Syllabus for
CSC 201—Introduction to Data Science
3 Credit Hours
Fall 2020

I.   COURSE DESCRIPTION

An introduction to data science, including acquiring, cleaning, analyzing, modeling, and visualizing data. The course will use real-world data and case studies from sports and business analytics to bio and cheminformatics.
Prerequisite: MAT 232 or MAT 325 with a grade of "C" or higher.

II.   COURSE GOALS

The purpose of this course is to enable the student to do the following:
A.   Understand data types, collection methods, licenses, and "trusted sources."
B.   Consume and clean data effectively using multiple platforms.
C.   Conduct exploratory data analysis.
D.   Create data visualizations.
E.   Perform cluster analysis.
F.   Build a variety of models and asses their effectiveness and domain of applicability.

III.   STUDENT LEARNING OUTCOMES FOR THIS COURSE

A.   Terminal Objectives
       Upon successfully completing this course, the student will be able to do the following:
       1.   Describe data collection methods, errors, biases, and licenses.
       2.   Understand the purpose and processes of data science.
       3.   Consume and clean data effectively and without prejudice.
       4.   Gain insights into the value of data through exploratory data analysis.
       5.   Gain insights into the value of data by creating data visualizations.
       6.   Execute classical regression techniques in Excel, R.
       7.   Perform basic cluster analysis in R.
       8.   Create machine learning predictive models in R.
       9.   Work effectively with real-world data from a variety of sources.
       10.   Effectively communicate insights, results, and recommendations.

B.   Unit Objectives
       Upon successfully completing this course, the student will be able to do the following:
       1.   For Unit I:
            a.   Describe what is usually meant by "data" and the goals of data science.
            b.   Gain familiarity with common analytics tools and their roles in the broader data science ecosystem.
       2.   For Unit II:
            a.   Perform basic data analysis and visualization of data.
            b.   Exhibit a working knowledge of R and Excel
            c.   Understand and perform data transformations
            d.   Explain data sets using statistics
       3.   For Unit III:
            a.   Explain the different formats of data storage

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b. Clean data according to the goal of the analysis
c. Effectively join data from different sources
4. For Unit IV:
    a. Construct effective visualizations of data for external communication
    b. Understand the principles of analytical reporting
    c. Generate data science reports with R Markdown
5. For Unit V:
    a. Explain the theory of linear regression.
    b. Construct a linear regression model.
    c. Construct other classical models.
    d. Assess the effectiveness of models and their domain of applicability.
    e. Perform clustering and classification in R
    f. Construct and interpret machine-learning models in R.
    g. Construct and interpret deep learning models in R.

IV. TEXTBOOKS AND OTHER LEARNING RESOURCES

A. Required Materials
    Textbooks
1. Wickham, Hadley, and Garrett Grolemund. *R For Data Science: Import, Tidy, Transform, Visualize, and Model Data*. O'Reilly Media, 2017.
ISBN: 978-1491910368

B.
1. Gareth James, Daniela Witten, Trevor Hastie, and Robert Tibshirani. *An Introduction to Statistical Learning: with Applications in R*. New York: Springer, 2013.
ISBN: 978-1461471370

IV. POLICIES AND PROCEDURES

A. University Policies and Procedures
1. Attendance at each class or laboratory is mandatory at Oral Roberts University. Excessive absences can reduce a student's grade or deny credit for the course.
2. Students and faculty at Oral Roberts University must adhere to all laws addressing the ethical use of others' materials, whether it is in the form of print, electronic, video, multimedia, or computer software. Plagiarism and other forms of cheating involve both lying and stealing and are violations of ORU's Honor Code: "I will not cheat or plagiarize; I will do my own academic work and will not inappropriately collaborate with other students on assignments." Plagiarism is usually defined as copying someone else's ideas, words, or sentence structure and submitting them as one's own. Other forms of academic dishonesty include (but are not limited to) the following:
    a. Submitting another's work as one's own or colluding with someone else and submitting that work as though it were his or hers;
    b. Failing to meet group assignment or project requirements while claiming to have done so;
    c. Failing to cite sources used in a paper;
    d. Creating results for experiments, observations, interviews, or projects that were not done;
    e. Receiving or giving unauthorized help on assignments.

