DSO-599: INTRODUCTION TO PYTHON FOR BUSINESS ANALYTICS
Spring 2020, 1.5 Units
JKP 204, Tue/Thu 3:30pm-4:50pm (for the second half of the semester)

Instructor: Peng Shi
Office: Bridge Hall 303D
Office Hours: Tue/Thu 2:30-3:10pm or by appointment. (If this time does not work for you, you can make an appointment by email to meet with me, but please give me at least 2 business days of advanced notice.)
Phone: (213) 821-1005
Email: Peng.Shi@marshall.usc.edu

COURSE DESCRIPTION
This course equips motivated students with little or no prior programming experience with an introductory knowledge of the Python programming language and Pandas data analysis package. By the completion of the course, students will be able to write simple programs on their own and to interface with software engineers. These skills are beneficial for every manager in today’s data-rich economy, and can also serve as a starting point for learning more advanced programming skills.

Python is one of the world’s most popular programming languages due to its simplicity, versatility, efficiency, and community support. Recent surveys have found it to be the most highly demanded programming language among job postings in data science. Pandas is a Python package that makes analyzing data easy, and it is widely used by data scientists at Google, Facebook, JP Morgan, and a host of other major companies.

More importantly than covering the technical tools, this course focuses on how to think algorithmically and solve problems related to business using programming. Datasets and applications are taken from a variety of fields, including healthcare, economics, education, marketing, digital platforms, and finance. During class, students learn by solving mini business problems using Python on their own computer under the guidance of the instructor. Students also work in teams to complete an open ended project in which they produce business insights from a dataset of their choice, and the project can be used to showcase their skills to future employers.

COURSE OBJECTIVES
Upon successful completion of the course, students will be able to

1. Predict the result of a given piece of Python code.
2. Code using Python to automate a given task or to analysis a dataset.
3. Communicate the purpose, methodology, and results of an analysis to a wide audience.

COURSE MATERIALS
The first half of course will rely heavily on the following textbook:
- Chapters 1-9 of “Python for Everybody” by Charles R. Severance, available at https://www.py4e.com/book.php. (Both the PDF and HTML versions are free.)
For the second half of the course, we will rely on course notes along with supplementary documentation on Pandas found online. All course material will be posted on Blackboard prior to class. If you have any questions or need assistance with the Blackboard Course Pages, please contact the Marshall HelpDesk at 213-740-3000 or HelpDesk@marshall.usc.edu.

**PRE-REQUISITES**
While no prior programming experience is assumed, students are expected to be able to proficiently operate a word processor, web browser, and to save files from the Internet and organize them into folders.

This course also requires students to have access to a laptop that they can bring to class with Python 3, Jupyter notebook, and the Pandas package installed. All of these are available via installing the latest Miniconda or Anaconda distribution for Python 3.X, available at [https://conda.io/docs/user-guide/install/index.html](https://conda.io/docs/user-guide/install/index.html). You should complete the installation as soon as possible, preferably before the first class session. Using Miniconda or Anaconda to install Python, Jupyter and Pandas, rather than using another method, will minimize technical difficulties.

**COMMUNICATION POLICY**
I am committed to respond to your email within 24 hours if it is received on a business day during 9am-5pm. If it is received in the evenings or on the weekends, then I will respond to the email by 5pm the next business day. (For example, for an email received on Monday at 3pm, I will respond by Tuesday at 3pm. For an email received at Monday at 6pm, I will respond by Tuesday at 5pm. For an email received on the weekend between Friday 5pm and Monday 8am, I will respond by Monday 5pm. If it were a long weekend and Monday is a holiday, then I will respond by Tuesday 5pm.)

**CLASSROOM POLICY**
Students should bring a computer to each class, but should only use it during the time allotted for the hands-on coding activity. During all other times, students should close all laptops and refrain from using cell-phones or tablets. When computer use is not allowed, students should take notes by hand using paper. Throughout the duration of the class, students should not access Facebook, YouTube, Twitter, Instagram, or any other website that is not related to the course.

**GRADING**
Your final grade will be based on your absolute performance with respect to the following criteria and weights, as well as on your relative performance compared to other students taking the course. The target average GPA for this course is 3.5.

