

Wayne State University
College of Engineering
Computer Science Department

CSC 3110

Algorithm Design and Analysis

Winter 2026

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Course description

Formal techniques to support design and analysis of algorithms: underlying mathematical theory and practical considerations of efficiency. Topics include asymptotic complexity bounds, techniques of analysis, algorithmic strategies, advanced data and file structures, and introduction to automata theory and its application to language translation.

This is an undergraduate course on the design and analysis of algorithms. In this course, we will evaluate the efficiency of various algorithms via a mathematical analytical framework known as asymptotic analysis. We cover general algorithmic design approaches and their application to various computational problems.

Course, Instructor and Grader information

Credit hours: 3 Credit Hours (Lecture only)

Pre-requisite: Prerequisites: BE 2100 with a minimum grade of C-, CSC 1500 with a minimum grade of C, CSC 2200 with a minimum grade of C, MAT 2250 with a minimum grade of C-, and MAT 2020 with a minimum grade of C-

Co-requisites: None

Course dates: January 12, 2026 – May 04, 2026

Course format: Traditional – Face to Face

Meeting times: Tuesday and Thursday from 5:30 PM to 6:45 PM, M. Roy Wilson State Hall Room 2216.

Course instructor: Farah Kamw

Office hours: My office hours are on Monday, Tuesday, and Thursday from 10:00 am - 12:00 pm, Office hours are provided in my office (room 3024) in Maccabees Building (5057 Woodward Ave), or via zoom (ID: 4343632586). The information about the office hours and the zoom link are on canvas. If these times do not work for you, send me an email and we can schedule a different day and time.

Email: id6085@wayne.edu

Teaching Assistant: Maedeh Yahaghi

Email: myahaghi@wayne.edu

Office hours: Tuesday, 10:00 AM – 11:00 AM.

Note: Always use your academic email address (@wayne.edu domain) for course related correspondences. Emails originating from other domains (e.g. Yahoo/Gmail) are subject to filtering and therefore, may not receive a response.

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Teacher and student expectations

Students are expected to:

- Ensure that their computer is compatible with Canvas.
- Follow the calendar of events and complete all assignments by their deadline.
- Respond to emails within 2 days.
- Participate in a thoughtful manner.
- Respect rules of netiquette.
- Respect your peers and their privacy.
- Use constructive criticism.
- Refrain from engaging in inflammatory comments.
- **Time Commitments:** In this class (without lab sessions), the instructor is designing assignments, readings, lectures, etc. which require about 9 hours per week, for the typical student.

The course facilitator will, to the best of her ability:

- Respond to her email within 2 days.
- In addition, grader will (to the best of her ability) review assignments within 7 days after the assignment deadline.

Course learning objectives

Upon successful completion of this class, the student will be able to:

1. Define the various types of efficiency (e.g., time and space) and types of analysis (best, worst, and average case).
2. Understand and use the formal definitions of asymptotic analysis (i.e., Big-O, Big-Omega, and Big-Theta) to derive upper and lower bounds on an algorithm's complexity.
3. List and contrast standard complexity classes.
4. Use and solve recurrence relations to determine the time complexity of recursively defined algorithms.
5. Use and solve summations to determine the time complexity of iterative (non-recursive) algorithms.
6. Describe and apply (to appropriate problems) the following algorithm design strategies: brute-force and exhaustive search, decrease-and-conquer, divide-and-conquer, transform-and-conquer, dynamic-programming, the greedy-choice rule, and iterative improvement.
7. Analyze the time-space trade-offs of algorithms.
8. Define and explain the significance of the classes P, NP, and NP-Complete.

9. Describe and apply algorithm design strategies for dealing with intractable problems (e.g., backtracking, approximation, etc.)

Course contents

- Fundamentals of the Analysis of Algorithm Efficiency.
- Brute Force and Exhaustive Search.
- Decrease-and-Conquer.
- Divide-and-Conquer.
- Transform-and-Conquer.
- Space and Time Trade-Offs.
- Dynamic Programming.
- Greedy Technique.

