Instructor: Dr. Chris Hartman, cmhartman@alaska.edu
TA: Dain Harmon, dmhartman@alaska.edu
Zoom Office Hours: TBD
Prerequisites: CS 311 and MATH 307
Text: Intro to Design & Analysis of Algorithms (3rd ed.) Levitin
Website: Course BlackBoard site at http://classes.alaska.edu
(From Monday, Aug. 24th until Friday, December 4th)
Midterm Exam: Friday, October 23rd.
Final Exam: 11:15am to 1:15pm Friday, December 11th.

Course topics and goals – CS 411 covers design techniques for efficient algorithms, along with standard algorithms that are based on these techniques.

We begin by discussing algorithms, efficiency, and the mathematical tools we use in analyzing these. We will spend most of the semester covering various algorithm-design ideas: brute force/exhaustive search, decrease-and-conquer, divide-and-conquer, transform-and-conquer, trading space for time, dynamic programming, greedy methods, iterative improvement. We will finish the semester with a discussion of the limits of algorithmic efficiency, and how we deal with such limits.

Student Learning Outcomes – After taking this class, students will:
• Be able to set up and solve recurrence relations of the kinds encountered in the analysis of algorithms.
• Be able to determine the efficiency class of an algorithm.
• Be able to choose and/or design the best algorithm for a given problem.
• Be familiar with classic algorithms from major problem domains: sorting, sets, graphs, etc.
• Understand how approximation algorithms work and when they are appropriate.
• Have a basic understanding of NP-completeness and its impact on algorithm design.

Discord – CS (and math) students have access to a student-run Discord server where you can chat/ask questions about mathematics, statistics, and computer science classes! You are encouraged to join channels which correspond to classes you are enrolled in, ask questions, and see what your classmates are talking about. Your professors may answer questions there, too (as well as by email, office hours, etc.).

To get started visit, https://nookbot.katlyn.dev/ and login with your UA account (they do not see your password). From there, you will be presented with the list of Mathematics, Statistics, and Computer Science courses. Select the one(s) you want to join by checking the box. There is no need to hit a submit or ok button since it is all updated live. The system will have you sign into Discord too, so it knows what Discord user to update. If you don’t have a Discord account, then it will also set one up for you. Once there, you will see your class channels as well as others for general discussion (even politics), homework help, CS clubs, etc.

If you are having issues or need help you can tag an admin with the @admin and send a message to ask for help!
**Assessment:** The following items will be used in the following proportions to determine student grades.

<table>
<thead>
<tr>
<th>Item</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Homework</td>
<td>50%</td>
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<tr>
<td>Quizzes</td>
<td>5%</td>
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<tr>
<td>Participation/Attendance</td>
<td>5%</td>
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<tr>
<td>Midterm Exam</td>
<td>20%</td>
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<tr>
<td>Final Exam</td>
<td>20%</td>
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**Homework** – Assignments will be required generally on a biweekly basis and will consist of both programming and answering questions from the textbook. Assignments will be done individually. Homework turned in late will generally be penalized. In order to do the programming homework assignments, students must obtain access to a C++ compiler with support for the C++11 standard. Note: Homework is worth 50% of your grade in this class. It is *imperative* that you do every assignment. If you get stuck, ask for help! That's why I have office hours.

**Quizzes** – Short quizzes will be given weekly via Blackboard. These are not intended to be hard, and will be closed book/internet/notes. The intent is that you should be able to do them without accessing other resources. They are intended to highlight the information I feel you should have memorized. (In particular, if you can answer all the quiz questions, you should be able to complete the exams in time.)

**Participation/Attendance** – This is a synchronous Zoom course and I expect you to be online and participate each class day. (It’s okay if you miss once in a while, especially if you let me know why but try to keep absences to a minimum.) Since this is a small class (13 people, at last count) I am also going to require weekly checkins (via Zoom, during office hours or by appointment.) I would also like you to follow and interact on the CS Discord for this class.

**Examinations** – Examinations will consist of short answer questions to demonstrate critical thinking skills as well as application of computer science concepts. The exams will be timed via Blackboard, with external resources (internet/notes/book/etc. but not other people) allowed.

**Policies** – Students are expected to be at every class meeting on time, and are responsible for all class content, whether present or not. If absence from class is necessary, in-class work (other than quizzes) and homework may be made up only if the instructor is notified as soon as possible; in particular, absences due to scheduled events must be arranged ahead of time.

Students who fail to attend the first class meeting after registering for the class, or who miss four consecutive class meetings, may be dropped/withdrawn without warning, unless prior arrangements are made with the instructor.

Academic dishonesty will not be tolerated, and will be dealt with according to UAF procedures. You may discuss homework and lab assignments with others, but everything you turn in must be your own work.

Students in this class pay the CS lab fee. Payment allows access to open computer labs on 5th floor Duckering.

Examinations must be taken at the scheduled time. In particular, there will be no early final exams.
UAF academic policies: http://catalog.uaf.edu/academics-regulations

CS Department policies: http://www.cs.uaf.edu/departmental-policies

Disabilities Services – The Office of Disability Services implements the Americans with Disabilities Act (ADA), and insures that UAF students have equal access to the campus and course materials. I will work with the Office of Disabilities Services to provide reasonable accommodation to students with disabilities.

COVID-19 – Students should keep up-to-date on the university’s policies, practices, and mandates related to COVID-19 by regularly checking this website: https://sites.google.com/alaska.edu/coronavirus/uaf/uaf-students. Further, students are expected to adhere to the university’s policies, practices, and mandates and are subject to disciplinary actions if they do not comply.

Student Protection – UAF embraces and grows a culture of respect, diversity, inclusion, and caring. Students at this university are protected against sexual harassment and discrimination (Title IX). Faculty members are designated as responsible employees which means they are required to report sexual misconduct. Graduate teaching assistants do not share the same reporting obligations. For more information on your rights as a student and the resources available to you to resolve problems, please go to the following site: https://catalog.uaf.edu/academicsregulations/students-rights-responsibilities/.