USC Marshall
School of Business

DSO 458 – Essentials of Business Data Analysis Using R

Semester: **Spring 2022**
Time: MW 12:00 pm – 1:50 pm
4 Units

Professor: Inga Maslova
Office: ACC 203

Office Hours: W 9:30 am – 10:30 am on Zoom
*other times b*y 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.

Recommended Reading

- Ohri, A. (2013). *R for Business Analytics*. New York, NY: Springer-Verlag. ISBN: 978-1-4614-4343-8.
- 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/

- 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:

BUAD 310 or equivalent (instructor's signature is required if the prerequisite is not met). 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 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.

Online Class Expectations

1. The initial sections of this course will be online, due to the pandemic, but the bulk of the course will be an in-person class. Class attendance and participation is important in developing a co-herent view of the materials covered in the course. Because this class is highly interactive and experiential, attendance and active participation is required at the synchronous Zoom class ses-sions. You cannot contribute if you are not present, and attendance will be taken every class. Students must be in the classroom unless a special accommodation has been arranged in ad-vance.

    If a student has an accommodation letter from USC's Office of Student Accessibility Services or from Marshall detailing visa or travel restrictions, attendance and active participation is ex-pected in the classroom. Any student with such accommodations should submit their accom-modation document to me and on Blackboard as soon as possible to discuss appropriate accom-modations. Either classroom recordings or live remote access to the class via Zoom will be pro-vided.

2. After the initial online class meetings, students will be expected to be in the classroom. There is no adequate substitute for the whole class experience. Activities that you miss cannot be reen-acted by the class or your team, there are activities in every class. Attendance is key to success in this fast-moving class.

3. In the event you cannot do so, you must contact the professor **prior to the beginning of class.** In the event you must join on-line, I expect you to have cameras on during the synchronous Zoom sessions. Headsets or earphones ensure the best audio quality but are not re-quired. *Please advise me if you have circumstances under which you will not be able to meet these expectations.*

4. Students who are experiencing illness should *not* attend class in person. Please inform me **in advance** (when possible) of any class sessions that you can't attend for medical reasons, and accommodations will be arranged to view recorded lectures and submit class participation work.

5. During synchronous Zoom sessions, the following netiquette is expected, as if you were in a physical classroom.

    a. Please DO:
        i.   Log into class early or promptly.
        ii.   Arrange to attend class where there is a reliable internet connection and without distractions.
        iii. Dress respectfully. Video conference business meetings are and will be the norm, so practice your professional telepresence.
        iv.   If you use a virtual background, please keep it respectfully professional.
        v.   Display both your first and last name during video conferencing and synchronous class meetings.
        vi.   Respectfully minimize distractions by muting and or turning off video if necessary and when appropriate.
        vii. Engage in appropriate tone and language with instructors and classmates.

    b. Please DON'T:
        i.   Engage in a simultaneous activity not related to the class.
        ii.   Interact with persons who are not part of the class during the class session.
        iii. Leave frequently or not be on camera for extended periods of time.
        iv.   Have other persons or pets in view of the camera.

6. All Zoom sessions will be recorded and posted in the Blackboard Course pages.

Online Technology Requirements

The following equipment and system requirements are recommended to successfully participate in this online course:
- Computer with webcam
- Earphones or headset
- Reliable (preferably high speed) Internet connection
- Current operating system for Windows or Mac
- Current browser
    - Google Chrome
    - Firefox
    - Internet Explorer (not recommended)
    - Safari (Mac)

For technical support please see:
- **USC Systems** (Blackboard, USC Login, MyUSC, USC Gmail, GoogleApps)
  For assistance with your USC login or other USC systems, please call +1 (213) 740-5555 or email Consult@usc.edu. They are open Mon – Fri, 9:30am – 5pm and weekends from 8am - 5pm (all Pacific time).
- **Zoom Video Web Conferencing System**
  For assistance using Zoom, go to Zoom Support Page. You may also call +1 (888) 799-9666 ext. 2. They are available 24/7.
- **Marshall Systems** (MyMarshall, Marshall Outlook email)

For assistance with Marshall systems you can call +1 (213) 740-3000 Mon-Fri 8am-6pm (Pacific), email HelpDesk@marshall.usc,edu, or use our self-help service portal as shown below. The portal allows you to get immediate assistance by searching for the information you need. You can also use it to chat with a technician or input a request. To access the service portal, follow these steps:

- o On a computer or mobile device, go to MyMarshall Home Page and click the "**Help**" link on the upper right.
- o Log in using your Marshall username and password.
  (If you don't know your Marshall login please follow the onscreen instructions pertaining to login issues)

If your computer does not have Microsoft Word, Office 365 package is available to you free of charge and allows you to install Word, Excel, PowerPoint, Outlook, OneNote, Publisher, and Access on up to 5 PCs or Macs and Office apps on other mobile devices including tablets. Office 365 also includes unlimited cloud storage on OneDrive. To download Office 365 log into your student (University) email through a web browser, choose Settings (top right corner), and select software. If you have further questions or need help with the software, please contact the USC ITS service portal (https://itservices.usc.edu/).

