UNIVERSITY OF LOUISVILLE

CSE 302-01: Data Structures; Spring 2025
Classroom: Duthie Engineering Center 117
Lecture: MWF 2:00-2:50 pm
TA: Mr. Yazan Abdulqader
TA Email: yazan.abdulqader@louisville.edu
(See BB TA/Info Link for TA Information and Office Hours)

Instructor: Dr. Zeyan Liu
(he/him/his)
Email: zeyan.liu@louisville.edu
Office: Duthie 220
Office Hour: MWF 1-2 pm or by appointment (Onsite & Online)

COURSE DESCRIPTION

Study of information representations and relationship between the form of representation and processing techniques. Transformations between storage media. Referencing of information as related to the structure of its representation and implications for the design of the referencing language. Engineering applications and associated designs are used to illustrate different structures.

Prerequisites: CECS/CSE 130 (Introduction to Programming Languages).

COURSE RESOURCES

- **Text Book:** Nell Dale, Chip Weems, Tim Richards. C++ Plus Data Structures, 6th Edition. ISBN: 978-1-284-08918-9.
- **Software:** C++

LEARNING GOALS AND OBJECTIVES

Upon completion of this course, students will be able to

1. Explain the role data structures play in the computer science and programming world.
2. Explain basic principles of software engineering and object-oriented programming.
3. Explain the difference between abstract data types and data structures, along with the three main levels of data representation (application, logical, and implementation).
4. Understand basic algorithm analysis and relevant trade-offs (e.g. speed, storage, and code simplicity.)
5. Understand the role sorting plays in efficient information retrieval and transformation.
6. Select an appropriate data structure and implementation to address a real-world problem.

7. Write C++ code to handle essential programming tasks (e.g. function calling, exception handling
8. Write C++ code to implement essential data structures (e.g. lists, stacks, queues, trees, and hash tables.)
9. Write C++ code to perform basic manipulation and transformation of data structures (e.g. printing, searching, sorting.)
10. Write C++ code to accommodate basics of object-oriented programming (e.g. polymorphism, encapsulation, inheritance.)

Please see the calendar at the end of the Syllabus for specific topics covered and a tentative schedule.

STUDENT OUTCOME

EAC Student Outcomes: This course supports the following EAC student outcomes:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics (EAC 1).
2. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions (EAC 6).

CAC Student Outcomes: This course supports the following CAC student outcomes:

1. Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions (CAC 1).
2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline. (CAC 2).

GRADING POLICY

- **Homework Assignments:** 20% (A total of 4 Assignments. 5% each.)
- **Project:** 15%
- **Mid-term Exams:** 40% (2 Exams)
- **Final Exam:** 25%

Grading Scale: A: 98-100; A: 93-97.99; A-: 90-92.99; B+: 87-89.99; B: 83-86.99; B-: 80-82.99; C+: 77-79.99; C: 73-76.99; C-: 70-72.99; D+: 67-69.99; D: 63-66.99; D-: 60-62.99; F: < 59.99.

Note: The final letter grade may be based on a curve if necessary.

Grade Disputes: If you have concerns about your final grade or your grade in one of the assignments, exams, or projects, contact me within one week of releasing the grade. Any disputes beyond one week will not be considered. Any requests that do not align with the syllabus will not be considered.

ACADEMIC INTEGRITY

I have zero tolerance for cheating, plagiarism, or any form of academic misconduct. Students are responsible for understanding the UofL Student Code of Conduct (louisville.edu/dos/students/codeofconduct) and the Code of Student Rights and Responsibilities (louisville.edu/dos/students/studentrightsandresponsibilities). I will strictly enforce these policies and address any violations accordingly.

COURSE POLICIES

- **Course Materials:** All course materials, including lecture videos, lecture notes, and assignments, will be posted on Blackboard. It is the student's responsibility to stay updated with announcements and submissions through the platform. Students are not allowed to post or distribute any course materials or their works on platforms outside Blackboard or Gradescope.

- **Attendance:** Attendance is not mandatory due to the combined nature of the course but is highly recommended. Laptops are recommended for note-taking and other class-related activities. Still, students should refrain from checking emails, browsing unrelated websites, or working on non-course-related tasks during class time. Sessions or suitable replacements will be recorded and/or uploaded within a day or two of the in-person session.

- **Exams:** Students taking the in-person offering (CSE 302-01) are expected to take tests in person. Students in CSE 302-50 will be required to use Respondus Lockdown Browser and Monitor (which requires a webcam) when taking exams. Exams will be closed book, and no cheat sheets will be allowed. See early week announcements for more details.