<table>
<thead>
<tr>
<th>Assignments</th>
<th>Points</th>
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<tbody>
<tr>
<td>Assignments</td>
<td>20</td>
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<tr>
<td>Team Project</td>
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<tr>
<td>Midterm Exam</td>
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<tr>
<td>Final Exam</td>
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<td><strong>TOTAL</strong></td>
<td>100</td>
<td>100%</td>
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**ASSIGNMENTS**
There are four graded assignments to be completed individually, each worth 5% and assess course learning objective 2 (coding). The assignments are based on the following business applications.
- **Assignment 1: Home Mortgage Calculator.** An important aspect of personal financial management revolves around a home mortgage. In this assignment, you will create a tool that calculates how long it takes to pay off a mortgage as well as how much monthly payment is required in order to pay off a mortgage in a given time frame.

- **Assignment 2: Streamlining Healthcare Operations by Automating a Decision Rule.** Studies have shown that healthcare outcomes can improve if the health provider can streamline its operations using precise decision rules to reduce human error. This can also improve the operational efficiency and lower the strain on limited time of doctors and nurses. In this assignment, you will use Python to build an automated tool that triages an incoming patient by asking a series of questions to determine the appropriate next step.

- **Assignment 3 and 4: Analyzing Data from Customer Reviews.** One challenge for marketing and sales teams is to analyze large amounts of unstructured text data, such as customer reviews. In this pair of related assignments, you will apply your understanding of basic data structures in Python and Pandas to read a large file of free text input and extract repeated words, while counting their numbers of occurrences. You will output the results in a structured table that is more amenable to analysis, and perform basic descriptive analysis.

**TEAM PROJECT**
Students will be assigned into teams of 3-4 students by the instructor and will work in their own time outside of class to complete a descriptive data analysis using Python that uncovers business insights. The analysis will not only be graded based on the use of Python, but also on the presentation, rigor, and business relevance. Students are encouraged to find their own datasets rather than using those from in-class activities.

The final deliverable is worth 20% of the course grade and is a Jupyter notebook written with two potential audiences simultaneously in mind: 1) a senior manager in a relevant company with minimal technical experience; and 2) a data analyst in the company with technical training. In other words, the opening sections of the notebook must clearly communicate the big picture and the business logic in a readable and concise way, while the later sections give sufficient details to demonstrate technical rigor.

With the submission of the project, each individual will complete a survey describing his or her own contribution to the project, as well as a breakdown of the percentage of total work performed by each person in the team. The breakdown must add up to 100% and must include yourself. This will be used to adjust individual grades if certain members contributed little. The team project assesses course learning objectives 2 and 3 (coding and communicating).

**MIDTERM EXAM**
This is a 75-minute in-class open book, open notes exam. However, no electronic device is allowed, including laptops, cellphones, and tablets. In other words, you will be expected to write correct code on paper without the feedback of a computer, to predict the output of given pieces of Python code, and to describe the purpose of given code. Learning to code on paper will train you to plan before coding and to sharpen your understanding of programming constructs. The exam is worth 25% of your total grade and assesses all three course learning objectives.

**FINAL EXAM**
This is a 110-minute cumulative exam during the finals period. As with the midterm, the exam is open book, open paper notes, but no electronic device is allowed. You will predict the output of given pieces of Python code, write correct code on paper, and to describe the purpose of given code. The exam is worth 35% of your total grade and assesses all three course learning objectives.
EXAM RESCHEDULING

Students must attend the midterm and final exams at the indicated time and date. If you foresee a conflict, you must contact the professor within the first two weeks of the semester to explore alternative options. **No rescheduling of exams will be allowed after the first two weeks of class.** The only exception is a documented medical or family emergency, for which the student must either provide a signed doctor’s note with the name and phone number of the medical professional verifying the medical emergency, or have a professional counselor contact the professor directly verifying the nature and seriousness of the emergency. For all other reasons of missing the midterm or final exam, including travels for non-emergencies, interviews, adverse traffic conditions, or forgetfulness about exam time, the student will not be allowed to reschedule and will receive a zero for the exam.

LATE SUBMISSIONS POLICY

Assignments must be submitted electronically via Blackboard before they are due. If your internet breaks down on the due date, you must deliver a hard copy printout at the beginning of class on that day. If you are unable to attend class on that day, make arrangements for it to be delivered to the classroom or to my office by the start of class. (To avoid such unforeseen circumstances, you should submit assignments early if possible.) **No late submissions will be considered for grading, and you will receive zero if you did not submit anything before the deadline. This policy is strict and timing of submission is defined by the timestamp of the Blackboard system, which means that assignments that counted late even if they are submitted a few minutes after the deadline.** The purpose of this policy is so that the instructor can go over the solutions of assignments immediately after they are due while they are still fresh, and to train students to be assiduous in completing tasks on-time, which is a part of professionalism.

