

CSE 431 Section 1: Algorithm Engineering

Department of Computer Science and Engineering, Michigan State University

Spring 2022

Credits: 3

Course web: <https://d21.msu.edu/d21/home/1383916>

Description: Algorithm analysis, design, implementation, and optimization for a broad range of problem categories including techniques to recognize and cope with intractable problems.

Time and location: Mondays and Wednesdays 3:00 PM – 4:20 PM

Instructor: Kevin Liu Instructor accessibility: Feel free to contact me via email to schedule a meeting.

Email: kjl@msu.edu

Office hours: Wednesdays from 4:30 pm to 5:30 pm: Zoom link with passcode 307913. Office hours are also by appointment, and can be arranged by emailing the course instructor.

TA: Julia Zheng , email: zhengjul@msu.edu

Office hours: Thursdays from 11:00 am to noon: Zoom link with passcode 800823. Office hours are also by appointment, and can be arranged by emailing the TA.

TA: Vincent Ragusa , email: ragusavi@msu.edu

Office hours: Mondays from 4:30 pm to 5:30 pm: Zoom link. Office hours are also by appointment, and can be arranged by emailing the TA.

TA: Jakob Therkelsen , email: therkels@msu.edu

Office hours: By appointment. Appointments can be made by emailing the TA.

Prerequisites: CSE 331 Algorithms and Data Structures. Fluency in C++ and Python programming languages.

Required textbook: The Algorithm Design Manual, S. S. Skiena, 2012. ISBN: 1848000693. Note: don't buy the textbook! Login to the MSU campus intranet (i.e., don't use off-campus internet access), and then you can download an electronic copy from MSU Libraries at <http://catalog.lib.msu.edu/record=b7176478~S39a>.

Optional textbooks (only if you wish to pursue further independent study):

- Jeff Erickson (2019) Algorithms, 1st Edition, available at <http://algorithms.wtf> or <http://jeffe.cs.illinois.edu/teaching/algorithms/>. Textbook license is open-source under Creative Commons Attribution 4.0 International License.
- Introduction to Algorithms, T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C. Stein, 3rd ed., 2009. ISBN: 9780262033848.

- Introduction to Algorithms, T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C. Stein, 4th ed., 2022. ISBN: 026204630X. To appear in March 2022.

Class notes: The class notes will be posted on the course web site.

Graded work:

- homework/programs 70%
- project, 25%
- class participation, 5%
- Grading: The final grades will be assigned based on the following scale:

$\geq 90\%$	$\geq 85\%$	$\geq 80\%$	$\geq 75\%$	$\geq 70\%$	$\geq 65\%$	$\geq 60\%$	$< 60\%$
4.0	3.5	3.0	2.5	2.0	1.5	1.0	0.0

To be eligible to earn a non-zero grade in the course, a student must do all the following:

- Earn at least 50% of the total points available for all homework/programs during the semester.
- Earn at least 20% of the points available for each individual homework/program.
- Earn at least 50% of the total points available for the project.

Important: Contact the instructor if you have any concerns about your performance in the class.

The instructor reserves the right to make changes to the grading scale. Specifically, the score required to obtain each mark may be lowered.

Lectures: The MSU Zoom videoconference system will be used to hold lecture: Zoom link with passcode 307913. All lectures will be saved and then posted on MSU Mediaspace and D2L. Students will receive emails about these resources, and announcements will also be made on the class D2L site.

Homework: Homework assignments typically will have multiple problems and may require mathematical analysis, analysis of an existing program or functions, or programming something new.

Homework deliverables: Students will submit programming homework via Mimir Classroom. **All Mimir assignments MUST be manually submitted in order to complete submission!** There is no auto-submit feature enabled for any Mimir coursework. To manually submit your assignment, navigate to the “Review and Submit” section in the left pane and click the green “Submit” button and complete any additional dialogs that appear. There will be no exemptions granted if you forget to manually submit your assignment. If time permits, you can contact the course staff and they can check on the Mimir website to confirm your assignment submission status. Additional submission requirements may be included in each assignment handout.

Non-programming homework will also be submitted electronically via Mimir Classroom. Type-set solutions are preferred. Non-type-set solutions must be neat and legible. Please convert non-type-set hardcopy solutions into an electronic document using dedicated optical scanning hardware (e.g., a flatbed scanner), if possible. If you use a smartphone or camera to convert hardcopy into electronic copy, please try to do so as neatly as possible and remember to check the electronic copy to make sure that everything is legible. See specific assignment handout for more details.

Mimir Classroom is currently free for academic use during this semester (<https://www.mimirhq.com/classroom/pricing>). Furthermore, the MSU CSE Department has a departmental license. Students should have free access to Mimir coursework.

Re-grading policy: Re-grade requests pertain only to original assignment submissions and require sufficient written justification – typically, a grading mistake. All re-grade requests must be submitted as a written document detailing the request with full written justification. The written request must be received by the course instructor no later than one week after the assignment grade is released on D2L. Any requests for re-grading that do not follow these guidelines will not be considered.

Note that requests for regrading can go in either direction. We are often generous when we first grade something, so please be sure that we did make a mistake before you submit your request. On the other hand, our goal is for you to understand the course material, so we will always be willing to explain to you any portion that you are stuck on.

Homework deadlines: All homework assignments are due on the deadline date specified on the assignment handout. Homework will not be accepted after the deadline, with a single important exception: each student is granted a pool totaling five extension days. The extension days can be used on any of the homework assignments, but be judicious with using them: once the pool is expended, no further extensions will be possible.

Important note: the late day pool applies only to homework assignments, and no late days will be allowed on the course project! The course project deadline is therefore a hard deadline.

