

SI 506: Programming I

Winter 2022

Prologue

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Welcome

go blue



UNIVERSITY OF
MICHIGAN

Prerequisites

none 😊

no prior programming
experience is required

Questionnaire

No wrong answers

SI 506 questionnaire

This anonymous questionnaire is designed to provide the SI 506 teaching team with basic student information in order to better adapt this course to meet your needs and interests. We will ask you to 1) identify your program of study, 2) provide us with a bit of info regarding your laptop, 3) describe your prior programming experience—if any, 5) familiarity with certain file types, 6) indicate prior use of various cloud services, 7) rate your level of enthusiasm for learning to program, and surface any meta-worries or anxieties that you might have about the course. There are no wrong answers; only useful information to be shared.

NEXT



Page 1 of 11

Never submit passwords through Google Forms.

Teaching Team

<https://www.si506.org/team/>

Anthony Whyte



Yaoqi Liao



Yash Kamat



Tasha Torchon



GSI

GSI

GSI

Joshua Horowitz



Swathi Komarivelli

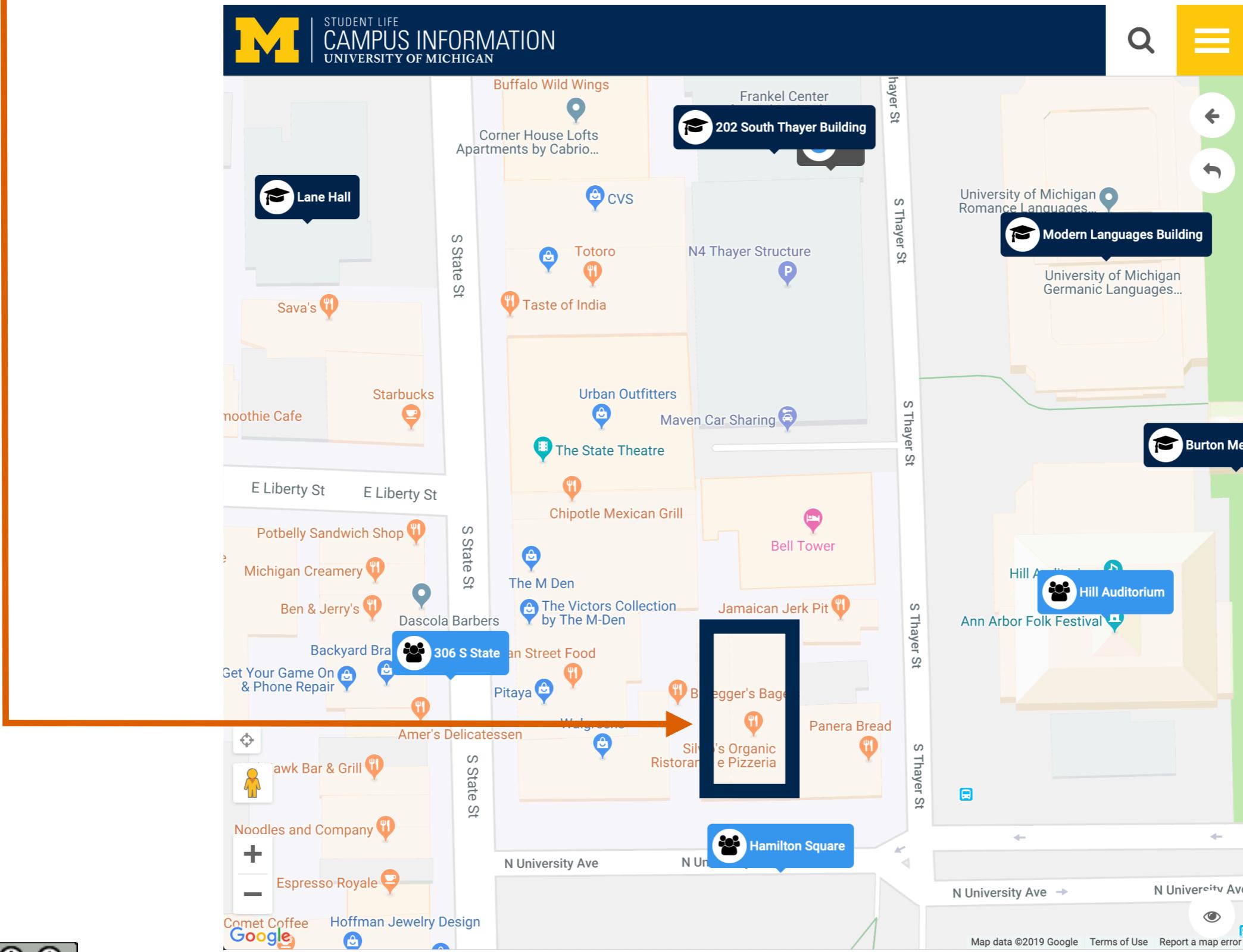


IA

IA

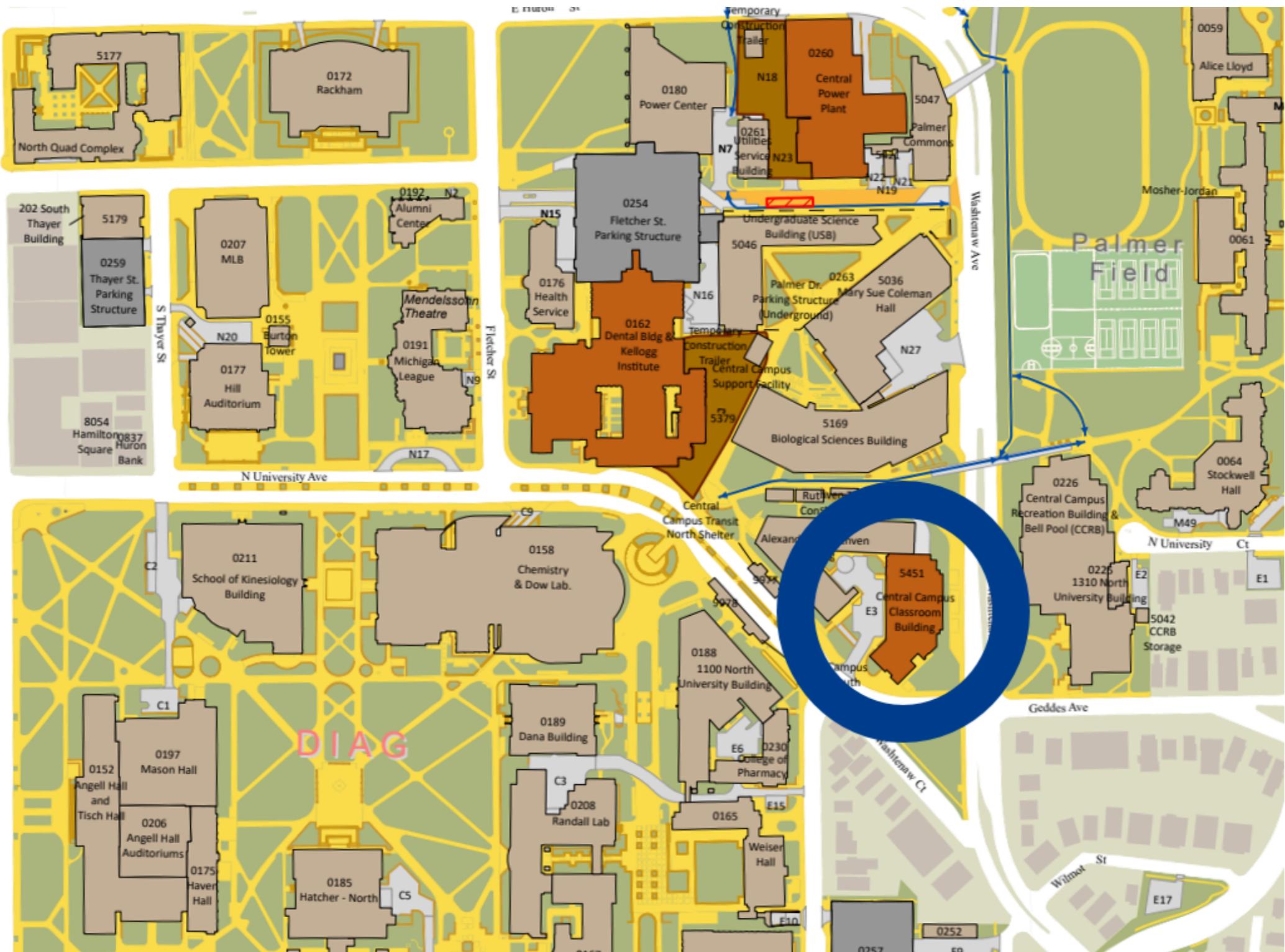
arwhyte: office

office: Roumanis Square, 2nd floor, UMSI Loft, Rm 201H



Central Campus Classroom Building

CCCB location (open Winter 2022)



