

BRYCE BOWLES, MDA



## MDA PROJECTS, INFORMATION AND COURSE WORK

Virginia Commonwealth University  
Master Of Decision Analytics (M.D.A.)

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- [Resume](#)

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## Projects Completed

(<https://github.com/bryce-bowles>)

### **Advanced Decision Analytics** (Machine Learning: Deterministic and Probabilistic Modeling, Optimization, Simulation)

**Federal Reserve Bank of Richmond Optimization Model:** Won Optimization model class competition issued by Dr. Brooks (M.D.A. department chair and professor). Proposed Python, Pyomo and GLPK network optimization model approach with binary variables and logical constraints to simulate reorganization of 1700 workspaces across 17 floors, while allocating for changing project teams and requirements. Provided report to IT Vice President, Christine Holzem at the Federal Reserve Bank of Richmond.

([View Report](#), [Python file](#))

**Helpdesk Optimization and Simulation Proposal for SCC Bureau of Insurance:** Proposed optimization and simulation framework to benefit helpdesk request distribution and simulate future request volume.

([View Report](#), [Relating Article](#))

**Mobile Munchies:** Mobile Munchies is deciding how much of each type of juice to prepare for the week. Given the ingredients and cost, a python model using Pyomo and GLPK determined the optimal amount of each type of lemonade to produce so the profits maximized subject to the constraints.

([View Report](#), [Python file](#))

**Diet Problem and Manufacturing Problem:** Decided how much of each of each dessert to consume per day so that taste index is maximized, and calories and grams of fat are minimized, subject to constraints (Algebraic Formulation).

([View Report](#), [HW\\_Dessert.ipynb](#), [Manufacturing.ipynb](#))

**Red Tomato Gardening Tools and Sporting Goods Company:**

- Demand forecast optimization problem model using Python, Pyomo and GLPK in Python. Multifactor objectives and constraints solved using algebraic formulation to allocate and minimize cost.
- Excel Solver used to allocate how much of each product to produce so that profit is maximized

([View Report](#), [HW 3 RedTomatoes.ipynb](#), [HW3sporting\\_goods.xlsx](#))

### **Business Data Analytics** (Machine Learning, Classification Trees, Regression, Random Forests, Support Vector Machines, etc.)

**Alchemy Broker Analysis:** Performed segmentation analysis and predictive modeling on insurance broker performance to conclude a random forest model (highest AUC of 73%) predicted whether 2020 Gross Written Premium will increase or decrease from 2019 with a misclassification rate of 35%. Four classification models (classification trees, logistic regression, random forests, and support vector machines) were built, evaluated, and then tuned for prescriptive measures to analyze broker performance. Explored, visualized, and described five groups of brokers using principal component analysis.

([View Report](#))

**Lending Club Cluster and Principal Component Analysis:** Performed a Kmeans cluster analysis to identify 7 groups or clusters of the borrowers by income, loan amount, employment length, home ownership status, and debt-to-income ratio. Included Data Preprocessing and Removing Outliers.

([View Report](#))

**Lending Club Classification Analysis:** Built a logistic regression model and a classification tree model for predicting the final status of a loan based on various variables available. Confusion matrix and misclassification rate for each model for a test dataset. Variables that appear to be important for predicting outcome. Plotted and described the ROC curves and AUC for the four models.

[\(View Report\)](#)

**Final Exam:** Terms, classification models, test and training dataset splits, logistic regression models, classification tree models, ROC curves, AUC, confusion matrix, support vector machines, variance, bias, leakage, MAE and RMSE, R squared, LASSO approach (penalty on the coefficients) etc.

[\(View Report\)](#)

## Statistical Analysis and Modeling

**Midterm Report:** Descriptive statistics, Confidence intervals, z-test for two independent samples / Two-tailed test, scattergrams, box plots, Analysis of Variance, p-values, root mean square error,  $R^2$ , Akaike's AIC Best model, Multicollinearity Variance Inflation Factors, etc.

[\(View Report\)](#), [Supporting documents](#)

**Whiskey Analysis:** Logistic regression model to predict the best and worst whiskeys using Confusion Matrix with training and validation samples. Correlation matrix, goodness of fit statistics, Hosmer-Lemeshow test, chi-squared, confusion matrix, Scatter plots, box plots etc.

