

SI 506: Programming I

Fall 2019

Prologue

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Roumanis Square, 2nd floor (“the loft”)



Welcome

go blue



expectations

Expectations

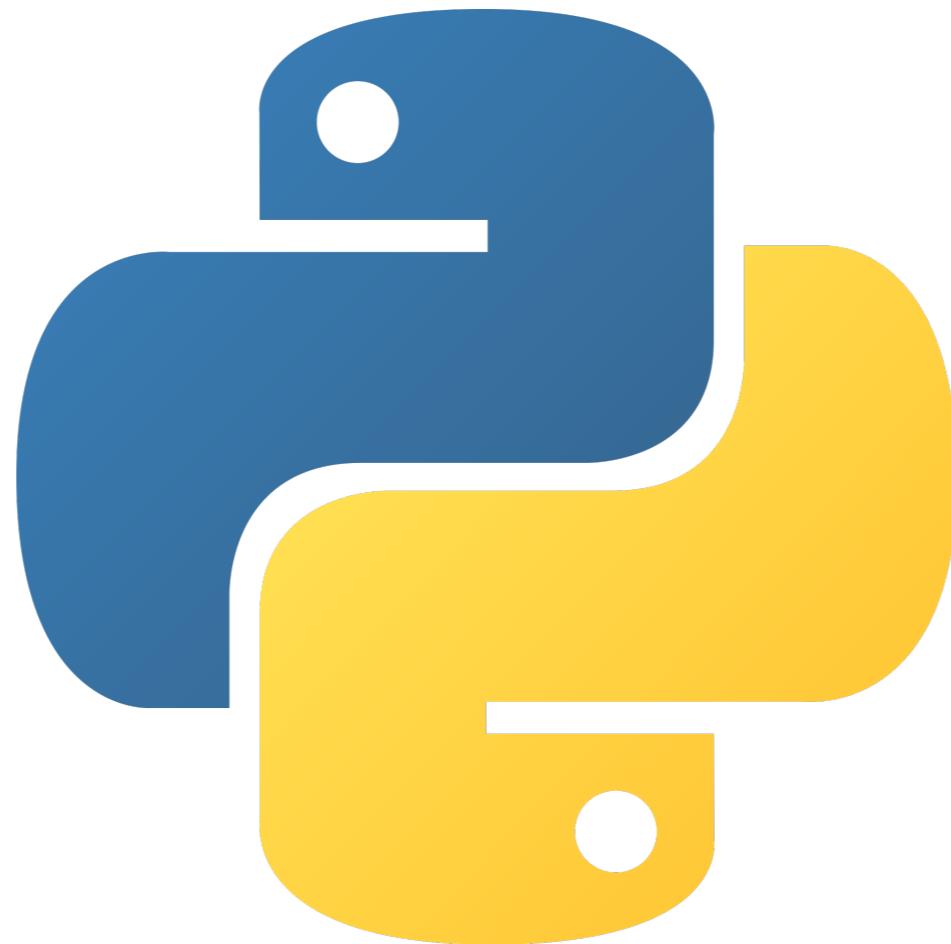
prior programming experience?

none required



Language of Instruction

expressive, flexible, general purpose, beginner-friendly



python™

data analysis, artificial intelligence, scientific computing, web development

learning objectives

Learning objectives

acquire a useful skill

- analyze computing problems *thoughtfully*
- solve computing challenges *skillfully*
- debug runtime errors *quickly*
- process data *efficiently*
- prepare for SI 507 😊

Learning objectives

stuff you will learn

- Python syntax & semantics
- data types, operators, & data structures
- expressions, statements & control flow
- functions & classes
- modules & packages
- errors & exceptions
- data handling & processing

Fundamentals today, tomorrow . . .

SI 664: Django Python web framework / MySQL database

SI664 Heritage Sites [about](#) [sites](#) [login](#)

UNESCO Heritage Sites

[new](#)