Central Campus Classroom Building

CCCB exterior



2460 CCCB

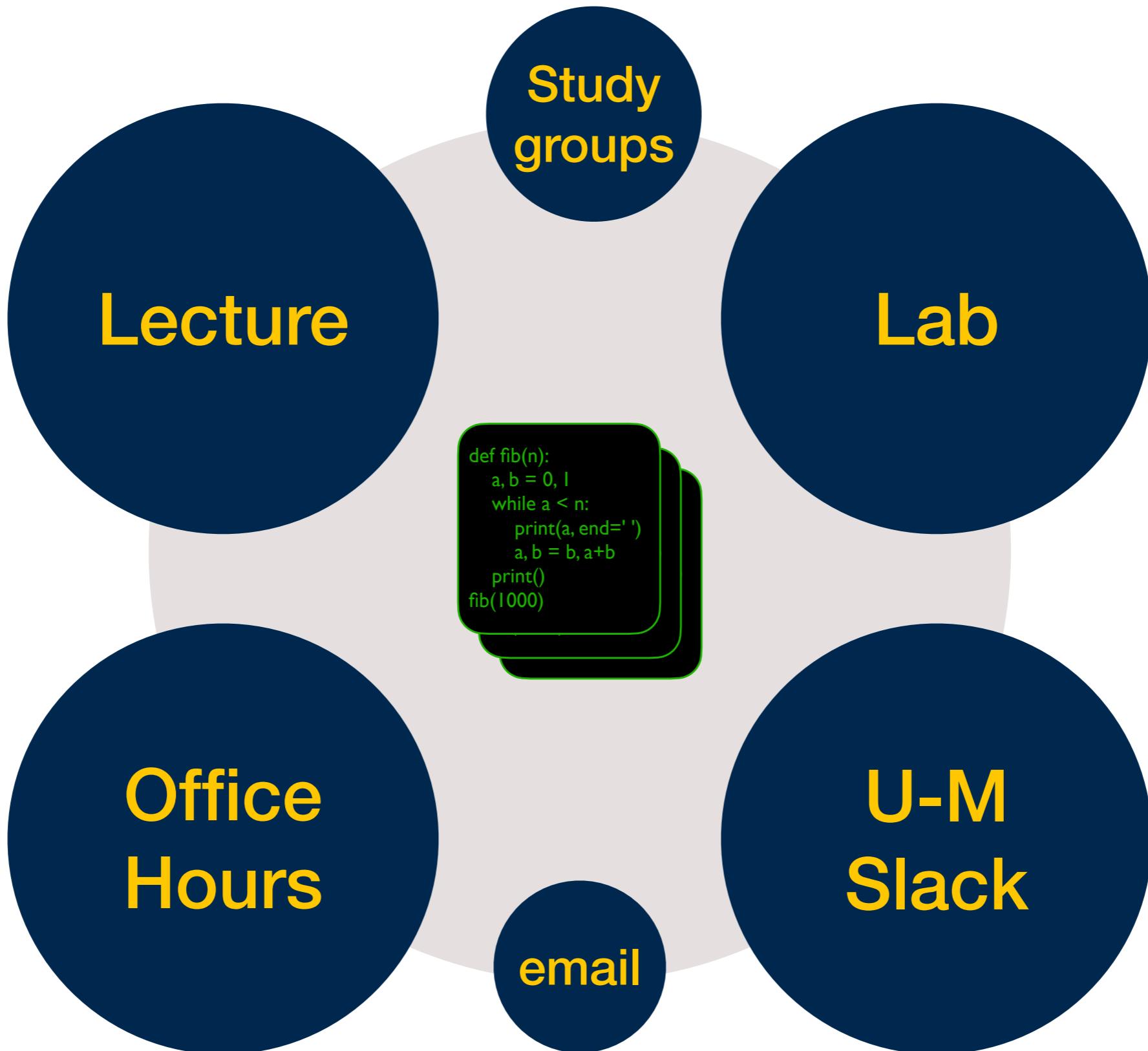
our classroom



teaching & learning

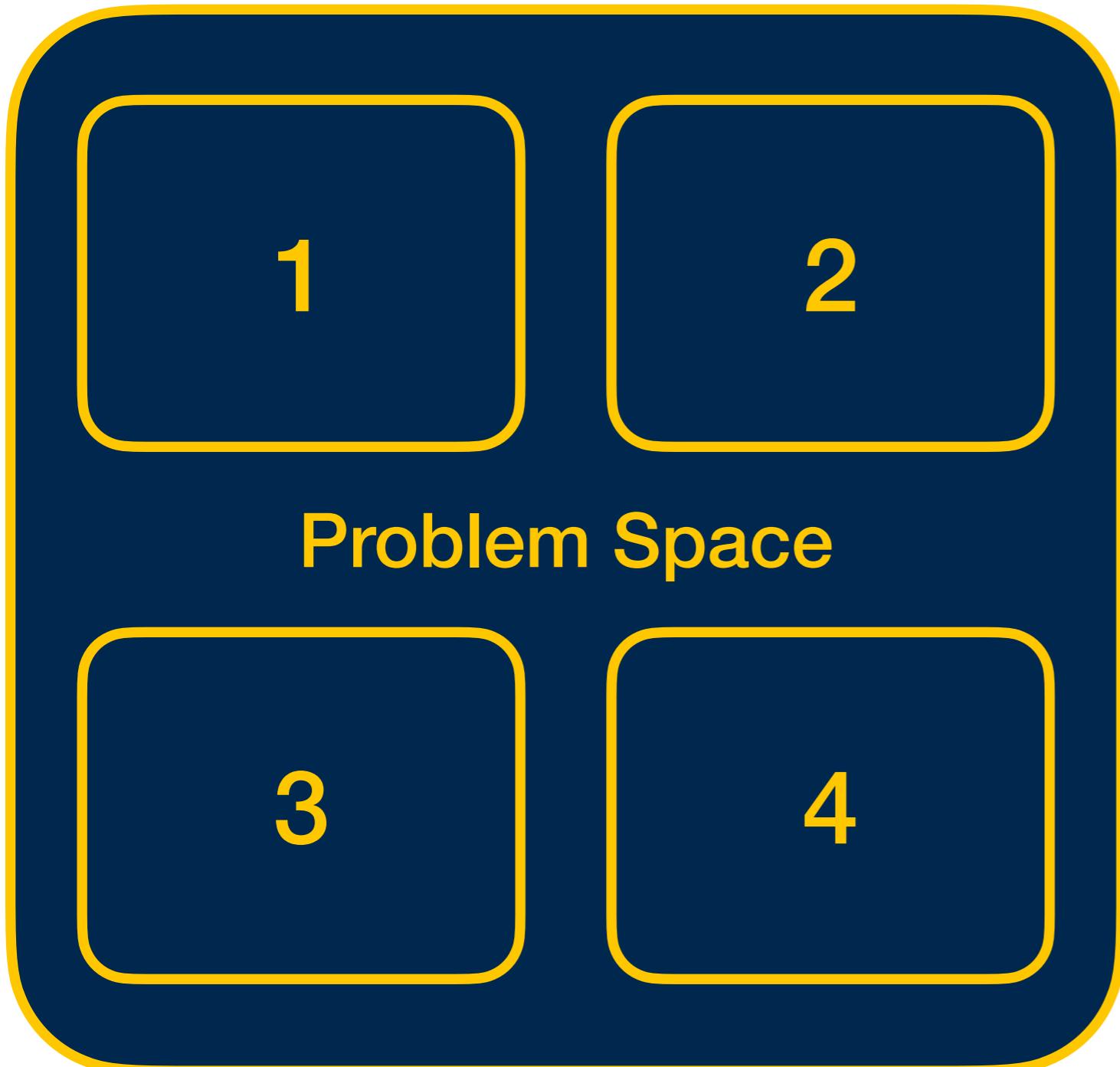


Communication channels



Problem-solving (programmatic)

decompose a problem into subproblems



- Divide problems into sub-problems.
- Work iteratively, moving from general solutions to specific solutions.
- For each sub-problem write working code.
- Solve each sub-problem before proceeding to next problem.