[\(View Report\)](#)

Other models using .R and R-Studio

- [TSPlots.R](#)
- [TSRegression.R](#)
- [TSDecomposition.R](#)
- [ExponentialSmoothing.R](#)
- [Differencing.R](#) - Must detrend before doing ARIMA
- [ARIMA.R](#)

## Database Management (SQL/ PostgreSQL)

**Taylor's Clothing DBMS:** Business rules, user requirements, ER diagram, entity relationships etc. (Oracle APEX)

[\(View Report\)](#)

**Automated Systems DBMS:** Completed and proposed an Automated Systems Database to Manager via SQL Server and MS Power BI Version. Centralized Relational SQL Database to help produce the appropriate roles for a position, creating consistency throughout departments and job titles (with the exception of optional roles for additional access) and reduce the number of access roles that are kept when changing positions. The DBMS unifies and consolidates system access to improve data security as well as onboarding and offboarding efficiency.

[\(View Report\)](#)

## Decision and Risk Analytics (Decision Tree and Influence Diagram)

**Midterm Report:** Probabilities, Decision Trees and Influence Diagram scenarios

[\(View Report\)](#) and Precision Tree files)

**Decision Tree – Career Moves:** Objectives, uncertainties, influence diagram, assumptions, decision tree model, probability and cumulative comparison node chart (supporting documents – proposal, excel analysis and presentation)

[\(View Documents\)](#)

## **Business Intelligence (Visuals)**

**Opioid Prescribing Rates Analysis:** Semester long project working with Virginia Department of Social Services to assist in data centric reengineer useful data into VA's major FAACT database. Tableau dashboard analysis and presentation created using data from 2016 to 2019 on Medicare Prescribing rates.

[\(View Report\)](#)

**Children's Bureau Race and Ethnicity Analysis:** General statistics on the race and ethnicity of children in foster care analyzing statistics on variables such as Child Maltreatment, Children Waiting for Adoption, children adopted etc.

[\(View Report\)](#)

**Car Loan Negotiation:** Used Excel Goal seek to negotiate a car purchased with variables such as Price, APR, Years, Payment/month.

[\(View Model\)](#)

**Norton Engines:** Optimization analysis solved using Excel solver, sensitivity analysis, and slack. To optimally maximize profits, Norton Engines should produce 1000 Type A engines and 500 Type B engines for a total profit of \$6,600,000.

[\(View Report\)](#), [Excel File](#)

**Music Sales:** Music sales displayed in a Tableau dashboard with a variety of graphs

[\(View Tableau Download\)](#)

**Airbnb:** A couple is deciding where to rent at an Airbnb in New York. Our team helped evaluate factors we thought would help them choose the best location using a Tableau dashboard story.

[\(View Tableau Download\)](#)

**IRIS Flower Data:** K-Means cluster analysis conducted using KNIME and Tableau

[\(View PowerPoint\)](#)

**Census Clustering:** US Census Bureau data K-Means cluster analysis and Logistic Regression conducted using KNIME and Tableau

[\(View PowerPoint\)](#)

**Lending Club Loan Analysis:** We are a group of investors, looking for the target group of people to give out a personal loan with expectations that it will be fully paid off. Used KNIME logistic regression and MS Excel data table to conclude our target group and focus factors.

[\(View PowerPoint\)](#)

**Netflix Student Competition:** Netflix data, such as Average user rating score and average rating description, visualized via Tableau dashboard

[\(View PowerPoint\)](#)

## Forecasting Methods

**Richmond Bank Total Core Deposit Forecasts:** Using MS Excel and R, accurately forecasted total core deposit data from a Richmond Bank. The Holt's Linear Exponential Smoothing had the overall lowest "Quick and Dirty" MAPE (1.2%), the lowest overall Maximum MAPE (3.49%), and consistently more accurate projections for each of the forecast horizons. Overall, the Unaided, Holts Linear Exponential Smoothing, and both regressions overestimated while the Naïve, 12 Month (M) Center Moving Average (CMA), 3M Moving Average (MA), 6M MA, Damped Trend Exponential Smoothing, and Simple Exponential Smoothing underestimated.

