PSYC 6300-002: Python and Machine Learning Applications in Psychology
Spring 2022

Instructor Information

Instructor(s):
Dr. Liegey Dougall

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Life Science 523

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Office Hours:
Tuesday & Thursday 11:00 AM-12:00 PM and by appointment

Office hours will be virtual and/or in person. You can send an email to me via Canvas to schedule a meeting date, time, and preference for virtual or in person. Then, I will invite you to a day and time. Invitations to virtual meetings will use Microsoft Teams, which everyone has access to through UT Arlington.

Course Information

Section Information:
PSYC 6300-002 Python and Machine Learning Applications in Psychology 3 hours credit

Time and Place of Class Meetings:
LS318, Tuesday, 2:00-4:50 PM (NOTE: This is different from the location and time on MyMav.)

Description of Course Content:
This is a graduate seminar focusing on the practical application of Python and machine learning skills to acquire, manage, and analyze data:
1. Data retrieval (e.g., behavioral data collection, job search ads from the internet, engagement data from ECHO360, sales data, etc.)
2. Data manipulation and graphing (e.g., creating composite variables, viewing distributions, etc.)
3. Machine learning algorithms (building predictive models with an emphasis on regression; e.g., predicting outcomes in a study, grades in a class, or sale of an item)
Prerequisites: PSYC 5405 and PSYC 5407

Student Learning Outcomes:
- Demonstrate a basic knowledge of Python programming by using and manipulating data structures, types, and values and by creating visualizations
- Retrieve, alter, and create new data sources using Python libraries and modules
- Formulate real-world solutions for research, teaching, and professional development through data curation and management
- Develop predictive models using machine learning algorithms

Required Textbooks and Other Course Materials:
- Python installed through Anaconda (the Anaconda Individual Edition is free)
- An IDE (integrated development environment) through Anaconda. I am using Spyder. You also can use Jupyter, PyCharm, the command prompt, etc.
- Readings will be open-sourced e-books, articles, manuals, and websites (free access). You will be required to access online, free manuals, including documentation for Python Standard Library, Python Language, Matplotlib, NumPy, Statsmodels, SciPy, and SciKit-learn.

Technology Requirements
- You will need access to online teaching tools including Canvas, Teams, and Echo360 (available free with your UTA account). Students can access tutorials on these tools by clicking on the "Get Started" Box on their Canvas Homepage.
- Access to a personal device or UT Arlington computer lab with Python/Anaconda, Canvas, Teams, and/or Echo360. If you do not have access to a laptop, you may check one out at the library.

<u>**CANVAS**</u>: Please see available training.

<u>**ECHO 360:**</u> If necessary this semester, I will be recording and posting lectures using Teams and/or the Echo360 software available for free through the University of Texas at Arlington. We will use this option when there is a need for virtual learning. I'd like to share with you the steps you'll need to take to be ready to participate in class. Please go to the Canvas site for this course, find "Echo360" on the left toolbar, and open the software. NOTE: You must set up the initial connection between the course's Canvas site and your Echo360 account using a browser (for example, desktop or laptop computer through Canvas) and NOT through the app. You must establish the connection between ECHO360 and Canvas for your account so you will receive credit for what you do on ECHO360 (it will not know who you are or to what course you belong otherwise). If you choose to use the ECHO360 mobile app, you will be directed to set up an account. You also should enter your cellphone number into your account information if you would like the option of texting responses to in-class polls. After you set up the Echo360 account, you will be able to download and use the Echo360 app on tablets or smartphones with iOS or android operating systems.

> *NOTICE: Class sessions will be recorded by the instructor for use by students enrolled in this class. Recordings that contain personally identifiable information or other information subject to FERPA shall not be shared with individuals not enrolled in this course unless appropriate consent is obtained from all relevant students. Class recordings are reserved only for the use of students enrolled in the class and only for educational purposes. Course recordings should not be shared outside of the class in any form without express permission.*

You will need to activate an Echo360 account for this course. For questions regarding Echo360, please visit the support website. If you do not have access to a smart device or laptop, you may check one out at the library.

<u>**ANACONDA:**</u> Anaconda manages Python and other packages, libraries, and modules so that they all work seamlessly together. I highly recommend that you use it for this course. The Anaconda Individual Edition is free. If you need help with the installation process, I recommend creating a free account with Anaconda Nucleus to access their tutorial and/or searching on YouTube.

<u>**Technological Difficulties**</u>: Given that we are using online tools, technological issues are possible. It is your responsibility to make sure you have access to a computer or other networked device, the course assignments, and reliable Wi-Fi. Make sure your system is compatible BEFORE you start an assessment. The university provides access to computers on campus for your use, if needed. Therefore, it is assumed that you have access, and technological difficulties (Wi-Fi connectivity issues, browser issues, computer problems etc.) are not a valid reason to ask for an extension or ask that the work not be considered late. Additionally, I set assignments to be open for at least one week to allow ample time to assess and correct any technological issues. For connection and other telecommuting technology issues, contact the Help Desk at 817-272-2208, helpdesk@uta.edu, or fill out a request form.