- **Extra Credit**: Extra credit opportunities may be offered for participation in out-of-class competitions, training, or seminars. No additional assignments or made-up exams for extra credit will be provided unless proactively offered by the instructor.

- **Assignments and Projects:** Discussions for the purpose of understanding a problem are allowed. Collaboration and/or group work is not allowed. Each student must submit their own work. Students should keep a copy of their submissions for their records. All assignment and project submissions are to be uploaded online by 11:59 PM EST on the day of the provided deadline to receive full credit. **No handwritten or hard copy submissions will be accepted. A 5% penalty will be applied immediately after the due time and every 24 hours thereafter, up to a maximum penalty of 30%. Submissions made six or more days late will receive zero credit.** If you experience an emergency, such as an illness requiring an emergency room visit, you must provide written proof (e.g., a timely diagnostic report) to contest any penalties. For technical issues like power outages, network problems or Blackboard access issues, email your submission directly to the instructor or TA before the due. No technical issues or difficulties will be accepted as valid excuses.

- **Assignments and Projects Submission:** All programs and coding blocks required for assignments and projects must be written in C++. Students are free to use a preferred IDE, text editor, or other tools to construct and test programs, but the code must compile successfully using the latest stable distribution of GCC and Make. Dev C++ is highly recommended, and instructor support for Dev C++ as an IDE is guaranteed. Assignments should be submitted in up to 2 parts: (1) a single doc or pdf file named "LN_FN_*" where LN is your last name, FN is your first name, and * is the assignment

number. For example, if the instructor were to submit assignment 0, the file would be uploaded as "Liu_Zeyan_0.doc" or "Liu_Zeyan_0.pdf"; (2) A set of cpp files (either zipped or unzipped) for any programming problems. **Note: this course now relies on a Gradescope autograder to grade programming submissions. Keep an eye on early announcements as to how to submit your assignments to Gradescope.**

- **Technical Support:** For Blackboard or university account support, visit louisville.edu/its/get-help/its-helpdesk or call (502)852-7997. Also, Speed IT staff are available by appointment from 9 am to 4 pm to assist you with your technology needs. You may schedule an appointment by sending a detailed email including any relevant error codes and screen snips at SPDHelp@Louisville.edu (preferred) or 502-852-7620.

- **AI Tools:** Use of AI, such as ChatGPT, can be used as a helpful tutor to help students understand concepts. However, to support your learning, all assignments, project reports, code, and exams should be completed independently without AI assistance, unless otherwise specified. If AI is a must to be used, cite and acknowledge AI usage.

- **Students' Responsibility:** Students are responsible for reviewing all content covered in the lectures, including chapters, course recordings, tutorials, reading materials, and handouts. You are not permitted to use, consult, reference, or in any other way derive advantage from solutions from previous years/terms or other students. During classes, students need to keep background audio (in particular, electronic device sounds) to a minimum when attending class or virtual sessions.

- **Scholastic Dishonesty Policy:** The University of Louisville defines academic dishonesty as including, but not limited to, cheating, fabrication, falsification, multiple submissions, and complicity in academic dishonesty. Scholastic dishonesty also includes providing false or misleading information to receive a postponement or an extension on assignments, unauthorized collaboration, and any act designed to avoid participating honestly in the learning process. The purpose of assignments is to provide individual feedback as well as to get you thinking. All academic work must be original and solely produced by the submitting individual.

- **Accessibility and Accommodations:** The Disability Resource Center provides accommodations for students with disabilities. If you need accommodations, please contact them as soon as possible. They can be reached at (502)852-6938 or found online at https://louisville.edu/disability. Please also privately inform me about any accommodations you need in this course.

- **Diversity and Inclusion:** The University of Louisville is committed to creating an inclusive learning environment where diversity is respected and valued. All members of the campus community are expected to promote respect and civility. Discrimination or harassment based on race, ethnicity, nationality, culture, gender, gender identity/expression, religion, sexual orientation, age, veteran status, or disability is against the university's mission. This classroom is an inclusive space where everyone is provided equitable opportunities to succeed. Please refer to our Office of Institutional Equity for more details (https://louisville.edu/diversity/university-of-louisville-diversity-and-international-student-services).

- **Student Wellness:** You may experience challenges that affect your ability to learn, such as stress, anxiety, or difficulties in personal relationships. These issues can impact your academic performance and daily life. UofL offers confidential mental health services to support students at no charge.

Visit https://louisville.edu/campushealth/services/behavioral-health-services for more information, or contact Campus Health Services at (502) 852-6479.