[\(View Report, .r File, Excel File\)](#)

**Richmond Casino Proposal Analysis:** Research analysis completed on the proposal of a Richmond, VA Casino presentation including history/background, economic/revenue impact, frustrations, process etc.

[\(View Presentation\)](#)

**New Product Forecasting:** New product forecasting concepts (such as Delphi method, Assumptions Based, ATAR model, and Sensitivity Analysis) used to forecast and present an innovative smart sticky note printer.

[\(View Presentation\)](#)

**Forecasting with R.:** Forecasting described from the perspective of using R and R studio software.

[\(View Report\)](#)

## KJ Manufacturing Company Case Scenario

1. Discussed the forecasting process at KJ Manufacturing, any relevant factors about the company and industry that are pertinent to the new forecast and Ken's forecast.
2. Forecasted monthly revenues for KJ Manufacturing for the coming year. Used a variety of methods and graphically displayed them. Explained and supported the new forecasting approach as well as the choice of models and the rationale for parameters selected.
3. Prepared a report to owner explaining/supporting the forecast.

[\(View Report\)](#)

**Time Series Forecasting Final Exam:** Comprehensive review with questions and answers on all topics learned including a variety of forecasting methods and examples. Case scenarios to answer questions on topics such as confidence intervals, forecast adjustments, classical decomposition, exponential smoothing, Croston's method, Holt's Exponential Smoothing, MSE,  $\alpha$  and  $\beta$ , seasonal adjusted series, Damping Coefficient, difference Autocorrelation, MAPE, take-off points etc.

[\(View Report\)](#)

## Business Policy and Strategy

**DoorDash Strategic Analysis (Presentations)**

- [Industry Analysis](#)
- [Environmental Assessment](#)
- [Strategic Review](#)
- [Growth through Acquisition](#)

**Uber's Failing Brand and Culture Analysis:** Uber Technologies Inc. brand analysis research report describing brand culture and change strategy. Historical strategic context of the brand, the role culture played in the performance decline of the brand, how the culture impacted financial performance, and how they are attempting to transform and renew the culture.

[\(View Report\)](#)

Lowe's Case Assessment: Lowe's industry analysis for the market space, brand positioning, environmental assessment, and strategic opportunities/dilemmas.

[\(View Report\)](#)

## Quality Management and Six Sigma

Time Series Apple Watch Workout Analysis: Time series health workout data was extracted from my Apple watch to analyze workout variables. A Scope, descriptive statistics, pivot tables, C-Chart and scatter plots were created to check workouts outside of control. Tableau work was used to display correlations.

[\(View Report\)](#)

## Skills and Tools Learned

- Python (python 3, Jupyter Notebooks)
  - NumPy, Pyomo, GLPK, Matplotlib, Scikit Learn, TensorFlow
- JSON
- R (R-Studio)
  - Dplyr, Ggplot2,
- SQL (Postgres SQL, SQL Server, AQT, Oracle APEX)
- MS Excel
  - Excel Goal seek
  - Excel solver
  - Palisade Decision Tools
    - Risk for Monte Carlo simulation
    - Precision Tree for decision trees
    - StatTools for statistical analysis and forecasting
- Tableau
- MS Power BI
- KNIME

## M.D.A. Program Overview

### Program goal ([Graduate Bulletin link](#))

The Master of Decision Analytics provides students with knowledge of the statistical, mathematical and scientific skills and experience necessary to utilize advanced methods of data analysis for business decision-making.

### Student learning goals

Students will be able to examine a situation/problem to determine a relevant data-driven analysis to provide valuable information for decision makers and apply advanced analytical and quantitative skills to the decision problems of businesses, organizations and society. Students will be able to communicate analysis information and recommended decisions in a clear, ethical and transparent manner.

1. **Database structures and query:** Students will have an understanding of basic database structures, be able to query databases and organize data for analysis.
2. **Quantitative skills:** Students will be able to identify appropriate data analysis approaches to address real-world problems. They will be able to perform the analysis using commercial software.
3. **Problem formulation:** Students will have the knowledge, skills and practice to take nonquantitative and perhaps ill-formed problems and issues and determine ways objective analysis can bring organization and insight to them. They will be able to determine data requirements and query available databases.
4. **Analytics applications:** Students will experience various applications of analytics in real situations.
5. **Technical communications and teamwork:** Students will be able to communicate analytical analysis and results effectively to nonquantitative audiences, and will develop skills in organizing, interacting and analyzing real problems as members of a team.