RE-GRADING POLICY

I will do my best to make my expectations for the various assignments clear and to evaluate them as fairly and objectively as I can. If you feel that an error has occurred in the grading of any assignment, you may, within one week of the date the grade is assigned, write me a memo in which you explain fully and carefully why you think the assignment should be re-graded. Be aware that the re-evaluation process can result in three types of grade adjustments: positive, none, or negative.

TEAM WORK

For most careers, it is important that you work well in teams. Most teams in the workplace are assigned by supervisors rather than chosen by team members. Therefore, you must learn to work effectively in the assigned teams. The teams for the final project will be assigned by the instructor and will be based on an optimization to maximize diversity of background and expertise. The team assignments may be imperfect but it is part of your learning experience to work out differences and disputes among yourselves.

THE IMPORTANCE OF COURSE EVALUATIONS

This course is continuously improved, based on feedback from students and instructor observations. Please submit the feedback cards at the end of every class and participate in end-of-term course evaluations online. Your feedback would be much appreciated and your instructor will read each evaluation carefully and use it to improve the course for the future.

STATEMENT ON ACADEMIC CONDUCT AND SUPPORT SYSTEMS

Academic Conduct:
Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, “Behavior Violating University Standards” policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, http://policy.usc.edu/scientific-misconduct.

Although students may discuss the individual coding assignments, students are expected to write their codes independently, so as to avoid involuntary plagiarism. No communication between students is tolerated during the midterm or final exams. Any suspicion of plagiarism or cheating will be reported and investigated. Students are encouraged to report any suspicious behavior of peers; the identity of the student who reports cheating will be held confidential. Any documented act of plagiarism or cheating will result at a minimum in a failing grade of “F” for all responsible parties and accomplices, and depending on the result of the investigation, may also result in higher penalties such as suspension or expulsion. In order to uphold the academic integrity of the university, such disciplinary actions will be executed without mercy on the first violation.

Students with Disabilities:
USC is committed to making reasonable accommodations to assist individuals with disabilities in reaching their academic potential. If you have a disability which may impact your performance, attendance, or grades in this course and require accommodations, you must first register with the Office of Disability Services and Programs (www.usc.edu/disability). DSP provides certification for students with disabilities and helps arrange the relevant accommodations. Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. This letter must be delivered to the professor by the end of the third week of class in order to apply accommodations for this course. DSP is located in GFS (Grace Ford Salvatori Hall) 120 and is open 8:30 a.m.–5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776. Email: ability@usc.edu.

Support Systems:
Student Counseling Services (SCS) - (213) 740-7711 – 24/7 on call
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention. https://engemannshc.usc.edu/counseling/

National Suicide Prevention Lifeline - 1-800-273-8255
Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. http://www.suicidepreventionlifeline.org

Relationship & Sexual Violence Prevention Services (RSVP) - (213) 740-4900 - 24/7 on call
Free and confidential therapy services, workshops, and training for situations related to gender-based harm. https://engemannshc.usc.edu/rsvp/

Sexual Assault Resource Center
For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: http://sarc.usc.edu/

Office of Equity and Diversity (OED)/Title IX compliance – (213) 740-5086
Works with faculty, staff, visitors, applicants, and students around issues of protected class. https://equity.usc.edu/
Bias Assessment Response and Support
Incidents of bias, hate crimes and microaggressions need to be reported allowing for appropriate investigation and response. https://studentaffairs.usc.edu/bias-assessment-response-support/

USC Support & Advocacy – (213) 821-4710
Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic. https://studentaffairs.usc.edu/ssa/

Diversity at USC – https://diversity.usc.edu/
Tabs for Events, Programs and Training, Task Force (including representatives for each school), Chronology, Participate, Resources for Students

USC Emergency Information
Provides safety and other updates, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible. emergency.usc.edu

USC Department of Public Safety – UPC: (213) 740-4321 – HSC: (323) 442-1000 – 24-hour emergency or to report a crime.
Provides overall safety to USC community. dps.usc.edu

