CUNY School of Professional Studies

DATA 605 COURSE TITLE

CUNY SPS Master of Science in Data Science

Fall 2021

Instructor Name: Lawrence Fulton **Instructor Email:** lawrence.fulton@sps.cuny.edu **Class Meetup:**
Office Hours:
Degree Program: M.S. in Data Science
Credits: 3 graduate credits
Prerequisites: None
Type of Course: Required course

Course Description

The course will provide an overview of the commonly used mathematical techniques in Data Analytics & Statistics. A lot of emphasis will be given to computational techniques and implementing math in programs. Students will be expected to do a fair bit of hands-on programming. We'll be primarily using R as our programming environment. All assignments will need to be submitted in as R-Markdown documents. Students can expect to walk away with a good under- standing of the kinds of math they'll need to be successful in the exciting area of Data Analytics

Course Learning Objectives:

1. Apply linear algebra to solve data science problems.
2. Apply probability and statistics to solve data science problems.
3. Apply univariate and multivariate calculus to solve data science problems.

Program Learning Outcomes addressed by the course:

1. Business Understanding. Apply frameworks and processes to build data-analytic solutions from an understanding of business goals.
2. Data Programming. Use industry standard statistical tools and simulation packages.
3. Foundational Math and Statistics. Emphasis on probability, statistics, and computational methods.
4. Data Understanding. Collect, describe, model, explore and verify data.
5. Prescriptive Modeling. Selecting prescriptive modeling techniques, generating test designs, building and assessing models.
6. Model Implementation and Deployment. Students will learn to implement mathematical models.
7. Presentation. Students will deliver presentations of their project results.

Assignments and grading:

1. Assignments: During the course, you will be completing a series of individual assignments, participating in forum discussions, and completing a final examination.
2. Examinations: This course has a single examination, a comprehensive final.
3. Grade Evaluation: Grades in this course are determined by the percentage of points obtained.

Assignment,Percentage Homework,15x3% = 45% Discussions Contribution,15x 1%= 15% Examination,1x 40%= 40% Total,100%

Grading Rubric:

1. Each homework will be graded as {zero, check minus, check, and check plus}. The associated grades are {0%, 1%, 2%, 3%}.
2. Discussions are applied analysis from the texts. You must post a response by Wednesday at midnight (ET) and respond to at least one of your colleagues' contributions by Saturday at midnight (ET), providing meaningful feedback on the analysis.

Late Policy for Homework:

Late work is penalized 20% per day. All assignment due dates and times are shown in Blackboard.

Course materials all open Source:

Introduction to Probability, Grinstead, C. Snell, J., 1997

A First Course in Linear Algebra, Beezer, R., 2008

Linear Regression Using R: An Introduction to Data Modeling, Lilja, D., 2016

APEX Calculus, Hartman, G. 2014

Relevant Software and Other Tools:

Students should have R Studio & R installed in their computers. Relevant libraries that are required will be posted in the assignments and course materials. Students are expected to submit R-Markdown files for their assignments.

Course Meeting Time:

See the course website.

The Course schedule follows.

(L=Linear Algebra text, P=Probability Text, C=Calculus Text, R=Regression)

Grading

Grade Distribution

Quality of Performance	Letter Grade	Range %	GPA
Excellent - work is of exceptional quality	A	93 - 100	4
Excellent	A-	90 - 92.9	3.7
Good - work is above average	B+	87 - 89.9	3.3
Satisfactory	B	83 - 86.9	3
Below Average	B-	80 - 82.9	2.7
Poor	C+	77 - 79.9	2.3
Poor	C	70 - 76.9	2
Failure	F	< 70	0

Schedule

Note: Schedule is subject to change.

Dates	Topic
Aug-25 to Sep-05	Vectors Matrices & Systems of Equations
Sep-06 to Sep-12	Trace Determinant Factorization of Matrices
Sep-13 to Sep-19	Eigenvalues & Eigenvectors
Sep-20 to Sep-26	Linear Transformations Representations
Sep-27 to Oct-03	Discrete and Continuous Probability Distributions
Oct-04 to Oct-10	Combinatorics and Conditional Probability
Oct-11 to Oct-17	Important Distributions / Densities Expected Value & Variance
Oct-18 to Oct-24	Sums of Random Variables Law of Large Numbers
Oct-25 to Oct-31	Central Limit Theorem & Generating Functions
Nov-01 to Nov-07	Markov Chains & Random Walks
Nov-08 to Nov-14	Regression Analysis in R
Nov-15 to Nov-28	Regression Analysis in R
Nov-29 to Dec-05	Univariate & Multivariate Calculus
Dec-06 to Dec-13	Taylor Series Approximations
	Functions of Several Variables
	Final Examination

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Academic Integrity

Academic dishonesty is unacceptable and will not be tolerated. Cheating, forgery, plagiarism and collusion in dishonest acts undermine the educational mission of the City University of New York and the students' personal and intellectual growth. Please see: http://media.sps.cuny.edu/filestore/8/3/9_dea303d5822ab91/839_1753cee9c9d90e9.pdf

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