

**BROWN SCHOOL**  
**WASHINGTON UNIVERSITY IN ST. LOUIS**  
**Summer 2020**  
**June 15, 2020 – June 19, 2020**  
**Skill Lab: Introduction to Python for Public Health Data Analysis**  
**S55 MPH 5976.01**

**CREDIT HOURS:** 1

**GRADE:** L/G

**SYNCHRONOUS HOURS:** M-F 2-3pm

**INSTRUCTOR:** Dominique Lockett

**E-MAIL:** [dlockett@wustl.edu](mailto:dlockett@wustl.edu)

**LECTURE HOURS:** M-F self-paced

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## **I. COURSE DOMAIN AND BOUNDARIES**

This course will allow students to grasp the fundamental tools necessary to use Python as an analytical tool for data analysis in Public Health. This course will introduce students to the fundamentals of the Python language, common Python modules for data manipulation and analysis, and Jupyter notebook environment. The course will teach how to acquire data from publicly available sources and databases, cleansing and transformation of data, creation of descriptive statistics and graphics. The course will also introduce Python's natural language processing and machine learning modules for basic data classification and predictive modeling applications. Throughout the course, instruction and assignments will promote best practices for data analysis that can be shared and used for reproducible research.

Prerequisites:

Familiarity with a similar analytic program such as R, Stata, or SPSS is preferred.

## **II. MPH FOUNDATIONAL KNOWLEDGE AND COMPETENCIES ADDRESSED IN THIS COURSE:**

### **Foundational Knowledge**

1. Explain the role of quantitative methods and sciences in describing and assessing a population's health.
2. Explain the critical importance of evidence in advancing public health knowledge.

### **Foundational Competencies**

1. Apply epidemiological methods to situations in public health.
2. Select quantitative data collection methods appropriate for a given public health context.
3. Analyze quantitative data using biostatistics, informatics, computer-based programming and software, as appropriate.

4. Interpret results of data analysis for public health research, policy or practice.

## Learning Objectives

The following skills will be taught to support data analysis in epidemiology and biostatistics:

- A brief overview of skills in basic probability and inference
- Calculate basic measures of frequency and association
- Understand the appropriate methods for descriptive and inferential interpretation (continuous, categorical, count data).
- Use understanding of appropriate methods to conduct inference using appropriate methods (linear regression, logit regression, duration models).
- Create graphical interpretations and summaries of statistical analysis.

## III. BROWN SCHOOL ACADEMIC POLICIES

Academic Integrity: If a faculty member or student suspects that academic or professional integrity has been violated, they are required to submit an Academic Integrity or Professional Integrity Violation form found on Inside Brown for review by the Assistant Dean of the program. The Assistant Dean or designated representative will aid in the investigation of the violation, which includes but is not limited to gathering relevant evidence; conversations with the instructor, student(s) involved, witnesses, and others as necessary. Depending on the seriousness of the case, the Assistant Dean may choose to refer the matter directly to the University Student Conduct Board. This referral procedure will generally be followed if it is believed that the penalty is likely to involve suspension or expulsion from the University. The Assistant Dean for the program or designated representative will offer to meet privately with the student(s) against whom the complaint has been made. It is the student's responsibility to familiarize themselves with the behaviors that constitute an academic integrity violation requiring referral.

### [Student Handbook 2019](#)

Accommodations: If you have a learning, sensory, or physical disability or any other diagnosis that requires accommodations and/or assistance in lectures, reading, written assignments, and/or exam taking, please work with the [Disability Resource Center](#), a University-wide resource that provides academic accommodations support and referrals. After [requesting academic accommodations](#) by providing [appropriate documentation](#), students approved for accommodations will provide an Accommodation Letter to the instructor and are encouraged to work directly with the instructor to discuss specific course needs. The student's Academic Advisor and/or the Assistant Dean for Academic Affairs can support a student through this process.

Pronouns: The Brown School embraces and promotes gender expansiveness as reflective of the lived experiences of many students, staff, faculty and members of our expanded community. The correct use of an individual's pronouns is a critical part of an individual's identity and of building

an inclusive community. Students, faculty and staff are encouraged to use pronouns during introductions, are expected to use expressed pronouns of all Brown School community members, and are encouraged to apologize when mistakes are made. Educational resources are available at: <https://campuslife.wustl.edu/lgbtqia/lgbt-resources/gender-pronouns/>

English Language Proficiency: If your English language proficiency is such that you may need special assistance in lectures, reading, written assignments, and/or exam taking, please communicate these needs to your instructor who may refer you to the [English Language Program](#) (ELP). ELP is a University-wide resource that provides classes and academic English language support designed to increase non-native English speaking students' English language proficiency and to facilitate their academic success at Washington University. You may also find the Academic Assistance resources available through the [Office for International Students and Scholars](#) to be helpful.

