled to meet for more than 50 minutes have more than one class hour for each meeting; for example, a class which meets for 75 minutes has one and one-half class hours for each scheduled meeting. Instructors may report absences to the Registrar's Office, which will in turn notify the students. **The grade given for excessive absences is a "V," which has the same effect as "F" (Fail) and is counted in the GPA.** This outcome can be appealed to the Dean of the College/School in which the course is offered. **What does this mean for you?**
If you miss six (6) 50-minute class periods over the course of the semester you can be given a "V" grade which will appear on your transcript as an "F."

- **Corresponding with the instructor via e-mail**. Please <u>message me through Canvas</u>; please only use direct e-mail if you are unable to access your Canvas account. This helps me keep course-related conversations together, will not accidently be flagged as spam mail (yes, it does happen!), and will ensure that I respond to your questions more promptly (i.e., It is not competing for my attention alongside the numerous other emails I receive!)

- **Accessing course materials**. Canvas is the online presence for this course. **Log in regularly (<u>every day</u>)** to view course announcements, view the course calendar schedule, access course materials, access your grades, and submit assignments. "I didn't know assignment X was due at this date/time" is not an acceptable excuse! It is your responsibility to keep on top of course tasks.

- **Checking your grades**. To view your current grades, click on the Grades tab in Canvas. My goal is to have work graded within one week of the final deadline, but this may not always be possible. Please check your grades regularly to ensure that your grades have been entered properly, and please let your instructor or the TA know as soon as possible if you detect an error.

- **Challenging a grade**. If you believe that I have made a mistake in grading an assignment, you have *one week* **(from the time your grade is first posted to the gradebook)** to discuss the matter. Such discussions should take place through Canvas—never in class (see point above). Please discuss grading issues as soon as possible. Students have often attempted to bargain for points well after their grades have been posted—often near the end of the semester when they have realized that they needed more points to obtain a certain grade. Please do not attempt to do this!

- **Exams**. In general, I will not allow you to make up the exam unless you (a) have a legitimate excuse and (b) make other arrangements with me at least one week in advance of the exam. If you have a **genuine emergency** and you cannot give proper notice, I will accept make-up requests after the fact, provided that (a) they are in writing, with supporting, signed documents, and (b) they are submitted to me no later than 24 hours after the starting time of the exam you missed. I will review each case on an individual basis, and I will let you know if your request is granted no later than 24 hours after it is submitted. **Travel plans are not a valid excuse to miss an exam!**

- **Late policy for assignments**. **Deadline reminders are a courtesy, not a requirement. You are responsible to follow the course calendar and be aware of provided due dates!** Course assignments are due by the stated due dates and times. See each assignment on Canvas for their deadline and late policy. **Note that some assignments may be time sensitive and will <u>not</u> allow**

for late submissions. In cases of illness and extenuating personal circumstances, you may request in writing that an exception be granted to this policy, but your request must be issued in a timely manner (preferably in advance of the due date), and there is no guarantee that it will be granted.

- **Academic integrity:** You are expected to follow the university policy on academic honesty. Academic honesty is expected of all Gonzaga University students. Academic dishonesty includes, but is not limited to cheating, plagiarism, and theft. Any student found guilty of academic dishonesty is subject to disciplinary action, which may include, but is not limited to, (1) a failing grade for the test or assignment in question, (2) a failing grade for the course, or (3) a recommendation for dismissal from the University. A complete copy of Gonzaga's Academic Honesty policy can be found at [course catalog](.).

Resources and Success for Well-being

Please take care of yourself and your fellow zags! Be aware of the student support resources that the University provides for you. Additional resources for student support are available at https://www.gonzaga.edu/academics/Diversity/CampusClimate/campus-and-local-resources.asp

- **Center for Cura Personalis.** The [Center for Cura Personalis](.) serves students in many ways including through proactive outreach and educational programs about healthy choices and interventions for students who may be struggling.
- **Health and Counseling Services.** Health & Counseling Services functions as your private physician's office and counseling center. Health & Counseling Services is a confidential resource. To schedule an appointment, please call 509-313-4052.
- **University Ministry.** University Ministry's mission is to support members of the Gonzaga community in their spiritual growth and development, empowering them to live out God's love in the world. Contact: University Ministry, Hemmingson Center 104, x4242 or [umin@gonzaga.edu](.)

Campus Security and Public Safety. At Gonzaga we believe that the security of our campus is a responsibility shared by all members of the community. For more information, visit the [Campus Security and Public Safety](.) site.

Gonzaga University-Wide Policies

University Academic Policy Statements	Associated Links
Support Links	Canvas Support
Diversity, Equity and Inclusion	**Office of Diversity, Equity and Inclusion** **Bias Incident Assessment and Support (BIAS) Team**
Harassment, Discrimination and Sexual Misconduct Policies	**Harassment and Non-Discrimination Policy** **Title IX**
Academic Integrity Policy	**Academic Integrity Policy**
Students with Disabilities/Medical Conditions and accessible Documents (EITA)	**Disability Access and Resources Office Electronic Information Technology Accessibility** **(EITA)**
Religious Accommodations for Students	**Religious Accommodations for Students Policy**
FERPA and Privacy	**FERPA**
Class Attendance Policy	**Class Attendance Policy**
Notice to Students of COVID-19 Expectations	**Student Arrival & Return to Gonzaga Guides**
Notice to Students about Class Recordings (audio, video and photos)	**Zoom sessions might be recorded**
Student Conduct	**Gonzaga University's Student Code of Conduct**
Course Evaluations	**Course Evaluations**