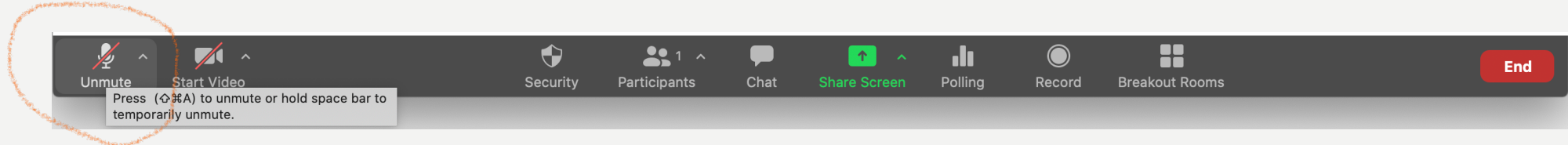


# **DESIGN AND ANALYSIS OF ALGORITHMS**

**CS 4120/5120  
COURSE INTRODUCTION**

# ZOOM MEETING MUTED BY DEFAULT

- By default your audio is muted upon entering the Zoom meeting.

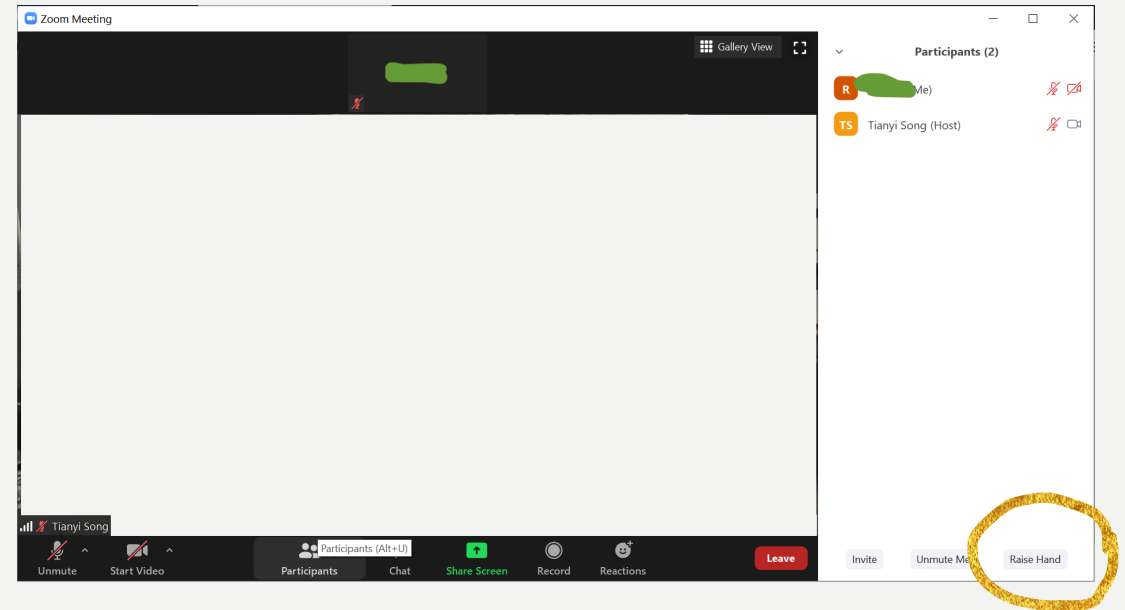


- You may press and hold the *space bar* to temporarily unmute your audio in case you want to speak to the class.
- By default your video is also off.
  - You may click the *Start Video* button if you want to be seen by everyone.
  - You are strongly encouraged to mute your video when you are not speaking.
    - Bandwidth constraint

# ZOOM MEETING

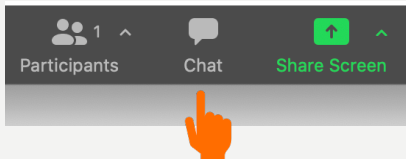
## THE “RAISE HAND” FUNCTION

- Anytime during the lecture, if you have a question about the subject being discussed, you may *raise your hand* by clicking the Raise Hand button.
- Or, you can simply *unmute* yourself and start speaking.



