

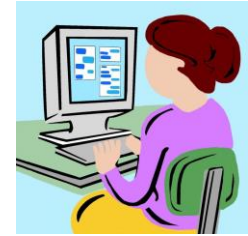
Advanced Algorithms 1 – CS 7081


Spring 2024

- Instructor: Ken Berman
- TAs: TBA
- This class is hybrid with lectures taught online using Canvas and an in-person recitation on Mondays.

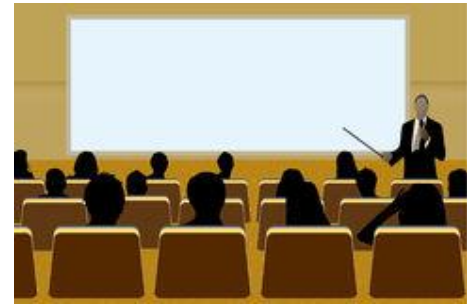


Classes and Lectures



- There will be a module for each class, labeled with the date, which includes the lecture with the prerecorded Kaltura video. Some classes will also include homework, quizzes, tests, supplementary notes, honor pledge, etc.
- Occasionally, rather than a prerecorded video, e.g., for reviews for tests, the class will be held live online using Zoom 
- At the end of the week the class modules for the next week will be made available.

Recitations



- The TAs will hold an in-person recitation in the classroom Probasco 210 every Monday from 10:10-11:05AM, **starting the third week of classes.**
- In the recitation the TAs will review the topics and objectives from the previous week, answer questions and do some examples. The TAs will also answer queries related to the homework.
- A 15-minute quiz on the topics from the previous week will be available on Canvas immediately after the recitation, which needs to be completed and submitted by the end of the day.

Email



- You can send me or the TAs email.
- If you have any queries or issues about the lectures or the course not related to homework email me.
- If you have queries related to the homework email the TAs.
- Keep in mind that I am teaching three classes with a total enrollment of about 350 students, so it may take some time for me to get back to you if I have a long queue of emails to answer.
- If multiple students have the same query or a response to the query is relevant to all students, I will send an email response to the whole class.



I will hold office hours via my [Zoom room](#):

The syllabus will be updated and an announcement will be made with my office hours and that of the TAs.

Honor Pledge



In order to get a grade in the class you need to sign the Honor Pledge. It is posted with the first class and must be signed before taking the first quiz on **January 17, 2024.**



- Homework will be assigned every other Monday, starting the second week and will be due on Friday of the next week unless otherwise specified.
- Homework will be done in groups of 2 or 3.





Homework Groups



- Prof. Berman will create a group called **Homework Group** on Canvas.
- Click on **People** then **Groups** to access.
- It will be set up so that students who would like to work with others they know in the class can sign up to the same group.
- If you don't know anyone in the class that you would like to join the same group as, no problem, you don't need to do anything. On January 17, I will randomly assign you to a group. The first homework assignment will be posted in the module for the January 17 class.
- One student in the group will be designated be **leader**.
- The **leader** will submit the homework assignment for the group.
- Everyone in the group is expected to do all the questions in the homework assignment individually.
- Then all members of the group should get together, discuss and compare solutions and collaborate on coming up with the best solution for submission by the leader.
- Every member of the group will receive the same grade.

Quizzes



Quiz

- There will be weekly quizzes given on **Mondays** (exception may be made if there is a test that week) on the **material from the week before**. Because Monday, January 15 is a holiday (MLK), the **quiz that week will be held on Wednesday, January 17**.
- The quiz will be available on Canvas at 11:05AM (immediately after the recitation) and must be completed before the end of the day.
- The quiz will consists of 10 multiple-choice questions and you will have 15 minutes to complete.
- Quizzes will be open book. Solutions will be made available at 11:59PM when everyone has finished taking the quiz.
- You are **not** allowed to involve anyone else or communicate with anyone but Prof. Berman while taking the test and once you have finished you are **not** allowed to discuss the test or quiz with another student who has not yet completed it. To do so is cheating and if you are caught there will be serious consequences.
- There will be 11 quizzes. The lowest quiz score will be dropped.

