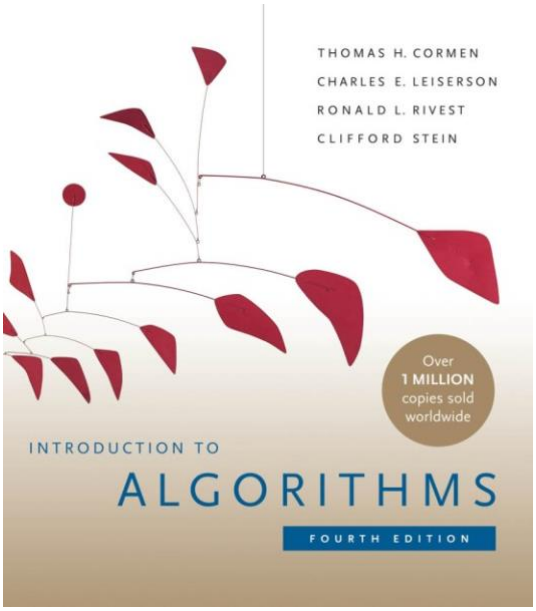
CSCE 423/823

Design and Analysis of Algorithms



(from the book cover)

Fall 2025

Dr. Qiuming Yao

College of Engineering
SCHOOL OF COMPUTING

*adapted from the template created by the Engineering and Computing Education Core (ECEC) of University of Nebraska-Lincoln.

CSCE 423/823 Design and Analysis of Algorithms

Fall 2025, 3 credits

Class Schedule:

Lecture: CPEH-213 CITY, in-person mode

MWF 01:30pm-02:20pm

Instructor:

Qiuming Yao (qyao3@unl.edu)

Office: Avery 122B

Office Hours: MW 02:20pm-03:20pm

(or by appointment for private meeting)

GTA (1):

Syed Owais Athar (sathar2@huskers.unl.edu)

Office: Student Resource Center (SRC) Avery 12

(in person)

Office Hours: See Canvas Homepage

(or by appointment for private meeting)

UTA (2):

Haoze Zheng (hzheng9@huskers.unl.edu)

Office: Student Resource Center (SRC) Avery 12

(in person)

Office Hours: See Canvas Homepage

(or by appointment for private meeting)

*Instructor and TAs have responsibility to assist all students equally in this class.

Prerequisites:

A grade of "P" or "C" or better in CSCE 310, CSCE 310H, CSCE 311, SOFT 260, SOFT 260H or RAIK 283H

Resources:

Required Text:

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

Recommended Text:

Introduction to Algorithms, Third Edition by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, MIT Press, 2009.

Introduction to the Theory of Computation, Third Edition by Michael Sipser, Cengage Learning, 2012.

Introduction to the Design and Analysis of Algorithms, Third Edition by Anany Levitin, Pearson, 2011.

Webpage and online resource:

Canvas (https://canvas.unl.edu/): Course materials will be available on Canvas*. You will use it multiple times a week. Please ensure you can access canvas site. Please ensure you set up the notification for announcements (menu: account -> notifications)

Canvas Home: Home summary page.

Canvas Announcements: Online version of announcements (as important as in-class announcements)

Canvas Modules: Learning modules for this course; collection of materials and grading elements.

Canvas Grades: View your item-wise grades.

Canvas Discussion: Create discussion topics for your own study group or for everybody.

Canvas Inbox: Send private message**.

*We are not responsible for any information obtained from other resources or web sites.

**We communicate and resolve online questions or comments through “Canvas Discussion”, “Canvas Inbox”, or UNL email system within a max time window of 36 hours (1.5 day, usually shorter than that). For more effective communication, you are welcome to meet instructor or TAs in person.

Course Format:

We use a letter-based system to classify our online materials. It's organized by:

M: modules

L: lecture videos (rare cases)

S: slides

N: notes

Q: quizzes

H: homework

E: exam

SI: supplementary information (this is dynamically changed)

Course Description:

This course provides a comprehensive exploration of algorithm design strategies, covering divide-and-conquer, greedy, and dynamic programming techniques. The curriculum encompasses topics such as fundamental algorithms, order statistics, graph search, shortest paths, spanning trees, flow optimization, NP completeness, polynomial transformations and approximation algorithms, empowering students to become proficient problem solvers equipped to address a variety of computational challenges.