Assessments

How to view your Grades

In Canvas, in the left side, click on Grades. Total values are usually calculated using only active (visible) and graded items. So, grades will change when more assignments become active and graded.

Grading

Assignment	30%
Quizzes	15%
Class Participation	5%
Project	15%
Midterm	15%
Final Exam	20%

Categories

Assignments

We will have 10 homework assignments. These are due by 11:59 PM on Sundays of the corresponding week. **Students may resubmit their assignments before the due date; however, they will not be able to do so after the assignments have been graded.**

Quizzes

This category includes activities such as quizzes

Class Participation

This category includes activities such as attendance quizzes, forum participation, surveys, in-class participation and others.

Project

In the fourth week of the course, the final project description will be posted, and it will be due in the 2 weeks before the end of the class. The final project is a group activity consisting of developing solutions to a problem. In addition, other activities related to the project will be part of this category and will be completed before the final project submission.

The term-long project will be group-oriented with 3-4 members in each group. Students will design and implement a solution to a problem. Popular programming languages for the implementation are recommended such as Python, Java, JavaScript, C/C++.

Midterm and final exams

These will be in-person written exams about the design and analysis of algorithms.

These exams can only be completed on the specific date defined by the course facilitator.

Grading Scale

Letter	Percentage
A	[93,100]%
A-	[90,93)%
B+	[87,90)%
B	[83,87)%
B-	[80,83)%
C+	[77,80)%
C	[73,77)%
C-	[70,73)%
D+	[67,70)%

Letter	Percentage
D	[63,67)%
D-	[60,63)%
F	[0,60)%

Course policies

1. Lecture will be posted on Canvas. It is expected students will review lectures and additional material before working on assignments.
2. No make-up exams/Quizzes will be given except for university sanctioned excused absences. If you miss an exam (for good reasons). It is your responsibility to contact me before the exam, or as soon as possible after the exam.
3. Late submission for assignment will be accepted according to the following:
 1. On due date/time, no deduction.
 2. 0.1% deduction per hour after the due date/time.
 1. Each assignment has a different late submission period. Review on Canvas when an activity is due, and when an activity closes.
4. The late submission policy does not apply for exams.
5. Students are expected to review their graded materials promptly when returned to them. If you have a question regarding grading on a particular assignment, you have seven days (from the date grades are released) to bring the matter to the attention of the course facilitator. After 7 days from posting, it on canvas, the grade will become final.
6. Assignment submission format:
 1. All assignments must be submitted by Canvas. No email or hard copy is accepted.
 2. The homework should be in the expected format mentioned in the assignment description. Also, your answer should be presented clearly.
 3. If your assignment requires more than one file, include all files in one folder and compressed (zipped) your folder.
 4. Use this format to name your file (FirstName_LastName_AssignmentNumber).
 5. I strongly suggest you submit it at least 60 minutes earlier in case any kind of accidents would happen like network delay.
 6. It is your responsibility to submit the right file or the right link.
 7. Students may resubmit their assignments before the due date; however, they will not be able to do so after the assignments have been graded.
 8. The instructor reserves the right to make changes to the syllabus.

Required book, software and technology

Required Textbook

Introduction to the Design and Analysis of Algorithms (3rd Edition), 2012 by Anany Levitin. ISBN: 9780132316811.

Other resources

We may use other tools and material. These will be shared in the Canvas website.

Required Tech. & Backup Plan

To fully participate in this course, you will need:

- An internet connected computer with the most updated versions of your favorite web browser installed. The Use of smartphones and tablets is not recommended.
- Speakers to listen to the lectures and other material.
- Microphone when having an appointment during office hours.
- Microsoft Office (free to students).
- The [Canvas, Zoom, MS Teams] app (free to students) when required.
- In the event that your computer crashes or internet goes down, it is essential to have a “backup plan” in place where you can log in using a different computer or travel another location that has working internet.
- Any files you intend to use for your course should be saved to a cloud solution (One Drive, Google Drive, Dropbox, etc.) and not to a local hard drive, USB stick or external disk. Saving files this way guarantees your files are not dependent on computer hardware that can fail.