## VCU M.D.A. Courses

Spring 2019

### INFO 364. Database Systems

Instructor: Howard A. Brown [Brownh2@vcu.edu](mailto:Brownh2@vcu.edu)

Text book: [Modern Database Management 12e](#)

Material: [Course Slides Link](#)

Designed to prepare students for development of systems involving databases and database management.

Topics:

- The Database Environment and Development Process
- Modeling Data in the Organization
- The Enhanced E-R Model
- Logical Database Design and the Relational Model
- Physical Database Design and Performance
- Introduction to SQL
- advanced SQL

**Projects Completed:** Database Management (SQL/ PostgreSQL)

Taylor's Clothing DBMS: Business rules, user requirements, ER diagram, entity relationships etc. (Oracle APEX)  
([View Report](#))

## MATH 200. Calculus with Analytic Geometry I

Instructor: Cheri Doucette, [doucettecc@vcu.edu](mailto:doucettecc@vcu.edu)

Textbook- Calculus: Early Transcendentals 3rd Edition

Math 200 is the first course in a two-semester sequence covering the calculus of one-variable functions. This course covers functions, limits, derivatives, applications of the derivative, and integration. All of this involves Chapters 1 through 5 of the text. Functions, limits, continuity, derivatives, differentials, antiderivatives and definite integrals.

Chapter 1 **Functions:** 1.1 Review of Functions, 1.2 Representing Functions, 1.3 Inverse, Exponential, and Logarithmic Functions, 1.4 Trigonometric Functions and Their Inverses. Elements of calculus: Algebra skills; the notion and terminology for various sets of real numbers; and the description of lines, circles and other basic sets in the coordinate plane. A review of this material is found in Appendix B, online at [bit.ly/2y3Nck3](https://bit.ly/2y3Nck3). This chapter begins with the fundamental concept of a function and then presents the entire cast of functions needed for calculus: polynomials, rational functions, algebraic functions, exponential and logarithmic functions, and the trigonometric functions, along with their inverses.

Chapter 2 **Limits:** 2.1 The Idea of Limits, 2.2 Definitions of Limits, 2.3 Techniques for Computing Limits, 2.4 Infinite Limits, 2.5 Limits at Infinity, 2.6 Continuity. All of calculus is based on the idea of a limit. Not only are limits important in their own right but they also underlie the two fundamental operations of calculus: differentiation (calculating derivatives) and integration (evaluating integrals). Derivatives enable us to talk about the instantaneous rate of change of a function, which, in turn, leads to concepts such as velocity and acceleration, population growth rates, marginal cost, and flow rates. Integrals enable us to compute areas under curves, surface areas, and volumes. Because of the incredible reach of this single idea, it is essential to develop a solid understanding of limits. We first present limits intuitively by showing how they arise in computing instantaneous velocities and finding slopes of tangent lines. As the chapter progresses, we build more rigor into the definition of the limit and examine the different ways in which limits arise. The chapter concludes by introducing the important property of continuity and by giving the formal definition of a limit.

Chapter 3 **Derivatives:** 3.1 Introducing the Derivative, 3.2 The Derivative as a Function, 3.3 Rules of Differentiation, 3.4 The Product and Quotient Rules, 3.5 Derivatives of Trigonometric Functions, 3.6 Derivatives as Rates of Change, 3.7 The Chain Rule, 3.8 Implicit Differentiation, 3.9 Derivatives of Logarithmic and Exponential Functions, 3.10 Derivatives of Inverse Trigonometric Functions, 3.11 Related Rates. The first task is to introduce the fundamental concept of the derivative. Suppose a function  $f$  represents the quantity of interest – for example, the variable cost of manufacturing an item, the population of a country, or the position of an orbiting satellite. The derivative of  $f$  is another function, denoted  $f'$ , that gives the slope of the curve  $y=f(x)$  as it changes with respect to  $x$ . Equivalently, the derivative of  $f$  gives the instantaneous rate of change of  $f$  with respect to the independent variable. We use limits not only to define the derivative but also to develop efficient rules for finding derivatives. The application of the derivative – which we introduce along the way – are endless because almost everything around us is in a state of change, and derivatives describe change.