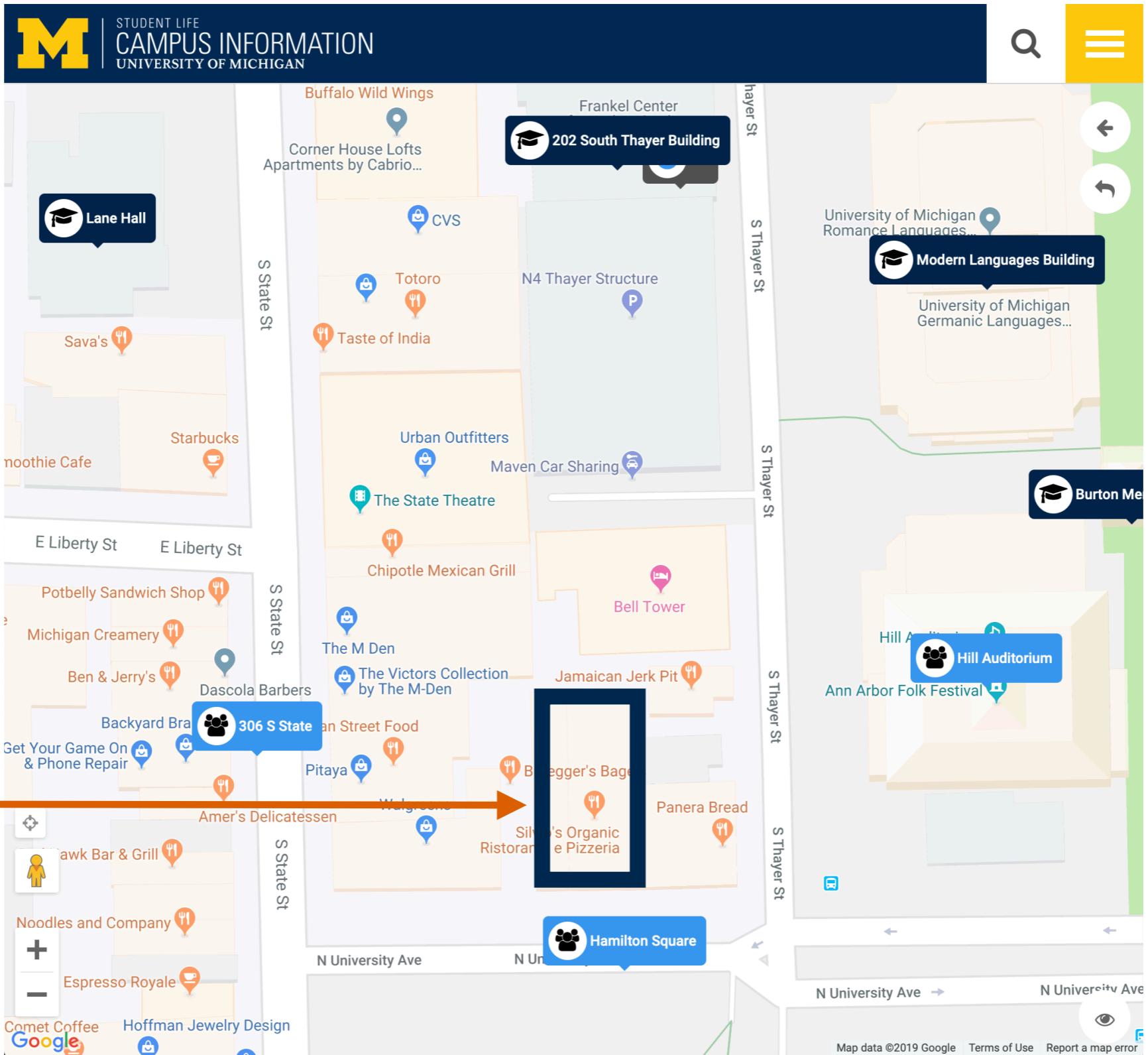
| | |
|--|--|
| Heritage Site Name <input type="text"/> | Cape Floral Region Protected Areas South Africa (ZAF) Inscribed on the World Heritage List in 2004, the property is located at the south-western extremity of South Africa. It is one of the world's great centres of terrestrial biodiversity. The extended property includes national parks, nature reserves, wilderness areas, State forests and mountain catchment areas. These elements add a significant number of endemic species associated with the <i>Fynbos</i> vegetation, a fine-leaved sclerophyllous shrubland adapted to both a Mediterranean climate and periodic fires, which is unique to the Cape Floral Region. |
| Description <input type="text"/> Park | iSimangaliso Wetland Park South Africa (ZAF) The ongoing fluvial, marine and aeolian processes in the site have produced a variety of landforms, including coral reefs, long sandy beaches, coastal dunes, lake systems, swamps, and extensive reed and papyrus wetlands. The interplay of the park's environmental heterogeneity with major floods and coastal storms and a transitional geographic location between subtropical and tropical Africa has resulted in exceptional species diversity and ongoing speciation. The mosaic of landforms and habitat types creates breathtaking scenic vistas. The site contains critical habitats for a range of species from Africa's marine, wetland and savannah environments. |
| Category <input type="text"/> ----- | Maloti-Drakensberg Park Lesotho (LSO), South Africa (ZAF) The Maloti-Drakensberg Park is a transboundary site composed of the uKhahlamba Drakensberg National Park in South Africa and the Sehlathebe National Park in Lesotho. The site has exceptional natural beauty in its soaring basaltic buttresses, incisive dramatic cutbacks, and golden sandstone ramparts as well as visually spectacular sculptured arches, caves, cliffs, pillars and rock pools. The site's diversity of habitats protects a high level of endemic and globally important plants. The site harbors endangered species such as the Cape vulture (<i>Gyps coprotheres</i>) and the bearded vulture (<i>Gypaetus barbatus</i>). Lesotho's Sehlabathebe National Park also harbors the Maloti minnow (<i>Pseudobarbus quathlambae</i>), a critically endangered fish species only found in this park. This spectacular natural site contains many caves and rock-shelters with the largest and most concentrated group of paintings in Africa south of the Sahara. They represent the spiritual life of the San people, who lived in this area over a period of 4,000 years. |
| Region <input type="text"/> ----- | Maloti-Drakensberg Park Lesotho (LSO), South Africa (ZAF) The Maloti-Drakensberg Park is a transboundary site composed of the uKhahlamba Drakensberg National Park in South Africa and the Sehlathebe National Park in Lesotho. The site has exceptional natural beauty in its soaring basaltic buttresses, incisive dramatic cutbacks, and golden sandstone ramparts as well as visually spectacular sculptured arches, caves, cliffs, pillars and rock pools. The site's diversity of habitats protects a high level of endemic and globally important plants. The site harbors endangered species such as the Cape vulture (<i>Gyps coprotheres</i>) and the bearded vulture (<i>Gypaetus barbatus</i>). Lesotho's Sehlabathebe National Park also harbors the Maloti minnow (<i>Pseudobarbus quathlambae</i>), a critically endangered fish species only found in this park. This spectacular natural site contains many caves and rock-shelters with the largest and most concentrated group of paintings in Africa south of the Sahara. They represent the spiritual life of the San people, who lived in this area over a period of 4,000 years. |
| Subregion <input type="text"/> ----- | ǂKhomani Cultural Landscape South Africa (ZAF) The ǂKhomani Cultural Landscape is located at the border with Botswana and Namibia in the northern part of the country, coinciding with the Kalahari Gemsbok National Park (KGNP). The large expanse of sand contains evidence of human occupation from the Stone Age to the present and is associated with the culture of the formerly nomadic ǂKhomani San people and the strategies that allowed them to adapt to harsh desert conditions. They developed a specific ethnobotanical knowledge, cultural practices and a worldview related to the geographical features of their environment. The ǂKhomani Cultural Landscape bears testimony to the way of life that prevailed in the region and shaped the site over thousands of years. |
| Intermediate Region <input type="text"/> Southern Africa | |
| Country/Area <input type="text"/> ----- | |
| Date Inscribed <input type="text"/> | |
| filter | |

