

ECE 0302: Data Structures and Algorithms (Spring 2024)

Department of Computer Science, SCUPI

Course Reference Number: 312180030 (ECE0302)

When: Spring 2024

What & Where:

Lectures: Tuesday, 8:15 - 11:00 AM @ SCUPI 212 (Zone 4, Liberal Arts Building, Jiangan Campus)

Instructor: Dr. Guangwu Qian

Email: guangwu.qian@scupi.cn

Office: Room 527, 5th Floor, SCUPI North

Web: <https://scupi.scu.edu.cn/en/faculty-staff-en/faculty-en/guangwu-qian>

Office hours: Monday, 10:00AM-11:30AM,
4:30PM- 5:30PM

Tuesday, 2:00PM-6:00PM

Wednesday, 3:30PM-6:00PM

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.

Course Objectives: In this course, you will learn how to employ data abstraction to build programs larger than before. You will learn how to use a variety of data structures while solving problems, and importantly, how to analyze what data structures and algorithms are most appropriate for a given problem. In addition, you will deepen your understanding of modern programming by learning the principles of object-oriented and generic programming.

Learning Outcomes: After completing this course, students will be able 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.

Prerequisites: ECE 0301ECE Problem Solving with C++. Working knowledge of programming languages (Java preferred) and familiarity with Windows/Linux are assumed.

Blackboard: <https://pibb.scu.edu.cn>

All handouts, class notes and assignments will be published on Blackboard. You are expected to check this website frequently.

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)

Note on Email & Communication: The instructor and TA will periodically post announcements to the Blackboard website. It is every student's responsibility to regularly monitor these announcements. The instructor and TA will periodically email enrolled students with announcements. Students must check their SCUPI email at least once per day to ensure these announcements are received. When

contacting the course staff via email, messages must be addressed to (or CC) both the instructor and the TA. Email subject should be prefaced with the appropriate prefix (e.g., "[ECE0302]").

Course Grading:

Ordinary Grade (Attendance, Questions, Assignments)	30%
Midterm Exam / Mini Project	20%
Final Exam	50%

Grading Policy:

Attendance and participation in lecture may be used to decide borderline grades.

Unless explicitly noted otherwise, the work in this course is to be done independently. Discussions with other students on the assignments should be limited to understanding the statement of the problems. Cheating in any way, including giving your work to someone else will result in a low grade for the course and a report to the appropriate University authority.

Submission & Late Policy: All written assignments must be submitted electronically and **there is no late submission**. An assignment which is late will be accepted *only* under special circumstances with the instructor's permission prior to its deadline. In such a case, the instructor will determine any penalty in a fair manner.

Make-up Policy: Students are expected to take both midterm and final exams. Make-up exams will only be given in the event of a medical situation or an emergency, and only if this is documented and the instructor is notified *immediately if in advance is not possible*. Missing an exam will result in a failure for the exam.

Students with Disabilities: If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and TA as early as possible in the term.

Religious Observance: In order to accommodate the observance of religious holidays, students should inform the instructor of any such days as early as possible in the term by email.

Audio/Video Recording: To ensure the free & open discussion of ideas, students may not record classroom lectures, discussion and/or activities without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the student's own private use.

Copyrighted Material: All material provided through this web site is subject to copyright. This applies to class notes, slides, assignments, solutions, project descriptions, etc.

You are allowed (and expected!) to use all the provided material for personal use. However, you are strictly prohibited from sharing the material with others in general and from posting the material on the Web or other file sharing venues.

Outline: Tentative Syllabus

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

References:

《C++数据抽象和问题求解(第6版)》 作者: [美] 弗兰克·M. 卡拉诺, 蒂莫西·M. 亨利 译者: 景丽 清华大学出版社 2013