CPSC 420
ALGORITHMS

Instructor: Prof. Aaron Koehl
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Office Hours: Luter 346, MW 11am-noon, and by appointment.

Meeting Times: TuTh 1:30pm-2:45   Ferguson 210

OVERVIEW

In this course we will learn concepts in the design and analysis of algorithms, using mathematical tools to quantify their efficiency, and correctness, and we will study their applications to a wide variety of problem domains.

OBJECTIVES

Upon finishing this course, it is expected that you will:

- Be a better programmer, by understanding the fundamentals of algorithmic analysis.
- Be equipped with the tools to understand theoretical computer science research.
- Be able to select the proper algorithm for the problem at hand.
- Be more prepared to embark upon a development project using studied data structures.
- Be more capable of learning new algorithms written in pseudo-code.
- Be able to communicate intelligently with other programmers about algorithmic techniques.
- Transform from hacker/coder to computer scientist.

  The essential objectives of the course are learning principles, generalizations or theories, and gaining factual knowledge, such as terminology, classifications and trends.

  Other important objectives are learning to apply course material, and developing specific skills, competencies and points of view needed by professionals in the field.

TEXT

Cormen, Leisersen, Rivest, and Stein. <u>Introduction to Algorithms</u>, Massachusetts. 2009. ISBN 978 0 26 203384 8

LECTURES

Students are responsible for attending lectures and reading book chapters before covering them in class. Some of the material is complex enough to require multiple reviews to ensure understanding. Students will not be successful if lectures are missed. You will incrementally build up a participation grade during the semester.

ASSESSMENT

There will be two partial-term exams during the semester, and a comprehensive final exam.
The grading breakdown is as follows:
- Coursework   30%
- Mid-terms (x2)   30%
- Final Exam   30%
- Participation / Quizzes   10%

HONOR POLICY

"*On my honor, I will maintain the highest possible standards of honesty, integrity, and personal responsibility. That means I will not lie, cheat, or steal and as a member of this academic community, I am committed to creating an environment of respect and mutual trust.*"

DISABILITIES

In order for a student to receive an accommodation for a disability, that disability must be on record in the Dean of Students' Office, 3rd Floor, David Student Union (DSU). If you believe that you have a disability, please contact Dr. Kevin Hughes, Dean of Students (594-7160) to discuss your needs. Dean Hughes will provide you with the necessary documentation to give to your professors.

Students with documented disabilities are required to notify the instructor no later than the first day on which they require an accommodation (the first day of class is recommended), in private, if accommodation is needed. The instructor will provide students with disabilities with all reasonable accommodations, but students are not exempted from fulfilling the normal requirements of the course. Work completed before the student notifies the instructor of his/her disability may be counted toward the final grade at the sole discretion of the instructor.

ACADEMIC SUPPORT

The Center for Academic Success offers free tutoring assistance for CNU students in several academic areas. Staff in the center offer individual assistance and/or workshops on various study strategies to help you perform your best in your courses. The center also houses the Alice F. Randall Writing Center. Writing consultants can help you at any stage of the writing process, from invention, to development of ideas, to polishing a final draft. The Center is not a proofreading service, but consultants can help you to recognize and find grammar and punctuation errors in your work as well as provide assistance with global tasks. Go as early in the writing process as you can, and go often!

You may drop by the Center for Academic Success to request a tutor, meet with a writing consultant, pick up a schedule of workshops, or make an appointment to talk one-on-one with a University Fellow for Student Success. The Center is located in the Trible Library, second floor, room 240.

SUCCESS

I want you to succeed in this course and at CNU. I encourage you to come see me during office hours or to schedule an appointment to discuss course content or to answer questions you have. If I become concerned about your course performance, attendance, engagement, or well-being, I will speak with you first. I also may submit a referral through our Captains Care Program. The referral will be received by the Center for Academic Success as well as other departments when appropriate (Counseling Services, Office of Student Engagement). If you are an athlete, the Athletic Academic Support Coordinator will be notified. Someone will contact you to help determine what will help you succeed. Please remember that this is a means for me to support you and help foster your success at CNU.

TENTATIVE SCHEDULE (MAY CHANGE)   REV. 1

TOPIC
Introduction / Mathematical Background
Analysis / Growth of Functions
Divide and Conquer
Solving Recurrences / Master Theorem
Searching and Selection
Sorting
Numerical Algorithms / Randomized
Dynamic Programming
Greedy Algorithms
Amortized Analysis
Disjoint Sets
Elementary Graph Algorithms
Minimum Spanning Trees
Shortest Paths
Optimization (Min-Cost Max-Flow)
NP-Completeness / Approximations

Special topics will be drawn from parallel programming, optimization, numerical algorithms, combinatorics, and systems.