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teaching team

arwhyte

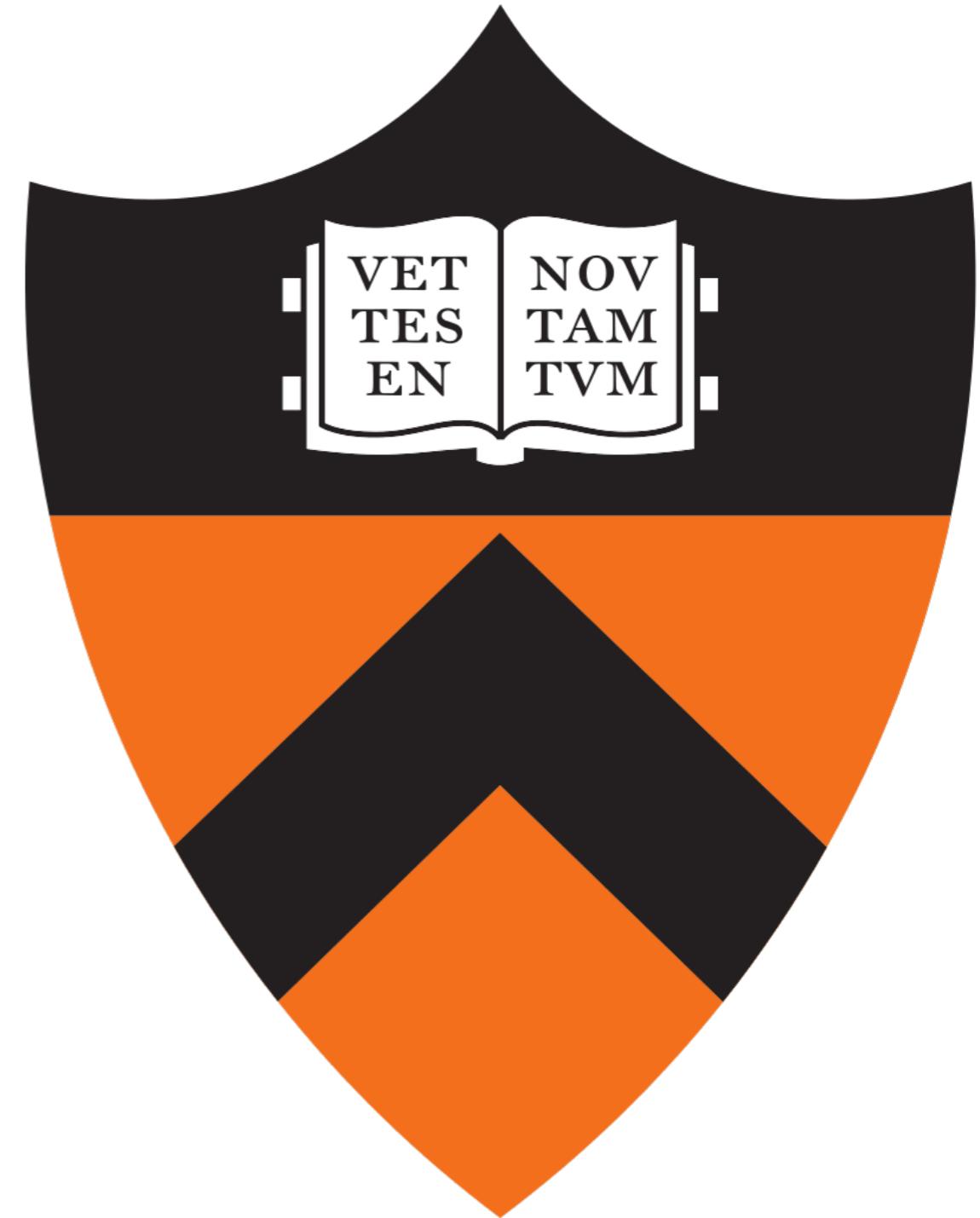
office: Roumanis Square, 2nd floor ('the loft')



above
Silvios
Pizzeria



BA, MA



PhD (ABD)

<https://github.com/IMSGlobal/caliper-spec>

IMS Base Document

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Caliper Analytics® Specification



IMS Base Document

Version 1.2

| | |
|-----------------|---|
| Date Issued: | 31 August 2019 |
| Status: | This document is for review and comment by IMS Contributing Members. |
| This version: | https://www.imsglobal.org/spec/caliper-spec/v1p2/ |
| Latest version: | https://www.imsglobal.org/spec/caliper-spec/latest/ |

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Abstract

This document comprises the TODO

› 1. Overview

arwhyte

passion (one of several)



Whyte Bikes Wessex SE

Yan Chen

Graduate Student Instructor (GSI)

Program: sixth year UMSI PhD candidate studying collaboration in programming.