Tests

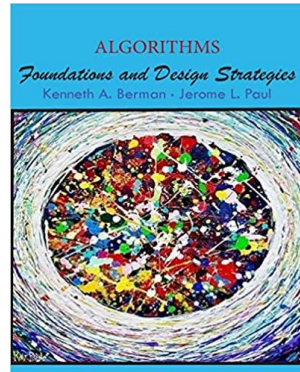


- Tests will be posted on Canvas in the module for the class the day of the test
- In order to accommodate students in different time zones you will have a 24-hour window in which to complete the test, i.e., from 12:00AM-11:59PM ET (Cincinnati time) the day it is given.
- The test will consist of 50 multiple-choice questions and you will have 60 minutes (one hour) to complete.
- There will be a review for the test the class before the test is held.
- Tests will be open book. Solutions will be made available at 11:59PM when everyone has finished taking the quiz or test.
- You are **not** allowed to involve anyone else or communicate with anyone but Prof. Berman while taking the test and once you have finished you are **not** allowed to discuss the test or quiz with another student who has not yet completed it. To do so is cheating and if you are caught there will be serious consequences.
- There will be 3 tests. The lowest test score will be dropped.

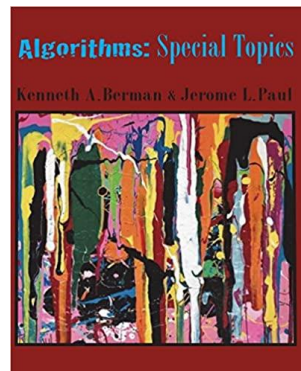
Textbooks

There will be two required textbooks for this course:

[Kenneth A. Berman and Jerome L. Paul, Algorithms: Foundations and Design Strategies, CreateSpace, 2017](#)



[Kenneth A. Berman and Jerome L. Paul, Algorithms: Special Topics, CreateSpace, 2018](#)

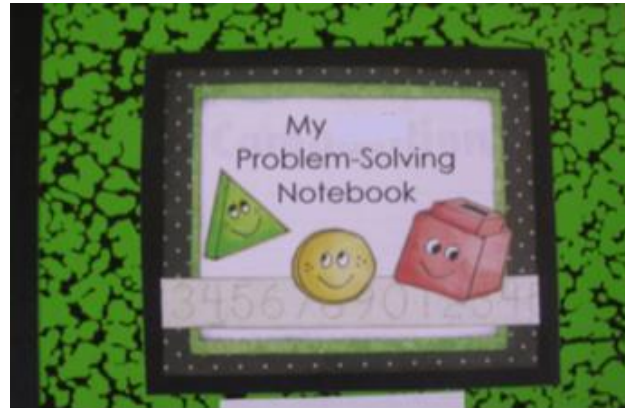


Related UC Courses

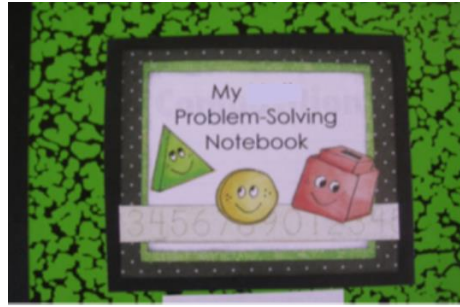


- Design and Analysis of Algorithms (CS 4071),
Advanced Data Structures and Algorithms (EECE 4040)
 - The material in the textbook *Foundations and Design Strategies* covered in these courses will be covered at an accelerated pace and in more depth in this course.
 - The material in the textbook *Special Topics* is new material not covered in these courses.
- Advanced Algorithms 2 (CS 7082)
 - This course is a prerequisite for CS 7082.

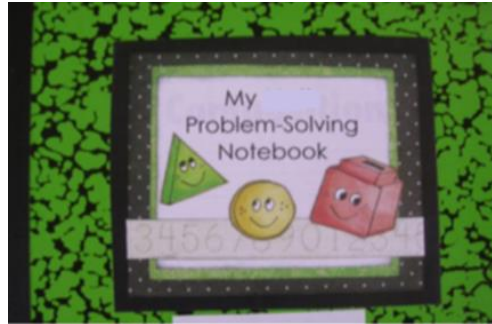
Problem-Solving Notebook (PSN)



- Attendance-participation-engagement will be assessed by a Problem-Solving Notebook (PSN).
- To keep students engaged as they watch videos, videos will contain problems for the PSN.