# ZOOM MEETING PRIVATE CHAT

- If you feel shy to ask questions in front of the class, you may start a private chat with me.
- You can do so by clicking the **Chat** button (next to the **Participants** button) at the bottom of the main view, then select me.

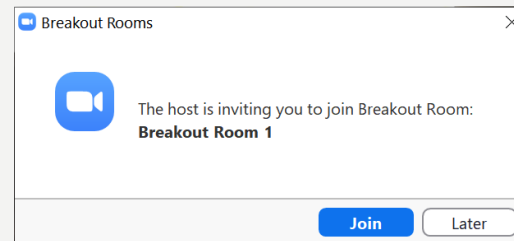


- You can also send me a file privately.



# ZOOM MEETING BREAKOUT ROOMS

- In some cases, I might randomly put you in breakout rooms for “brainstorming, discussions, group work”



- If you and your “roommate” need some help from me, you may click the *Ask for Help* button.



# **ZOOM MEETING**

## **MORE FEATURES**

- As we progress through the semester, we can explore more features of Zoom and start using those features!

# ABOUT THE INSTRUCTOR

- Instructor: Dr. Tianyi Song
- Office Hours: 1:00 pm ~ 2:00pm Mondays, Tuesdays, Wednesdays, and Fridays
- Email: [tsong@bgsu.edu](mailto:tsong@bgsu.edu)
- Class Delivery: Remote on Zoom
  - Zoom meetings are posted the Weeks' modules

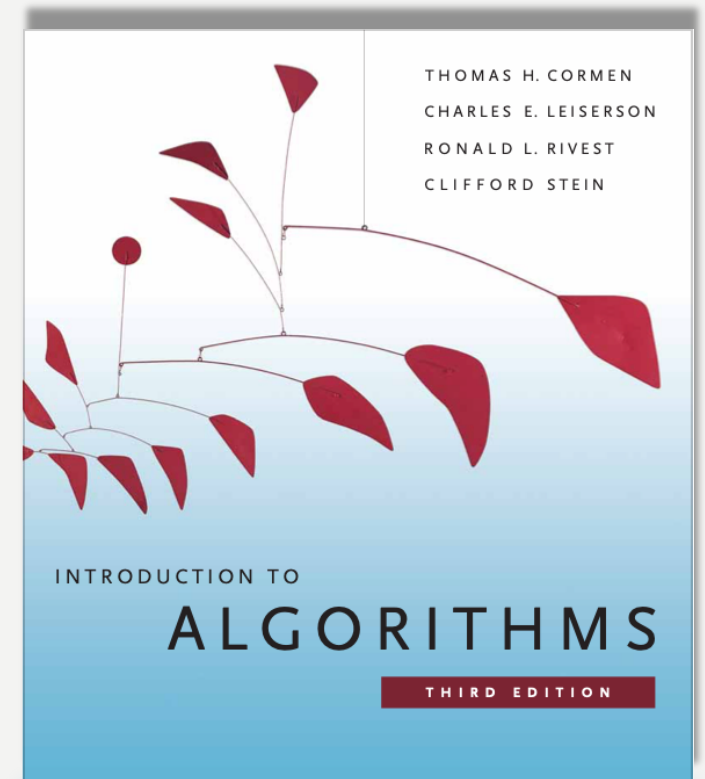
# GETTING HELP FROM THE TA

- Teaching Assistant: Mr. Prabesh Pathak
- Email: [ppathak@bgsu.edu](mailto:ppathak@bgsu.edu)
- Office Hours: [11:00 am ~ 12:00 pm Tuesdays](#)
  - Meeting ID: 756 3092 7466 Passcode: ta1112



