CS 1501: Algorithm Implementation (Spring 2025)

Department of Computer Science, SCUPI

Course Reference Number: 312196030 (CS1501)

When: Spring 2025

What & Where:

Lectures, 8:15-11:00 and 13:50–16:25 on Wednesday @ S106, SCUPI, Jiang'an South

Instructor: Dr. Guangwu Qian

Email: guangwu.qian@scupi.cn

Office: Room N524, 5th Floor, SCUPI Building

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

Office hours: 8:00-12:00 and 14:00-18:00 on Monday,
16:30-18:00 on Tuesday and Wednesday

Teaching Assistant: Junqiao Wang and Hengyuan Xu

Course Description: This course covers a broad range of the most used algorithms. Some examples include algorithms for sorting, searching, encryption, compression, and local search. The students will implement and test several algorithms. The course is programming intensive.

Course Objectives: In this course, we will explore common computer science problems, solutions to those problems, and the tradeoffs of the various solutions. Towards the end of the course, we will explore what makes an algorithm "good" and how to determine the quality of an algorithm. You will learn how to describe algorithms, how to analyze an algorithm's runtime, and tradeoffs between different algorithms that solve a problem.

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

- Describe algorithms that solve common computer science problems.
- Convert non-trivial algorithms into programs.
- Analyze and compare run-times of algorithms.

Prerequisites: The courses CS0441 and CS0445 are required. 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: *Algorithms, 4th Edition.* Robert Sedgewick and Kevin, Addison-Wesley, 2011, 4th Edition (ISBN 9780321573513)

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., "[CS1501]").

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 Institute/ 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. ADT Tree
2. Binary Search Tree
3. Self-balancing Trees
4. Searching Trees and Tries
5. ADT Heap
6. Priority Queues and Heaps
7. Compression
8. Graphs
9. Network Flow
10. Clustering
11. Dynamic Programming

References:

1) 算法（英文版·第4版），ISBN：9787115416902，出版社：人民邮电出版社
2) 算法（第4版），作者：[美] Robert Sedgewick / [美] Kevin Wayne，译者：谢路云，ISBN：9787115293800， 出版社：人民邮电出版社