Descriptions of major assignments and examinations:

Challenges: Challenges will be presented during designated class time. These will be designed to target the practical applications of Python that will be beneficial in your research, teaching, and professional development. You will help to decide on which challenges we explore via the "pre-test" Homework and regular class discussions. Examples are provided below:

1. Research
   Examples:
   a. Writing programs for behavioral data collection
   b. Scraping the web for social media posts
   c. Merging multiple data files with the same or different subjects
   d. Conducting analyses
2. Teaching
   Examples
   a. Integrating attendance data
   b. Applying drop rules to ECHO360 data
   c. Predicting learning outcomes
3. Professional Development
   Example
   a. Scrape the internet for job postings, such as post-docs or careers
   b. Visualizations

The Python code and output for each Challenge will be uploaded to Canvas for grading. The grading criteria are below:
- Program correctness - 60%
- Documentation - 20%
- Readability - 20%

If you do not submit a challenge by the due date, it will be considered a missed challenge and will receive a grade of zero (0).

Homework: Homework assignments will consist of a "pre-test" and "post-test" to provide you with the opportunity to make suggestions and provide feedback on the selection of learning activities. The remaining homework assignments will be concept review questions and/or Python code and output. Homework will be administered through Canvas. Information covered in these assignments will be used in class and in the Challenges.

Multiple choice questions will be graded automatically via Canvas. Submitted Python code and output will be graded using the same criteria as the Challenges.

If you do not submit a homework, it will be considered a missed homework and will receive a grade of zero (0). **All Homework assignments will be due at 11:59 PM on the due date.**

Class engagement: This seminar will focus on a hands-on learning approach. Therefore, class participation is required and will be assessed based on the following criteria:
- You will be prepared with knowledge of the topic(s) indicated on the schedule. Therefore, you will have read and reviewed the assigned material prior to participating in class. – 20%
- You will be active learners, and you will ask and answer questions. I encourage you to answer someone else's question. – 20%
- You will work independently as well as in teams to write code. – 40%
- You will try to solve problems with your code and after reasonable attempts you will bring your problem to the entire class for a solution. – 20%

Grading Information

Grading:

Challenges - 40%
Homework - 40%
Class Engagement - 20%

Students are expected to keep track of their performance throughout the semester which Canvas facilitates and seek guidance from available sources (including the instructor) if their performance drops below satisfactory levels; see "Student Support Services," below.

Make-up Work:
If you miss challenges, homework, or daily class engagement (attendance and class activities), a grade of zero will be given, respectively. If you know of a conflict in advance and have a documented excuse, we will attempt to arrange for you to participate remotely, make up the work, or be excused. I will consider a request for make-up work only if documentation for a University-approved excuse (see current University Catalog), that covers the entire period the challenge or homework was available and is received within one week of the due date. If class engagement is excused, there will be no make-up. You will be responsible for obtaining the class information from your fellow students. Routine scheduled activities, such as work, doctor's appointments, vacations, weddings, or other conflicting appointments, will not be considered excused absences. It is the responsibility of the student to schedule make-up work in a timely fashion.

Expectations for Out-of-Class Study:
A general rule of thumb is this: for every credit hour earned, a student should spend 3 hours per week working outside of class. Hence, a 3-credit course might have a minimum expectation of 9 hours of reading, study, etc. Beyond the time required to attend each class meeting, students enrolled in this course should expect to spend at least an additional 9 hours per week of their own time in course-related activities, including reading required materials, completing homework and challenges as necessary.

Grade Grievances:
Any appeal of a grade in this course must follow the procedures and deadlines for grade-related grievances as published in the current University Catalog.

Institution Information

UTA students are encouraged to review the below institutional policies and informational sections and reach out to the specific office with any questions. To view this institutional information, please visit the Institutional Information page (http://www.uta.edu/provost/administrative-forms/course-syllabus/index.php) which includes the following policies among others:
- Drop Policy
- Disability Accommodations
- Title IX Policy
- Academic Integrity
- Student Feedback Survey
- Final Exam Schedule

Additional Information

Face Covering Policy
While the use of face coverings on campus is no longer mandatory, all students and instructional staff are strongly encouraged to wear face coverings while they are on campus. This is particularly true inside buildings and within classrooms and labs where social distancing is not possible due to limited space. If a student needs accommodations to ensure social distancing in the classroom due to being at high risk they are encouraged to work

directly with the Student Access and Resource Center to assist in these accommodations. If students need masks, they may obtain them at the Central Library, the E.H. Hereford University Center's front desk or in their department.

COVID-19 Reporting and Daily Self-Monitoring
We will follow the rules on COVID-19 Reporting and Daily Self-Monitoring established by UT Arlington. If you or I develop symptoms, are exposed, and/or test positive for COVID-19, we will report our situation to UT Arlington. Therefore, we will all need to be flexible. The university will provide documentation as needed. As stated under Make-up Work, we will attempt to arrange for you to participate remotely, make up the work, or be excused. If I am affected or the University moves the course online, we may have class synchronously (live) on Teams, or I may record and post lectures to ECHO 360, depending on my status. I will notify you about any changes via Canvas as soon as possible.