# TEXTBOOK

- “Introduction to Algorithms,” by Cormen, Leiserson, Rivest, and Stein, MIT Press, 3rd Edition, 2009, ISBN-Hardcover: 978-0-262-03384-8, ISBN-Paperback: 978-0-262-53305-8.
  - The course will cover about 1/3 of the textbook contents
  - Related textbook pages will be extracted and provided within each week’s module



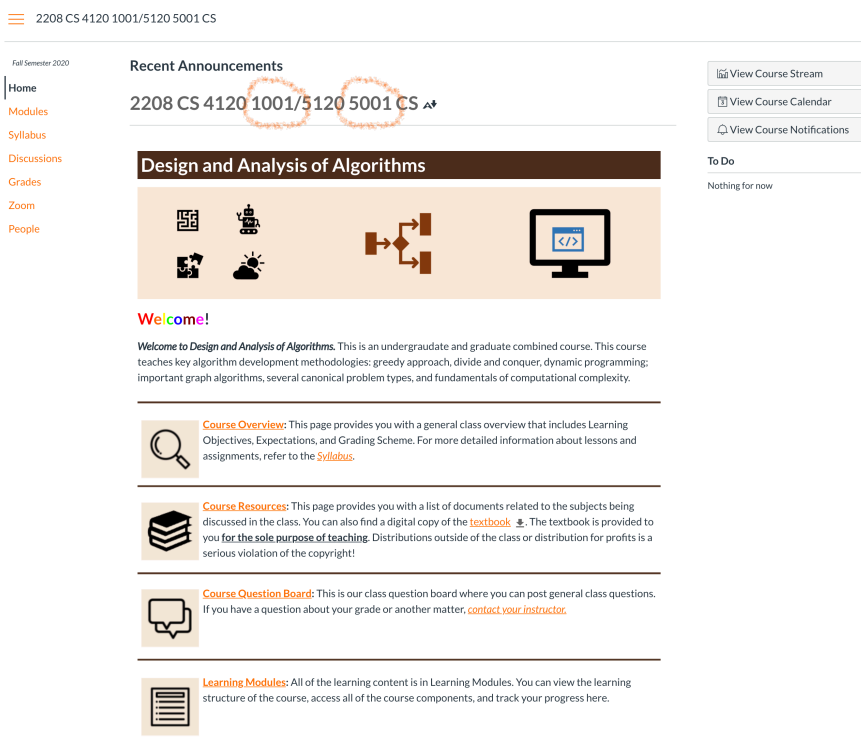
# CLASS CANVAS SHELL

- BGSU template adopted
  - The course syllabus is accessible from **Course Overview**.
  - Textbook and supplemental materials are provided in **Course Resources**.
  - Feel free to ask/answer questions or start a discussion by clicking **Course Question Board**.
    - You can also contact me
  - Access weekly schedules, lecture slides, assignments from **Learning Modules**.

The screenshot shows the Canvas LMS interface for the course 'Design and Analysis of Algorithms'. The top navigation bar includes links for Home, Modules (highlighted), Syllabus, Discussions, Grades, Zoom, and People. The main content area features a header with the course title and a 'Welcome!' message. Below this, there are four sections: 'Course Overview' (with a magnifying glass icon), 'Course Resources' (with a book icon), 'Course Question Board' (with a speech bubble icon), and 'Learning Modules' (with a document icon). The 'Course Question Board' section is circled in red, and the text 'contact your instructor' is highlighted. On the right side, there are buttons for 'View Course Stream', 'View Course Calendar', and 'View Course Notifications', and a 'To Do' section showing 'Nothing for now'.

# CLASS SECTION EXPLAINED

- Two sections are cross-listed as one section.
- Officially, you are still enrolled in your intended section.
- Attending the class
  - You will need to attend the sections that you enrolled in.
    - If you registered for section 1001/5001, attend the class @ **2:30 pm MWF**.
    - If you registered for section 1002/5002, attend the class @ **3:30 pm MWF**.