Chapter 4 **Applications of the Derivative:** 4.1 Maxima and Minima, 4.2 Mean Value Theorem, 4.3 What Derivatives Tell Us, 4.4 Graphing Functions, 4.5 Optimization Problems, 4.6 Linear Approximation and Differentials, 4.7 L'Hôpital's Rule, 4.9 Antiderivatives. Much of the previous chapter was devoted to the basic mechanics of derivatives: evaluating them and interpreting them as rates of change. We now apply derivatives to a variety of mathematical questions, many of which concern properties of functions and their graphs. One outcome of this work is a set of analytical curve-sketching methods that produce accurate graphs of functions. Equally important, derivatives allow us to formulate and solve a wealth of practical problems. For example, an asteroid passes perilously close to Earth: At what point along their trajectories is the distance separating them smallest, and what is the minimum distance? An economist has a mathematical model that relates to the demand for a product to its price: What price maximizes the revenue? In

this chapter, we develop the tools needed to answer such questions. In addition, we begin an ongoing discussion about approximating functions, we present an important result called the Mean Value Theorem, and we work with a powerful method that enables us to evaluate a new kind of limit. The chapter concludes with two important topics: a numerical approach to approximating roots of functions, called Newton's method, and preview of integral calculus, which is the subject of Chapter 5.

Chapter 5 **Integration:** 5.1 Approximating Areas under Curves, 5.2 Definite Integrals, 5.3 Fundamental Theorem of Calculus, 5.4 Working with Integrals, 5.5 Substitution Rule. Cornerstone of calculus because it explains the relationship between the two processes of calculus: differentiation and integration. We begin by explaining why finding the area of regions bounded by the graphs of functions is such an important problem in calculus. Then you will see how antiderivatives lead to definite integrals, which are used to solve the area problem. You will also see the remarkable connection between derivatives and integrals, which is expressed in the Fundamental Theorem of Calculus. Develop key properties of definite integrals, investigate a few of their many applications, and present the first of several powerful techniques for evaluating definite integrals.

Test Material: [Course Final Exam](#)

Fall 2019

## INFO 610. Analysis and Design of Database Systems

- Professor: Chris Fauerbach
- [Course Content Link](#) and (slides) [https://chrisfauerbach.github.io/info610\\_fall\\_2019/](https://chrisfauerbach.github.io/info610_fall_2019/)

Development of information systems using modern databases and database management techniques.

- Write advanced SQL statements
- Understand how to model data
- Demonstrate SQL DDL principles to create database tables
- Understand basic concepts of indexes and how to select and create indexes
- Understand concepts of transactions and concurrency control
- Understand different types of databases: Relational, Document/Columnar, Key/Value, Document
- Insert, update and query data in a wide range of open-source database servers

Software used: PostgreSQL

Also learned:

- ACID Properties, Window Functions
- JSON, Python
- REST API (application program interface)
- 'flask' dependency
- Python

### **Projects Completed:** Database Management (SQL/ PostgreSQL)

Automated Systems DBMS: Completed and proposed an Automated Systems Database to Manager - also created a MS Power BI Version. Centralized Relational SQL Database to help produce the appropriate roles for a position, creating consistency throughout departments and job titles (with the exception of optional roles for additional access) and reduce the number of access roles that are kept when changing positions. The DBMS unifies and consolidates system access to improve data security.

[\(View Report\)](#)

## SCMA 524. Statistical Fundamentals for Business Management

Professor: Daniel G. Stephenson, [stephensod@vcu.edu](mailto:stephensod@vcu.edu)

Developed an ability to interpret and analyze business data in a managerial decision-making context. Applications were stressed in the coverage of descriptive statistics, contingency tables, probability, sampling, correlation, confidence interval estimation, hypothesis testing and regression analysis. Business-oriented computational software will be used for data visualization and analysis.

