CPSC 121 Computer Science I Syllabus

Spring 2024

Last Updated: 15 January 2024 (Note: syllabus subject to change, your instructor will make an announcement if changes occur)

Instructor information

Instructor: Daniel Olivares, PhD
Email: olivares@gonzaga.edu
Phone: 509-313-5753
Office location & hours: BCISE 011 (& via Zoom upon request)
Tuesday & Thursday
9:00-10:45 a.m. & 1:00-1:45 p.m.

General information

Course Meetings Time & Location
TR 10:50am-12:05pm - BCISE 003

Course Information

- Techniques of problem-solving and algorithmic development. An introduction to programming. Emphasis is on how to design, code, debug, and document programs using good programming style.
- Credits: 3.00
- College: School of Engineering/Applied Science (SEAS)
- Department: Computer Science
- Prerequisites: None

Description

CptS 121 is a first course ("CS 1") in computer science for majors. In this course, we use the C++ programming language to explore the fundamental concepts, constructs, and techniques of modern computer programming, including functional decomposition, data structures, and software engineering. The primary aim of this course is to give you a thorough introduction into problem solving, algorithm discovery, and program design in C++. Some of these concepts include, but are not limited to, the following:

- Algorithm design
- Program design and implementation
- Software processes
- Data structure design and implementation

Learning Objectives

Students who successfully complete this course will be able to:

1. Perform basic algorithm design and analysis
2. Demonstrate a basic understanding of computer organization relevant to programming
3. Demonstrate the ability to use fundamental programming constructs including assignment statements, Boolean expressions, iteration (for and while loops), conditional statements, defining and calling functions, console input/output, and using arrays
4. Describe the compilation process
5. Solve computational problems using the C++ programming language
6. Demonstrate good practices in program design and development
Outcomes:

- An ability to apply knowledge of computing and mathematics appropriate to the discipline
- An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
- An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs
- An ability to use current techniques, skills, and tools necessary for computing practice.
- An ability to apply design and development principles in the construction of software systems of various complexity.

Course Topics

- Basic algorithm design and analysis
  i. Examples drawn from various problems utilizing different programming constructs (assignment, conditions, iteration) Informal comparison of algorithm efficiency (e.g., operation counts)
- Basic computer organization relevant to programming
  i. Bits, bytes, and words
  ii. Numeric data representation and number bases
  iii. Representation of non-numeric data (e.g., ASCII)
  iv. Basic organization of a von Neumann architecture
  v. Basic instruction fetch, decode, and execution cycle
  vi. Basic high-level idea of machine code instructions
  vii. Compilation stages
- Introductory programming in C++
  i. Variables and primitive data types (e.g., numbers, characters, Booleans)
  ii. Expressions and assignments
  iii. Conditional statements (if-else-else if and case statements)
  iv. Iterative control structures (for, while, and do loops)
  v. Calling and defining functions with parameter passing
  vi. Arrays (including two dimensional arrays)
  vii. Basic string and string processing (via the string class)
  viii. Console I/O
- Program design and development
  i. Abstraction (process and data)
  ii. Program decomposition
  iii. Documentation and program style
  iv. Debugging and testing strategies
  v. Static typing
- Emphasis throughout on programming to solve problems within one or more application areas (such as game development, cryptography, numerical analysis, statistics, graphical and image processing, robotics, embedded systems, etc.)

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 to take in-class exams and quizzes. 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, some 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/](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**

Programming in C++ (a zyBooks book ISBN 979-8-203-27231-7). This is an online interactive textbook. Follow these instructions to gain access to the book:

1. Sign in or create an account at [learn.zybooks.com](https://learn.zybooks.com)
2. Enter zyBook code: **GONZAGACPSC121OlivaresSpring2024**
3. Subscribe

A subscription is **$64** and will last until May 29, 2024. Students will be able to subscribe until **Apr 28, 2024**.

**Additional Notes:**

- You are required to register with your official @zagmail.gonzaga.edu student email.
- Please enroll in the section you are officially registered for. If you switch sections, please communicate this to your instructor as soon as you are officially in a new section.
- Though access to the digital book is not indefinite, you may print (or download as PDF) the zyBooks contents during subscription time to maintain an offline, non-interactive, copy of the book.

  *If you have any difficulty with or questions about zyBooks usage, support is available at the zyBooks help desk: [https://zybooks.zendesk.com/hc/en-us/sections/360001556914-Students](https://zybooks.zendesk.com/hc/en-us/sections/360001556914-Students)*

**Required software**

- **Development environments:**
  i. Windows, Linux, or MacOS with terminal access and the g++ compiler installed.
  ii. A basic text editing program, e.g., gedit on Linux.
  iii. NOTE: while Visual Studio Code can be configured with g++ (or other) compiling tools, *I strongly encourage you to not jump straight to this development environment as it will be easy to get lost in the configuration details. The initial content of this course depends on your understanding of the materials. While certainly useful, certain IDE tools can prevent you from learning the materials if you become dependent upon them rather than learning the materials first as a proper framework for all future coding endeavors.*
• 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 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).

