USC Marshall
School of Business

DSO 599: R and Python for Business Analytics

Online Syllabus*
Fall 2017
Date/Time
1.5 Units

Faculty Contact Information

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Course Description

R and Python are the two of the most popular open source programming languages for data and business analytics. This course uses a small program oriented approach. Strong emphasis will be given to small programs that solve a specific task. Topics include control-flow, introductory data structures, algorithms using selection and iteration, basic object-oriented programming, testing and debugging. The course uses business cases to introduce practical ways of solving problems. You will learn how to use R and Python to download real-world data, manipulate data sets from various sources, manage the information, and produce high quality charts.

You will learn the basics of computing, as well as problem-solving and algorithmic thinking. You will complete projects and create programs that are practical to business applications outside the class, you will work on a real-world cases.

This is an online course and will consist of 1 hour synchronous video conferencing sessions to be offered at the same time each week. These "MarshallTALK" sessions will require students to have a broadband Internet connection, webcam, and speakers or headset.

All MarshallTALK sessions are mandatory; please contact your instructor in writing if you are not able to attend a session.

This course will be offered in a "flipped" format. Prior to the MarshallTALK sessions, you will be expected to complete all asynchronous activities including watching all pre-taped lectures and completing all readings, quizzes, labs, and homework assignments.

It is expected that asynchronous classroom activities will take approximately 1.5 hours each week and that homework assignments will take approximately 6 hours to complete each week.

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Learning Outcomes

At the end of this course, you will be able to:

I. Explain the key capabilities of R and Python for solving data analytics problems
II. Identify new opportunities to use R & Python in various business domains
III. Translate the business task to a data analytics problem and provide an effective solution
IV. Apply basic data analytics techniques to business problems using both R and Python
V. Critically assess the validity of analytics-based recommendations in the context of specific business decision

Please see the appendix for alignment of these goals with the Marshall Learning Objectives.

Required Materials

This class covers R and Python. Both pieces of software are open source, run on any operating system, and can be downloaded to a personal computer from:

- R Project
- R Studio
- Python
- Rodeo

Recommended Reading

- Ohri, A. (2013). *R for Business Analytics*. New York, NY: Springer-Verlag. ISBN: 978-1-4614-4343-8.
- McKinney, W. (2013). *Python for Data Analysis: Data Wrangling with Pandas, NymPy, and IPython*. Sebastapol, CA: O'Reilly Media Inc. ISBN: 978-1-449-31979-3.
- VanderPlas, J. (2016). *Python Data Science Handbook: Essential Tools for Working with Data*. Sebastapol, CA: O'Reilly Media Inc. ISBN: 978-1-4919-1204-1.

- Miller, T. W. (2015). *Modeling Techniques in Predictive Analytics with Python and R: A Guide to Data Analysis*. Upper Saddle River, NJ: Pearson Education Inc. ISBN: 978-0-13-389206-2.

Prerequisites and Recommended Preparation

This course assumes knowledge of the basic statistics concepts. This course does not assume any prior programming experience.

Course Notes:

We will use Blackboard for all assignments, course materials, and announcements. Please check the Blackboard site and your email daily. If you would like hard copies of any course materials, it will be your responsibility to print them.

Working with software in the computer lab is an integral part of this course. We will have at least one lab session for each case assignment. During these sessions, we will discuss the case and practice using software. Your quizzes and assignments (see below) will often require you to use this software. Thus, it is very important that you attend and actively participate in lab sessions.

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Discussing homework assignments, pre-class preparation with a partner or study-group is permitted and highly encouraged. Your peers are now and will always be your best resource to learn. **However, each student is required to prepare, write-up, and submit his or her own solutions independently, including computer work.** Collaboration of any sort on quizzes and exams is prohibited **and will result in a zero on that quiz/exam and the appropriate University-level authorities to be notified**. See also the Marshall Guidelines on Academic Integrity below.