Software: R, RStudio

Topics: Probability, Univariate Distributions, Random Variables, Joint Distributions, Exploring Data, Computational Software, The Normal Distribution, Convergence, Sampling Distributions, Hypothesis Testing, Simple Regression, Multiple Regression

Course Documents:

- [Course Slides](#)
- [Course Notes](#)

Spring 2020

## INFO 664 Information Systems for Business Intelligence

Professor  
Shailesh Deshpande

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[sdeshpande@vcu.edu](mailto:sdeshpande@vcu.edu) (Primary)  
[get2shailesh@gmail.com](mailto:get2shailesh@gmail.com) (Alt)

Secondary Contact  
804-714-5588

Good business decision making hinges on a few key ingredients – knowing how to structure and frame up a business problem, using appropriate analytic tools and making effective presentations and pitches. This course will refine your ability to clearly articulate and tackle diverse business problems ranging from the marketing, pricing, sourcing, credit risk, targeting and complex simulations. With each business case you will be introduced to a new business tool. Learn how to use it and more importantly when to use it.

One of the most commonly seen pitfalls in the analytic world is sound technical analysis hamstrung by meandering, incoherent or overly complicated story telling. If the presentation is not effective, everything else accomplished prior to that becomes diluted or even moot. A consistent emphasis across all 4 project modules (see schedule below) will be the ability to convey your insights and sell your recommendations in an effective manner. The rest of the students and the professors will roleplay as ‘management’ in class – asking for clarifications and probing deeper.

Software Used: Microsoft Excel and PowerPoint, Tableau, KNIME (open-source analytic software), AWS (cloud computing)

Concepts	Analytical Tool Covered
Data manipulation in Excel; the importance of data disaggregation; data visualization and good story telling with data	Excel (Pivot tables and advanced functions) / PowerPoint
Data visualization using Tableau	Tableau
Supervised and unsupervised clustering and the relevance of segmentation to decision making using linear and logistic regression	KNIME
Real world examples for cloud computing	AWS
Final Capstone project – details will be provided in the class	ALL OF THE ABOVE

### Projects Completed: Business Intelligence (Visuals)

**Car Loan Negotiation:** Used Excel Goal seek to negotiate a car purchased with variables such as Price, APR, Years, Payment/month.

[\(View Model\)](#)

**Norton Engines:** Optimization analysis solved using Excel solver, sensitivity analysis, and slack. To optimally maximize profits, Norton Engines should produce 1000 Type A engines and 500 Type B engines for a total profit of \$6,600,000.

[\(View Report, Excel File\)](#)

**Music Sales:** Music sales displayed in a Tableau dashboard with a variety of graphs

[\(View Tableau Download\)](#)

**Airbnb:** A couple is deciding where to rent at an Airbnb in New York. Our team helped evaluate factors we thought would help them choose the best location using a Tableau dashboard story.

[\(View Tableau Download\)](#)

IRIS Flower Data: K-Means cluster analysis conducted using KNIME and Tableau  
([View PowerPoint](#))

Census Clustering: US Census Bureau data K-Means cluster analysis and Logistic Regression conducted using KNIME and Tableau  
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Lending Club Loan Analysis: We are a group of investors, looking for the target group of people to give out a personal loan with expectations that it will be fully paid off. Used KNIME logistic regression and MS Excel data table to conclude our target group and focus factors.  
([View PowerPoint](#))

Netflix Student Competition: Netflix data, such as Average user rating score and average rating description, visualized via Tableau dashboard  
([View PowerPoint](#))

## SCMA 645 Advanced Decision Analytics / Management Science

Paul Brooks, Phone: 828-1540, Email: [jpbrooks@vcu.edu](mailto:jpbrooks@vcu.edu)

Text: Albright, S.C. and Winston, W.L. Business Analytics: Data Analysis and Decision Making, 6th Edition. Cengage, 2017.

Examines the formulation, analysis and solution of quantitative models for business problems. Problems addressed include the allocation of resources, making decisions and dealing with uncertainty. Applications relevant in diverse business disciplines will be investigated, and the models may include linear programming, simulation and other management science tools. Current computer solution methods will be utilized.