Language of instruction

expressive, flexible, general purpose, beginner-friendly

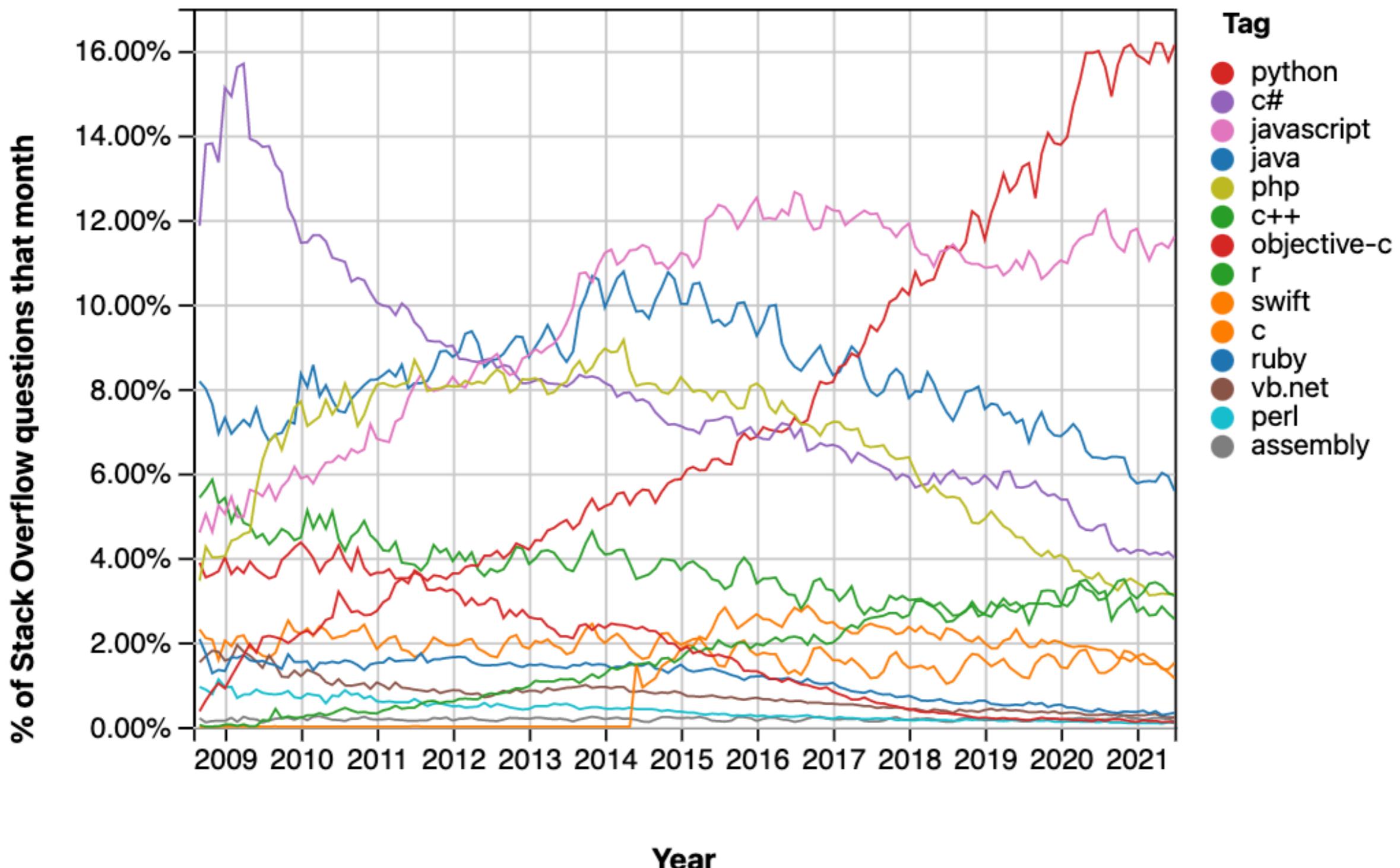


python™

scripting,
data analysis,
artificial intelligence,
scientific computing,
web development

Gauging interest in Python

stackoverflow trends (Q&A):



Topics

programming fundamentals

Syntax / Semantics

variables
objects
operators
expressions
statements

Data Structures

strings
lists
tuples
dictionaries
nested structures

Iteration

Definite iteration
Indefinite iteration
Accumulation
Comprehensions

Control Flow

conditional execution
(if-elif-else)
truth value

Functions

built-in
user-defined
main()
parameters
return value

Files

read / write
file objects
.txt, .csv, .json

Web API

package install (pip)
HTTP GET requests

Modules

import
modular design

Documentation

comments
Docstrings
README

Errors

tracebacks
debugging

Write programs

modular, reusable code

```
import json
import requests

ENDPOINT = 'https://swapi.py4e.com/api'

def create_person(response):
    pass

def get_resource(url, params=None):
    pass

def write_json(filepath, data):
    pass

def main():
    response = get_resource(f'{ENDPOINT}/people/', {'search': 'rey'})
    rey = create_person(response)
    print(f'Rey = {rey}')
    write_json('rey.json', rey)

if __name__ == '__main__':
    main()
```

