Preliminaries

Science

Computer Science

CS 331: Data Structures and Algorithms

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College of Science

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- Office: SB 226C
  - Hours: Wed/Fri 12:30-1:30

Agenda

- Course overview & Administrivia
  - Prerequisites
  - Topics & Resources
  - Grading
  - Dev environment & Class procedures

Data Structures

- How do we store, organize, and retrieve data on a computer?

& Algorithms

- How can we efficiently (in space/time) carry out some typical data processing operations?
- How do we analyze and describe their performance?

Prerequisites

- I assume you are …
  - fluent in some programming language
    - familiar with procedural & OO paradigms
  - comfortable with development processes:
    - compilation, debugging, testing

Python

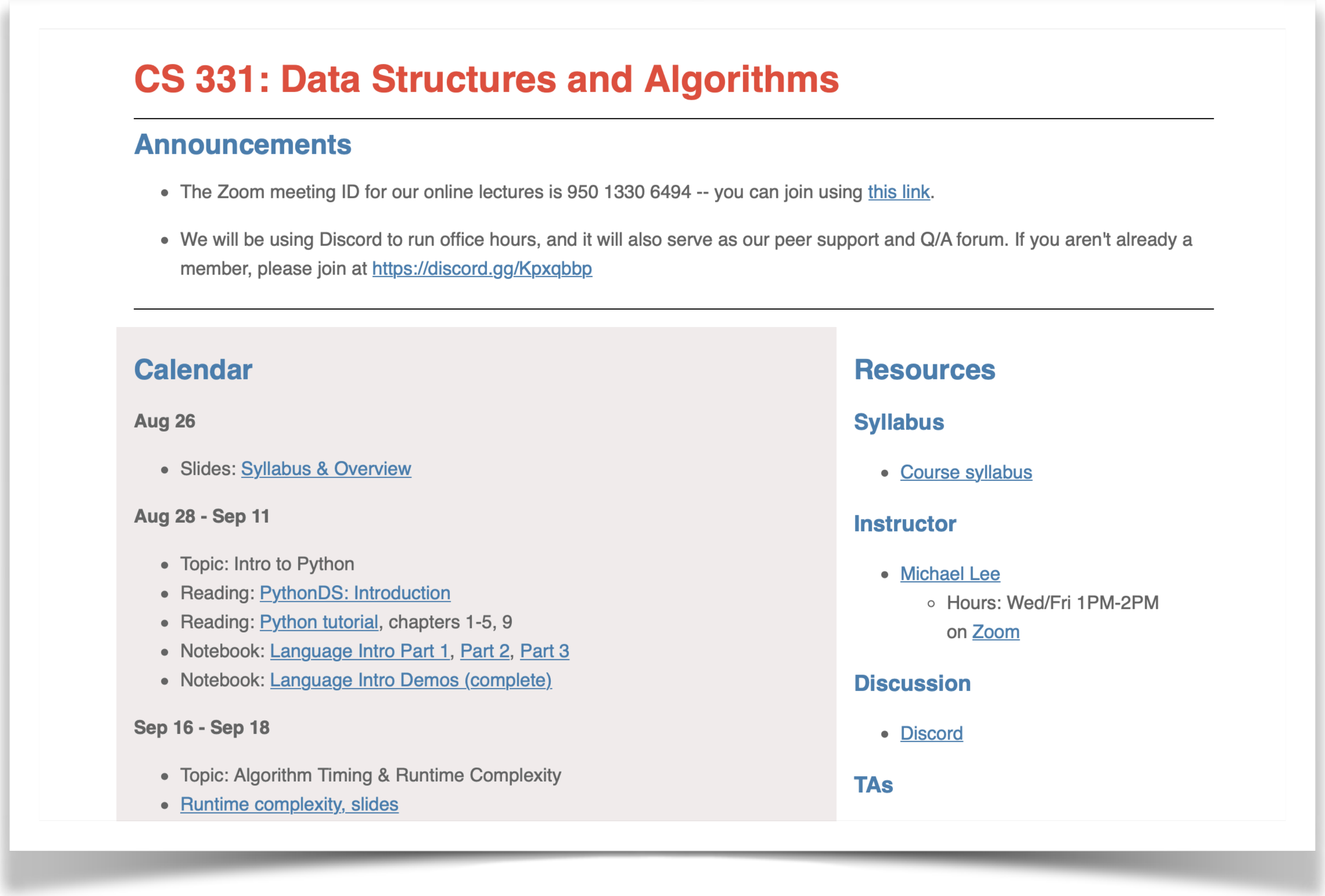
- We'll use the Python programming language to explore data structures & algorithms
- Easy-to-learn, clean ("one obvious way to do" things), and popular language
  - Ton of useful, powerful libraries