**Recommended Textbook**

*Starting out with C++: From Control Structures through Objects* by Tony Gaddis. 9th Edition. Click [here](#) for the Amazon link.

*Note: older editions are likely just as helpful for major concepts though order of content and/or examples may have changed. The zyBook required for this course is tailored to this edition of the text.*

**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:

- **Wednesday, May 8, 2024 - 10:30 am to 12:30 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

Assignment Weights

• Participation Activities (10%)
• Quizzes (10%)
• ZyBooks Activities (10%)
• Programming assignments (30%)
• Exams (40%)
  o Exam 1 (5%)
  o Exam 2 (10%)
  o Exam 3 (10%)
  o Lab final exam (15%)

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 of 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. Participation submissions will normally be due by the end of that day’s lecture period. 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.

• 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 IQ “freebies” that excuse your failure to submit an IQ for any reason.

• Programming Assignments (30%). You will be given several 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. See the late work section for the PA late submission policy.

• ZyBooks Textbook Activities (10%). This part of your grade will be for completing assigned challenge activities in the zyBooks textbook. Note that zyBook activities will be scored at percent complete at the time of the final submission deadline. No late completion of zyBook activities will receive credit.
You are expected to read through each section of the course zyBook prior to the lecture the topic is covered. Though not graded, it is highly recommended that you also complete the (optional) participation activities for each topic before the class we talk about it. The intent is for you to have some minimal level of familiarity to better inform question asking and discussion activity during lectures and help you to actively engage in course activities.

Please note that some of the zyBook challenge activities can be unexpectedly difficult so do not put off their completion until the last minute! There will not be extensions or exceptions to the zyBook deadline policy - with that in mind, make sure to attempt these activities well before the deadline so you have ample time to visit office hours for any unresolved issues PRIOR to the final submission deadline.

There may be an opportunity to replace two (2) incomplete zyBook scores towards the end of the semester but do not count on this (it depends on the progress of course materials during the semester).

- Exams (40%). We will have three 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.

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>93-100</td>
<td>A</td>
</tr>
<tr>
<td>90-92.99</td>
<td>A-</td>
</tr>
<tr>
<td>87-89.99%</td>
<td>B+</td>
</tr>
<tr>
<td>83-86.99%</td>
<td>B</td>
</tr>
<tr>
<td>80-82.99%</td>
<td>B-</td>
</tr>
<tr>
<td>77-79.99%</td>
<td>C+</td>
</tr>
<tr>
<td>73-76.99%</td>
<td>C</td>
</tr>
<tr>
<td>70-72.99%</td>
<td>C-</td>
</tr>
<tr>
<td>67-69.99%</td>
<td>D+</td>
</tr>
<tr>
<td>60-66.99%</td>
<td>D</td>
</tr>
<tr>
<td>59.99%</td>
<td>F</td>
</tr>
</tbody>
</table>

**Contesting a Grade**

If you believe that a mistake has been made with grading an assignment or exam, please speak with me within one week (but no sooner than 24 hours) of the assignment or exam being returned. Do not wait until the end of the semester to discuss any grade changes. You need to constantly be aware of how you are performing in the class. Thus, there will not be any surprises at the end of the semester when grades are to be formally submitted. You should be able to view your grades via Canvas. These will be updated regularly.

*Note: the grades are weighted according to the ones described above. You cannot determine your grade with a simple raw sum of point total calculation (look at the Canvas grades tab for “what if” calculations).*
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 message me through Canvas; 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 accidentally 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 (every day) 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 not 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.

Additional CPSC 121 Code Integrity Policy:
For this course both collaborative and individual work will be required. You are RESPONSIBLE for knowing all material involved in a collaborative assignment. All individual work must be completed alone.
Do NOT work with any team members on individual assignments. You may discuss ideas with team members about problems related to individual assignments, but do not discuss implementation details.

Discussing implementation details includes (but is not limited to):

1. Copying/taking a picture of another student's code/work
2. Letting another student copy/take a picture of your code/work
3. Sending your code/work to another student (i.e. digitally or in print)
4. Receiving another’s student code/work (i.e. digitally or in print)

Note: If you use content from sources other than the ones provided by the instructor (e.g. textbook, notes, etc.), cite the source in your code.

If are unsure of whether a situation might be considered cheating, be cautious and don’t do it. If help is required, please ask the instructor for guidance. I’m always more than willing to help! Any instances of plagiarism will be reported to the Academic Integrity Board.

**Code plagiarism software will be used to check for code similarity.**

**Note:** Even though programming assignments are noted as individual assignments, this does NOT mean that you are not allowed to get help with the assignments. You are encouraged to make use of help from your instructor, TAs, or tutoring services provided the work you submit is your own (that is, someone else did not produce the work you are submitting).
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**

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