**CPSC 1230 Data Structures  
Fall B 2022 Course Syllabus**

*Published: October 8, 2022*

**Instructional Mode**

The instructional mode for this course is *Online Asynchronous*. The course will be conducted online in its entirety, and there will be no specific time of day during which you are required to participate in a course activity. You will be responsible for setting your own schedule for completing course readings, watching pre-recorded lecture videos, submitting assignments and taking exams no later than the published deadlines, and completing all other activities required by this course.

You are expected to have all the equipment and software needed to be successful in this course. At a minimum, you must have a computer and a broadband Internet connection capable of interacting with Canvas and Vocareum via a web browser, as well as streaming video and audio of pre-recorded lectures.

Times for all course events (assignment deadlines, exam times, etc.) will be set in US [Central Time](https://www.timeanddate.com/time/zones/ct). You are responsible for meeting deadlines in Central Time regardless of what your local time zone may be. You may find it helpful to follow the instructions linked [here](https://community.canvaslms.com/t5/Student-Guide/How-do-I-set-a-time-zone-in-my-user-account-as-a-student/ta-p/414) to have Canvas show deadlines appropriately in your local time zone to avoid any confusion.

**Course Description**

CPSC 1230 is designed to introduce fundamental data structures and associated algorithms, as well as applications in which they are commonly used. An object-oriented approach to problem solving and program design will be emphasized in the lecture and reinforced in the lab.

**Bulletin Description:** Admission into Bachelor of Computer Science Program. Developing programs that use data structures and collections to efficiently store data. Emphasis will be placed on the interplay between effective data structures and efficient algorithms.

**Credit Hours:** 3 (DSL. 45.)

**Prerequisite:** CPSC 1220

**Learning Outcomes**

By the end of this course, the student will demonstrate an ability to:

* Create, verify, and assess computational solutions in Java.
* Create, verify, and assess software components that are expressed at a high level of abstraction.
* Apply standard problem-solving strategies in the creation of solutions.
* Demonstrate the behavior of standard collections and data structures.
* Analyze and assess standard collections and data structures with respect to efficiency and use case.
* Apply standard collections, data structures, and associated algorithms in the creation of solutions.
* Assess algorithms and software components with respect to time complexity.

**Materials and Resources**

**Textbook**

No specific text is required for this course, but I recommend that you do select a good text for reference and studying. There are many excellent texts on data structures and algorithms, and I’ve listed four examples below. Any one of these texts will serve you well for the course. Both Bailey and Shaffer are available as **free** PDF downloads, while Weiss and Sedgewick are available for purchase from Amazon and other booksellers.

**Bailey**, Duane A. (2007). *Java Structures: Data Structures in Java for the Principled Programmer, \(\sqrt{7}\) Edition*. <http://www.cs.williams.edu/~bailey/JavaStructures/Welcome.html>

**Shaffer**, Clifford A. (2013). *Data Structures and Algorithm Analysis, 3.2 (Java version)*. <http://people.cs.vt.edu/~shaffer/Book/JAVA3elatest.pdf>

**Weiss**, Mark A. (2010). *Data Structures and Problem Solving Ssing Java. 4th ed.*, Addison-Wesley. ISBN: 978-0321541406.

**Sedgewick**, Robert. (2002). *Algorithms in Java: Parts 1–4. 3rd ed.*, Addison-Wesley. ISBN: 978-0201361209.

**Course Notes**

Notes and other materials relating to each topic covered in the course are available through Canvas. You are expected to read the notes and interact with the other materials as we progress through the course. Although the course notes are relatively complete, they are not designed to be your only source of information on the course material. You are expected to use a textbook to supplement the course notes.

**Vocareum**

Vocareum is a cloud-based lab environment in which you will submit programming assignments and complete programming tests. There is no fee for students using Vocareum this term.

**Discord**

Discord is an online communication and community-building tool that this course will use as a collaborative discussion and Q&A forum. This software is free, and instructions on installation and use will be provided in Canvas during the first week of the course.

**Zoom**

This course uses the Zoom teleconferencing software to facilitate optional synchronous interaction with the course instructor and TA during office hours and appointments. Zoom is licensed by Auburn University, and you can sign up free of charge for this added-feature version authenticated with your AU credentials at <https://auburn.zoom.us/>.