Technical Assistance

For assistance with any of these technology issues, contact C&IT Helpdesk M-F from 7:30 am to 8 pm at 313-577-4357 or helpdesk@wayne.edu.

Students who lack adequate hardware or reliable internet access should email doso@wayne.edu or call 313-577-1010 for assistance.

Tentative schedule

This is a tentative schedule that may be subject to change.

Date	Assignment	Due date
Jan 12	Class begins	
Feb 08	Assignment 01: Summation notation	Feb 08, 11:59 pm
Feb 08	Assignment 02: Design and solve a recurrence relation	Feb 08, 11:59 pm
Feb 15	Brute Force and Exhaustive Search Assignment	Feb 15, 11:59 pm
Feb 22	Decrease-and-Conquer Assignment	Feb 22, 11:59 pm
Feb 26	Midterm	Feb 26, During lecture time
Mar 08	Divide-and-Conquer Assignment	Mar 08, 11:59 pm
Mar 15	Transform-and-Conquer Assignment	Mar 15, 11:59 pm
Mar 29	Space and Time Trade-Offs Assignment	Mar 29, 11:59 pm
Apr 05	Dynamic Programming Assignment	Apr 05, 11:59 pm
Apr 12	Greedy Technique Assignment	Apr 12, 11:59 pm
Apr 12	Limit of Algorithmic Power Assignment	Apr 12, 11:59 pm
Apr 19	Coping with the Limitations of Algorithm Power Assignment	Apr 19, 11:59 pm
Apr 19	Project submission	Apr 19, 11:59 pm
Apr 16 - 23	Project presentations	During class.
Apr 29 - May 4	Final exam	TBD

University and other policies

Class recordings

Students need prior written permission from the instructor before recording any portion of this class. If permission is granted, the audio and/or video recording is to be used only for the student's personal instructional use. Such recordings are not intended for a wider public audience, such as postings to the internet or sharing with others. Students registered with Student Disabilities Services (SDS) who wish to record class materials must present their specific accommodation to the instructor, who will subsequently comply with the request unless there is some specific reason why they cannot, such as discussion of confidential or protected information. Violations of this syllabus policy may result in charges under the student code of conduct.

Religious holidays (from the online Academic Calendar)

Because of the extraordinary variety of religious affiliations of the University student body and staff, the Academic Calendar makes no provisions for religious holidays. However, it is University policy to respect the faith and religious obligations of the individual. Students with classes or examinations that conflict with their religious observances are expected to notify their instructors well in advance so that mutually agreeable alternatives may be worked out.

Land acknowledgement

Wayne State University rests on Waawiyaataanong (Waa-we-yaa-tih-nong), also referred to as Detroit, the ancestral and contemporary homeland of the Three Fires Confederacy. These sovereign lands were granted by the Ojibwe (Oh-jib-way), Odawa (Oh-daa-waa), Potawatomi (Pow-tuh-waa-tuh-mee), and Wyandot nations, in 1807, through the Treaty of Detroit. Wayne State University affirms Indigenous sovereignty and honors all tribes with a connection to Detroit. With our Native neighbors, WSU can advance educational equity and promote a better future for the earth and all people.

Student Disability Services

If you have a documented disability that requires accommodations, you will need to register with Student Disability Services (SDS) for coordination of your academic accommodations. Please visit <https://studentdisability.wayne.edu> to register your condition. Once you have accommodations in place, please inform your instructor. Student Disability Services' mission is to assist the University in creating an accessible community where students with disabilities have an equal opportunity to fully participate in their educational experience at WSU. SDS supports students with a variety of conditions, such as mental health disorders, learning disabilities, chronic health conditions, etc.

