# CSCI 532: Algorithms
## Spring 2023 syllabus

**Instructor:** Dr. Brendan Mumey, brendan.mumey@montana.edu

**Lecture times:** 8:00 - 9:15 am Tue/Thu, NAH 153

**Office hours:** Tue/Thu 9:30 a.m. - 10:50 a.m. (NAH 253B)

*If those times do not work for you, send me an email or drop by, usually I can help you.*
My webex link: montana.webex.com/meet/q88x929

### Resources

Brightspace: ecat.montana.edu (mainly for grades)

Google drive: Used for course-related materials:

https://drive.google.com/drive/folders/1BqhkVnxwGNNQ_vygFtr0cNE_HbJ74iND?usp=sharing

### Textbook

Kleinberg and Tardos, *Algorithm Design*

*References:*    Cormen, Leiserson, Rivest, and Stein, *Introduction to Algorithms*
                Dasgupta, Papadmitriou, and Vazirani, *Algorithms*

### Course Prerequisite

Any 200+ level undergraduate course in algorithms and data structures (such as CSCI 232 at MSU).

### Course Outline

This course will cover a selection of graduate level algorithms and data structures. Topics will include: graph and network flow algorithms, techniques such as dynamic programming and greedy methods, and randomized and approximation algorithms. We will follow the textbook and also recent papers of interest. Students will be required to give some presentations during the semester and actively participate in class.

### Homework

Approximately every 2-3 weeks you will have a homework assignment. We will discuss the homework in a class and I may call on students to present their solutions.

I recommend using *latex*. (There is a free web version of latex at overleaf.com)

**Paper/Topic Presentation**

You will present an algorithms-related research paper. You may work with a partner. The presentation should be polished (like a conference presentation) and 15-20 minutes in length (or 30-35 if you work with a partner). You will also need to come up with 1-2 questions for the rest of the class to answer related to the paper.

You can also speak with your advisor about potential papers to present. Please send a link to the paper so I can approve it. Once approved, you can also pick an open date to present (see lecture schedule).

**Algorithms-related project**

You are required to do an algorithms-related project in this course. You may work with a partner. The topic should be related to algorithms and data structures in some way (or be an applied project requiring some application of algorithm design and analysis). There are three general types of projects:

1. Survey a problem: Find at least three academic papers that address the same or similar problems. Discuss each solution and compare and contrast them. What are their relative advantages and disadvantages?
2. Algorithm Experimentation: Implement two or more algorithms for a particular problem (e.g. a simple approach and a more sophisticated approach) based on relevant literature. Create a few experimental scenarios to test your programs on. Discuss the results.
3. Do some new research: Read some background for a problem that interests you and try to develop a new algorithmic approach. Discuss your ideas and any results that you are able to obtain.

You will give a short presentation of your project to the class and also submit a written paper detailing the project. The paper should be 2.5+ pages in length.

**Grading Scheme**

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| Homework | 50% |
| Paper presentation | 10% |
| Project | 20% |
| Quizzes | 20% |