You must have a computer and a broadband Internet connection capable of installing and reliably running [Zoom](https://support.zoom.us/hc/en-us/articles/201362023-System-requirements-for-Windows-macOS-and-Linux)

**Development Environment and Other Software**

This course will require the use of the Java Development Kit (JDK) and other software. This software is free, and instructions on installation and use will be provided in Canvas during the first week of the course.

**Instructional Staff**

**Instructor**

A person wearing glasses and a suit

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**Grading**

Your grade for the course will be determined by the points you earn on items in the following categories.

* **Exams** (40%): There will be three exams in the course, including the final exam. Dates for the first two exams will be set and announced at least one week in advance. Missed exams are assigned a score of zero points.
* **Lab Tests** (25%): There will be three programming-based tests in the course. Dates for each will be set and announced at least one week in advance. Lab Test grades will be based on the percentage of test cases passed on Vocareum. Passing zero test cases will result in a grade of zero points. Missed lab tests are assigned a score of zero points.
* **Assignments** (30%): There will be seven assignments designed to both reinforce and expand on the topics covered in lecture. Each assignment will specify a well-defined problem with multiple possible solutions. You will be required to apply what you have learned, discover new information, and exercise creative problem solving to construct a solution that meets the problem specification. All assignments require you to express solutions in Java. Most assignments will be completed individually while some may be completed in teams. Unless it is explicitly stated otherwise, all assignments are to be completed individually and must reflect your own individual work. Assignment grades will be based on the percentage of test cases passed on Vocareum. Passing zero test cases will result in a grade of zero points. Assignments not completed by the specified deadline are assigned a score of zero points.
* **Hands-On Activities** (5%): There will be a set of hands-on activities designed to both reinforce and expand on the topics covered in lecture. Hands-on activities not completed by the specified deadline are assigned a score of zero points.

Your total score (*Total*) for the course will be calculated as follows, where *E* is the percentage of possible points earned on exams, *A* is the percentage of possible points earned on assignments, *T* is the percentage of possible points earned on lab tests, and *H* is the percentage of possible points earned on hands-on activities. Each percentage is calculated as (*points earned* / *points possible*) \* 100.

*Total* = (0.4 \* *E*) + (0.25 \* *T*) + (0.3 \* *A*) + (0.05 \* *H*)

Your letter grade for the course will be assigned based on your *Total* numeric score using the following scale.

| ***Total*** | **Letter Grade** |
| --- | --- |
| [90, 100] | A |
| [80, 90) | B |
| [70, 80) | C |
| [60, 70) | D |
| [0, 60) | F |

**Extra Credit:** Opportunities for extra credit are sometimes given to the entire class, but are never given on an individual basis.

**Course Outline**

The course is organized into eight modules covering the topics below.

* **Module 0**: Course overview, policies, getting started
* **Module 1**: Programming fundamentals, correctness, testing, debugging, generality, idioms, patterns
* **Module 2**: Efficiency, algorithm analysis, sorting, divide-and-conquer, recursion
* **Module 3**: Collections, array-based and node-based implementations
* **Module 4**: Lists, stacks, queues
* **Module 5**: Trees, binary search trees, AVL trees, red-black trees, 2-4 trees, binary heaps
* **Module 6**: Hash tables, graphs
* **Module 7**:

Module 0 runs from the first day of classes through the first Sunday of the term, Module 1 through Module 7 are each allocated one week, with each beginning on a Monday and ending on the following Sunday.

Below is the weekly schedule for [Fall B 2022](http://online.auburn.edu/term_calendar). Note that course work continues through all days of the term, including those marked as holidays.

| **Week** | **Dates** | **Module** | **Graded Items** | **Bailey** | **Shaffer** | **Weiss** | **Sedgewick** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | Mon 10/10 - Sun 10/16 | M0 | H |  |  |  |  |
| 2 | Mon 10/17 - Sun 10/23 | M1 | H A | 2, 4, 8, 11 | 1 | 1-4, 6 | 3, 4, 12 |
| 3 | Mon 10/24 - Sun 10/30 | M2 | H A E T | 5, 6 | 2, 3, 7 | 5, 8 | 2, 6-8 |
| 4 | Mon 10/31 - Sun 11/6 | M3 | H A | 3, 7, 9 | 4 | 6, 17 | 3, 4 |
| 5 | Mon 11/7 - Sun 11/13 | M4 | H A E T | 5, 9-11 | 2, 4 | 6, 7, 15-17 | 4, 5 |
| 6 | Mon 11/14 - Sun 11/20 | M5 | H A | 12, 13 | 5, 10, 13 | 6, 18, 19, 21 | 5, 9, 12, 13 |
| 7 | Mon 11/21 - Sun 11/27 | M6 | H A | 15, 16 | 9, 11 | 6, 14, 20 | 1, 14 |
| 8 | Mon 11/28 - Fri 12/2 | M7 | H A E T |  | 6 | 24 | 1, 4 |

**Course Policies**

**Attendance**

Since this course is being conducted in Online Asynchronous mode, “engagement” better captures what is expected rather than “attendance.” You are expected to fully engage in this course and take responsibility for your learning experience. Lack of engagement almost always leads to poor course performance.