Counseling and Psychological Services (CAPS)

It is quite common for college students to experience mental health challenges, such as stress, anxiety, and depression, that interfere with academic performance and negatively impact daily life. Help is available for any currently enrolled WSU student who is struggling with a mental health difficulty. Go to <https://caps.wayne.edu> for information on the services offered and how to access them. Other options, for students and non-students, include the Mental Health and Wellness Clinic at the College of Education (<https://education.wayne.edu/mental-health-and-wellness-clinic>). Services at all these clinics are free and confidential. Remember that getting help, before stress reaches a crisis point, is a smart and courageous thing to do – for yourself, and for those you care about. CAPS provides afterhours/weekend crisis support: students living on campus can call (313) 577-2277, and all others, call (313) 577-9982. In a life-threatening emergency, call the WSU Police at 313-577-2222.

Sexual Misconduct and Title IX

Most faculty and staff are considered “**Responsible Employees**” and are **required to report** information they receive about incidents of sexual misconduct (including sexual assault, stalking, dating/domestic violence, and sexual harassment) to the Title IX Coordinator when it involves a student.

Confidential support is available 24/7 through the [Rape, Abuse & Incest National Network \(RAINN\)](https://www.rainn.org/) (<https://www.rainn.org/>). Call **1-800-656-4673** or [Chat](https://hotline.rainn.org/online) (<https://hotline.rainn.org/online>) with a professional support specialist.

Options for Self-Reporting Sexual Misconduct

Any student impacted by sexual misconduct or sexual harassment has the right to report to the University (i.e., Responsible Employee or Title IX Coordinator), to law enforcement (i.e., WSUPD or other jurisdiction), to both, or to neither. Every Warrior is encouraged to make the reporting decision that is right for them.

Reporting to the University

The [Title IX Office](https://titleix.wayne.edu/) (<https://titleix.wayne.edu/>) is available to consult with individuals impacted by sexual violence or discrimination regarding resource referrals, supportive and protective measures, and reporting and resolution options. Where WSU has jurisdiction, the affected party may request an administrative investigation by the University.

Phone: 313-577-9999

Email: TitleIX@wayne.edu

Reporting to Law Enforcement

The [WSU Police Department](https://police.wayne.edu/) (<https://police.wayne.edu/>) is available 24/7 to assist individuals reporting criminal activity or concerns on or near campus. Report off-campus incidents to the appropriate police jurisdiction. In the event of an emergency or imminent threat, reporting to the police is highly encouraged.

Phone: 313-577-2222

Every Warrior has the right to live, learn, and work at WSU – free from Harassment or Discrimination. If you or someone you know has been impacted by sexual violence or discrimination, please visit [TitleIX.wayne.edu](https://titleix.wayne.edu) to learn more about resources and support on campus and in the community.

Food Pantry and Basic Needs

Wayne State has a food pantry, a free resource available for all students. See the hours on the website <https://thew.wayne.edu/pantry>.

Learning is always more challenging when you are struggling to meet basic needs. Wayne State recognizes that you may face a number of challenges during your time here, and we are here to support you. Any student who faces challenges securing food, housing, or medical care is encouraged to contact relevant university offices noted on the [Financial Aid website \(https://wayne.edu/financial-aid/\)](https://wayne.edu/financial-aid/) for support. You are also encouraged to contact Care, Support, and Intervention services in the Dean of Students Office (DOSO) for assistance with connecting to resources for basic needs. Students can call DOSO at 313-577-1010 or submit a [care referral form \(https://doso.wayne.edu/conduct/student-support-intervention\)](https://doso.wayne.edu/conduct/student-support-intervention).

Academic Dishonesty – Plagiarism and Cheating

Academic misconduct (<https://doso.wayne.edu/conduct/academic-misconduct>) is any activity that tends to compromise the academic integrity of the institution or undermine the education process. Examples of academic misconduct include:

- **Plagiarism:** To take and use another's words or ideas as your own without appropriate referencing or citation.
- **Cheating:** Intentionally using or attempting to use or intentionally providing unauthorized materials, information or assistance in any academic exercise. This includes copying from another student's test paper, allowing another student to copy from your test, using unauthorized material during an exam and submitting a term paper for a current class that has been submitted in a past class without appropriate permission.
- **Fabrication:** Intentional or unauthorized falsification or invention of any information or citation, such as knowingly attributing citations to the wrong source or listing a fake reference in the paper or bibliography.
- **Other:** Selling, buying or stealing all or part of a test or term paper, unauthorized use of resources, enlisting in the assistance of a substitute when taking exams, destroying another's work, threatening or exploiting students or instructors, or any other violation of course rules as contained in the course syllabus or other written information.

