ECE 0302: Data Structures and Algorithms 01

Spring, 2025

COURSE DESCRIPTION

This course covers the fundamentals of data structures and algorithms. Topics include stacks, queues, trees, lists, heaps and other widely used abstract data types. Students will learn how to implement these data structures using C++ and techniques for analyzing algorithms that contain them. Advanced applications of recursion, sorting and searching algorithms and other algorithms that incorporate data structures will also be discussed.

INSTRUCTOR

Hao Qin, Room 527
Email: hao.qin@scupi.cn
Office Hours: Tuesday 3:30-5:30 pm, Thursday 3:30-5:30 pm, or by appointment

TEACHING ASSISTANT

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LECTURES

Tuesday 8:15-11:00 am
Location: S506 SCUPI Building. In-person attendance is required for all class meetings.

RECITATION

TBA

TEXTBOOK

Data abstraction & problem solving with C++: Walls and Mirrors, 7th Edition. Frank M. Carrano and Timothy M. Henry, Pearson (c) 2016, 7th Edition (ISBN 9780134463971)

COURSE OBJECTS AND LEARNING OUTCOMES

In this course, you will be expected to:

- Identify and describe the fundamental data structures used in computing.
- Implement data structures using an object-oriented programming language.
- Design computer programs that use data structures to solve problems.
- Analyze algorithms and quantitatively evaluate their efficiency.
- Compare multiple approaches to solving a problem and choose the data structures and algorithms that would be most effective.

COURSE REQUIREMENTS AND GRADING

There will be homework assignments, quizzes, and two exams.

- Homework: 30%
- Quizzes: 10%
- Midterm Exam: 30%
- Final Exam: 30%

ABET OUTCOMES

- An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- An ability to function effectively on a team whose members together provide leadership, create a collaborative environment, establish goals, plan tasks, and meet objectives.
- An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

HOMEWORK

Homework assignments and their due dates will be given in the lectures. All work should be clearly presented, showing all steps to demonstrate your understanding of the process. While collaboration with classmates is encouraged, the final submission must be your own independent work, and plagiarism is strictly prohibited. **No late homework** will be accepted.

QUIZZES

There will be short quizzes given during the class meetings. Quizzes are designed to test basic skills and prepare you for the exams.

EXAMS

There is a midterm exam and a final exam. Each test will focus on the material presented since the previous exam, while also having the potential to include content from earlier sections. Attendance at all exams is mandatory. Make-up exams will only be given in the event of an emergency and only if advance notification is provided.

ACADEMIC INTEGRITY

Maintaining academic integrity is essential in this course. All work submitted must be your own, whether individual or group assignments. Plagiarism, cheating, or any form of dishonesty will not be tolerated and will result in disciplinary action as per the institution's policies. You are encouraged to collaborate with classmates on understanding concepts, but all submitted work must reflect your independent effort. Properly cite any sources or assistance received and uphold the highest standards of academic honesty in all your work.

TENTATIVE PROGRESS

	Topic Sections
1	Data Structures & C++ Recap
2	C++ Recap & Generics
3	The Efficiency of Algorithms
4	Linked Lists & Iterators
5	Stacks & Queues
6	Sorting & Searching
7	Hashing
8	Trees
9	Heaps
10	Graphs