Career interest: improve developer tools like IDEs; looking for ways to support developers learn programming and collaborate on software development better.

Summer fun: Google filmed my summer intern project about live streaming programming.



Pei-Yao Hung

Graduate Student Instructor (GSI)

Program: UMSI PhD student studying Human-Computer Interaction.

Career interest: designing interactive systems to empower patients, caregivers, and clinicians, making their lives better.

I use Python for applying natural language processing and machine learning to acquire and analyze online text data, for predicting the characteristics of visitors and identifying prominent topics in health communities.



Ihudiyia Finda Ogbonnaya-Ogburu

Graduate Student Instructor (GSI)

Program: UMSI PhD student; research areas are in the intersection of HCI and ICTD

Prior Education: RIT (undergrad), Harvard (masters)

Industry gigs: Booz Allen Hamilton, WGBH, Uplift Education, US Department of State

Random Facts: returned Peace Corps Volunteer and lover of animals



Bryan Romas

Graduate Student Instructor (GSI)

Program: 2nd year MSI student studying Data Science.

Career interest: combining data science skills with game theory and choice architecture to improve products and services.

Summer fun: analyzed data related to a client's financial product and recommended interventions to increase market share.



Rob Rumble

Graduate Student Instructor (GSI)

Program: 2nd year PhD student studying applications of virtual reality in environmental psychology.

Career interest: continuing VR research in either academia or an industrial research setting.

Summer fun: just got back from a road trip circumnavigating Lake Michigan.



Andrew vande Guchte

Graduate Student Instructor (GSI)

Program: 2nd year MSI student studying Data Science.

Career interest: apply data science to business intelligence, consumer insight, and data-driven product design.

Summer fun: used Python extensively in my internship at a board/video game company to build machine learning tools that inform future product development.



Gabriel Grill

Graduate Student Instructor (GSI)

Program: UMSI PhD student focusing on Science and Technology studies; investigating the ethics and politics of algorithms and/or software.

Prior Education: Computer Science with a focus on natural language processing, parallel computing, compilers and functional programming.

Research: two projects: 1) examining discourses, affordances and impact of protest/strike surveillance research and products; 2) analysis of how an algorithm used by European public employment agency to allocate job seeker support measures may reproduce and reinforce inequalities.

Sansitha Nandakumar

Instructional Assistant (IA)

Program: 1st year MSI student studying Data Science; 2nd year MS, Sports Management.

Career interest: solving real-world problems using data and analytics, specifically sports data.

Fun fact: former India no. 1 tennis player.



Yangtao ‘Max’ Zhang

Instructional Assistant (IA)

Program: 2nd year MSI studying Data Science.

Career interest: solving real-world problems using data and analytics.

Summer Fun: Full stack developer intern. Built interactive tool for operation team using Vue.js as front-end and Flask (Python) as back-end.



now your turn



Questionnaire

No wrong answers

<http://bit.ly/2IzQrMA>

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



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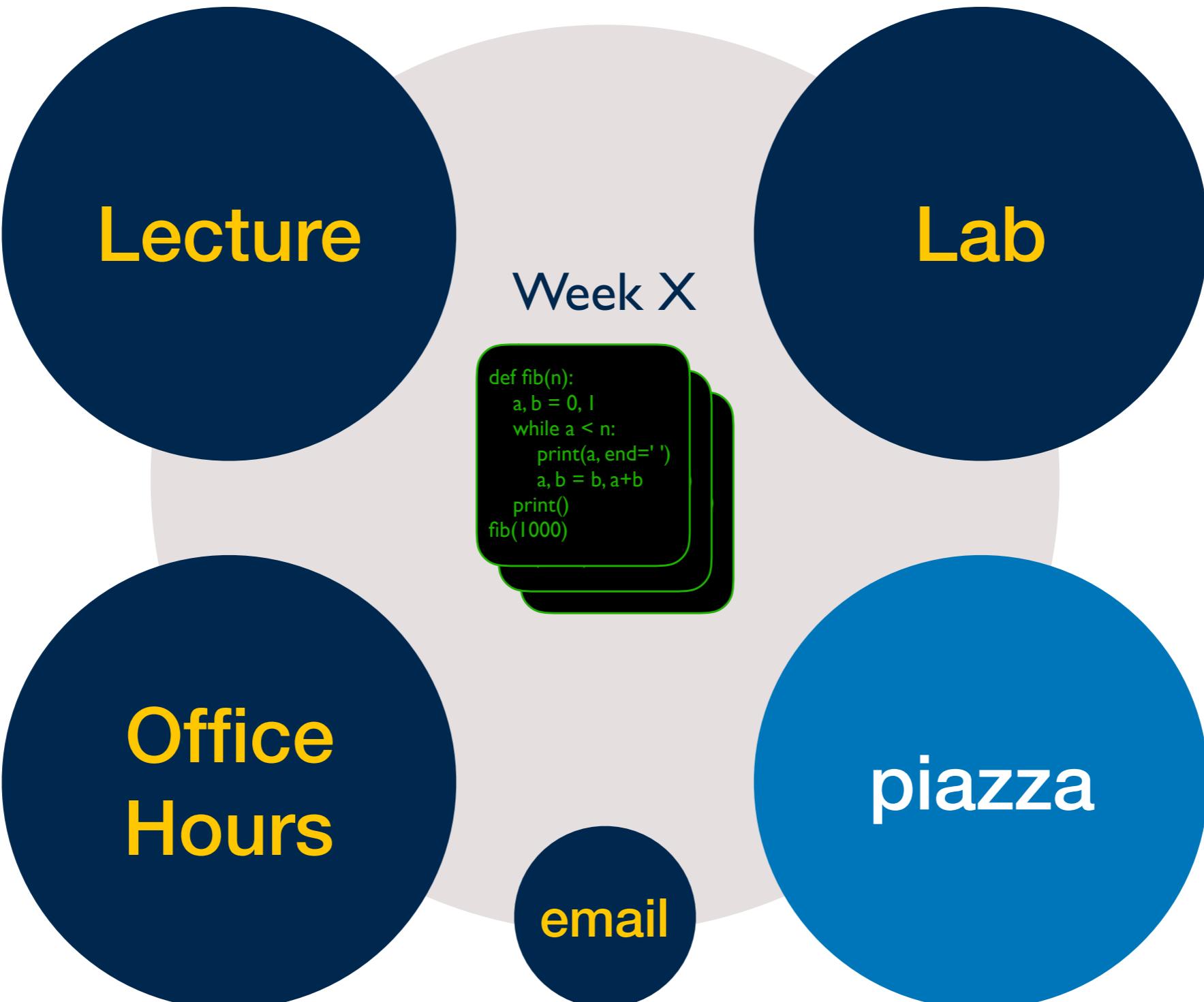
Never submit passwords through Google Forms.

