

# CSE 331 Algorithms and Data Structures

**Credits:** 3

**Course web:** <http://www.cse.msu.edu/~cse331>

**Description:** In this course, students will survey fundamental data structures and many associated algorithms. Emphasis will be placed on matching the appropriate data structures and algorithms to application problems. Analysis of algorithms is crucial to making proper selections, so analysis is important in the course. This course assumes that students are already familiar with advanced programming techniques including the definition of classes, and use of dynamic memory and linked data structures, including lists and trees. Even though the treatment of algorithms and data structures is mostly conceptual, students are expected to be able to transform these algorithms and data structures into programs with proper approaches of software module development.

**Time and location:**

Section 1: Mondays and Wednesdays 10:20 - 11:40 AM 1145 Engineering Building

**Instructor:** James Daly, email: [dalyjame@msu.edu](mailto:dalyjame@msu.edu)

Office: 3501 Engineering Building

Office Hours: By appointment

**TAs:**

Vincent Ragusa, email: [ragusavi@msu.edu](mailto:ragusavi@msu.edu)

Zhiwei Wang, email: [wangzh65@msu.edu](mailto:wangzh65@msu.edu)

**Helproom:** Helproom:

Thursday 3-5pm, 3203 Engineering Building (Bone Lab)

Friday 3-5pm, 3203 Engineering Building (Bone Lab)

You can go to these helprooms to work on your homework or projects.

**Prerequisites:** Knowledge comparable to that taught in:

1. CSE 260 Discrete Structures in Computer Science
2. CSE 232 Introduction to Programming II

**Textbook:** M. Goodrich, R. Tamassia, and M. Goldwasser (2013) Data Structures and Algorithms in Python, Wiley

**Class notes:** The class notes will be posted on D2L.

**Piazza:** This section will use Piazza for discussion. You should receive an invite during the first week of class.

Piazza is a tool for students to post homework, project, and class material questions only. Piazza neither can be used as a venting tool to express frustrations toward the class material or topics, nor to be used as a tool to change the students' perception towards the TAs or instructor of the class. Those who do not follow this simple etiquette will be blocked from piazza for the rest of the semester and reported to the Dean of Students.

**Important Dates:**

Open add ends: Jan 11

Last day to drop with refund: Feb 1

Last day to drop with no grade reported: Feb 27

**Graded work:**

1. Quizzes (15%)
2. 2 Midterm Exams (15% each)
3. Final Exam (20%)
4. Projects (30%)
5. Class Participation (5%)

**Grading:** The final grades will be assigned based on the following scale. The instructor reserves the right to make changes to the grading scale. Specifically, the score required to obtain each mark may be lowered.

4.0	90%
3.5	85%
3.0	80%
2.5	75 %
2.0	70 %
1.5	65 %
1.0	60 %

**Homework:** Homework will be assigned, but not collected. While not required, doing homework will be helpful for preparing for quizzes and exams.

**Projects:** There will be about 7 programming projects. Any required files can be submitted via Mimir (<https://class.mimir.io/login>). Only the most recent submission will be graded. You are responsible for ensuring the correctness of your submissions. Additionally, penalties will be assigned for warning or errors issued by the runtime environment.

**Policy about late work:** The submission deadline will be specified for each project. In general, projects will be due at 11:59 PM on Fridays. Projects received one day late will be graded with a 50% grade deduction. After one day, no credit will be given. Mimir is the final arbiter on all submission times. Make sure that you leave sufficient time to upload your projects.

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

**Quizzes:** Several quizzes will be given throughout the semester. **There are no makeups for missed quizzes.** The lowest quiz will be dropped.

**Exams:** There will be three exams: two mid-terms and a cumulative final. You are allowed a single sheet of notes on Letter paper or smaller. You may write on all six faces of the notes sheet. You may also bring a paper dictionary.

- Midterm Exam 1: Feb 20 - regular class time
- Midterm Exam 2: Mar 27 - regular class time
- Final Exam (Section 1): Thursday, May 2, 7:45 am  
All issues related to the final examination will follow the policies and schedule of the University: MSU Final Exam Schedule.

**Crowdmark:** Quizzes and Examinations will be uploaded to Crowdmark. You must write your MSU netid (not your APID) on each exam. Exam results will be available on Crowdmark. The physical exams will not be returned.

**In-class exercises:** In-class exercises will be distributed and collected in most classes. The class participation score will be decided based on the number of submitted in-class exercises. You may miss up to three in-class exercises without penalty.

**Grading Policy:** Once grades are posted on D2L, you will have one week to raise any concerns about your grade on that particular assignment. After one week of posting grades, no regrading requests will be accepted.

**Other Policies:** Any extenuating circumstances that impact your participation in the course should be discussed with your instructor as soon as those circumstances are known (such as absences due to illness, religious observances, or other required school activities).

**Academic Integrity:** Article 2.3.3 of the Academic Freedom Report states: The student shares with the faculty the responsibility for maintaining the integrity of scholarship, grades, and professional standards. In addition, CSE adheres to the policies on academic honesty specified in General Student Regulation 1.0, Protection of Scholarship and Grades; the all-University Policy on Integrity of Scholarship and Grades; and Ordinance 17.00, Examinations. (See Spartan Life: Student Handbook and Resource Guide and/or the MSU Web site.)

You are expected to develop original work for this course. Therefore you may not submit course work you completed for another course to satisfy requirements for this course. While you are encouraged to discuss problems with your classmates, you may not share answers or code. **You are responsible for any code you post online.** Students who violate MSU rules will receive a penalty grade. **The penalty for plagiarism on a project is a mark of 0 on**

**the project and a further 5% is subtracted from your final grade.** Repeat offenses will result in your failure of the course and recommendation for your dismissal from the program.

**Spartan Code of Honor:** *“As a Spartan, I will strive to uphold values of the highest ethical standard. I will practice honesty in my work, foster honesty in my peers, and take pride in knowing that honor is worth more than grades. I will carry these values beyond my time as a student at Michigan State University, continuing the endeavor to build personal integrity in all that I do.”*

**Distribution and Commercialization:** MSU prohibits students from commercializing their notes of lectures and class materials without written consent of the instructor. You are also prohibited from distributing course materials.

**Course Calendar:** The tentative course calendar is below and on the course website. Changes will be announced in class and then reflected on the course website.

Week	Topics and Reading
Jan 7	Course intro; insertion sort; Algorithm analysis, Chapter 5, Chapter 3
Jan 14	Asymptotic notation; Sorting; Chapter 3, Chapter 12
Jan 21	Lists, Stacks and Queues; Chapter 6, Chapter 7
Jan 28	Introduction to trees; Chapter 4, Chapter 8
Feb 4	Binary search trees; AVL trees; Chapter 11
Feb 11	AVL Trees continued; B-Trees; Chapter 12, Chapter 15
Feb 18	Exam 1, Heaps; Chapter 9
Feb 25	Priority Queues, Heapsort; Hashing; Chapter 9, Chapter 10
Mar 4	Spring Break
Mar 11	Hashing; Graphs, DFS, BFS; Chapter 14
Mar 18	Topological sort, Dijkstra’s Algorithm, Warshall’s algorithm;
Mar 25	Review Warshall’s algorithm; MST; Exam II
Apr 1	Greedy algorithms and dynamic programming; Chapter 13
Apr 8	Algorithm design techniques
Apr 15	Algorithm design techniques
Apr 22	Complexity theory and course summary;

**Changes:** This syllabus is subject to change. The changes will be announced in class and then reflected in this document.

**Acknowledgments:** Parts of this syllabus, the lectures, and assignments are based on works from the MSU CSE faculty.