CS 477-677 Analysis of Algorithms

Spring 2024

Course Information

Instructor Information

Instructor: Monica Nicolescu
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Office Hours: Tuesday 9:30-11:30am (tentative, see Canvas calendar for up to date times)

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Course Description

Analysis and design of algorithms on sequences, sets, graphs and trees. Geometric, algebraic and numeric algorithms, FFTs, reductions. Parallel algorithms.

Course Pre/Co-requisites

CS 302 with a "C" or better; CS 365 or EE 291.

Required Texts/Course Materials

Introduction to Algorithms, 4th Edition, by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, 2022.

Class Procedures/Structures

General

The design and analysis of algorithms is the core subject matter of Computer Science. Given a problem, we want to (a) find an algorithm to solve the problem, (b) prove that the algorithm solves the problem correctly, and (c) prove that we cannot solve the

problem any faster. Designing an algorithm for a computational problem involves knowledge of the problem domain, a thorough knowledge of the data structures that are available and suitable, and no small measure of creativity. This course concentrates on the above problems, studying useful algorithmic design techniques, and methods for analyzing algorithms.

This course will be delivered entirely in person. However, students will be required to access materials and complete activities and assignments online via WebCampus.

Office hours appointment scheduling

Appointments are recommended due to the large class size. To schedule an appointment, please use the available calendar in Canvas. Walk-in appointments also possible based on availability.

Student Learning Outcomes

Graduate SLOs

Students will have:

(a) an ability to apply engineering and computer science research and theory to advance the art, science, and practice of the discipline

Undergraduate SLOs

Students will have an ability to:

SLO1	Identify, formulate, analyze, and solve complex computing or engineering problems by applying principles of computing, engineering, science, and mathematics.
SLO2	Design, implement, and evaluate a computing or engineering solution to meet a given set of requirements, with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

Course Requirements

Homework assignments: There will be a number of homework assignments, some of which will include programming. The homeworks and their due dates will be posted on the course web page. Homeworks are due on the specified date at the beginning of the class.

Exams: There will be two midterm exams and one final exam. Both exams will be closed books, closed notes, and closed calculators. Students will be required to show identification at the time of the exam.

Tentative midterm schedule:

- Midterm 1: February 27, during class time.
- Midterm 2: April 2, during class time.

Final exam:

- The final exam will be on May 14, from 12:45-2:45pm.

Grading Criteria, Scale, and Standards

Grading structure: The final score will be computed as follows:

Homework assignments:	30%
Midterm exam 1:	20%
Midterm exam 2:	20%
Final exam:	30%

Extra credit may be given for participation in class discussions (up to 3% of total grade). This will be evaluated according to the instructor's observations during the semester and applied to the final grade.

Letter grades: The letter grade will be computed according to the following table. Some upward adjustment may occur, but do not count on it.

[92, 100]:	A
[88, 92):	A-
[84, 88):	B+
[79, 84):	B
[75, 79):	B-
[71, 75):	C+
[66, 71):	C
[62, 66):	C-
[58, 62):	D+
[53, 58):	D
[50, 53):	D-
< 50:	F

Late Work or Make-up Exams Policies

Each late homework will incur a 10% penalty for each day of delay, but no homework may be submitted later than 3 days after the deadline.

Permissions to take exams on other dates than scheduled will not be given, except for extreme medical/personal emergencies.

Course Calendar or Topics Outline

The course will cover the following topics:

- Introduction/Mathematical Foundations (Chapters 1, 3, Appendix A)
- Recurrences (Chapter 4)
- Sorting Algorithms (Chapters 2, 8)
- Randomized Algorithms (Chapters 5, 7, 9)

- Data Structures (Chapters 6, 11, 12, 13, 14)
- Greedy Algorithms (Chapter 16)
- Dynamic Programming (Chapter 15)
- Graph Algorithms (Appendix B4, Chapters 22, 23, 24, 25)
- Selected Topics (Chapters 28, 30, 31, 34, 35)

University Policies

Statement on Academic Dishonesty

The University Academic Standards Policy defines academic dishonesty, and mandates specific sanctions for violations. See the University Academic Standards policy: UAM 6,502.