communications



Learning channels

communication nodes



Suggested best practices

your call

- Attend lectures, labs
- Post to Piazza (ask questions)
- Visit Office Hours
- Peruse recommended readings
- Submit problem sets on time
- Do lab exercises (extra credit)
- Practice
- Don't cram
- See me if a blocker arises



Assignments



Assignments

get ready to code

- Weekly problem sets
- Weekly lab exercises (extra credit)
- Midterm exam
- More weekly problem sets
- More weekly lab exercises (extra credit)
- Final project

Assignment scoring

regular points

| Week | Assignment | Points | Weight | Total |
|------|----------------------|-------------|--------------|-------------|
| 2 | Problem set 01 | 150 | 0.030 | 150 |
| 3 | Problem set 02 | 150 | 0.030 | 300 |
| 4 | Problem set 03 | 150 | 0.030 | 450 |
| 5 | Problem set 04 | 150 | 0.030 | 600 |
| 6 | Problem set 05 | 150 | 0.030 | 750 |
| 7 | Midterm Exam | 1000 | 0.200 | 1750 |
| 8 | Problem set 06 | 150 | 0.030 | 1900 |
| 9 | Problem set 07 | 150 | 0.030 | 2050 |
| 10 | Problem set 08 | 150 | 0.030 | 2200 |
| 11 | Problem set 09 | 150 | 0.030 | 2350 |
| 12 | Problem set 10 | 150 | 0.030 | 2500 |
| 13 | Final Project Plan | 100 | 0.020 | 2600 |
| 15 | Final Project | 2400 | 0.480 | 5000 |

Assignment scoring

lab exercises (extra credit points)

| Week | Assignment | Points | Running Total |
|------|------------|--------|---------------|
| 1 | Lab 01 | 25 | 25 |
| 2 | Lab 02 | 25 | 50 |
| 3 | Lab 03 | 25 | 75 |
| 4 | Lab 04 | 25 | 100 |
| 5 | Lab 05 | 25 | 125 |
| 6 | Lab 06 | 25 | 150 |
| 8 | Lab 07 | 25 | 175 |
| 9 | Lab 08 | 25 | 200 |
| 10 | Lab 09 | 25 | 225 |
| 11 | Lab 10 | 25 | 250 |
| 12 | Lab 11 | 25 | 275 |
| 14 | Lab 12 | 25 | 300 |