If illness or an emergency situation prevents you from being able to participate in the course, please contact me in advance of affected deadlines if possible. See other syllabus policies regarding extended absences, late submissions, and make-ups.

**Excused Absences**

To have a covid-related absence excused you must provide the course instructor with an official email from the AU COVID-19 Resource Center (CRC). This email can only be obtained by filing a [student self-report form](http://auburn.edu/covid-resource-center/reporting/) with the CRC.

To have a non-covid absence excused you must first obtain an Excused Absence Memo from Engineering Student Services (ESS) for any absence that falls into categories 1 through 6 in the AU Policy on Class Attendance. You should contact the course instructor directly for other absences.

Engineering Student Services provides excused absence memos to students who present verifiable documentation related to university excused absences. The steps for obtaining an excused absence memo are as follows:

1. The student submits the request form using this link: <https://aub.ie/EngAbsence>
   * Students submit documentation of the reason for the absence.
   * Students must read and acknowledge the excused absence policy.
2. The ESS office staff processes the requests and verifies authenticity of documentation provided by student, as well as the dates of the absence(s).
3. Assistant Dean determines if the documentation meets the standard for a university excused absence or if the documentation warrants consideration by the professor.
4. An official memo is sent directly to professors via email regarding the student’s absence

**Exam and Test Makeup**

A missed exam or test can only be made up for excused absences (see policy). Students must contact the instructor **within 48 hours** from the time that the exam or test was given or the exam or test score will remain zero. The makeup schedule is determined by the instructor and will need to be done within five business days from the time that the exam or test was given.

**Late Assignment Submission**

All assignments are due no later than the date and time specified in Canvas, and no late submissions are accepted. If you believe that your situation warrants an exception to this policy (e.g., medical emergency) you must treat this as an *absence* and have the absence excused (see policy).

**Connectivity Issues**

If connectivity issues (e.g., Internet connection problems, electrical power failures) prevent you from completing an element of the course on time, you must notify the instructor immediately when the incident occurs (email to dh@auburn.edu and/or voicemail to 334-844-6305) and then provide appropriate documentation (e.g., service provider notices) within one hour of the incident. No extensions or makeup opportunities will be available otherwise.

**Time Commitment**

Auburn University has the following [expectation](http://www.auburn.edu/student_info/student_policies/) of the time commitment and work that a course will require per credit hour. “*Auburn University expects that for each credit hour awarded, an appropriately prepared student will complete an average of 3-3.5 hours of academic work per week over the length of a 15 week semester.*” This time estimate is independent of instructional mode, so although this course is being offered Online Asynchronous, you should plan on spending the same amount of preparation, work, and “in class” time on this course as you would if you were taking the course face-to-face. Also, since this course is being offered in a compressed 7.5 format, the expected amount of time per week is effectively doubled.

This course carries three credit hours, so at a minimum, an “appropriately prepared” student (read: you did great in COMP 1220) would be expected to spend 3 \* 3 \* 2 = 18 hours each week working on this course. Regardless of the specifics, you should be prepared to allocate an appropriate amount of time for this course.

**Academic Honesty**

Academic honesty is critical to the entire educational process and is a serious matter in this course. You are expected to apply the [Auburn University Oath of Honor](https://wp.auburn.edu/sga/initatives/academic-affairs/oath-of-honor/) to each graded item in this course:

In accordance with those virtues of Honesty and Truthfulness set forth in the Auburn Creed, I, as a student and fellow member of the Auburn family, do hereby pledge that all work is my own, achieved through personal merit and without any unauthorized aid. In the promotion of integrity, and for the betterment of Auburn, I give honor to this, my oath and obligation.

Issues surrounding violations of academic honesty will be handled per the [Student Academic Honesty Code](https://sites.auburn.edu/admin/universitypolicies/policies/academichonestycode.pdf). You are encouraged to familiarize yourself with this policy and the other resources available from the [Office of Academic Effectiveness](http://www.auburn.edu/academic/provost/academic-effectiveness/academic-honesty.php).