In case of a documented crisis, such as illness, the student should submit the an official document to arrange for alternate grading. Advance notification is required for late submission unless this is impossible.

Class participation: The class participation component of the grade will in part be based on class attendance and participating in classroom discussion. Students are expected to attend remote lecture via Zoom videoconference at the regularly scheduled lecture times. The D2L site will provide instructions on how to access upcoming remote lectures. The course instructor will log attendance using the Zoom Usage Reports/Participants feature.

Those who participate in class provide us with another source of information as to how well they are learning the material, and how much effort they are putting into the course. We use this information to help counterbalance difficulties with homework assignments and/or the course project. Let's have an active class! Class participation will never harm your grade. Always ask any questions you may have about the material. We strongly encourage students to ask and answer each others questions on Piazza. Providing helpful answers on Piazza can be factored into the participation component of the course grade. Also, if your grade is borderline, we may consider your participation to sway our decision to your advantage.

Learning management system: Course administration is supported using Desire2Learn, Michigan State University's learning management system (LMS). The LMS can be accessed at d2l.msu.edu. Course announcements, homework assignments, grades, and other materials will be distributed through the LMS.

Course calendar: Available through the course LMS. Based on the university final exam schedule, the MSU Registrar's Office did not assign a final exam time slot for this course.

Changes to syllabus: The course syllabus is subject to change. All changes will be announced in class, after which the syllabus will be updated with announced changes.

Classroom technology: Personal computing devices such as laptops, cell phones, tablets, and other electronic devices may be used in class only for note-taking or other activities that are directly related to lecture. The course instructor reserves the right to ban personal computing device usage when it interferes with normal classroom activity. Violations of this policy may be assessed a classroom participation grade penalty.

Honors option: An honors option is available by email request to the course instructor. Honors option eligibility is based on both Honors College and CSE Department requirements. The latter criteria is as follows: “In general, the Honors Option designation will be given only to students who earn a 3.5 or 4.0 in the course under the same criteria applied to all other students in the course and who have done a significant project (research paper, a major extension of course material, etc.) that is in addition to the regular requirements in the specific course. Completion of extra homework problems does not meet the high standards for Honors Option designation expected by this department.”

The course honors option is a major course project. Project deliverables consist of a project proposal and full project report.

Students with disabilities: The course instructor is committed to accommodating students with disabilities according to the policy of the Michigan State University Resource Center for Persons with Disabilities (RCPD), stated as follows (reproduced from the RCPD Model Statement): “Michigan State University is committed to providing equal opportunity for participation in all programs, services and activities. Requests for accommodations by persons with disabilities may be made by contacting the Resource Center for Persons with Disabilities at 517-884-RCPD or on the web at rcpd.msu.edu. Once your eligibility for an accommodation has been determined, you will be issued a verified individual services accommodation (“VISA”) form. Please present this form to me at the start of the term and/or two weeks prior to the accommodation date (test, project, etc). Requests received after this date will be honored whenever possible.”

University anti-discrimination policies: CSE 431 adheres to Michigan State University policies that prohibit discrimination and harassment. The university policies on this matter are set forth in the Office of Institutional Equity handbook and the MSU Faculty handbook. Furthermore, the course staff are committed to creating a safe and productive environment for student engagement; disruptive behavior that is not conducive to intellectual discourse in such an environment will not be tolerated.

Academic freedom: CSE 431 adheres to Michigan State University policies regarding academic freedom. The university policies on this matter are set forth in the MSU Faculty handbook.

Academic honesty policy for coursework: Plagiarism (unsourced use of other’s intellectual property) is not allowed. However, citing and using other’s works is generally fine (please ask if uncertain) as long as the material wasn’t made specifically for solving assignments in this class.

Each student’s coursework and homework/assignment solutions must be their own and each student must write (and not share) their own code. Additionally, the use of material from previous semesters and code from other students in the class are instances of academic dishonesty. If a student submits code that they don’t understand, such is also an act of academic dishonesty. Other examples of academic dishonesty include (but are not limited to):

- Copying another student’s code or other coursework, or sharing your own solution.
- Using code implemented by someone else intended to solve this class’s assignments (i.e., don’t get someone else to do your assignment for you!).
- Using code independently implemented by someone else without attributing credit (i.e., you can use tools, libraries, or code snippets from the web, but cite them!).
- Writing code that deceptively passes the test cases, but doesn’t solve the problem given. In other words, abusing the auto-grader to give unearned points.
- Using websites and sources, whose purpose is to provide assignment solutions (e.g. using Chegg.com for any purpose regarding this class).
- Submitting a solution that you don’t understand and/or can’t explain to an instructor.
- Providing false information to the instructor about matters related to the course.

- Facilitating another student in any of these activities.

Academic integrity: As scholars and scientists, academic integrity is of the utmost importance. CSE 431 will adhere to the Michigan State University policies of academic integrity as set forth in the General Student Regulations, the All-University Policy on Integrity of Scholarship and Grades, and the Department of Computer Science and Engineering Graduate Student Handbook. Students violating the policies and regulations regarding academic dishonesty will be penalized accordingly. Furthermore, additional penalties may be imposed at the discretion of the instructor.

Instructor availability and course feedback: We're really happy that you're taking this course and we're looking to an exciting semester! Please feel free to reach out at anytime with your comments and feedback.

Acknowledgments: Some course materials have been adapted from others including Charles Ofria, Yanni Sun, Jeremy Buhler, George Stockman, John Weng, Li Xiao, Laura Dillon, Jeff Erickson, Steven Skiena, Luay Nakhleh, and Eric Torng.