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	25.0%
QUIZZES	20.0%
MIDTERM	20%
CLASS PARTICIPATION AND LABS	20.0%
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 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 to a minimum of 30%. *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

Another 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 beginning of the class. All quizzes are timed. The sample quizzes will be available for you to practice.
Midterm

There will be one midterm in this class. The sample midterm will be available for you to practice.
No make-up exams or quizzes are offered. Midterm cannot be retaken.

Final Exam

The final exam will be cumulative. It will involve both written and computer portions. 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 (see the schedule below).

ADDITIONAL INFORMATION

Add/Drop Process
DSO 458 will remain in open enrollment (R-clearance) through the Add deadline, Jan 28, 2022. 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 Jan 28, 2022; last day to drop the course with a "W" is April 8, 2022.

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/
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

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. 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.

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[1]

	Date	Topics and Cases	Cases/Readings.	Deliverables and Due Dates
Week 1	10-Jan-22	Why R? R infrastructure, R interface, Rstudio	Material posted on Blackboard	Participation: answer the questions on BB. Due by the end of next day.
	12-Jan-22	Introduction, course structure, R basics	Ch 1, 2 & 3. R for Business Analytics*	Lab 1[2]: Work in class. Answer the questions on BB
Week 2	17-Jan-22	No class. MLK		
	19-Jan-22	Manipulating data. Basic data structures	Material posted on Blackboard. Ch 4. R for Business Analytics*	Lab 2[2]: Work in class. Due by the end of next day. Submit your answers on BB
Week 3	24-Jan-22	Manipulating data	Material posted on Blackboard	Lab 3[2]: Work in class. Due by the end of next day. Submit your answers on BB
	26-Jan-22	**Case 1**: Advertising and Promotion	Ch 4. R for Business Analytics*	**HW 1**: Due Jan 26 by the end of the day
Week 4	31-Jan-22	Data Import, Export and Output using R **dplyr** package	Material posted on Blackboard	Participation: answer the questions on BB. Due by the end of the class.
	2-Feb-22		Ch 10. R for Business Analytics*	**Quiz 1**: Data manipulation in R, Feb 2.
Week 5	7-Feb-22	Data preparation and data cleaning: **tidyr** package	Material posted on Blackboard	
	9-Feb-22		Ch 5: R for Business Analytics*	Lab 4[2]: Work in class. Due by the end of next day. Submit your answers on BB
Week 6	14-Feb-22	Exploring data part 1: Summary and Visualization in R (**quantmod** package)	Material posted on Blackboard	Participation: answer the questions on BB. Due by the end of the class.
	16-Feb-22		Ch 5: R for Business Analytics*	
Week 7	21-Feb-22	No class. President's day		
	23-Feb-22	Exploring data part 1: Summary and Visualization in R (**quantmod** package)	Material posted on Blackboard. Ch 9: R for Business Analytics*	Participation: answer the questions on BB. Due by the end of the class.
Week 8	28-Feb-22	**Case 2**: Financial charts' analysis and stock price prediction	Material posted on Blackboard	
	2-Mar-22			Lab 5[2]: Work in class. Due by the end of next day. Submit your answers on BB
Week 9	7-Mar-22	Review before the Midterm, Sample test	Material posted on Blackboard	
	9-Mar-22			**Midterm**, March 9, 2022
Week 10	14-Mar-22	No classes. Spring break		
	16-Mar-22			
Week 11	21-Mar-22	Introduction to time series analysis	Material posted on Blackboard	**HW 2.** Due by the end of March 23, 2022
	23-Mar-22	Exploring data part 2: data visualization in R (**ggplot2** package). Case 3: Brand and price analysis		Lab 6[2]: Work in class. Due by the end of next day. Submit your answers on BB
Week 12	28-Mar-22	Text mining in R: Text Mining from Web.	Material posted on Blackboard	Participation: answer the questions on BB. Due by the end of the class.
	30-Mar-22	**Case 4**: Working with Twitter data		**Quiz 2.** March 31, 2022
Week 13	4-Apr-22	CRISP-DM. Review.	Material posted on Blackboard	Participation: answer the questions on BB. Due by the end of the class.
	6-Apr-22	**Case 5**: Real estate: a fair market value identification.		
Week 14	11-Apr-22	Web scrapping	Material posted on Blackboard	Participation: answer the questions on BB. Due by the end of the class.
	13-Apr-22			Lab 7[2]: Work in class. Due by the end of next day. Submit your answers on BB
Week 15	18-Apr-22	Shiny apps.	Ch 7: R for Business Analytics*	Participation: answer the questions on BB. Due by the end of the class.
	20-Apr-22	**Case 4**: Creating an app from scratch		Lab 8[2]: Work in class. Due by the end of next day. Submit your answers on BB; **HW 3**: Due April 20 by the end of the day.
Week 16	25-Apr-22	Review before the final exam	Material posted on Blackboard	
	27-Apr-22			
FINAL		**Final Exam**	**comprehensive**	**Friday, May 6, 11:00 am - 1:00 pm**

[1]Additional short readings/videos may be assigned via BB throughout the semester
[2]All Labs are due on Friday the week they were assigned by the end of the day (midnight) submitted on Blackboard
*Suggested reading

Appendix

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<u>Undergraduate Program Learning Goals and Objectives</u>

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

Learning Goal 2: Our graduates will develop people and leadership skills to promote their effectiveness as *business managers and leaders in the 21st 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)

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

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

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.

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

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Participation
Behavioral Anchor Rating Scale

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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