Final Grades

point tallies

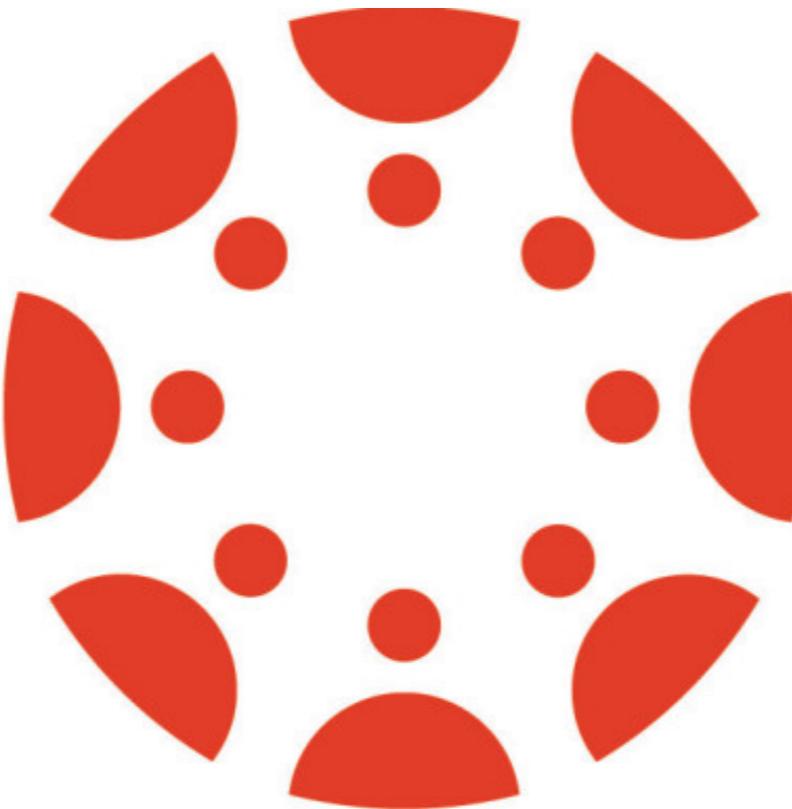
| Grade | Points | Percentage |
|-------|--------|------------|
| A+ | 4850 | 97% |
| A | 4650 | 93% |
| A- | 4500 | 90% |
| B+ | 4350 | 87% |
| B | 4150 | 84% |
| B- | 4000 | 81% |
| C+ | 3850 | 78% |
| C | 3650 | 75% |
| C- | 3500 | 72% |
| D+ | 3350 | 69% |
| D | 3150 | 66% |
| D- | 3000 | 63% |
| E | <=2999 | |

infrastructure



Course Site

syllabus, modules, assignments, grade book, piazza, etc.



canvas

<https://umich.instructure.com>



Github repo: SI506-2019Fall

docs and code (tutorials, problem sets, etc.)

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



Gradescope

problem set scoring

gradescope 

< SI 506 2019 Fall

Problem Set 000

-  Configure Autograder
-  Manage Submissions
-  Review Grades
-
-  Regrade Requests
-  Statistics
-  Settings

Autograder Results

Results 

| Autograder Output (hidden from students) | |
|--|--|
| PROBLEM SET 000 | |
| <pre>jabberwocky='Twas brillig, and the slithy toves Did gyre and gimble in the wabe; All mimsy were the borogoves, And the mome raths outgrabe. "Beware the Jabberwock, my son! The jaws that bite, the claws that catch! Beware the Jubjub bird, and shun The frumious Bandersnatch!" He took his vorpal sword in hand: Long time the manxome foe he sought— So rested he by the Tumtum tree, And stood awhile in thought. And as in uffish thought he stood, The Jabberwock, with eyes of flame, Came whiffling through the tulgey wood, And burbled as it came! One, two! One, two! And through and through The vorpal blade went snicker-snack! He left it dead, and with its head He went galumphing back. "And hast thou slain the Jabberwock? Come to my arms, my beamish boy! O frabjous day! Callooh! Callay!" He chortled in his joy. 'Twas brillig, and the slithy toves Did gyre and gimble in the wabe; All mimsy were the borogoves, And the mome raths outgrabe.</pre> | |
| num_chars=933 | |
| num_words=166 | |
| Evaluate character count for equality. (100.0/100.0) | |
| Evaluate word count for equality. (100.0/100.0) | |

STUDENT
Anthony Whyte

AUTOGRADE SCORE
200.0 / 200.0

PASSED TESTS
Evaluate character count for equality. (100.0/100.0)
Evaluate word count for equality. (100.0/100.0)

Account 

 More  Debug via SSH  Submission History  Download Submission  Resubmit 



Python Anywhere

Browser-based code editor

[Send feedback](#) [Forums](#) [Help](#) [Blog](#) [Account](#) [Log out](#)



[Dashboard](#) [Consoles](#) [Files](#) [Web](#) [Tasks](#) [Databases](#)

Dashboard

Welcome, [nantin](#)

CPU Usage: 1% used – 1.13s of 100s. Resets in 22 hours, 29 minutes [More Info](#)

[Upgrade Account](#)

File storage: 0% full – 148.0 KB of your 512.0 MB quota

Recent
Consoles + 5 -

You have no recent consoles.

New console:

[\\$ Bash](#)

[>> Python ▾](#)

[More...](#)

Recent
Files + 5 -

You have no recently edited files.

[+ Open another file](#)

[Browse files](#)

Recent
Notebooks + 5 -

Your account does not support Jupyter Notebooks. [Upgrade your account](#) to get access!

All
Web apps

You don't have any web apps.

[Open Web tab](#)