Professional Use of Electronic Devices in the Classroom: Computers or other electronic devices, including “smart pens” (devices with an embedded computer and digital audio recorder that records the classroom lecture/discussion and links that recording to the notes taken by the student), may be used by students at the discretion of the faculty member to support the learning activities in the classroom. These activities include taking notes and accessing course readings under discussion. If a student wishes to use a smart-pen or other electronic device to audio record lectures or class discussions, they must notify the instructor in advance of doing so. Permission to use recording devices is at the discretion of the instructor, unless this use is an accommodation approved by Disability Resources.

Nonacademic use of laptops and other devices and use of laptops or other devices for other coursework is distracting and seriously disrupts the learning process for other people in the classroom. Neither computers nor other electronic devices are to be used in the classroom during class for nonacademic reasons or for work on other coursework. Nonacademic use includes emailing, texting, social networking, playing games, instant messaging, and use of the Internet. Work on other coursework may include, but is not limited to, use of the Internet, writing papers, using statistical software, analyzing data, and working on quizzes or exams. The nonacademic use of cell phones during class time is prohibited, and they should be set on silent before class begins. In the case of an emergency, please step out of the room to take the call. The instructor has the right to hold students accountable for meeting these expectations, and failure to do so may result in a loss of participation or attendance points, a loss of the privilege of device use in the classroom, or being asked to leave the classroom.

Religious Holidays: The Brown School recognizes the individual student’s choice in observing religious holidays that occur during periods when classes are scheduled. Students are encouraged to arrange with their instructors to make up work missed as a result of religious observance, and instructors are asked to make every reasonable effort to accommodate such requests.

#### **IV. WASHINGTON UNIVERSITY ACADEMIC SUPPORT POLICIES**

Accommodations based upon sexual assault: The University is committed to offering reasonable academic accommodations to students who are victims of sexual assault. Students are eligible

for accommodation regardless of whether they seek criminal or disciplinary action. Depending on the specific nature of the allegation, such measures may include but are not limited to: implementation of a no-contact order, course/classroom assignment changes, and other academic support services and accommodations. If you need to request such accommodations, please direct your request to [Kim Webb](#), Director of the [Relationship and Sexual Violence Prevention Center](#), or [Jen Durham Austin](#), Support Services Counselor. Both Kim Webb and Jen Durham Austin are confidential resources; however, requests for accommodations will be shared with the appropriate University administration and faculty. The University will maintain as confidential any accommodations or protective measures provided to an individual student so long as it does not impair the ability to provide such measures.

If a student comes to me to discuss or disclose an instance of sexual assault, sex discrimination, sexual harassment, dating violence, domestic violence or stalking, or if I otherwise observe or become aware of such an allegation, I will keep the information as private as I can, but as a faculty member of Washington University, I am required to immediately report it to my Department Chair or Dean or directly to Ms. Jessica Kennedy, the University's Title IX Director. If you would like to speak with directly Ms. Kennedy directly, she can be reached at [\(314\) 935-3118](tel:(314)935-3118), [jwkennedy@wustl.edu](mailto:jwkennedy@wustl.edu), or by visiting the [Title IX office](#) in Umrath Hall. Additionally, you can report incidents or complaints to the Office of Student Conduct and Community Standards or by contacting WUPD at [\(314\) 935-5555](tel:(314)935-5555) or your local law enforcement agency. See: [Title IX](#)

You can also speak confidentially and learn more about available resources at the Relationship and Sexual Violence Prevention Center by calling [\(314\) 935-3445](tel:(314)935-3445) for an appointment or visiting the 4<sup>th</sup> floor of Seigle Hall. See: [RSVP Center](#)

**Bias Reporting:** The University has a process through which students, faculty, staff and community members who have experienced or witnessed incidents of bias, prejudice or discrimination against a student can report their experiences to the University's Bias Report and Support System (BRSS) team. See: [brss.wustl.edu](http://brss.wustl.edu).

**Mental Health:** Mental Health Services' professional staff members work with students to resolve personal and interpersonal difficulties, many of which can affect the academic experience. These include conflicts with or worry about friends or family, concerns about eating or drinking patterns, and feelings of anxiety and depression.

**Center for Diversity and Inclusion (CDI):** The Center of Diversity and Inclusion (CDI) supports and advocates for undergraduate, graduate, and professional school students from underrepresented and/or marginalized populations, creates collaborative partnerships with campus and community partners, and promotes dialogue and social change. One of the CDI's strategic priorities is to cultivate and foster a supportive campus climate for students of all backgrounds, cultures and identities. See: [diversityinclusion.wustl.edu/](http://diversityinclusion.wustl.edu/)

**Additional Issues or Concerns:** If you feel that you need additional supports in order to be successful in your time at Brown, beyond the mentioned accommodations, please contact your

Academic Advisor or Danielle Bristow, the Assistant Dean for Academic Affairs. They can assist you in navigating a myriad of concerns.