Grading Policies:

The course grade will be based on your performance on the labs, homework assignments, a final exam, and class participation. These will be combined using the following weights:

Assignments	**% of Grade**
FINAL EXAM	30.0%
QUIZZES	25.0%
LABS	20.0%
CLASS PARTICIPATION	10.0%
HOMEWORK ASSIGNMENTS	15.0%
TOTAL	100.0%

Final grades represent how you perform in the class relative to other students. Your grade will not be based on a mandated target, but on your performance. Historically, the average grade for this class is about a "B+". Three items are considered when assigning final grades:

1. Your average weighted score as a percentage of the available points for all assignments (the points you receive divided by the number of points possible).
2. The overall average percentage score within the class.
3. Your ranking among all students in the class.

Assignment Submission Policy:

Assignments must be turned in on the due date/time electronically via Blackboard. Any assignment turned in late, even if by only a few minutes, will receive a grade deduction of 5% per day. Late or not, however, you must complete all required assignments to pass this course.

Class Participation

One of the key learning outcomes of this course is to develop the ability to effectively discuss and propose coding techniques with your peers. Consequently, class participation is critical. **Your participation will be evaluated on the quality of your contribution.** Students are expected to come to the synchronous class sessions prepared, to activate their webcams upon arrival, and to contribute robust and meaningful comments to their instructor and their peers in order to earn full class participations points.

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Labs
There will be weekly labs in this course. The main goal of the labs is to provide hands-on experience with the material introduced during the asynchronous sessions.

Homework
Homework assignments mirror the cases we explore in the lab and provide an opportunity for you to apply your coding skills to a new business problem. In many ways, these assignments are a good example of the kinds of analytics work you may expect to do in your job after you are out of Marshall.

Homework assignments must be typed neatly with necessary computer output and graphics placed in order with each corresponding homework exercise. Figures (including fonts) should be clear and readable. You are welcome to discuss homework problems with the instructor and other students on online discussion forums but all work turned in should be your own and reflect your understanding of the material. Direct copying of assignments or solutions will not be tolerated! All homework will be due at the end of the day (midnight) on the due date. All assignments will be posted and submitted on Blackboard. The grade for the homework will be reduced by 5% for every working day it is late after that, to a minimum of 30% of the original grade. Late or not, however, you must complete all required assignments to pass this course.

Quizzes
A second key learning outcome of this course is to develop the ability to confidently apply the coding skills to business problems. Quizzes support that outcome, asking you to write a program that performs a straightforward application of data analysis.
There will be two quizzes in this class. The quizzes will be given during the asynchronous sessions. All quizzes will be timed and must be completed in one sitting.
No make-up exams or quizzes are offered. Quizzes cannot be retaken.

Final Exam
The final exam will be cumulative. It will involve both written and computer portions. It will be an open-book and open-notes test. During the final you will demonstrate your proficiency in coding and data analytics using R and Python. The Final exam will take place during the last scheduled MarshalTALK session of the course.

ADDITIONAL INFORMATION

Add/Drop Process
DSO 599 will remain in open enrollment (R-clearance) through the Add deadline. If there is an open seat, students can add the class using Web Registration. If the class is full, students will need to submit a wait list application to secure a seat if one becomes available. The Graduate Wait List Request form can be completed and submitted to the Marshall graduate registration office. An instructor may drop any student who does not attend the first two class sessions without prior consent; the instructor is not required to notify the student that s/he is being dropped. These policies maintain professionalism and ensure a system that is fair to all students.

Retention of Graded Coursework
Final exams and all other graded work which affected the course grade will be retained on Blackboard page for one year after the end of the course.

Technology Policy
Use of personal communication devices, such as cell phones, is considered unprofessional and is not permitted during real-time interactive sessions.

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Academic Integrity and Conduct

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own (plagiarism). 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. All students are expected to understand and abide by the principles discussed in the SCampus student policy guide. The general principles of plagiarism appears in Part B, Section 11.

Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty. Failure to adhere to the academic conduct standards set forth by these guidelines and our programs will not be tolerated by the USC Marshall community and can lead to dismissal.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the Office of Equity and Diversity or to the Department of Public Safety. This is important for the safety of the whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report or can initiate the report on behalf of another person. Relationship and Sexual Violence Prevention and Services (RSVP) provides 24/7 confidential support, and the Sexual Assault Resource Center webpage describes reporting options and other resources.