2208 CS 4120 1001/5120 5001 CS

Full Semester 2020

Home  
Modules  
Syllabus  
Discussions  
Grades  
Zoom  
People

Recent Announcements

2208 CS 4120 1001/5120 5001 CS

**Design and Analysis of Algorithms**

**Welcome!**

**Welcome to Design and Analysis of Algorithms.** This is an undergraduate and graduate combined course. This course teaches key algorithm development methodologies: greedy approach, divide and conquer, dynamic programming; important graph algorithms, several canonical problem types, and fundamentals of computational complexity.

**Course Overview:** This page provides you with a general class overview that includes Learning Objectives, Expectations, and Grading Scheme. For more detailed information about lessons and assignments, refer to the [Syllabus](#).

**Course Resources:** This page provides you with a list of documents related to the subjects being discussed in the class. You can also find a digital copy of the [textbook](#). The textbook is provided to you for the sole purpose of teaching. Distributions outside of the class or distribution for profits is a serious violation of the copyright!

**Course Question Board:** This is our class question board where you can post general class questions. If you have a question about your grade or another matter, [contact your instructor](#).

**Learning Modules:** All of the learning content is in Learning Modules. You can view the learning structure of the course, access all of the course components, and track your progress here.

[View Course Stream](#)  
[View Course Calendar](#)  
[View Course Notifications](#)

**To Do**  
Nothing for now

# CLASS ORGANIZATION

- Course content will be organized antichronologically in **modules of weeks**.
- Each week's module will contain
  - A class page providing
    - the links to Zoom meetings of the week
    - the corresponding lecture slides in PDF format
  - Supplemental readings extracted from the textbook
  - Assignments due by the Friday of the following week

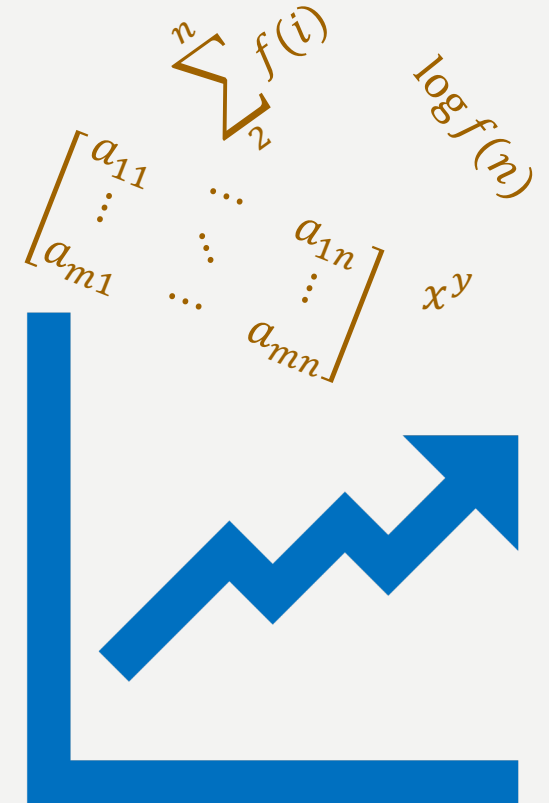
# EXPECTATIONS

- Attending your registered class sections
  - If you need to attend a different section, you must send me a notice by 12:00 pm on the day of the class.
- Taking notes
  - There will be in-class practice. The answers to those questions will not be posted.
- Actively engaging in the class
  - Ask many questions.
- Active thinking

# EXPECTATIONS

## BE COMFORTABLE WITH MATH

- Make yourself comfortable with mathematical symbols and works.
  - Determine the complexity of an algorithm
  - Analyze a given problem, and identify and define the computing requirements appropriate to its solution; and
  - Apply mathematical foundations, algorithmic principles, and computer science theory as appropriate in modeling and solving real-world problems.
  - Check out the mathematical notations posted in the [Course Resources](#) page.