- When a PSN problem is encountered, **highlighted in red**, you are to **pause the video** and work on the problem, taking as much or as little time as you need.
- The solution is to be **written by hand** in your PSN.
- For each lecture, include **the lecture date** followed by a **statement of the PSN problem** and **your corrected solution** for each PSN problem given in that lecture. In this case when there is more than one also **number them in the order they occur in the lecture**.



- At the end of the course, you are to submit a **PDF file scan** of your PSN for 10 percent of your grade. It won't be graded on whether your original solution was correct, so don't erase your original, just stroke out the parts that were wrong. If you include a solution to all the PSN problems, you will get full marks.
- You may consider taking a snapshot using your cellphone of each problem when you finish writing it up and insert it into a Word file. At the end of the course you can easily convert your PSN Word file to PDF.

PPT Slides

- PPT slides will not include solutions to PSN problems given in the lecture video.
- Lecture videos provide additional insight and information not in the PPT slides, so make sure to watch the videos and take notes.

Grading

To compute your final numeric score I will use the distribution:

Tests 50%, Quizzes 20%, Homework 20%, PSN 10%

Translation from numeric to letter grade:

A: 92-100

A-: 89-91

B+: 86-88

B: 82-85

B-: 79-81

C+: 76-78

C: 72-75

Occasionally there will be a glitch



Tech Help

Special Topics

In addition to covering the **mathematical tools needed for the effective design and analysis of algorithms** and the **major design strategies**, we will also cover material from the following special topics:

Graph Algorithms

Probabilistic Algorithms

Cryptographic Algorithms

Lower Bound Theory

NP-Completeness

Internet Algorithms

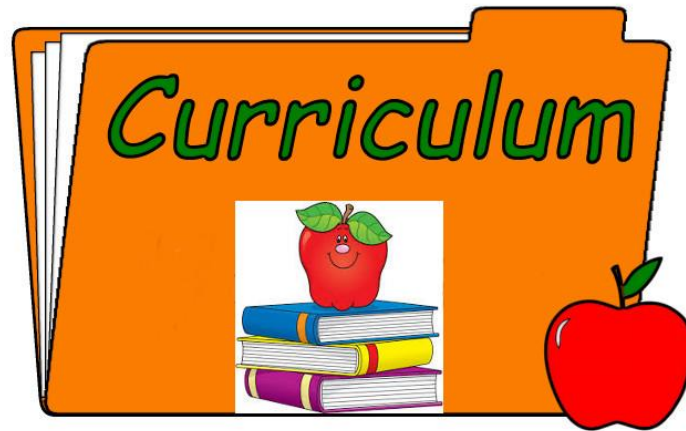
Genetic Algorithms

Approximation Algorithms

Syllabus and Schedule

Syllabus

Schedule



Presentation Style

I will integrate into lectures:

- **Connections**

- to courses you have taken, such as Models 1 and 2, Data Structures, Probability and Statistics
- to courses you may take in the future such as Advanced Algorithms 2
- to computer science and engineering

- **Context**

- When and how concept was conceived and how it is applied

- **History**

- Historical background on people and concepts

- **Bloom's Taxonomy**

- **Jokes**

- Usually at end of lecture videos

How to Succeed



- Watch the lecture videos and look over associated PPT slides in a timely fashion.
- Do the PSN problems in a timely fashion, keeping PSN up to date.
- Do the assigned textbook reading.
- Prepare well for quizzes and tests. When studying for quizzes carefully look over (1) the PPT slides and rewatch lecture videos for parts that are not clear to you; (2) your notes; (3) the textbook readings. When studying for tests do the same but look over quizzes as well.
- Do the homework in a timely fashion. Make sure to contact and communicate regularly with members of your homework group.
- If you do poorly on a quiz or test, make sure to look over and understand the correct solution.
- If you need help see me or the TA during our office hours. You can also contact us by email and set up an appointment if needed.

Joke



Why is the algorithms lecturer so fat?

Because he always minimizes the running time.