Statement on Student Compliance with University Policies

In accordance with section 6,502 of the University Administrative Manual, a student may receive academic and disciplinary sanctions for failure to comply with policy, including this syllabus, for failure to comply with the directions of a University Official, for disruptive behavior in the classroom, or any other prohibited action. "Disruptive behavior" is defined in part as behavior, including but not limited to failure to follow course, laboratory or safety rules, or endangering the health of others. A student may be dropped from class at any time for misconduct or disruptive behavior in the classroom upon recommendation of the instructor and with approval of the college dean. A student may also receive disciplinary sanctions through the Office of Student Conduct for misconduct or disruptive behavior, including endangering the health of others, in the classroom. The student shall not receive a refund for course fees or tuition.

Additional Standards Policy for Writing Code

A student may receive academic and disciplinary sanctions for cheating, plagiarism or other attempts to obtain or earn grades under false pretenses. In addition to University definitions of academic dishonesty, the following rules define plagiarism and cheating for students in computer science and engineering classes:

1. Sharing ideas with other students is fine, but you should write your own code. Never copy or read other students' code, including code from previous years. Cosmetic changes such as rewriting comments, changing variable names, and so forth -- to disguise the fact that your work is copied from someone else is easy to detect and not allowed.

2. It is your responsibility to keep your code private. Sharing your code in public is prohibited and may result in zero credit for the entire assignment.

3. If you find some external code (such as an open-source project) that could be re-used as part of your assignment, you should first contact the instructor to see whether it is fine to reuse it. If the instructor permits it, she/he may announce it to the entire class so all

students can use it. If you decide to reuse the external code, you should clearly cite it in comments and keep the original copyright in your code, if applicable.

4. You should be prepared to explain any code you submit, including code copied/modified from external sources.

5. Every student will be asked to include the following statement with every programming assignment:

"This code is my own work, it was written without consulting online resources, a tutor or code written by other students.""

Statement of Disability Services

Any student with a disability needing academic adjustments or accommodations is requested to speak with me or the Disability Resource Center (Pennington Achievement Center Suite 230) as soon as possible to arrange for appropriate accommodations.

Statement on Audio and Video Recording

Student-created Recordings

Surreptitious or covert video-taping of class or unauthorized audio recording of class is prohibited by law and by Board of Regents policy. This class may be videotaped, or audio recorded only with the written permission of the instructor. In order to accommodate students with disabilities, some students may have been given permission to record class lectures and discussions. Therefore, students should understand that their comments during class may be recorded.

Instructor-created Recordings

Class sessions may be audio-visually recorded for students in the class to review and for enrolled students who are unable to attend live to view. Students who participate with their camera on or who use a profile image are consenting to have their video or image recorded. If you do not consent to have your profile or video image recorded, keep your camera off and do not use a profile image. Students who un-mute during class and participate orally are consenting to have their voices recorded. If you do not consent to have your voice recorded during class, keep your mute button activated and only communicate by using the "chat" feature, which allows you to type questions and comments live.

Statement on Maintaining a Safe Learning and Work Environment

The University of Nevada, Reno is committed to providing a safe learning and work environment for all. If you believe you have experienced discrimination, sexual harassment, sexual assault, domestic/dating violence, or stalking, whether on or off campus, or need information related to immigration concerns, please contact the University's Equal Opportunity & Title IX office at 775-784-1547. Resources and interim measures are available to assist you. For more information, please visit the Equal Opportunity and Title IX page.

Statement on Campus Closures or Delays

In the event of class cancelations or delays caused by inclement weather conditions, fire/smoke conditions, or other unforeseen emergencies, the safety and well-being of students are the University's top priority. Official notifications will be disseminated through the University website and other official channels with details related to any campus delays or closures.

In the event of a campus closure, you will be informed as to whether the class will be offered remotely or if it will be canceled. If the class is cancelled, you will receive information on how to address any missed course content.

Students facing significant impacts due to these events are encouraged to communicate with their instructor for potential accommodations.

Statement for Academic Success Services

Your student fees cover usage of the University Math Center (https://www.unr.edu/university-math-center), (775) 784-4433; University Tutoring Center (https://www.unr.edu/tutoring-center), (775) 784-6801; and University Writing & Speaking Center (https://www.unr.edu/writing-speaking-center), (775) 784-6030. These centers support your classroom learning; it is your responsibility to take advantage of their services. Keep in mind that seeking help outside of class is the sign of a responsible and successful student.

As per the University Administrative Manual (3,020), students are expected to attend classes in which they are enrolled.

Material subject to change.