The terminal

interact with your operating system / file system

```
arwhyte@0587377524:~/Documents/umich/courses/SI506
$ Documents cd ..
$ ~ clear
$ ~ mkdir Documents/umich/courses/SI506
$ ~ cd Documents/umich/courses/SI506
$ SI506 pwd
/Users/arwhyte/Documents/umich/courses/SI506
$ SI506 mkdir assignments
$ SI506 mkdir lectures
$ SI506 cd lectures
$ lectures mkdir lectures_01
$ lectures cd ../../..
$ courses cd SI506
$ SI506 python3
Python 3.10.1 (main, Dec 6 2021, 22:25:40) [Clang 13.0.0 (clang-1300.0.29.3)] on darwin
Type "help", "copyright", "credits" or "license" for more information.
>>> teaching_team = ['Anthony', 'Tasha', 'Yash', 'Yaoqi', 'Joshua', 'Swathi']
>>> gsi_members = teaching_team[1:4]
>>> ia_members = teaching_team[-2:]
>>> print(gsi_members)
['Tasha', 'Yash', 'Yaoqi']
>>> print(ia_members)
['Joshua', 'Swathi']
>>> instructor = None
>>> for member in teaching_team:
...     if member not in gsi_members and member not in ia_members:
...         instructor = member
...
>>> print(instructor)
Anthony
>>> exit()
$ SI506
```



Visual Studio Code

<https://code.visualstudio.com/>

The screenshot shows the Visual Studio Code interface with two files open:

- Preview lecture_03.md**: A Markdown file titled "SI 506 Lecture 03" containing a "Topics" section and a "1.0 COMMENTS" section. The "1.0 COMMENTS" section includes code examples for single-line and multi-line comments.
- lecture_03.py**: A Python script with the following content:

```
# SI 506 Lecture 03
# 1.0 COMMENTS
# this is a comment
"""
A
multiline
string
"""

# 2.0 VALUES (OBJECTS) AND TYPES
# 2.1 NUMBERS: integer, float (decimal)
506
.25

# 2.2 SEQUENCES (ORDERED SET)
'this is a string'
[506, 507, 618]
('csev', 'arwhyte')

# 2.3 ASSOCIATIVE ARRAY (MAP): dictionary (key-value pairs)
{'nickname': 'anth', 'role': 'student'}

# 2.4 BOOLEAN
True
False
```

The bottom of the screen shows the terminal output for the "lecture_03" script:

```
(venv) → lecture_03 git:(master) ✘ /Users/arwhyte/Development/repos/github/umsi-arwhyte/SI506/venv/bin/python3.8 /Users/arwhyte/Development/repos/github/umsi-arwhyte/SI506/docs/lectures/2020fall/lecture_03/lecture_03.py
teaching_team_count = None
instructor_count = None
max_enrollment = None
average_lab_size = None
average_lab_size = None
(venv) → lecture_03 git:(master) ✘
```

The status bar at the bottom indicates the environment is "Python 3.8.5 64-bit ('venv': venv)" and the file is "lecture_03.py".

infrastructure



si506.org

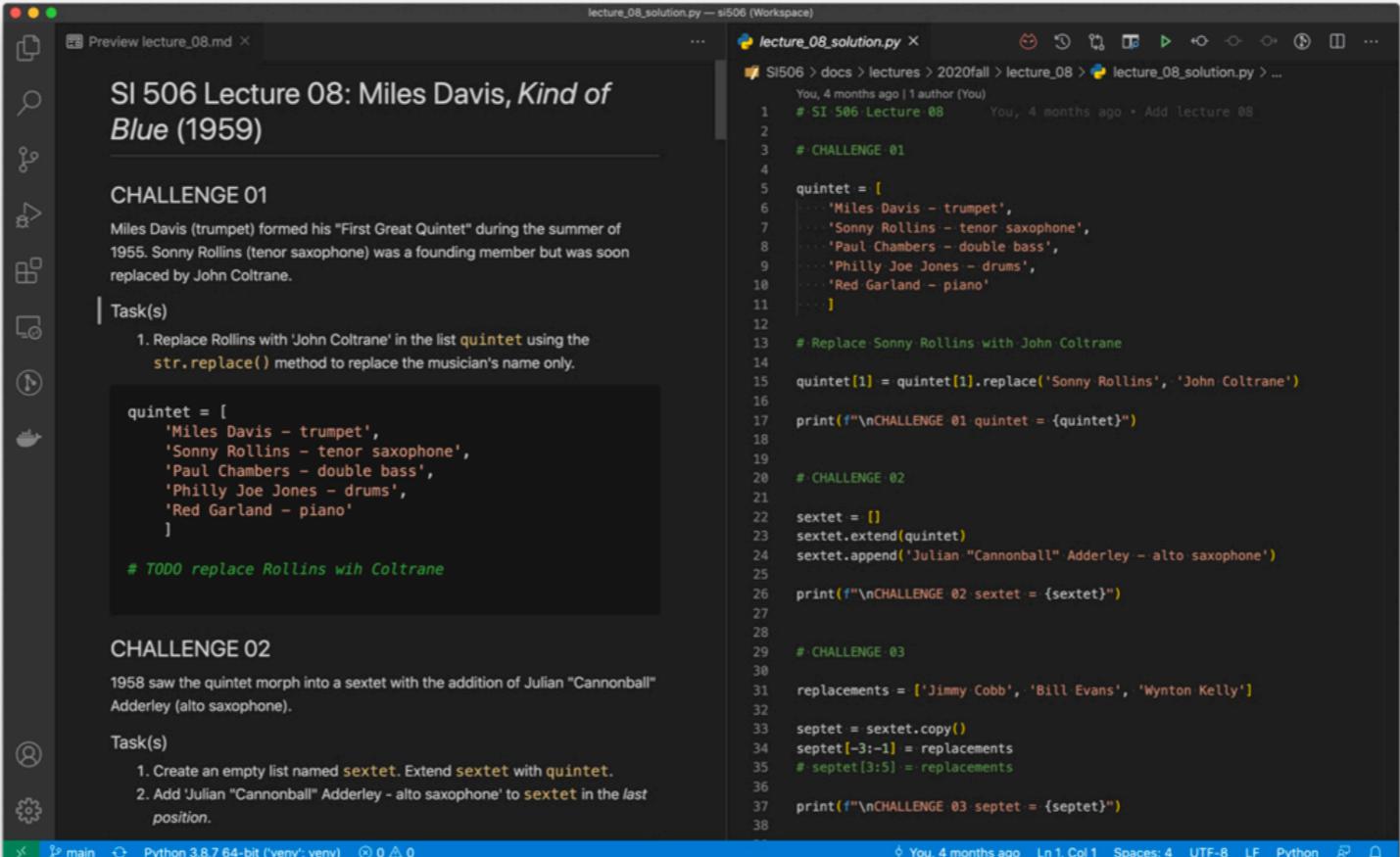
syllabus, meetings, schedule, resources, team