Topics

- Python crash course
- Algorithmic analysis
- Linear data structures (Lists, Stacks, Queues)
- Hashing and Hashtables (aka Maps)
- Recursion and Trees

Class Resources

1. Course website: moss.cs.iit.edu/cs331
   - static information
     - lecture calendar, slides, external resources, etc.



CS 331: Data Structures and Algorithms

Announcements

- The Zoom meeting ID for our online lectures is 950 1330 6494 -- you can join using this link.
- We will be using Discord to run office hours, and it will also serve as our peer support and Q/A forum. If you aren't already a member, please join at https://discord.gg/Kpxqbbp

Calendar

Aug 26

- Slides: Syllabus & Overview

Aug 28 - Sep 11

- Topic: Intro to Python
- Reading: PythonDS: Introduction
- Reading: Python tutorial, chapters 1-5, 9
- Notebook: Language Intro Part 1, Part 2, Part 3
- Notebook: Language Intro Demos (complete)

Sep 16 - Sep 18

- Topic: Algorithm Timing & Runtime Complexity
- Runtime complexity, slides

Resources

Syllabus

- Course syllabus

Instructor

- Michael Lee
  - Hours: Wed/Fri 1PM-2PM on Zoom

Discussion

- Discord

TAs

Class Resources

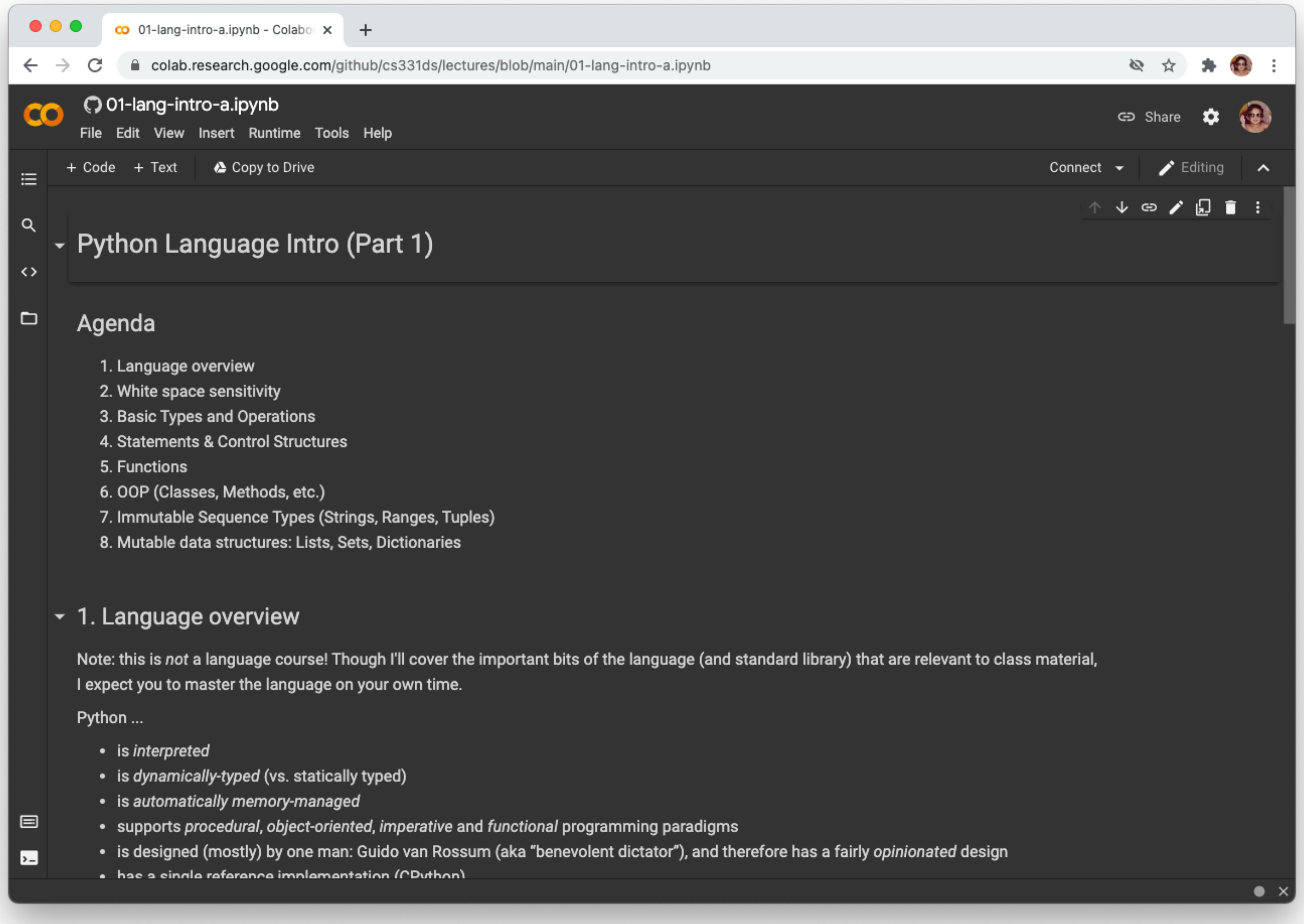
2. Learning platform: Mimir

  - lab notebooks with built-in tests
  - quizzes/self-assessments

Class Resources

3. Google Colaboratory

- interactive lecture notebooks


01-lang-intro-a.ipynb - Colabo
colab.research.google.com/github/cs331ds/lectures/blob/main/01-lang-intro-a.ipynb
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Python Language Intro (Part 1)

Agenda

1. Language overview
2. White space sensitivity
3. Basic Types and Operations
4. Statements & Control Structures
5. Functions
6. OOP (Classes, Methods, etc.)
7. Immutable Sequence Types (Strings, Ranges, Tuples)
8. Mutable data structures: Lists, Sets, Dictionaries

1. Language overview

Note: this is *not* a language course! Though I'll cover the important bits of the language (and standard library) that are relevant to class material, I expect you to master the language on your own time.