Course Learning Objectives:

At the end of this course, students will be able to:

1.) Learn major concepts of designing algorithms
2.) Design, modify, integrate, and implement algorithms
3.) Use algorithms to resolve applications
4.) Analyze correctness and complexity of algorithms
5.) Develop self-learning and team-working spirits

Tentative Course Schedule (All Information Subject to Change):

Please see another separate document. It is recommended by the department that the course schedule should be presented by itself.

Grading Scale:

Numerical score or class curved % (whichever is higher)	Letter grade (Undergraduate)	Letter grade (Graduate)
97-100	A+	A+
93-97	A	A
90-93	A-	A-
87-90	B+	B+
83-87	B	B
80-83	B-	B-
77-80	C+	C+
73-77	C	C
70-73	C-	C-
67-70	D+	D+
63-67	D	D
60-63	D-	D-
<60	F	F

Attendance Policy:

Comply with current university rules for in-person classes.

Classroom Participation:

Comply with current university rules for in-person classes.

Homework:

General Guidelines

- *Homework will be assigned and announced. Due date will be clearly stated. Homework needs to be submitted to Canvas. Late homework can be still allowed to submit to Canvas but with a late tag for points deduction.*
- *Hard copies are not collected. Please scan your hard copy or take a picture of the homework pages if you originally plan to submit as hard copy. Then submit the scanned version or pictures to Canvas. Please convert it to PDF format before submission.*
- *Reasonable points will be awarded to the PROCESS of getting to the solution and not on the final answer. (TA can post detailed grading rubrics by students request.)*

- *CSCE423 students and CSCE823 students may have different questions and thus different grading policies in homework and exams. No points will be given if you answer the wrong category of questions.*

Format Guidelines

- *Student name should appear on each page. Student should use the exact same name as shown in Canvas system.*
- *For online submission, we only allow one-single PDF file. The pages of your homework (per assignment) must be printed or scanned as a single PDF format for online submission. Typically, it should be on 8.5"x11" paper (letter) in PDF. You may include handwriting or pictures as long as they can be assembled into the single PDF file. If you copy and paste some online images or published resources, please refer to the website or resource name to avoid copy right violation.*
- *Poor quality of the document will lead to poor grades if critical steps or answers cannot be recognized. No further argument is allowed for poor quality submission.*
- *Final answers must include correct units for full credit when applicable.*

Group Homework Policy

- *You are encouraged to work on your homework assignments in groups, and each student must turn in their homework by themselves or by their teammate (one copy for one team is enough).*
    - *If you do choose to work with a group, the names of the group members should be provided with the homework assignment.*
    - *If you choose to work on your own, please better notify "NO teammates".*
- *Teammates names cannot be added or changed after the homework is submitted and past the deadline. If your name is missed or duplicated and thus your homework becomes invalid, you can still submit a late homework with points deduction.*
- *The team size can be 1-4 students. Each team should consist of students only from CSCE 423 or only from CSCE 823, not mixed.*
- *The team can be changed dynamically for each homework. We don't pre-assign groups, and therefore we only rely on your proposed names in the homework.*

Late Homework Policy

- *If a late due date is necessary, permission from the instructor is required.*
- *Late homework can only be submitted online in Canvas, and we will not accept hard copies. Please scan your hard copy if you originally plan to submit as hard copy.*
- *Late homework will have 20% deduction from your grade for every 12 hours past the due time. Less than 12 hours is counted as 12 hours.*
- *Under no circumstances will homework assignments be accepted after graded homework has been returned and solutions have been posted on canvas.*
- *Homework turned in late will not always be returned at the same time as the homework turned in on time.*

Quiz:

Multiple choices, multiple answer questions, simple true or false questions, simple answer questions, or blank filling problems are typical quiz problems. Every student should be responsible to finish individual copy before deadline or within the time limit. This should be an individual work, not group work.

Take home quiz (on Canvas): Version A is for preparation purposes. Version B is for grading purposes.