What constitutes cheating on exams and tests is fairly obvious, and everyone understands that anything other than individual work on these is wrong. Where many students are unsure of what is allowable and what is not allowable is in the completion of programming assignments. I encourage students to form study groups, help each other learn the course material, and help each other solve problems. Collaborative problem solving is a great way to learn. However, collaborative problem solving must be restricted to the level of concepts, strategies, and algorithms; it should never involve source code. If you’re in doubt about a certain practice, it’s best to ask rather than assume it’s okay. In certain instances, course work is to be completed in groups rather than individually, but these instances will be clearly identified by the instructor and the collaboration is allowed only within the bounds set by the instructor.

**Communication with Instructor and Teaching Assistants**

Your Auburn University email address (@auburn.edu) is the university-approved form of communication between instructors and students. Emails that you send to the instructor or to a teaching assistant must come from your @auburn.edu email address. Sending emails from addresses other than @auburn.edu could result in you not receiving a response to your message. Do not send messages via Canvas; instead, send an email.

All course announcements will be posted to Canvas and/or sent to your @auburn.edu address. All email communications from the instructor to you will be sent to your @auburn.edu address. Follow the steps in the video linked [here](https://community.canvaslms.com/t5/Video-Guide/Notification-Preferences-All-Users/ta-p/383690) to set your notifications preferences and specify that all course alerts are routed to your @auburn.edu email address. You are expected to check both Canvas and your @auburn.edu account daily.

**Getting Help in the Course**

If you find yourself struggling academically in this course, please reach out to your instructor and/or a teaching assistant as soon as possible. Do not wait until the end of the term to seek help for problems that were present much earlier. The instructor and teaching assistants want to help you, but can not do so unless you ask in a timely manner.

**Accessibility**

Students who need accommodations are asked to electronically submit their approved accommodations through AU Access and to arrange a meeting with me during the first week of classes, or as soon as possible if accommodations are immediately needed. If you need accommodations but have not established them, make an appointment with the Office of Accessibility, 1228 Haley Center, 334-844-2096.

**Diversity and Inclusion Statement**

It is my intent that students from all diverse backgrounds and perspectives be well served by this course, that students’ learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength, and benefit. It is my intent to present materials and activities that are respectful of diversity: gender, religion, sexuality, disability, age, socioeconomic status, veteran status, ethnicity, race, and culture. All students in this course are expected to respect their fellow classmates and actively participate in fostering an inclusive learning environment. If you experience anything in this class that makes you feel uncomfortable, please bring it to my attention and we will formulate a response. If you would prefer to remain anonymous you may complete a [Bias Incident Report](http://studentaffairs.auburn.edu/bert/submit-a-report-of-bias/) which will maintain your confidentiality.

Your suggestions are encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally or for other students or student groups.

**Classroom Behavior**

The Auburn University [Policy on Classroom Behavior](https://sites.auburn.edu/admin/universitypolicies/Policies/PolicyonClassroomBehavior.pdf) is strictly followed in this course. Note that this policy extends to all virtual elements of this course including Zoom, Vocareum, Discord, and all electronic communication.

**Grade Appeals**

Scores for all graded items will be posted to Canvas. You will have five business days from the date that a score is posted to Canvas to send an email to the instructor requesting grade adjustments on your work. If no appeal is sent to the instructor after five business days, the score is final. Once the five-day appeal period has passed, students forfeit their right to have the graded material reassessed at a later date.

To appeal a grade that you have received, send an email to the instructor specifying the graded item in question and justifying in a clear, concise manner why you think your response should be awarded more points. Once received, the instructor may or may not communicate with you regarding your appeal. Ultimately, the instructor will render a decision.

**Extended Student Absence**

If illness causes you to be unable to participate in the course, please contact me as soon as possible to discuss your options.

**Extended Instructor Absence**

If illness causes me to be unable to continue teaching the course, a back-up instructor has been selected who will assume all teaching responsibilities to ensure that the course will proceed uninterrupted.

**Auburn University Transition to Remote Operations**

Since this course is being delivered in Online Asynchronous mode, neither course requirements nor course delivery will change in the event that the University is forced to move to remote operations and fully online instruction.

**Data Collection and Use Disclosure**

Any and all results of graded items in the course are data sources for research and assessment, and may be used in publications related to research and accreditation. All such use will be anonymous.