Support Systems

Students whose primary language is not English should check with the American Language Institute, which sponsors courses and workshops specifically for international graduate students.

The Office of Disability Services and Programs 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. Please be sure the letter is delivered to your instructor as early in the semester as possible. DSP is located in Grace Ford Salvatori Hall, room 120 and is open Monday through Friday during normal business hours. The phone number for DSP is (213) 740-0776. Email: ability@usc.edu.

If an officially declared emergency makes travel to campus infeasible, USC Emergency Information will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.

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Summary of Deliverables

	Topics	Cases/Readings.	Deliverables and Due Dates
Week 1	Why R? R infrastructure, R interface,	Week 1 recordings. Material posted on BB Ch 1, 2 & 3. R for Business Analytics (optional)	Lab 1: Module 1 discussion during MarshallTALK Self-assessment
Week 2	Manipulating data	Week 2 recordings. Material posted on BB. Ch 4. R for Business Analytics (optional)	Case 1: Advertising and Promotion Lab 2: Module 2 discussion during MarshallTALK Self-assessment HW 1: Basic data manipulation in R
Week 3	Data Import, Export and Output using R **dplyr** package	Week 3 recordings. Material posted on BB; Ch 10. R for Business Analytics(optional)	Lab 3: Module 3 discussion during MarshallTALK. Self-assessment Quiz 1: Data manipulation in R
Week 4	Exploring data: Summary and Visualization in R **quantmod** and **ggplot2** packages	Week 4 recordings; Material posted on BB; Ch 5: R for Business Analytics (optional)	Case 2: Financial charts' analysis and stock price prediction Lab 4: Module 4 discussion during MarshallTALK. Self-assessment HW 2: Exploratory data analysis in R: summary and visualization
Week 5	Introduction to Python. Getting started with pandas	Ch 5: Python for Data Analysis	Lab 5: Module 5 discussion during MarshallTALK.
Week 6	Data loading, storage, and file formats Data Wrangling: Clean, Transform, Merge, Reshape in Python	Ch 6 & 7: Python for Data Analysis	Self-assessment Case 3: Brand and Price analysis in Python Lab 6: Module 6 discussion during MarshallTALK Self-assessment
Week 7	Visualization with Matplotlib in Python	Ch 4: Python Data Science Handbook	Case 4: Predicting loan default Lab 7: Module 7 discussion during MarshallTALK. Self-assessment Quiz 2: Data manipulation in Python HW 3: Data analysis in Python
FINAL	**Final Exam**		Date: last MarshallTALK session

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Appendix

How DSO 599 Contributes to Student Achievement of USC Marshall's Six Graduate Programs Learning Goals		
Marshall Graduate Programs Learning Goals	**Degree of Emphasis (1=Low, 2=Moderate, 3=High)**	**DSO 599 Objectives that support this goal**
Learning goal #1: Our graduates will develop a strategic level of understanding of the key functions of business and be able to comprehend the relationships between the core business disciplines in order to *make holistic judgments and decisions in analyzing business situations.*		
1.1 Students will demonstrate foundational knowledge of core business disciplines, including their interrelationships.	2	II
1.2 Students will analyze business scenarios, such as cases, with a firm grounding of how each of the core fields play into decisions made.	3	V
1.3 Students will apply theories, models, and frameworks to analyze relevant markets (e.g. product, capital, commodity, factor and labor markets).	3	IV
1.4 Students will show the ability to utilize technologies (e.g., spreadsheets, databases, software) relevant to contemporary business practices in a variety of disciplines and industries.	2	III
1.5 Students will demonstrate the ability to utilize interdisciplinary business skills in case analyses, exams, presentations and projects, including capstone projects.	2	V
Learning goal # 2: Our graduates will develop a global mindset and a competitive edge in this interdependent, fast-changing, diverse and volatile world through structured educational opportunities. They will acquire knowledge, both theoretical and practical as well as experiential, about America and the rest of the world, and the economic/financial interdependencies that signify current geopolitical, economic and financial relationships that impact business decisions *so as to make a difference in the world.*		
2.1 Students will understand how local, regional and global markets interact and are impacted by economic, social and cultural factors.	1	II
2.2 Students will understand that stakeholders, stakeholder interests, business environments (legal, regulatory, competitor) and business practices vary across regions of the world.	1	III
2.3 Students will demonstrate the ability to evaluate global business challenges and opportunities through experiential learning, immersion international trips, case studies, international business consulting projects and exams.	1	V