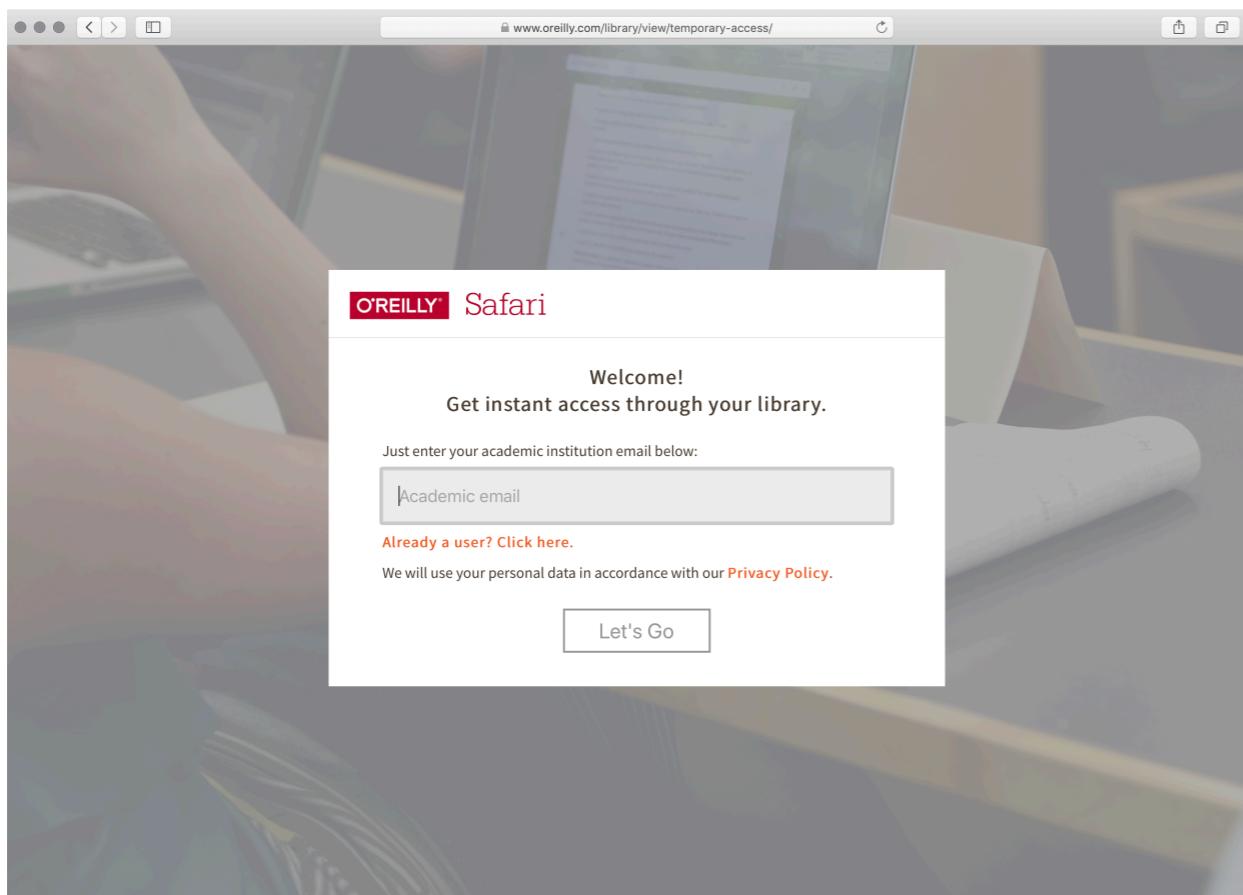


O'Reilly Learning Platform

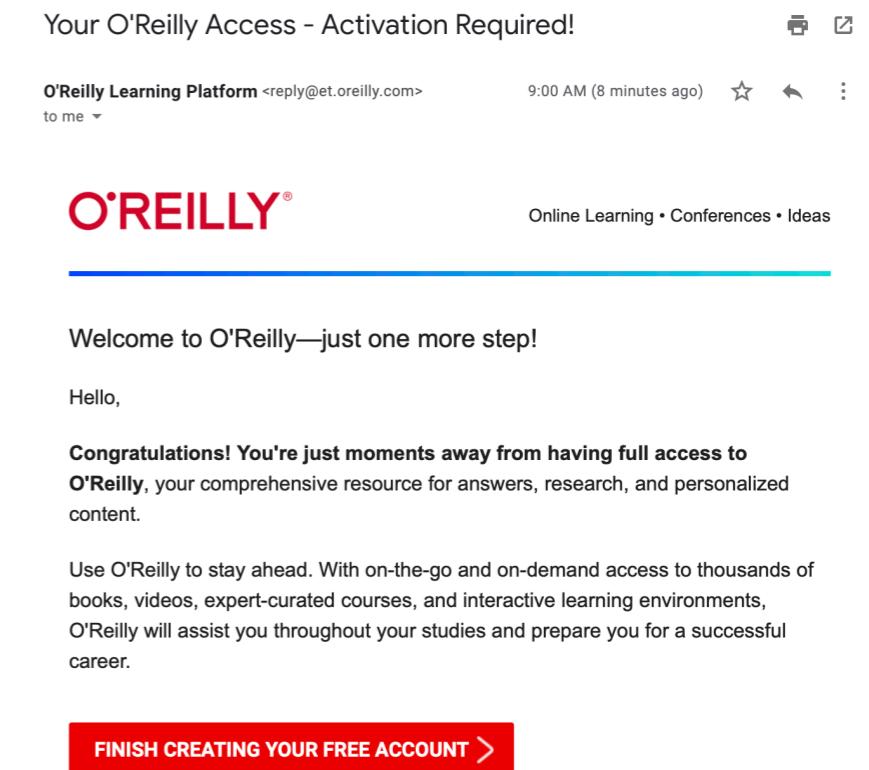
two step signup

<http://bit.ly/2knnALe>

1. umich.edu email



2. activate account



At O'Reilly, we pride ourselves on our commitment to protecting your privacy. Our data governance and privacy policies reflect our company's values and how we strive to maintain your privacy. For details, please refer to our [Privacy Policy](#).

Thanks!
The O'Reilly team

Piazza Q&A

five step signup (as student)

<http://bit.ly/2kpPZ3g>

1. select course / role

Welcome to Piazza!