SI 506 Programming I

Syllabus Meetings Schedule Resources Team Contact

SI 506 Programming I

SI 506 is designed for graduate students with little or no programming experience. Programmatic thinking, program design fundamentals, and code readability and maintainability are key themes. SI 506 together with SI 507 constitutes an introductory course series that focuses on programming fundamentals. As a foundational course SI 506 serves as a prerequisite for SI 507 along with other more advanced UMSI courses.



```
lecture_08_solution.py -- si506 (Workspace)

lecture_08_solution.py
# SI 506 Lecture 08
# CHALLENGE 01
quintet = [
    'Miles Davis - trumpet',
    'Sonny Rollins - tenor saxophone',
    'Paul Chambers - double bass',
    'Philly Joe Jones - drums',
    'Red Garland - piano'
]
# TODO replace Rollins with Coltrane

# Replace Sonny Rollins with John Coltrane
quintet[1] = quintet[1].replace('Sonny Rollins', 'John Coltrane')
print(f"\nCHALLENGE 01 quintet = {quintet}")

# CHALLENGE 02
sextet = []
sextet.extend(quintet)
sextet.append('Julian "Cannonball" Adderley - alto saxophone')
print(f"\nCHALLENGE 02 sextet = {sextet}")

# CHALLENGE 03
replacements = ['Jimmy Cobb', 'Bill Evans', 'Wynton Kelly']
septet = sextet.copy()
septet[-3:-1] = replacements
# septet[3:5] = replacements
print(f"\nCHALLENGE 03 septet = {septet}")

You, 4 months ago | 1 author (You)
# SI 506 Lecture 08
# CHALLENGE 01
# Replace Sonny Rollins with John Coltrane
# CHALLENGE 02
# CHALLENGE 03
You, 4 months ago + Add lecture 08
```

SI 506 Lecture 08: Miles Davis, *Kind of Blue* (1959)

CHALLENGE 01

Miles Davis (trumpet) formed his "First Great Quintet" during the summer of 1955. Sonny Rollins (tenor saxophone) was a founding member but was soon replaced by John Coltrane.

Task(s)

- Replace Rollins with 'John Coltrane' in the list `quintet` using the `str.replace()` method to replace the musician's name only.

```
quintet = [
    'Miles Davis - trumpet',
    'Sonny Rollins - tenor saxophone',
    'Paul Chambers - double bass',
    'Philly Joe Jones - drums',
    'Red Garland - piano'
]
# TODO replace Rollins with Coltrane
```

CHALLENGE 02

1958 saw the quintet morph into a sextet with the addition of Julian "Cannonball" Adderley (alto saxophone).

Task(s)

- Create an empty list named `sextet`. Extend `sextet` with `quintet`.
- Add 'Julian "Cannonball" Adderley - alto saxophone' to `sextet` in the *last position*.

```
sextet = []
sextet.extend(quintet)
sextet.append('Julian "Cannonball" Adderley - alto saxophone')
```

CHALLENGE 03

```
replacements = ['Jimmy Cobb', 'Bill Evans', 'Wynton Kelly']
septet = sextet.copy()
septet[-3:-1] = replacements
# septet[3:5] = replacements
```

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Canvas LMS

Modules: Zoom info, weekly readings, assignments



← → ⌛ umich.instructure.com/courses/415327

Apps Archives/Libraries Finance Maps Data Vis

SI 506 001 WN 2021 > Modules

Winter 2021

Home Announcements 🔍

Zoom Piazza

Modules

Assignments

Pages

Files

People

Grades

New Analytics

Teaching Evaluations

Theia

Collaborations 🔍

Conferences 🔍

Discussions 🔍

Outcomes 🔍

Quizzes 🔍

Rubrics 🔍

Syllabus 🔍

Settings

Collapse All View Progress + Module ⋮

Course Status

Unpublish Published

Import Existing Content

Import from Commons

Choose Home Page

View Course Stream

New Announcement

New Analytics

View Course Notifications

Coming Up

View Calendar

Nothing for the next week

Course Info

Zoom connection info

Week 01: Local setup

Week 02: Variables, Operators, Expressions, and Statements

Week 03: Data Structures, Part I

Week 04: Data Structures, Part II

Week 05: Control Flow, Part I

A vertical sidebar on the left contains icons for various course functions: Home, Announcements, Zoom, Piazza, Modules, Assignments, Pages, Files, People, Grades, New Analytics, Teaching Evaluations, Theia, Collaborations, Conferences, Discussions, Outcomes, Quizzes, Rubrics, Syllabus, and Settings. The "Modules" icon is highlighted with a yellow background. The main content area displays a list of course modules, each with a title, a green checkmark, a plus sign, and a three-dot menu icon.