## **V READINGS (SOFTWARE)**

Software: All synchronous meetings will occur on Zoom and installation of this tool will be necessary to participate live.

Additionally you will need three other components on your personal laptop to complete this course: Python 3.8, GitHub Desktop, and JupyterLab or Jupyter Notebook. The first day of class will be dedicated to getting these programs running on your computer and getting you familiarized with using these programs to upload your assignments.

Recommended Materials: While there are no books required in this course, effective use of internet resources is fundamental in the use of analytical software. You are encouraged to review the following online resources to supplement the lectures provided in this course:

- <https://realpython.com/>
- [Mastering Python Data Analysis](#)
- I cannot understate the utility of doing web searches when you encounter a problem on Python. Whether it be the complicated installation processes or an inscrutable error, applying a web search will reveal dozens of others who can encounter similar issues. [Stack Overflow](#) offers a priceless set of experts to help guide you in your troubleshooting.

In addition to effective use of internet resources, students can benefit from purchasing or renting the following book as it will guide instruction throughout the course:

- McKinney, Wes. Python for data analysis: Data wrangling with Pandas, NumPy, and IPython. " O'Reilly Media, Inc.", 2012.

## **VI. ORGANIZATION OF COURSE**

Lectures for the course will be pre -recorded and will be distributed on Canvas and available 24 hours before the live meeting are to occur. Typically, these lectures will be split up into three thirty minute intervals. At the end of each interval you will be tasked with completing an activity to demonstrate your understanding of the materials at hand. Because of the unorthodox nature of this class, the in -class activities will serve as a measure of your participation in the course. Synchronous meetings will serve as office hours for any questions of problems you may have while watching the lecture and completing the activities. These meetings will be no more than 90 minutes and will last as long as students need them. Participation in these meetings are not required but strongly encouraged. Links to the live meetings will be provided on Canvas along with a password to ensure the security of the meetings.

## **VII. ROLE OF FACULTY AND STUDENT**

### Student Role:

- Complete all activities and attend all class Zoom sessions. For professional development students, your completion certificate will include the number of contact hours completed.
- Provide the instructor questions about lecture content **prior to** the live meetings.
- Be attentive during class lectures and ask questions prior to our live meetings.
- Complete assignments as required and submit them on time.

### Instructor Role:

- Come to live meetings prepared, organized, and enthusiastic.
- Provide timely and constructive feedback on your performance.
- Be available to answer any questions that you may have about the course. Please feel free to contact me to discuss any issues concerning the course. Email is the best way to contact me.
- Retain the right to change the content and order of the lectures and exercises to meet the needs of the students who are enrolled in the course.

## VIII. ASSIGNMENTS AND GRADING CRITERIA

Grading: For Brown School Students, final grades will be based on your performance on the four quizzes (40%), the final lab assignment (40%) and participation (20%)

Quizzes: You will complete four quizzes in classes 2 -5 which cover the daily course material. These quizzes will focus on the skills obtained during in class activities and will aid the instructor and students in monitoring one's understanding of class material.

Final Assignment: The final assignment be a problem set which asks the students to demonstrate their knowledge of course materials. The assignment is due June 26 at midnight (GitHub Submission)

Participation: Completion of the lecture activities will account for 10% of the participation grade. If you are unable to execute an activity on your own, you are expected to participate in the synchronous session. To demonstrate participation, you will be required to upload your documents to GitHub.

## IX. COURSE OUTLINE\*

Day	Date	Topics	Quizzes
1	6/15	<b>Introduction</b>  <b>Getting started with Python and Jupyter and GitHub and class content</b>  <b>Python Basics I</b> <ul style="list-style-type: none"><li>- Syntax</li><li>- Indexing</li><li>- Types and attributes</li><li>- Imports</li><li>- Control Flow</li><li>- Functions</li></ul>	

2	6/16	<b>Python Basics II</b> <ul style="list-style-type: none"> <li>- More on lists and dictionaries</li> <li>- List/dictionary comprehension</li> </ul> <b>Data Cleaning and transformation</b> <ul style="list-style-type: none"> <li>- Reading/writing data</li> <li>- NumPy and pandas</li> <li>- Merging datasets</li> </ul>	Quiz 1
3	6/17	<b>Basic statistics and descriptive graphics</b> <ul style="list-style-type: none"> <li>- Graphs and insights</li> <li>- Public health examples</li> </ul>	Quiz 2
4	6/18	<b>Data Visualization</b> <ul style="list-style-type: none"> <li>- Single variable</li> <li>- Multi -variable</li> <li>- Time -series</li> </ul>	Quiz 3
5	6/19	<b>Crash course in natural language processing and machine learning</b> <ul style="list-style-type: none"> <li>- Frequency Analysis</li> <li>- Document classification</li> <li>- Web scraping (optional)</li> </ul>	Quiz 4
	6/26		Final assignment due

\*Content and order of this schedule are subject to change