Grade Disputes:
All grades assigned by faculty members are final. Students have the right to seek explanation, guidance, counsel and reasons for the assignment of a grade. Faculty may initiate a change in grade if there is an error in the calculation of a grade. Students may appeal a grade according to university policy as set forth in SCampus. A faculty member may not change a disputed grade outside the formal appeals process. In response to a disputed academic evaluation by an instructor, a student is entitled to two levels of appeal after review by the instructor: first to the chairperson of the department and then to the appropriate dean of the school. The full university policy can be found in SCampus under University Governance / Academic Policies at https://policy.usc.edu/scampus-part-c/.
# COURSE OUTLINE AND ASSIGNMENTS (SUMMARY TABLE)

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<tr>
<th>Session</th>
<th>Module</th>
<th>Topic</th>
<th>Pre-class Readings</th>
<th>Assignments Due</th>
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<tr>
<td>1 (Tue 3/10)</td>
<td>I. Introduction to Programming using Python</td>
<td>Variables and Statements</td>
<td>PY4E Ch. 1-2</td>
<td>Pre-class survey, Assignment 0</td>
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<tr>
<td>2 (Thu 3/12)</td>
<td></td>
<td>Conditional Execution</td>
<td>PY4E Ch. 3</td>
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<tr>
<td>3 (Tue 3/24)</td>
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<td>Functions</td>
<td>PY4E Ch. 4</td>
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<td>4 (Thu 3/26)</td>
<td></td>
<td>Iteration</td>
<td>PY4E Ch. 5</td>
<td>Assignment 1</td>
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<tr>
<td>5 (Tue 3/31)</td>
<td></td>
<td>Strings and Files</td>
<td>PY4E Ch. 6-7</td>
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<tr>
<td>6 (Thu 4/2)</td>
<td></td>
<td>Lists and Dictionaries</td>
<td>PY4E Ch. 8-9</td>
<td>Assignment 2</td>
</tr>
<tr>
<td>7 (Tue 4/7)</td>
<td></td>
<td>Midterm Exam Review</td>
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<tr>
<td>8 (Thu 4/9)</td>
<td></td>
<td>In-class Midterm Exam</td>
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<tr>
<td>9 (Tue 4/14)</td>
<td>II. Introduction to Data Analysis using Pandas</td>
<td>Series and DataFrames</td>
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<td>10 (Thu 4/16)</td>
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<td>Filtering Data</td>
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<td>Assignment 3</td>
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<tr>
<td>11 (Tue 4/21)</td>
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<td>Aggregating Data</td>
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<tr>
<td>12 (Thu 4/23)</td>
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<td>Merging Data</td>
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<td>Assignment 4</td>
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<tr>
<td>13 (Tue 4/28)</td>
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<td>Manipulating Text</td>
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<tr>
<td>14 (Thu 4/30)</td>
<td></td>
<td>Final Exam Review</td>
<td></td>
<td>Team Project due 6pm Friday 5/1.</td>
</tr>
</tbody>
</table>

- **PY4E** denotes the textbook “Python for Everybody” by Charles Severance.
- All assignments are due on Blackboard before the start time of each session. All late assignments will receive a grade of zero.
After carefully reviewing the above syllabus, please complete the following and return a hard copy to the instructor by the second week of class.

Acknowledgement of Understanding

I, ________________________________, USC # ____________________, hereby acknowledge that I have carefully reviewed the DSO 599 (Introduction to Python for Business Analytics) syllabus in Spring 2020 and that I fully understand and agree to the policies written therein. Specific policies include:
- Any late assignment, even by a few minutes, will receive a grade of zero.
- Although discussion among students is allowed, all individual assignments must be written up individually and students must not share solutions with one another.
- Any documented act of plagiarism or cheating for an assignment or exam will result, at a minimum, in a failing grade of F for the course with no option of withdrawal for all responsible persons. The penalty will be applied without mercy upon the first offence.
- No exam rescheduling is allowed after the first two weeks of class. Except for documented medical or family emergencies, missing any exam will result in a grade of zero for the exam.
- DSP students must provide the instructor with the official letter of verification during the first three weeks of class in order to apply the accommodation.
- No adjustment of grades for any graded work unless the student submits a memo describing the reasons for regrading within one week of the grade being assigned.
- The teams for the team project will be assigned by the instructor. The instructor will not act as an intermediary for team disputes during the course. At the end of the course, each team member will complete a reflection survey as outlined in the syllabus, which will be used to adjust individual grades if needed.

Signature: _______________________

Date: _________________________