Slack

SI506-2021 Fall workspace

The screenshot shows the Slack interface for the SI506-2021 Fall workspace. The left sidebar lists various channels, with '# general' selected. The main pane displays a post from 'AWS' about GoHugo.io, followed by a message from 'Anthony Whyte' about tutoring resources. The UMSI logo is visible in the top right corner of the Slack window.

general Company-wide announcements and work-based matters

The world's fastest framework for building websites (218 kB) Wednesday, August 25th

GoHugo.io

Amazon Web Services, Inc.

Build Mobile & Web Apps Fast | AWS Amplify | Amazon Web Services

AWS Amplify helps front-end web and mobile developers build secure, scalable full stack applications. Supports iOS, Android, JavaScript, Flutter, React, and more.

Anthony Whyte 2:42 PM [Tutoring] Occasionally students inquire about tutoring resources. The UMSI Office of Academic and Students Affairs (OASA) is offering a couple of tutoring options for students enrolled in SI 506 and certain other classes this semester. Laura Elgas, OASA Executive Director outlined for me the two options which I pass on to you:

TutorMe

UMSI will again offer tutoring through TutorMe, which is an online tutoring vendor. The benefit of this option is that students can get connected to get help quickly and it is available 24 hours a day, 7 days a week. Last year, there was limited use of this tool, but of those who used it, the tutors received an average of 4.8/5 rating. However, there were some students who did not have the best experiences, so we are continuing to evaluate this service.

To access TutorMe, students go through a Canvas site. All students enrolled in the course will receive an email alerting them to the service and providing details on how to access the course. The first one will go out today or tomorrow.

UMSI Supported Tutoring

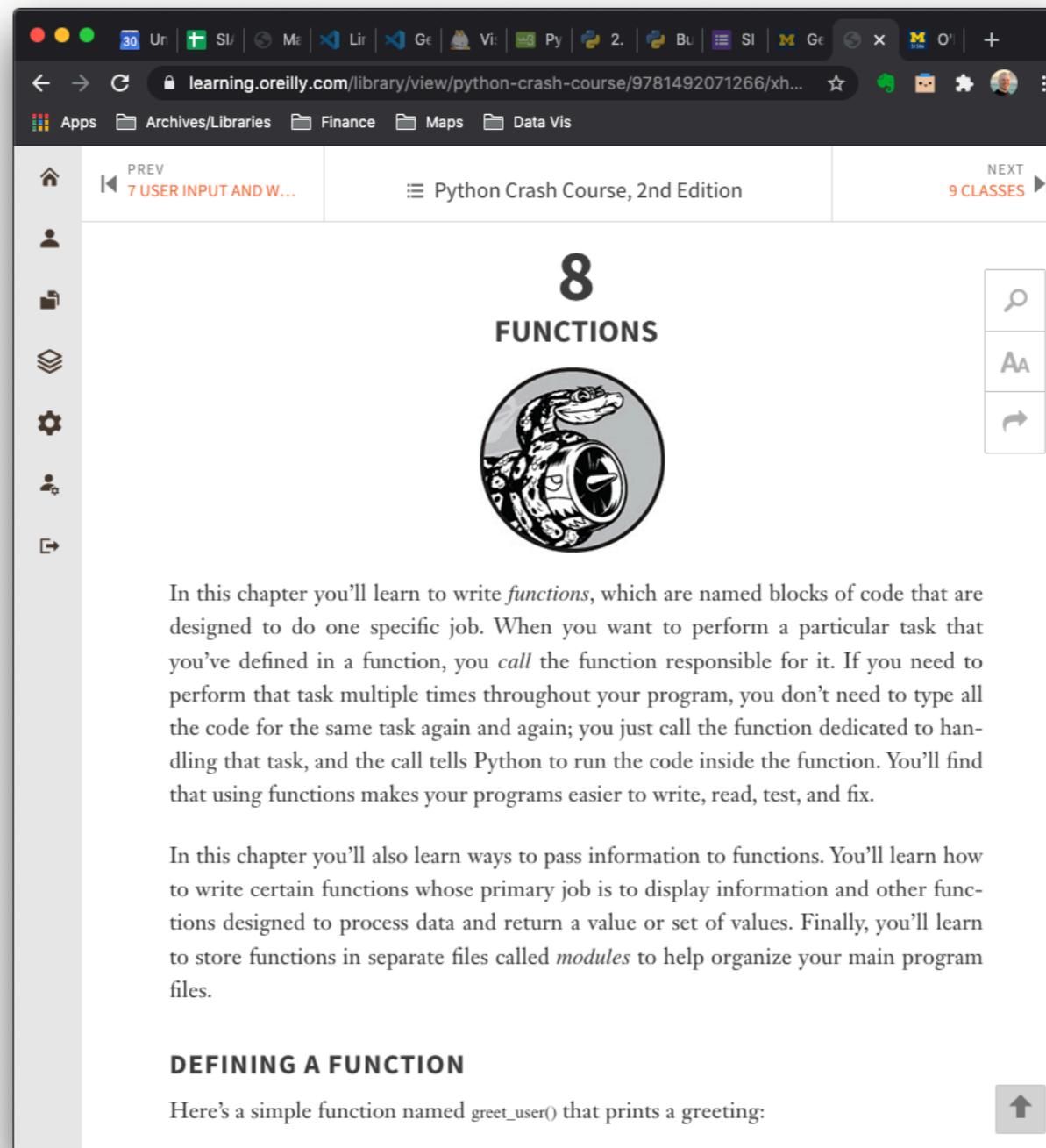
UMSI will be launching a supported tutoring program, providing free access to students for some individual and small group tutoring or study tables. We will be following some of the models of the Science Learning Center and the LSA Math Lab. As we hire tutors and have some options available, we will be following up with both the instructors and the class rosters to share additional information. (edited)

Message #general

signup instructions: <https://si506.org/resources>

O'Reilly Learning Platform

Free school account



The screenshot shows a web browser window displaying a chapter from the "Python Crash Course, 2nd Edition". The chapter title is "8 FUNCTIONS". A circular icon featuring a snake is centered above the title. The page content describes functions as named blocks of code designed to perform specific tasks, explaining how they can be called and reused. It also mentions passing information to functions and storing them in modules. A sidebar on the left contains various icons for navigation and settings. The top of the browser window shows a navigation bar with multiple tabs and a search bar.