In-class quiz (on Canvas): This is given randomly during classroom lectures.

Exam:

- *Exam is only available at specific time. There is no definition for "late exam" given it's already flexible.*
- *Grading an exam is similar to homework. CSCE423 and CSCE823 students will have to answer different questions in some sections of the exams.*
- *Submission requirements are similar to homework.*

Communication and Work Expectations:

Expectations for Student Behavior

- *Students are expected to display tolerance and respect in all communication.*
- *For this class to be effective, you must be an active learner. You must check the schedule and due dates actively.*
- *Students should learn from each other with respect and dignity, in order to benefit from group studies.*
- *Every student should be responsible for self-health conditions, and respect each other's health conditions or personal decisions towards health concern.*

Expectations for Teaching Assistant Behavior

- *TAs are expected to display tolerance and respect in all communication, and timely communication.*
- *TAs are responsible to grade homework and exams with fair and reasonable rubrics. TAs are expected to return the grades for homework and exams to students within maximum 1.5 weeks (10 days).*

- *TAs are responsible to hold office hours (counted toward 20 hours/week working load) and individual meetings by appointment.*

- *TAs are expected to provide homework grading rubrics.*

Expectations for Instructor Behavior

- *Instructor expected to display tolerance and respect in all communication, and timely communication.*

- *Instructor is delivering the whole learning and teaching materials covering the core topics of this course.*

- *Instructor will check and update the homework or exam submission status for every student within half day. ("None: normal", "Late","Missing","Excused"). If you see the status is unexpected next day, double check with your group leader first, and then contact TAs or instructor next.*

- *Instructor should care about each student's progress equally unless the student is not communicable. Instructor needs to respond to student's learning request and help the learning procedure actively.*

- *Instructor can coordinate the communication between TAs and students if needed.*

Technology Policy:

Technology is allowed in class only as it directly supports class learning and announced by professor. General internet surfing, texting, e-mailing, working on other coursework or personal items is not appropriate or acceptable. Out of respect for the class, students are expected to silence or turn off their phones and other notification devices during class and to refrain from texting, calling or using electronics, except as a part of classwork. If any of these behaviors occur during the class meetings the student will be asked to leave the class and will be counted as absent. This is also applicable to online zoom meetings.

Academic Honestly Policy:

Student Code of Conduct, Section B. Conduct – rules and regulations, 1. Acts of Academic Dishonesty

Academic integrity is of the utmost importance at Nebraska. Be sure you understand expectations of you and your academic work. View the complete list of academic dishonesty violations in the Student Code of Conduct, specifically Article III: Proscribed Conduct, Section

B. Conduct – Rules and Regulations, 1. Acts of Academic Dishonesty. For more information, please visit https://studentconduct.unl.edu/. If you are unsure what counts as academic dishonesty in this course, please visit me during office hours. The first instance of academic dishonesty will result in a score of zero for the assignment or exam. The second incidence of academic dishonesty will result in a failing grade for the course

https://studentconduct.unl.edu/student-code-conduct

Diversity and Inclusion Statement:

It is my intent that students from all diverse backgrounds and perspectives be well-served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. I would like to create a learning environment for my students that supports thoughts, perspectives, and experiences, and honors your identities (including gender, sexuality, disability, age, socioeconomic status, ethnicity, race, nationality, religion, culture, etc.). If you have any concerns, please feel free to contact me.

https://diversity.unl.edu/student-resources

Emergency Procedures:

City Campus Emergency Information:

Please follow the link below for UNL's Emergency Preparedness Resources. Sign up for the UNL Alert service under the "**Stay Connected**" portion of the web-page.

Fire and Medical Emergencies: 911

University Police: 402-472-2222

Twitter: @NebPrepare

E-Mail: preparedness@unl.edu

https://emergency.unl.edu/

Scott Campus Emergency Information:

A number of resources are available for distributing and receiving critical information and instructions during an emergency.