University of Michigan

Selected Term: Fall 2019

Fall 2019

Class 1: SI 506 001 FA 2019: SI 506 001 FA 2019 (edit)
Instructors: Anthony Whyte - 11 Enrolled
✓ Joining as Student

Join as: Student TA Professor

Class 2: X
Class 3: X
Class 4: X
Class 5: X

Add Another Class

Join Classes

2. umich.edu email

University of Michigan

Selected Term: Fall 2019

Fall 2019

1. SI 506 001 FA 2019: SI 506 001 FA 2019
Instructors: Anthony Whyte - 11 Enrolled
✓ Joining as Student

Please enter your school email address
Please enter the umich.edu email address to which you would like to add your classes.

Email:
Confirm Email:

Submit Email

3. verification code

University of Michigan

Selected Term: Fall 2019

Fall 2019

1. SI 506 001 FA 2019: SI 506 001 FA 2019
Instructors: Anthony Whyte - 11 Enrolled
✓ Joining as Student

We see you're new to Piazza!
Check your inbox for your confirmation email. Enter the validation code below so you can access your classes!

Validation Code:
Submit Code

Not Getting Our Email?
Please check your bulk mail or spam folder first. Click here to resend the email. (It may take a few minutes to arrive.)
If it's still not there, please email us at team@piazza.com for help!

4. account setup

Set Up Your Piazza account:

Account Information (required)

Is this your preferred email address: nantin@umich.edu No, use another email

Full Name Choose Password Confirm Password

Academic Information (required)

What degree are you currently pursuing?

Graduate Program Major Anticipated Completion
Select current program... Enter current major... Month Year
Add Another Major | Add Minor

I'm not pursuing a degree

This information will be used for collaborative features on Piazza. We will never share your information without your permission.

I've read and accept the [Terms of Service](#) and [Privacy Policy](#)

Continue

Learn more about how Piazza complies with FERPA

5. join network (optional)

(Optional) Join the Piazza Network of students and employers

If career and networking opportunities are relevant to you, join the network

In the network Outside the network

| | |
|-------------------------------------|---|
| <input checked="" type="checkbox"/> | Access class Q&A discussions |
| <input checked="" type="checkbox"/> | See what classes other students are taking |
| <input checked="" type="checkbox"/> | See where your classmates have worked |
| <input checked="" type="checkbox"/> | See examples of strong resumes in your community |
| <input checked="" type="checkbox"/> | Get referred to companies by your classmates |
| <input checked="" type="checkbox"/> | Know when companies are coming to campus |
| <input checked="" type="checkbox"/> | Get contacted by companies for employment opportunities |
| <input type="checkbox"/> | |
| <input type="checkbox"/> | |

Join the network Don't join the network

Learn more about how Piazza complies with FERPA



labs / discussion sections



Lab 01 extra credit exercise

is a bit more challenging than this

```
$ python3
Python 3.7.4 . . .
>>> print('Hello World')
Hello World
>>> print('Declare Victory')
Declare Victory
>>> quit()
$
```

Lab 01 (this week)

Python Anywhere tutorial/exercise (please attend)

The screenshot shows the PythonAnywhere web interface. At the top, there's a file navigation bar with a folder icon, the path '/home/nantin/si506/lab_exercises/si506_lab_01.py', and various action buttons: 'Keyboard shortcuts: Normal', 'Share', 'Save', 'Save as...', 'Run', and a menu icon.

The code editor contains the following Python script:

```
13     uniqname = argv[0]
14
15     # Invoke the function and assign its return value to the variable cheer.
16     cheer = huzzah(uniqname)
17
18     # Print the message to the screen.
19     print(cheer)
20
21
22 - def huzzah(name):
23     """
24     Function accepts a user provided name and then declares victory
25     by returning a string that includes the current date and time.
26     The new string is assembled using the new f-string
27     formatted string literal syntax.
28     """
29     claim = f"Huzzah! {name} writes first Python program at {umich_now()}"
30
31     # str.format()
32     # claim = "Huzzah! {} writes first Python program at {}".format(name, umich_now())
33
34     # str.join() using a list
35     # claim = ''.join(['Huzzah!', name, ' writes first Python program', umich_now()])
36
37     return claim
38
39
```

Below the code editor is a terminal window showing the command:

```
17:13 ~/si506/lab_exercises $ python3 si506_lab_01.py nantin
```

The terminal output area is currently blacked out.

syllabus

Syllabus

available in Canvas and Github

The screenshot shows a GitHub repository page for the file `SI506-syllabus-2019F-arwhyte.md`. The repository is named `umsi-arwhyte / SI506-2019Fall`. The page includes a commit history showing one update by `arwhyte` with the message "Updated GSI info." and timestamp "2 hours ago". The file details show 336 lines (242 sloc) and 22.6 KB. The content of the file is displayed below:

SI 506: Programming I (2019 Fall)

Prerequisites: None

Course Description

SI 506 is designed for graduate students with little or no programming experience. 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 MSI/MHI courses.

Again, no one who enrolls in this course is expected to have any prior programming experience. The programming language of instruction is [Python 3.x](#), a general-purpose, object-oriented, dynamically typed, interpreted language popular among developers and data scientists.

Learning Objectives

Leverage Python at the introductory level to

- analyze computing problems thoughtfully
- solve computing challenges skillfully
- debug runtime errors quickly
- process data efficiently
- prepare for SI 507

Key topics covered in this course include:

- Python syntax and semantics
- data types, operators, and data structures
- expressions, statements and control flow
- functions and classes
- modules and packages
- errors and exceptions
- data handling and processing



Lecture 02

This Thursday

vocabulary & concepts

(start exploring Python syntax & semantics)

