# CSC-421 Applied Algorithms and Structures
# Spring 2021-22

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**Office Hours (Office/Zoom)**: Monday 4:40-5:40 & Wednesday 1:00-3:00
**Course Website**: https://d2l.depaul.edu/

## Course Description

This course covers techniques for designing and analyzing algorithms. Fundamental topics such as running-time analysis and efficiency, and problem-solving techniques (divide-and-conquer, greedy, dynamic programming) will be covered. Examples from various areas, including computational geometry and bioinformatics, will be discussed.

## Prerequisites

CSC-400 and CSC-403.

## Textbook

Jeff Erickson, *Algorithms*, **1st edition**. Publicly available and can be downloaded from
`https://jeffe.cs.illinois.edu/teaching/algorithms/#book`

## High-Production Recorded Materials

Throughout this course, you will be provided with high-production video recordings of the materials that will be covered in this course, as well as the slides accompanying these materials. The high-production videos were pre-recorded at the "light studio" at DePaul and their quality will generally be superior to that of COL recordings. You should note, however, that these

videos were recorded with no audience, and hence, lack student participation.

### Attendance

Attendance is not mandatory. Students who miss a lecture are responsible for the material covered in the lecture.

### Changes to Syllabus

This syllabus is subject to change as necessary during the quarter. If a change occurs, it will be thoroughly addressed during class, posted in D2L and sent via email.

### COVID-19 Health and Safety Precautions

Keeping our DePaul community safe is of utmost importance. Students, faculty and staff are expected to abide by DePaul's health and safety guidelines and by the City of Chicago Emergency Travel Advisory. By doing these things, we are Taking Care of DePaul, Together. The recommendations may change as local, state, and federal guidelines evolve. Students who do not abide by the requirements may be subject to the student conduct process and will be referred to the Dean of Students Office. Students who have a medical reason for not complying with any requirements should register with DePauls Center for Student with Disabilities (CSD).

### Respect for Diversity and Inclusion

At DePaul, our mission calls us to explore what must be done in order to respect the inherent dignity and identity of each human person. We value diversity because it is part of our history, our traditions and our future. We see diversity as an asset and a strength that adds to the richness of classroom learning. In my course, I strive to include diverse authors, perspectives and teaching pedagogies. I also encourage open dialogue and spaces for students to express their unique identities and perspectives. I am open to having difficult conversations and I will strive to create an inclusive classroom that values all perspectives. If at any time, the classroom experience does not live up to this expectation, please feel free to contact me via email or during

office hours.

## Grading

- *Assignments (5-6 assignments)—30%*

  Homework assignments are due on the specified due date and time. Late submissions will not be accepted. Please double check your submission on D2L to make sure that you submitted the correct file; **NO** resubmissions due to submitting the incorrect/incomplete file will be accepted.

- *Midterm Exam—30%*

  **In-Class Students.** The midterm exam is on Monday, May 2nd, from 5:45 - 7:45 PM, in class (during class hours). No make up exams will be given. The exam is open book. Electronic devices and internet access are not allowed.

  **Online/ASYNC Students.** You will need to take a proctored exam at an approved testing facility (university, library, etc.) or at CDM; no online exams will be given. You will need to register through MyCDM/D2L to take your proctored exam during a time window that is specified in the registration system; no make-up exams outside of this time window will be given. The duration of the midterm exam is two hours (120 minutes). Please register as soon as possible. Please note that you will need to meet the University's vaccination requirements in order to take your proctored exams. The exam is open book. Electronic devices and internet access are not allowed.

- *Final Exam—40%*

  **In-Class Students.** The final exam is on Monday, June 6th, from 5:45 - 8:15 PM, in class (during class hours). No make exams will be given. The exam is open book. Electronic devices and internet access are not allowed.

**Online/ASYNC Students.** You will need to take a proctored exam at an approved testing facility (university, library, etc.) or at CDM; no online exams will be given. The duration of the exam is two hours and a half (150 minutes). You will need to register through MyCDM/D2L to take your proctored exam during a time window that is specified in the registration system; no make-up exams outside of this time window will be given. Please register as soon as possible. Please note that you will need to meet the University's vaccination requirements in order to take your proctored exams. The exam is open book. Electronic devices and internet access are not allowed.

## Topics

1. Review: growth of functions and run-time analysis (sections 0.5 and 0.6 and examples from outside the textbook).
2. Divide and conquer (chapter 1 and examples from outside the textbook).
3. Dynamic programming (chapter 3).
4. Greedy algorithms (sections 4.2, 4.3, 4.4, chapter 7 and section 8.6).
5. NP-completeness (chapter 12) if time permits.

## Plagiarism

All the assignments and the exams must be done on **YOUR OWN**. You are strictly prohibited from using any source other than the text and the lecture notes when working on the homework and exams' problems. In particular, you are strictly forbidden from acquiring hints and/or solutions from the internet or from any other external resource or person (besides the instructor). Copying is strictly forbidden. Scholastic dishonesty includes acquiring answers from any unauthorized source, working with another person, observing the work of other students during any exam, providing answers when not specifically authorized to do so, and informing any person of the contents of an exam prior to the exam. Disciplinary actions range from grade penalty to expulsion. Please refer to the school policy on plagiarism for more specific details.

## Learning Outcomes

- Students will be able to use basic algorithmic structures for modeling problems in computer science.
- Students will learn basic techniques for designing and analyzing computer algorithms.
- Students will be exposed to a set of fundamental problems that have applications in several areas of computer science.

### Students with Disabilities

Students who feel they may need an accommodation based on the impact of a disability should contact the instructor privately to discuss their specific needs. All discussions will remain confidential. To ensure that you receive the most appropriate accommodation based on your needs, contact the instructor as early as possible in the quarter (preferably within the first week of class), and make sure that you have contacted the Center for Students with Disabilities (CSD) at: csd@depaul.edu

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### Course Evaluation: School Policy

Course and instructor evaluations are critical for maintaining and improving course quality. Please complete the evaluations at the end of the quarter.