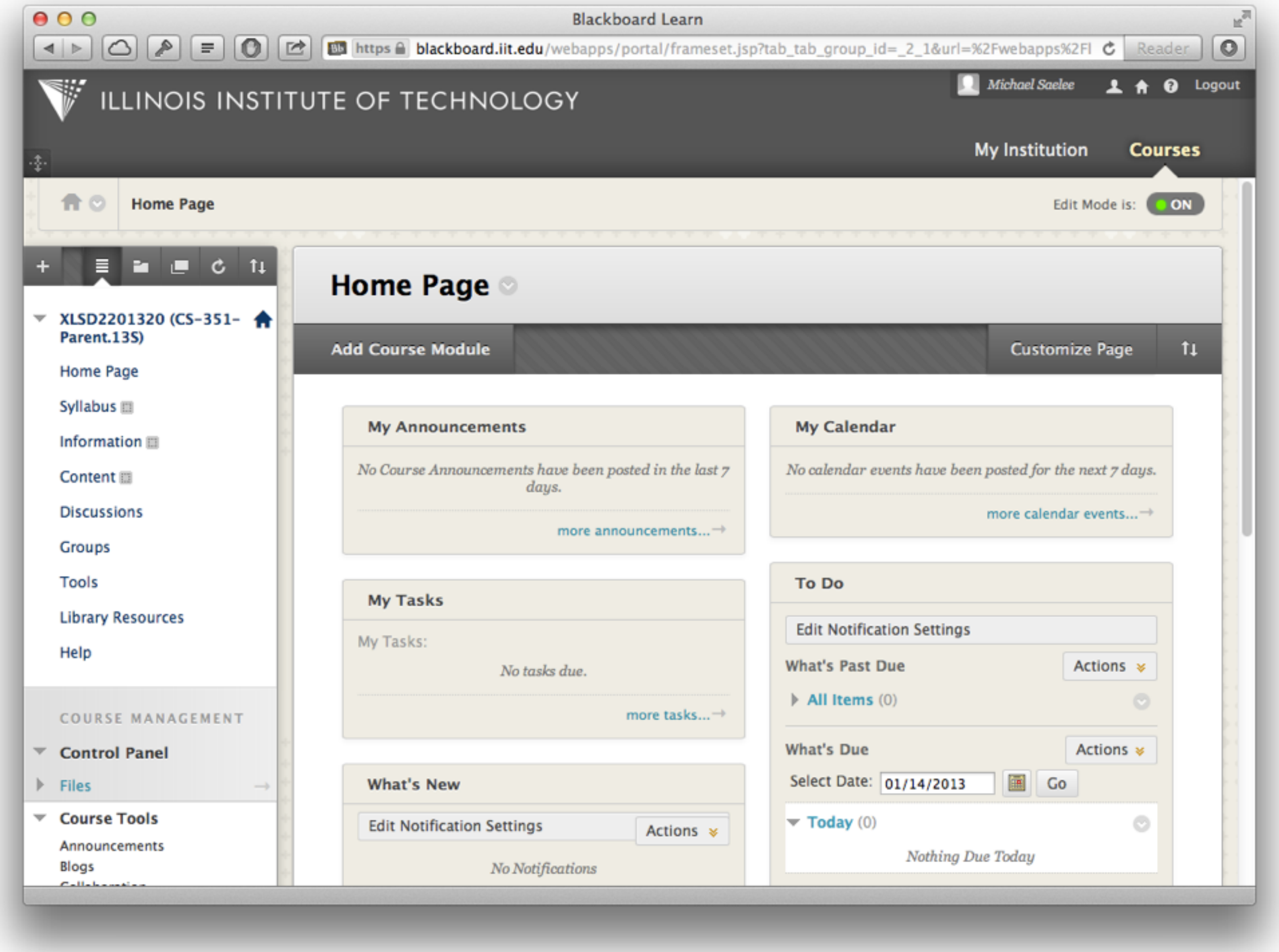
Python ...

- is *interpreted*
- is *dynamically-typed* (vs. statically typed)
- is *automatically memory-managed*
- supports *procedural*, *object-oriented*, *imperative* and *functional* programming paradigms
- is designed (mostly) by one man: Guido van Rossum (aka “benevolent dictator”), and therefore has a fairly *opinionated* design
- has a single reference implementation (CPython)

Class Resources

4. Blackboard

   - Final gradebook



No Course Announcements have been posted in the last 7 days.

No calendar events have been posted for the next 7 days.

My Tasks:

No tasks due.