By submitting an assignment in any form, the student gives permission for the assignment to be checked for plagiarism, either by submitting the work for electronic verification or by other means. Penalties for any of the above infractions may result in disciplinary action including failing the assignment or failing the course or expulsion from the University, as determined by department and University guidelines.

3. Final exams cannot be given before their scheduled times. Students need to check the final exam schedule before planning return flights or other events at the end of the semester.

4. Students are to be in compliance with university, school, and departmental policies regarding Whole Person Assessment (WPA) requirements. Students should consult the WPA handbooks for requirements regarding general education and the students' majors.

    a. The penalty for not submitting electronically or for incorrectly submitting an artifact is a zero for that assignment.

    b. By submitting an assignment, the student gives permission for the assignment to be assessed electronically.

B. Department Policies and Procedures

1. Computer Resources - Each Student who uses the computer is given access to the appropriate computer resources. These limited resources and privileges are given to allow students to perform course assignments. Abuse of these privileges will result in their curtailment. Students should note that the contents of computer directories are subject to review by instructors and the computer administrative staff.

2. Late Exams - Each instructor has his or her own late-exam policy, so an instructor may decide that an exam missed because of an unexcused absence cannot be made up.

3. Unexcused Absences - Any student whose unexcused absences total 33% or more of the total number of class sessions will receive an F for the course grade.

4. Incompletes – As stated in the University catalog, incompletes are granted only for "good cause," such as extended hospitalization, long-term illness, or a death in the family. Students must petition for an incomplete using the form available in the Computing and Mathematics Department. Very few incompletes are granted.

C. Course Policies and Procedures

1. Evaluation Procedures
Homework 50%
Analytics Projects 50%

2. Whole Person Assessment Requirements

    a. A WPA artifact is required for this course. A link to submit your WPA assignment will be provided in D2L.

    b. The WPA artifact is the final project. A WPA project that is not properly uploaded receives a grade of zero and therefore reduces your total grade by 25%.

Course Inventory for ORU's Student Learning Outcomes
CSC 201—Introduction to Data Science
Spring 2020

This course contributes to the ORU student learning outcomes as indicated below:
Significant Contribution – Addresses the outcome directly and includes targeted assessment.
Moderate Contribution – Addresses the outcome directly or indirectly and includes some assessment.
Minimal Contribution – Addresses the outcome indirectly and includes little or no assessment.
No Contribution – Does not address the outcome.

The Student Learning Glossary at http://ir.oru.edu/doc/glossary.pdf defines each outcome and each of the proficiencies/capacities.

	OUTCOMES & Proficiencies/Capacities	Significant Contribution	Moderate Contribution	Minimal Contribution	No Contribution
1	**Outcome #1 – Spiritually Alive** Proficiencies/Capacities				
1A	Biblical literacy				X
1B	Spiritual Formation				X
2	**Outcome #2 – Intellectually Alert** Proficiencies/Capacities				
2A	Critical thinking, creativity, and aesthetics	X			
2B	Global & historical perspectives				X
2C	Information literacy	X			
2D	Knowledge of the physical and natural world	X			
3	**Outcome #3 – Physically Disciplined** Proficiencies/Capacities				
3A	Healthy lifestyle				X
3B	Physically disciplined lifestyle				X
4	**Outcome #4 – Socially Adept** Proficiencies/Capacities				
4A	Ethical reasoning and behavior			X	
4B	Intercultural knowledge and engagement				X
4C	Written and Oral Communication		X		
4D	Leadership capacity			X	

(Revised 12/28/17)