Attendance:
At the University of Texas at Arlington, taking attendance is not required but attendance is a critical indicator of student success. Each faculty member is free to develop his or her own methods of evaluating students' academic performance, which includes establishing course-specific policies on attendance. As the instructor of this section, **I expect that you will attend class, and I will take daily attendance and participation as described under Class Engagement**. By enrolling in this course, you have made a commitment to attend at the scheduled meeting times. Research has shown that students who attend class regularly have higher course grades. Furthermore, students who actively listen and participate in courses have higher grades than do students who attend class but engage in competing activities such texting, surfing the internet, reading, sleeping, etc.

However, while UT Arlington does not require instructors to take attendance in their courses, the U.S. Department of Education requires that the University have a mechanism in place to verify Federal Student Aid recipients' attendance in courses. UT Arlington instructors should be prepared to report the last date of attendance as part of the final grading process. Specifically, when assigning a student a grade of F, faculty must report the last date a student attended their class based on evidence of academic engagement such as a test, participation in a class project or presentation, or an engagement online via Canvas. This date is reported to the Department of Education for federal financial aid recipients.

Distance education courses require regular and substantive online interaction and participation. Students must participate in online course activities to demonstrate attendance; logging into an online class is not sufficient by itself to demonstrate attendance.

Emergency Exit Procedures:
Should we experience an emergency event that requires evacuation of the building, students should exit the room and move toward the nearest exit, which is located to the left or right in the hallway. When exiting the building during an emergency, do not take an elevator but use the stairwells instead. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist individuals with disabilities.

Students also are encouraged to subscribe to the MavAlert system that will send information in case of an emergency to their cell phones or email accounts. Anyone can subscribe at Emergency Communication System.

Librarian to Contact

Each academic unit has access to Librarians by Academic Subject that can assist students with research projects, tutorials on plagiarism and citation references as well as support with databases and course reserves. Library information can be obtained through Nicole Spoor, Psychology Librarian. Please contact her by email (della.spoor@uta.edu) or phone (817-272-5332). You will find useful information for psychology on their website.

Respect for Diversity

It is my intent that students from all diverse backgrounds and perspectives be well served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. It is my intent to present materials and activities that are respectful of diversity, including but not limited to race, ethnicity, national origin, language, sex, disability, age, sexual orientation, gender identity, religion, creed, ancestry, culture, belief, veteran status, genetic information, or socioeconomic status. Your suggestions are encouraged and appreciated. I invite you to share your perspective

during class discussions. Please let me know ways to improve the effectiveness of the course for you personally or for other students or student groups.

Please remember that each of us is responsible for creating a safer, more inclusive environment.

Emergency Phone Numbers

In case of an on-campus emergency, call the UT Arlington Police Department at **817-272-3003** (non-campus phone), **2-3003** (campus phone). You may also dial 911. Non-emergency number 817-272-3381

Don't Forget About Taking Care of Yourself

Given current events and our own personal hardships, I understand that you may be dealing with things in your personal life that might make it hard to participate in this course. Therefore, I want to highlight some of the resources available through UT Arlington. I highly recommend the Counseling and Psychological Services (CAPS) on campus. I have known many students who have used their services and benefited greatly. You get 6 free sessions a semester. They have virtual sessions and have added online and app-based help resources. We also have other great resources (see above for more), including but not limited to the following:

[Counseling and Psychological Services](#)
[Division of Student Success](#)
[Health Services](#)
[Behavior Intervention Team](#)
[Relationship Violence and Sexual Assault Prevention](#)

Additionally, you can contact the University's [Resource Hotline](#) to determine if there are any services that you can take advantage of to help you be successful. There are many resources out there, but many of us do not know they exist or how to access them. I encourage you to ask.

Tentative Course Schedule

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As the instructor for this course, I reserve the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course. –Angela Liegey Dougall, PhD

Week	Date	Lecture Topic	Readings
Module 1: Basic Python Programming			
1	T 1/18	Using the Python Interpreter, operators, types and values	data types (see Chpt. 2)
2	T 1/25	Functions, flow control statements, data structures, global and local variables	data structures, functions (See Chpt. 3), flow control statements
3	T 2/1	Challenges	TBA
4	T 2/8	Containers, date and time, reading and writing files	TBA
5	T 2/15	Visualization, working with files, miscellaneous	TBA
6	T 2/22	Challenges	TBA
Module 2: Data Curation and Management			
7	T 3/1	Classes, Arrays	TBA
8	T 3/8	NumPy, Pandas	TBA
9	T 3/15	*Spring Vacation*	TBA
	R 3/17	*Spring Vacation*	TBA
10	T 3/22	Challenges	TBA
11	T 3/29	Challenges	TBA
12	T 4/5	Challenges	TBA
13	T 4/12	Challenges	TBA
Module 3: Machine Learning Algorithms			
14	T 4/19	Statsmodels	TBA
15	T 4/26	SciPy; Scikit-learn	TBA
16	T 5/3	Challenges	TBA