# ASSESSMENT ASSIGNMENTS

- Weekly assignments
  - Individual work!
  - Accessible in modules of weeks
  - There is no homework assignments for the 1st week
  - Starting from the 2nd week, there will be weekly assignment
    - Due by 11:59 pm of the Friday of the following week

Fall Semester 2020

Home  
Syllabus  
Modules  
Discussions  
Grades  
Zoom  
People

▼ Week 01: August 26 and 28. No Homework

Join the class

This Week's Presentations

01 - Course Introduction

02 - Analyzing an Algorithm

Supplemental Readings

The Role of Algorithms (Textbook Chapter 1)

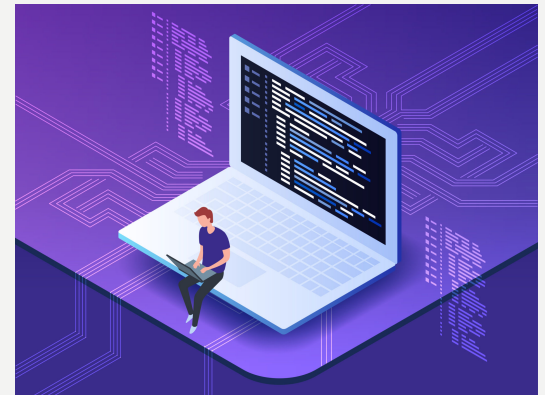
Analyzing algorithms (Textbook page 23 - 29)

Weekly Assignments

No homework assignments for the 1st week.

# ASSESSMENT PROJECTS

- Two programming projects
  - Individual work!
  - Project instructions will be posted via Canvas.
  - Students have the freedom of choosing their favorite programming languages to implement the algorithms.
  - Students be given 3 weeks to complete a project.





# ASSESSMENT EXAMINATIONS

- Midterm examination through Canvas
  - The scope of content is subjects covered from the first lecture through week 06.
  - Exam will be available on the Monday of the 8th week
    - Starts: 12:00 am, Monday, October 12, 2020
    - Ends: 11:59 pm, Friday, October 16, 2020
  - Two attempts allowed
    - Each attempt is limited by two and a half hours (150 minutes)
    - The final score will be the average of the two attempts

# ASSESSMENT EXAMINATIONS (CONT'D)

- Final examination through Canvas
  - The exam is NOT comprehensive.
    - Subject may be built on the content taught in the first half of the semester
  - The scope of content is subjects covered from week 07 through week 15.
  - Exam will be available on the Monday of the Final week
    - Starts: 12:00 am, Monday, December 7, 2020
    - Ends: 11:59 pm, Friday, December 11, 2020
  - Two attempts allowed
    - Each attempt is limited by two and a half hours (150 minutes)
    - The final score will be the average of the two attempts

# GRADING POLICY

- Your final letter grade will be determined by the overall percentage
- Based on your overall percentage you will receive
  - A if you achieve  $\geq 89.5\%$
  - B if you achieve  $\geq 79.5\%$  and  $< 89.5\%$
  - C if you achieve  $\geq 69.5\%$  and  $< 79.5\%$
  - D if you achieve  $\geq 60\%$  and  $< 69.5\%$
  - F if you achieve  $< 60\%$
- The cuts for A, B, and C will be lowered by 0.5% if you do not have missing/late submission.

# TOPICS OVERVIEW

## FOUNDATIONS

- The role of algorithms
- Reading/writing pseudocode
- Analyzing algorithms
- Growth functions
- The case of sorting algorithms

# TOPICS OVERVIEW

## DESIGN TECHNIQUES

- Divide-and-Conquer
- Prune-and-search
- Dynamic programming
- Greedy strategy

# TOPICS OVERVIEW

## ELEMENTARY GRAPH ALGORITHMS

- Data structure
- Binary search tree
- Graph traversal algorithms
- Minimum spanning tree
- Shortest-path algorithms

# TOPICS OVERVIEW

## ADVANCED

- Polynomial time
- NP-completeness (required for graduate level)
- NP-complete problems (required for graduate level)

- Table of references
  - <https://rb.gy/mq83ie>





# **NEXT UP**

# **THE ROLE OF ALGORITHMS**