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Learning goal 3: Our graduates will demonstrate critical thinking skills by making the intellectual connection between quantitative and qualitative tools, theories and context to provide the basis *for proper and effective problem solving and decision making as well as the development of new and innovative business opportunities to strategically navigate the complex demands of the current and dynamic national and international business environments.*		
3.1 Students will understand the concepts of critical thinking, entrepreneurial thinking and creative thinking as drivers of innovative ideas.	1	II
3.2 Students will critically analyze concepts, theories and processes by stating them in their own words, understanding key components, identifying assumptions, indicating how they are similar to and different from others and translating them to the real world.	2	V
3.3 Students will be effective at gathering, storing, and using qualitative and quantitative data and at using analytical tools and frameworks to understand and solve business problems.	2	I
3.4 Students will demonstrate the ability to anticipate, identify and solve business problems. They will be able to identify and assess central problems, identify and evaluate potential solutions, and translate a chosen solution to an implementation plan that considers future contingencies.	2	III
3.5 Students will demonstrate the ability to be accurate, clear, expansive (thorough, detailed) and fair-minded in their thinking.	1	IV
3.6 Students will demonstrate their ability to apply critical thinking tools and the USC-CT Framework in designated exercises, cases, projects and exams.	1	V
Learning Goal 4: Our graduates will develop people and leadership skills by demonstrating self-awareness, emotional intelligence, curiosity, visionary and strategic thinking, teamwork, refection and knowledge transfer skills to promote their effectiveness as *business managers and leaders.*		
4.1 Students will recognize, understand, and analyze the motivations and behaviors of stakeholders inside and outside organizations (e.g., teams, departments, consumers, investors, auditors).	1	III
4.2 Students will be able to demonstrate various emotional intelligences and leadership skills such as self-awareness, self-management, teamwork and collaboration to better understand the potential complexities in organizations in papers, exercises, cases, exams and projects.	1	V
4.2 Students will recognize, understand and analyze the roles, responsibilities and behaviors of effective managers and leaders in diverse business contexts (e.g., marketing, finance, accounting, etc.)	1	V
4.3 Students will be able to demonstrate the understanding of visions and values of world-class companies and the impact it has had on financial results.	1	II
4.4 Students will understand factors that contribute to effective teamwork.	1	III
Learning goal 5: Our graduates will demonstrate ethical reasoning skills, understand social, civic, and professional responsibilities *and aspire to add value to society*		
5.1 Students will understand professional codes of conduct.	1	V
5.2 Students will recognize ethical challenges in business situations and assess appropriate courses of action.	1	III
5.3 Students will be able to apply ethical principles and professional standards in analyzing situations and making informed decisions.	2	III
5.4 Students will demonstrate an understanding of and consistently apply the ethical principles and professional standards related to the business world and show the ability to express and follow results of independence and the highest sense of professional ethics.	2	IV

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5.5 Students will demonstrate the ability to research, critically analyze, synthesize, and evaluate information, including professional standards for decision making, in the local, regional and global business environment.	3	V
5.6 Students will enhance their appreciation of values of social responsibility, legal and ethical principles and corporate governance through the analysis and discussion of pertinent articles and real business cases, seminars and summits.	2	V
Learning Goal #6: Our graduates will be effective communicators *to facilitate information flow in organizational, social, and intercultural contexts*		
6.1 Students will identify and assess diverse personal and organizational communication goals and audience information needs.	1	I
6.2 Students will understand individual and group communications patterns and dynamics in organizations and other professional contexts.	2	III
6.3 Students will demonstrate an ability to gather and disseminate information and communicate it clearly, logically, and persuasively in professional contexts.	3	V
6.4 Students will be able to clearly communicate in oral and written formats the solutions to business issues and problems accurately and effectively.	2	I

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