

**DSO 499 – Essentials of Business Data Analysis Using R**  
**(half-semester course)**

**Semester:** Fall 2019  
**Time – M, W 12:00 pm – 1:50 pm**  
**2 Units**

**Professor:** Inga Maslova  
**Office:** BRI 303C

**Office Hours:** MW 10:00 am – 11:30 am in BRI 303C and Zoom  
*other times by appointment*

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**Course Description**

R is one 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 business analytics 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 to download real-world data, manipulate data sets from various sources, manage the information, 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.

**Learning Outcomes**

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

- I. Explain the key capabilities of R for solving data analytics problems
- II. Identify new opportunities to use R 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 R
- 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 an open source software: R. It runs on any OS, and can be downloaded to a personal computer from:  
R: <https://www.r-project.org/>  
RStudio: <https://www.rstudio.com/>

- Recommended Reading:
  - Ohri, A. (2013). *R for Business Analytics*. New York, NY: Springer-Verlag. ISBN: 978-1-4614-4343-8.
  - Miller, T. W. (2015). *Modeling Techniques in Predictive Analytics with 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 covered in BUAD 310. 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 require you to use this software. Thus, it is very important that you attend and actively participate in lab sessions.

Discussing homework assignments 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:

<u>Assignments</u>	<u>% of Grade</u>
<b>FINAL EXAM</b>	35.0%
<b>QUIZZES</b>	25.0%
<b>CLASS PARTICIPATION AND LABS</b>	15.0%
<b>HOMEWORK ASSIGNMENTS</b>	<u>25.0%</u>
<b>TOTAL</b>	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 weighted percentage of the available points for all assignments.

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 and Labs***

Class participation is an extremely important part of the learning experience in this course as the richness of the learning experience will be largely dependent upon the degree of preparation by *all* students prior to each class session.

Students are expected to come to class prepared, and to contribute robust and meaningful comments to their instructor and their peers in order to earn full class participations points. Students are expected to complete the pre-class assignments to fully participate in the discussion. The points collected for the pre-class assignments will count toward your class participation score. Cold calling will take place to encourage active participation and to gain multiple perspectives and points of view, thus lending itself to the richness of the learning experience.

There will be weekly labs in this course. The main goal of the labs is to provide hands-on experience with the material introduced in class. You will be asked to answer several questions from the lab on Blackboard and submit your scripts. The lab points will count toward your participation score.

In-class participation grading will be based on students' demonstrated willingness to participate and the quality of the comments expressed, rather than quantity. One of the key learning outcomes of this course is to develop the ability to effectively discuss and propose coding techniques with your peers. **Your participation will be evaluated on the quality of your contribution** (see the appendix for the evaluation rubric). While some students are far more comfortable than others with class participation, *all* students should make an effort to contribute meaningfully in *every* class.

### ***Homework***

Homework assignments mirror the cases we explore in class 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 available on Blackboard 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 open-book/notes quizzes in this class. The quizzes will be given during the beginning of the class. All quizzes are timed. The sample quizzes will be available for you to practice.

*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. The Final exam will take place during the USC scheduled time.

## **ADDITIONAL INFORMATION**

### **Add/Drop Process**

DSO 499 will remain in open enrollment (R-clearance) through the Add deadline (Sept 4). If there is an open seat, students can add the class using Web Registration. 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. Last day to drop the course with the refund is Sept 4; last day to drop the course with a “W” is Oct 7, 2019.

### **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 sessions.

## **USC 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” <https://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>.

### **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/>

#### *The Office of Disability Services and Programs*

Provides certification for students with disabilities and helps arrange relevant accommodations. <dsp.usc.edu>

#### *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/>*

Tab 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>

### **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](http://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. Please be sure the letter is delivered to me (or to your TA) as early in the semester as possible. 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](mailto:ability@usc.edu).

### **Emergency Preparedness/Course Continuity**

In case of a declared emergency if travel to campus is not feasible, the *USC Emergency Information* web site (<http://emergency.usc.edu/>) will provide safety and other information, including electronic means by which instructors will conduct class using a combination of USC's Blackboard learning management system (blackboard.usc.edu), teleconferencing, and other technologies.