- **Title IX/Clery Act Notification:** Sexual misconduct (including sexual harassment, sexual assault, and any other nonconsensual behavior of a sexual nature) and sex discrimination violate University policies. Students experiencing such behavior may obtain confidential support from the PEACC Program (852-2663), Counseling Center (852-6585), and Campus Health Services (852-6479). To report sexual misconduct or sex discrimination, contact the Dean of Students (852-5787) or University of Louisville Police (852-6111). Disclosure to University faculty or instructors of sexual misconduct, domestic violence, dating violence, or sex discrimination occurring on campus, in a University-sponsored program, or involving a campus visitor or University student or employee (whether current or former) is not confidential under Title IX. Faculty and instructors must forward such reports, including names and circumstances, to the University's Title IX officer. For more information, see the UofL Sexual Misconduct Resource Guide.

- **COVID-19/Pandemic Protocol Considerations:** As a Community of Care, all Cardinals are expected to abide by public health guidelines and regulations as published by the University. For Spring of 2025, this includes: (1) staying home when sick—any UofL community member experiencing fever, consistent dry cough, or other symptoms of contagious disease should remain at home until symptoms subside or advised that it is safe to return by a medical professional. Remember that office hours include an online option. (2) practicing good hygiene and responsibility for one's own surroundings: (a) Cover sneezes and coughs; (b) Wash hands frequently with soap and water when possible, use hand sanitizer when soap and water are not available; (c) Wipe down frequently touched surfaces; and (d) Maintain 6 feet physical distancing when possible.

- **Changes Subject to Adjustment:** If the university transitions to all courses being provided online for whatever reason, synchronous sessions will be given remotely at the same time frame.

- **Tips for Success:** To fully benefit from this course, it's important to stay engaged. Read the course materials regularly and begin working on assignments as soon as they are assigned. Plan to dedicate at least 12 hours a week to this course out of class.

Note: All schedules are tentative for reference and subject to changes. Always consult the course Blackboard page for specific assessment details and due dates.

Week	Dates	Topics Covered	Reading Assignments	Homeworks & Projects (Tentative!)
1	Wed, Jan 8 - Fri, Jan 10	Course Overview, Introduction and Program Design Fundamentals	Chapter 1	
2	Mon, Jan 13 – Fri, Jan 17	Data Views, Basic Structures, Algorithm Basics, Unsorted List ADT	Chapter 2	Assignment 1 Posted
3	Mon, Jan 20	Martin Luther King Holiday		
	Wed, Jan 22 – Fri, Jan 24	AUList, Intro to Pointers in C++	Chapter 3	
4	Mon, Jan 27 – Fri, Jan 31	LLUList, Sorted List ADT, ASList, Search, Big O Notation	Chapter 4	Assignment 1 Due
5	Mon, Feb 3 – Fri, Feb 7	Dynamic Arrays, LLSList, Stacks	Chapter 5	Assignment 2 Posted
6	Mon, Feb 10 - Wed, Feb 12	Queues, Stack Applications		
	Fri, Feb 14	Exam I Review		
7	Mon, Feb 17	Exam I		
	Wed Feb 19 – Fri, Feb 21	Circularly Linked Lists, Doubly Linked Lists	Chapter 6	Assignment 2 Due
8	Mon, Feb 24 – Fri, Feb 28	Recursion, Limitation of Lists	Chapter 7	Assignment 3 Posted
9	Mon, Mar 3 – Fri, Mar 7	Basic Data Analysis, Trees, Binary Search Tree (BST)	Chapter 8	Project Pt 1 Posted
10	Mon, Mar 10 – Sun, Mar 16	Spring Break		
11	Mon, Mar 17 – Fri, Mar 21	BST Traversal, Balancing BSTs		Assignment 3 Due
12	Mon, Mar 24 - Wed, Mar 26	BST cont., Polymorphism and Inheritance in C++		Assignment 4 Posted
	Fri, Mar 28	Exam II Review		Project Pt 1 Due
13	Mon, Mar 31	Exam II		
	Med, Apr 2 - Fri, Apr 4	Priority Queues and Heaps	Chapter 9	Project Pt 2 Posted
14	Mon, Apr 7 – Fri, Apr 11	Sorting, HeapSort, Sets, Maps	Chapter 11	
15	Mon, Apr 14 – Fri, Apr 18	Hash Tables	Chapter 12	Assignment 4 Due
16	Mon, Apr 21	Tying Up Loose Ends		
	Wed, Apr 23	Final Exam Review		Project Pt 2 Due
	Mon, Apr 28	Final Exam (2:30PM – 4:30 PM)		