Select Date: 01/14/2013

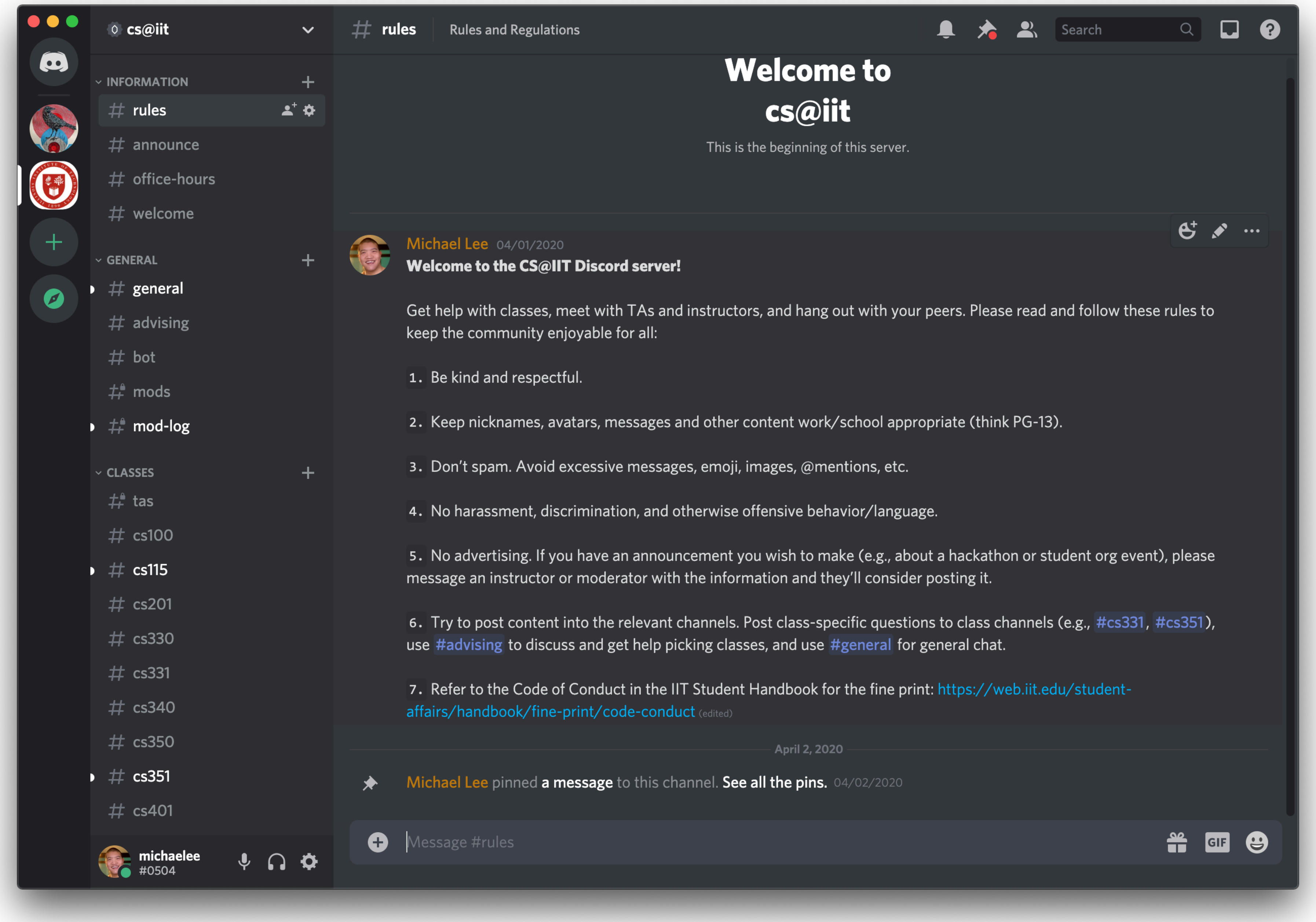
Nothing Due Today

No Notifications

Class Resources

5. Discord: discussion forum

   - text/voice chat + screen share



Welcome to cs@iit

This is the beginning of this server.

Michael Lee 04/01/2020

Welcome to the CS@IIT Discord server!

Get help with classes, meet with TAs and instructors, and hang out with your peers. Please read and follow these rules to keep the community enjoyable for all:

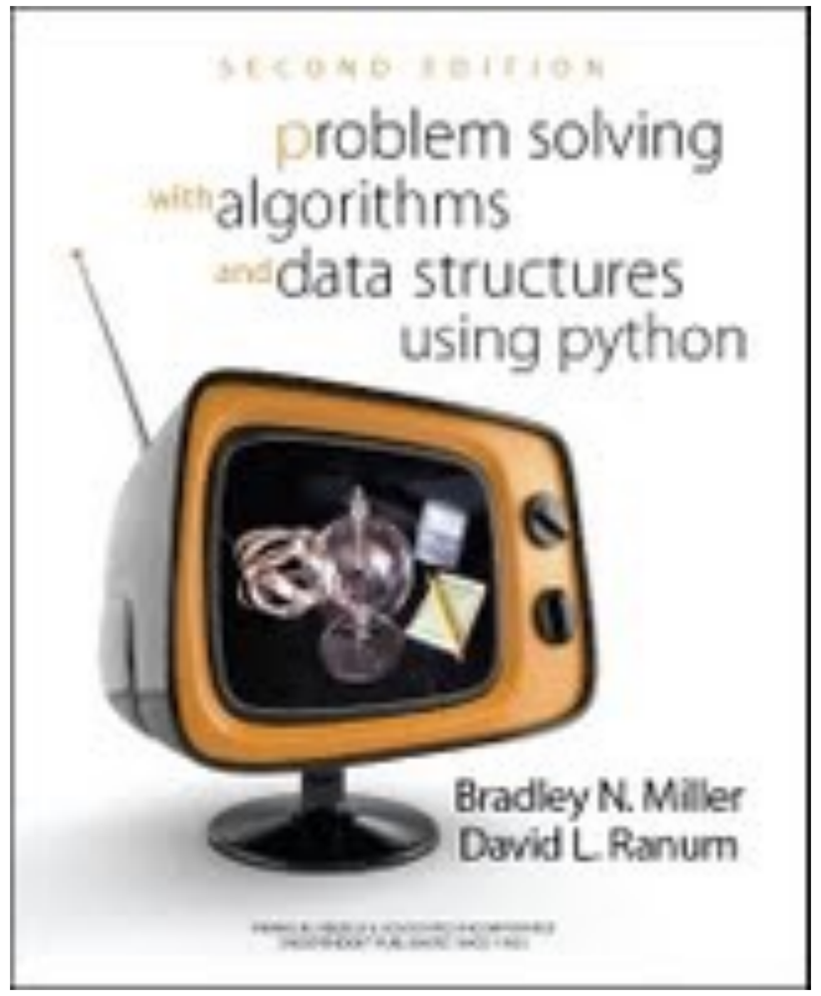
1. Be kind and respectful.
2. Keep nicknames, avatars, messages and other content work/school appropriate (think PG-13).
3. Don't spam. Avoid excessive messages, emoji, images, @mentions, etc.
4. No harassment, discrimination, and otherwise offensive behavior/language.
5. No advertising. If you have an announcement you wish to make (e.g., about a hackathon or student org event), please message an instructor or moderator with the information and they'll consider posting it.
6. Try to post content into the relevant channels. Post class-specific questions to class channels (e.g., #cs331, #cs351), use #advising to discuss and get help picking classes, and use #general for general chat.
7. Refer to the Code of Conduct in the IIT Student Handbook for the fine print: https://web.iit.edu/student-affairs/handbook/fine-print/code-conduct (edited)

April 2, 2020

Michael Lee pinned **a message** to this channel. **See all the pins.** 04/02/2020

Supplements

- The Python Tutorial (docs.python.org/3/)
- Problem Solving with Algorithms and Data Structures Using Python



Grading

- 35% Machine Problems
- 5% Quizzes / Self-evaluation
- 60% Exams (3 total: 2 midterms + final)

On Exams

- Will be announced at least 2 weeks in advance
- Nominally cumulative (but will focus on material since preceding exam)
- Format/Modality to be determined

Quizzes

- Released periodically on Mimir
- For self-evaluation and exam preparation
- Retake as many times as you wish (but scores released after due date)

Machine Problems

- New programming assignment most weeks
- All assignments are retrieved and submitted on Mimir
  - Provided codebase typically covered in preceding lectures
- Late policy: 7 total late days, distributed as you like throughout semester — once out, no late work accepted!

Jupyter Notebook

- In-browser Python development platform
  - “Cells” can contain plain text, code, output (and more)
  - All lecture notes, demos, and assignments will be distributed as notebook files

Jupyter Notebook

- You can optionally install a notebook server on your own computer for convenience
  - See http://jupyter.org/install.html — either JupyterLab & "Classic" Jupyter Notebook are fine (with Python3)

Interactive Lectures

- Lecture notebooks available in course repository
  - Open on Google Colab or local Jupyter installation
    - Class is usually one long interactive demo.
- Completed notebooks posted on the class website

§ Demo