In this chapter you'll learn to write *functions*, which are named blocks of code that are designed to do one specific job. When you want to perform a particular task that you've defined in a function, you *call* the function responsible for it. If you need to perform that task multiple times throughout your program, you don't need to type all the code for the same task again and again; you just call the function dedicated to handling that task, and the call tells Python to run the code inside the function. You'll find that using functions makes your programs easier to write, read, test, and fix.

In this chapter you'll also learn ways to pass information to functions. You'll learn how to write certain functions whose primary job is to display information and other functions designed to process data and return a value or set of values. Finally, you'll learn to store functions in separate files called *modules* to help organize your main program files.

DEFINING A FUNCTION

Here's a simple function named `greet_user()` that prints a greeting:

signup instructions: <https://si506.org/resources>



Gradescope

auto graded programming assignments

The screenshot shows a web browser displaying the Gradescope interface. The title bar reads "www.gradescope.com/courses/78527/assignments". The main heading is "23 Assignments". Below this is a table with the following columns: NAME, POINTS, RELEASED, DUE (EDT), SUBMISSIONS, % GRADED, PUBLISHED, and REGRADES. The table lists 13 assignments, each with a green progress bar indicating 100% grading. The assignments are:

NAME	POINTS	RELEASED	DUE (EDT)	SUBMISSIONS	% GRADED	PUBLISHED	REGRADES
SWAPI Echo Base Assignment	1500.0	APR 14	APR 30 AT 11:59PM	102	100%	✓	⋮
Problem Set 10	300.0	APR 07	APR 15 AT 11:59PM	100	100%	✓	⋮
Lab Exercise 11	20.0	APR 07	APR 14 AT 11:59PM	96	100%	✓	⋮
Problem Set 09	200.0	MAR 31	APR 09 AT 11:59PM	101	100%	✓	⋮
Lab Exercise 10	20.0	MAR 31	APR 09 AT 11:59PM	95	100%	✓	⋮
Lab Exercise 09	20.0	MAR 24	MAR 31 AT 11:59PM	98	100%	✓	⋮
Problem Set 08	200.0	MAR 24	MAR 31 AT 11:59PM	101	100%	✓	⋮
Problem Set 07	150.0	MAR 17	MAR 24 AT 11:59PM	102	100%	✓	⋮
Lab Exercise 08	20.0	MAR 17	MAR 24 AT 11:59PM	98	100%	✓	⋮
Problem Set 06	150.0	MAR 10	MAR 17 AT 11:59PM	100	100%	✓	⋮
Lab Exercise 07	20.0	MAR 10	MAR 17 AT 11:59PM	97	100%	✓	⋮
Midterm Problem	500.0	FEB 27	FEB 27 AT 11:30AM	100	100%	✓	⋮
Lab Exercise 06	20.0	FEB 18	FEB 24 AT 11:59PM	100	100%	✓	⋮

At the bottom of the table is a teal footer bar with three buttons: "Download Grades", "Duplicate Assignment", and "Create Assignment".



Github repo: SI506-practice

<https://github.com/umsi-arwhyte/SI506-practice>

The screenshot shows the GitHub repository page for 'SI506-practice'. The repository has 4 stars, 9 forks, and 39 commits. It contains files like README.md, lab_exercises, problem_sets, .gitignore, LICENSE, and README.md. The README.md file describes the repository as 'Retired problem sets and lab exercises made available for self-study.' It also lists the files included in each assignment. The Languages section shows Python at 100%. Contributors include arwhyte, garrisok, and others.

umsi-arwhyte / **SI506-practice**

Code Issues Pull requests Actions Projects Wiki Security Insights ...

master 1 branch 0 tags Go to file Add file Code

arwhyte Merge pull request #23 from garrisok... 6717692 on Oct 16, 2020 39 commits

lab_exercises Merge pull request #23 from garrisok/master 3 months ago

problem_sets Added informats.json to PS09 2020 Winter 3 months ago

.gitignore Update README and .gitignore 3 months ago

LICENSE Update LICENSE 6 months ago

README.md Update README and .gitignore 3 months ago

README.md

SI506-practice

Retired problem sets and lab exercises made available to SI 506 students for additional practice.

Files

Each problem set and lab exercise contains the following files:

1. README.md (instructions)
2. problem_set_XX.py or lab_exercise_XX.py (template/submission file)
3. problem_set_XX_solution.py or lab_exercise_XX_solution.py (solution file)
4. For certain assignments data files are also included.

About

Retired problem sets and lab exercises made available for self-study.

Readme

BSD-3-Clause License

Releases

No releases published Create a new release

Packages

No packages published Publish your first package

Contributors 5

Languages

Python 100%

practice problems



This week deliverables

Activate
U-M Slack Account
U-M Zoom Account
O'Reilly School Account

Review

si506.org

syllabus
meetings
schedule
resources

Install

Python 3.10.1
VS Code + extensions

Take
Questionnaire

Suggested best practices

we recommend, you decide

Attend

lectures
labs
office hours

Watch

recordings

Post

Slack

Read

weekly readings

Practice

write code

Submit

assignments
(on time)

finis



Slide deck revisions

errata: corrections and other changes

Slide no(s).	Fix ver.	Description
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v1p1