- All-campus email
- UNO Alert text message and email alerts
- Posts on UNO's official Facebook and Twitter accounts
- Emergency banner on the UNO homepage
- Overhead pages and indicator lights on campus
- Emergency information line (402.554.2255)

- Media outlets

https://www.unomaha.edu/emergency/index.php

Student Resource Information (please double check, some of them may only have online services at this moment):

Well-Being (Home Campus – Lincoln Campus):

UNL offers a variety of options to students to aid them in dealing with stress and adversity.

- Counseling and Psychological Services (CAPS) is a multidisciplinary team of psychologists and counselors that works collaboratively with Nebraska students to help them explore their feelings and thoughts and learn helpful ways to improve their mental, psychological and emotional well-being when issues arise.
    - CAPS can be reached by calling 402-472-7450.

- Big Red Resilience & Well-Being (BRRWB) provides one-on-one well-being coaching to any student who wants to enhance their well-being. Trained well-being coaches help students create and be grateful for positive experiences, practice resilience and self-compassion, and find support as they need it.
    - BRRWB can be reached by calling 402-472-8770.

Well-Being (Home Campus – Scott Campus):

UNO offers a variety of options to students to aid them in dealing with stress and adversity.

- Counseling and Psychological Services (CAPS) is dedicated to working with students to provide that can assist with challenges that have impacted their overall well-being. These could include adjusting to life events, relationship issues and mental health changes. Counseling staff work closely with Nebraska Medicine Health Services to provide on-campus referrals and collaboration with their services.
    - CAPS can be reached by calling 402-554-2409.

Math Resource Center:

The Mathematics Resource Center (MRC) is a free tutoring service and is the primary facility for undergraduate students who are enrolled in an have questions related to any precalculus or calculus course offered by the department. The Center also provides an excellent location for students to meet and work together on assignments or group projects.

- No appointments or reservations are needed.
- Staffed by Graduate Teaching Assistants and by undergraduate math majors hired for the center.
- Ask for assistance with math courses 100A, 101, 102, 103, 104, 106, 107, and 107H.

https://www.math.unl.edu/resources/undergraduate/mrc

The Writing Center:

At the Writing Center, our undergraduate and graduate Writing Consultants work with writers at all levels, from all disciplines, at all stages of the writing process. All members of the UNL community (students, faculty, and staff) are welcome.

Whether you are brainstorming or organizing ideas or polishing a final draft, we look forward to discussing your writing with you.

All forms of communication are welcome, from essays, lab reports, research papers, and journal articles to presentations, cover letters, personal statements, and theses/dissertations.

https://www.unl.edu/writing

Engineering Study Shop:

The College of Engineering provides FREE walk-in tutoring services for all engineering students! The courses and areas-of-study that the Engineering Study Stop tutors are able to assist with include: Math, Physics, Chemistry, Mechanical Engineering, and a variety of other engineering-related coursework. Click on the button below to meet our tutors and learn more about which courses they are able to assist you with. Study Stop allows you to study with other engineering students and trained tutors to gain more confidence and a better understanding of your course material... No reservations needed!

https://engineering.unl.edu/current-students/study-stop-city-campus/

ADA and Accommodation:

Students with disabilities are encouraged to contact the instructor for a confidential discussion of their individual needs for academic accommodation. It is the policy of the University of Nebraska-Lincoln to provide flexible and individualized accommodation to students with documented disabilities that may affect their ability to fully participate in course activities or to meet course requirements.

To receive accommodation services, students must be registered with the Services for Students with Disabilities (SSD) office, 232 Canfield Administration, 472-3787 voice or TTY.

Office of Services for Students with Disabilities:

The University of Nebraska-Lincoln is committed to ensuring equal access to curricular and co-curricular opportunities for students with disabilities. Providing a range of services, SSD implements reasonable accommodations for students with disabilities and offers students the

opportunity to contribute and participate in the diverse campus experience at the University of Nebraska–Lincoln. This site is intended to provide you with the information you need to enjoy your life as a University of Nebraska student.

https://www.unl.edu/ssd/home

Academic Flexibility for COVID-19
Students who have medical documentation of a health risk that cannot be mitigated through vaccination should submit a COVID-19 Academic Flexibility Request. Those with a disability and/or chronic health condition that makes them high risk for the virus should seek support via Services for Students with Disabilities. International students should contact the International Student and Scholar Office to discuss their options.