Such activity may result in failure of a specific assignment, an entire course, or, if flagrant, dismissal from Wayne State University.

Course drops and withdrawals

For courses running the full term, students can drop this class and receive 100% tuition and course fee cancellation for the first two weeks. After the end of the second week there is no tuition or fee cancellation. Students who wish to withdraw from the class can withdraw on Academica (<https://academica.wayne.edu/>). You will receive a mark of W at the time of withdrawal. No withdrawals can be initiated after the deadline. Students enrolled beyond the deadline will receive a grade. Because withdrawing from courses may have negative academic and financial consequences, students considering course withdrawal should make sure they fully understand all the consequences before taking this step, including speaking with your instructor or advisor. More information on course drops and withdrawals can be found on the Registrar's website (<https://wayne.edu/registrar>). For classes that are shorter than the full term, deadlines for dropping and withdrawal can be found on the section's detail in the Schedule of Classes (<https://registration.wayne.edu/>).

Student Services

The Academic Success Center

The Academic Success Center (1600 Undergraduate Library) assists students with content in select courses and in strengthening study skills. Visit the Academic Success Center (<https://success.wayne.edu/>) for schedules and information on study skills workshops, tutoring and supplemental instruction (primarily in 1000 and 2000 level courses).

The Writing Research and Technology Zone

The Writing Research and Technology Zone is located on the 2nd floor of the Undergraduate Library and provides individual tutoring consultations free of charge. Visit the Writing Research and Technology Zone (<http://clas.wayne.edu/writing>) to obtain information on tutors, appointments, and the type of help they can provide.

Library research assistance

Working on a research assignment, paper or project? Trying to figure out how to collect, organize and cite your sources? Request an appointment with a Wayne State librarian (https://library.wayne.edu/forms/consultation_request.php), who can provide on- campus or online personalized help.

First day Inclusive Access

This course is participating in a new course material access and affordability initiative called First Day Inclusive Access. This program provides your required course material prior to the first day of classes directly through Canvas at a price equal to or lower than the publisher-direct prices. A direct charge for the course material is placed against your student account and is visible on your tuition bill. Participation in the First Day program is optional. Opting-out will result in a credit placed against your WSU student account, which will be disbursed in accordance with the Office of the Bursar, Student Accounts Receivables Policies. Once opted-out, you would be responsible to procure access to the required course materials on your own (ie, online, through the bookstore, etc.).

Things to consider before opting out:

- The material through this program is guaranteed to be priced at publisher direct pricing or lower.
- The opt-out deadline for your course material is available when you click on the course material link within your Canvas course. This date is the final day you can opt-out for a full credit back to your student account. (see image below)
- You may opt-out, or back in to the First Day program through the opt-out deadline date.
- After the opt-out deadline:
 - The day following the deadline, your participation status is final despite your enrollment status in the course.
 - If opted-out, access to the required materials (etext or etext + courseware) may remain for a short period, allowing you time to purchase/rent your materials through the bookstore or favorite online textbook provider.

For additional information regarding the First Day Inclusive Access course material program, please visit the WSU First Day website here [Studentservices.wayne.edu/bookstore/inclusive-access](https://studentservices.wayne.edu/bookstore/inclusive-access) or the Barnes & Noble College First Day Inclusive Access FAQ page at <https://customercare.bncollege.com>.

You may also contact the campus bookstore via email or Microsoft TEAMS Chat at FirstDay@wayne.edu or call the store during business hours, 313-577-2436.