## Summary of Deliverables<sup>1</sup>

	Topics and Cases	Cases/Readings.	Deliverables and Due Dates
<b>Module 1</b>	Why R? R infrastructure, R interface, RStudio.  R basics	Material posted on Blackboard  Ch 1, 2 & 3. R for Business Analytics*	Participation: answer the questions on BB. Due by the end of the class.  Lab 1 <sup>2</sup> : Work in class. Answer the questions on BB
<b>Module 2</b>	Manipulating data  <b>Case 1:</b> Advertising and Promotion	Material posted on Blackboard  Ch 4. R for Business Analytics*	Lab 2 <sup>2</sup> : Work in class. Due by the end of the day. Submit your answers on BB  <b>HW 1:</b> Basic data manipulation in R
<b>Module 3</b>	Data Import, Export and Output using R <b>dplyr</b> package	Material posted on Blackboard  Ch 10. R for Business Analytics*	Participation: answer the questions on BB. Due by the end of the class.  <b>Quiz 1:</b> Data manipulation in R  Lab 3 <sup>2</sup>
<b>Module 4</b>	Exploring data part 1: Summary and Visualization in R ( <b>quantmod</b> package)  <b>Case 2:</b> Financial charts' analysis and stock price prediction	Material posted on Blackboard  Ch 5: R for Business Analytics*	Lab 4 <sup>2</sup> : Data visualization for lost days case. Submit your work on BB  <b>HW 2:</b> Exploratory data analysis in R
<b>Module 5</b>	Exploring data part 2: data visualization in R ( <b>ggplot2</b> package)  <b>Case 3:</b> Brand and price analysis	Material posted on Blackboard  Ch 5: R for Business Analytics*	<b>Quiz 2:</b> Data visualization in R, in-class on W covers material from Module 3 and 4
<b>Module 6</b>	Shiny apps.  <b>Case 4:</b> Creating an app from scratch  Review before the final exam	Ch 7: R for Business Analytics*	Lab 5 <sup>2</sup> : Answer the questions on BB  <b>HW 3:</b> Data visualization and analytics in R
<b>FINAL</b>	<b>Final Exam</b>	<b>comprehensive</b>	<b>December 13, 11 am – 1 pm</b>

<sup>1</sup>Additional short readings/videos may be assigned via BB throughout the semester

<sup>2</sup>All Labs are due on Friday the week they were assigned by the end of the day (midnight) submitted on Blackboard

\*Suggested reading

## Appendix



### **Undergraduate Program Learning Goals and Objectives**

**Learning goal 1: Our graduates will demonstrate critical thinking skills so as to become future-oriented problem solvers, innovators and decision makers in diverse and rapidly changing business environments.**

- 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
- Students will demonstrate the ability to be accurate, clear, expansive (thorough, detailed) and fair-minded in their thinking
- 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
- 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
- Students will understand the concepts of critical thinking, entrepreneurial thinking and creative thinking as drivers of innovative ideas

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**Learning Goal 2: Our graduates will develop people and leadership skills to promote their effectiveness as business managers and leaders in the 21<sup>st</sup> century's evolving work and organizational structures.**

- Students will recognize, understand and analyze the roles, responsibilities and behaviors of effective managers and leaders in diverse business contexts e.g., functionally diverse, culturally diverse, geographically diverse, etc.
- Students will understand factors that contribute to effective teamwork including how to elicit, manage and leverage diverse perspectives and competencies.
- Students will recognize, understand, and analyze the motivations and behaviors of stakeholders inside and outside organizations (e.g., teams, departments, consumers, investors, auditors)

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**Learning Goal 3: Our graduates will be effective communicators to facilitate information flow in organizational, social, and intercultural contexts.**

- Students will identify and assess diverse personal and organizational communication goals and audience information needs
- Students will demonstrate an ability to gather and disseminate information and communicate it clearly, logically, and persuasively in professional contexts
- Students will understand individual and group communications patterns and dynamics in organizations and other professional contexts

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**Learning goal 4: Our graduates will demonstrate ethical reasoning skills, understand social, civic, and professional responsibilities and aspire to add value to society.**

- Students will recognize ethical challenges in business situations and assess appropriate courses of action
- Students will understand professional codes of conduct

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**Learning goal 5: Our graduates will develop a global business perspective. They will understand how local, regional, and international markets, and economic, social and cultural issues impact business decisions so as to anticipate new opportunities in any marketplace.**

- Students will understand that stakeholders, stakeholder interests, business environments (legal, regulatory, competitor) and business practices vary across regions of the world
- Students will understand how local, regional and global markets interact and are impacted by economic, social and cultural factors.

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**Learning goal 6: Our graduates will understand types of markets and key business areas and their interaction to effectively manage different types of enterprises.**



## **Participation Behavioral Anchor Rating Scale**

### **Excellent Performance (2 points)**

- Initiates information relative to topics discussed
- Accurately exhibits knowledge of assignment content
- Clarifies points that others may not understand
- Shares personal experiences or opinions related to topic
- Offers relevant / succinct input to class
- Actively participates in labs and class exercises
- Demonstrates ability to apply, analyze, evaluate & synthesize course material.
- Demonstrates willingness to attempt to answer unpopular questions
- Builds on other students' contributions

### **Good Performance (1.5 points)**

- Regularly participates in discussions
- Shares relevant information
- Gives feedback to classroom discussions
- Consistently demonstrates knowledge of reading assignments
- Demonstrates ability to analyze / apply course material
- Demonstrates willingness to attempt to answer questions

### **Fair / Average Performance (1 point)**

- Participates in group discussions when asked
- Demonstrates knowledge of course material
- Offers clear, concise, "good" information on class assignments
- Offers input, but tends to reiterate the intuitive
- Attends class regularly

### **Poor Performance (0.5 point)**

- Occasional input, often irrelevant, unrelated to topic
- Reluctant to share information
- Not following the flow of ideas
- Personal applications only
- Drains energy from the class

### **Unacceptable Performance (0 points)**

- Fails to participate even when specifically asked
- Gives no input to discussions
- Does not demonstrate knowledge of the readings
- Shows up to class: does nothing
- Distracts group / class
- Irrelevant discussion