Course Software: Microsoft Excel, Python, Pyomo, Jupyter Notebook, GLPK

Skills Targeted for Improvement:

- Problem solving skills: Ability to extract relevant data from a word problem, produce a valid model and convey results.
- Modeling skills: Ability to construct models that aid in decision-making and evaluate the output.
- Computer software skills: Ability to organize data and implement spreadsheet models. Ability to use a programming language to build models.
- Technical communication: Ability to summarize and communicate results of mathematical models.

Tentative Course Outline:

Relevant book chapters are in parentheses.

- Introduction to management science (1, 13.1-13.2)
- Deterministic Modeling
  - Solving linear programs with a spreadsheet (13.1-13.3)
  - Steps in optimization modeling (13.3, 13.7-13.8)
  - Properties of optimization problems and more LP formulations (13.5-13.6, 14.1-14.3, 14.5-14.6)
  - Solving LPs with a modeling language (13.8-13.10)
  - Production planning, the simplex method, duality, and sensitivity (13.8, 13.4)
  - Data envelopment analysis (<http://people.brunel.ac.uk/~mastjib/jeb/or/dea.html>)
  - Network optimization (13.8, 14.4) and Integer programming (14.7)
  - Integer programming (cont.) (14.7)
- Probabilistic Modeling
  - Probability (15.1-15.2)
  - Monte Carlo simulation (15.3-15.6)
  - Probability distributions for Monte Carlo simulation (15.3-15.6)
  - Monte Carlo simulation (15.3-15.6, 16)
  - Advanced newsvendor problems (15.3-15.6, 16)

**Projects Completed:** Advanced Decision Analytics (Machine Learning: Deterministic and Probabilistic Modeling, Optimization, Simulation)

Federal Reserve Bank of Richmond Optimization Model: Won Optimization model class competition issued by Dr. Brooks (M.D.A. department chair and professor). Proposed Python, Pyomo and GLPK network optimization model approach with binary variables and logical constraints to simulate reorganization of 1700 workspaces across 17 floors, while allocating for changing project teams and requirements. Provided report to IT Vice President, Christine Holzem at the Federal Reserve Bank of Richmond.

([View Report](#), [Python file](#))



Optimization and Simulation Proposal for SCC Bureau of Insurance: Proposed optimization and simulation framework to benefit helpdesk request distribution and simulate future request volume.

([View Report](#), [Relating Article](#))

Mobile Munchies PDF: Mobile Munchies is deciding how much of each type of juice to prepare for the week.

Given the ingredients and cost, a python model using Pyomo and GLPK determined the optimal amount of each type of lemonade to produce so the profits maximized subject to the constraints.

([View Report](#), [Python file](#))

Diet Problem and Manufacturing Problem: Decided how much of each of each dessert to consume per day so that taste index is maximized, and calories and grams of fat are minimized, subject to constraints (Algebraic Formulation).

([View Report](#), [HW Dessert.ipynb](#), [Manufacturing.ipynb](#))

Red Tomato Gardening Tools and Sporting Goods Company:

- Demand forecast optimization problem model using Python, Pyomo and GLPK in Python. Multifactor objectives and constraints solved using algebraic formulation to allocate and minimize cost.
- Excel Solver used to allocate how much of each product to produce so that profit is maximized

([View Report](#), [HW 3 RedTomatoes.ipynb](#), [HW3sporting\\_goods.xlsx](#))

Fall 2020

## SCMA 632 Statistical Analysis and Modeling

Professor: Dr. Jason Merrick, [jmerrick@vcu.edu](mailto:jmerrick@vcu.edu)

Text: Business Analytics: Data Analysis & Decision Making, 7th Edition - S. Christian Albright and Wayne L. Winston (Cengage Unlimited ISBN: 9780357692677)

Statistical analysis and modeling for decision analytics. Topics covered have an applied focus and may include logistic regression, bootstrap estimation, permutation tests, categorical data analysis, model selection, sparse methods and Bayesian methods. Statistical analysis of data will be conducted using business-oriented computational software.

Learning Objectives, Each student should be able to:

- Visualize and explore data
- Compare groups in a population
- Build complex regression models and use them to make predictions
- Perform clustering and classification analysis

Software: Tableau, Excel and XLSTAT, R and RStudio

Topics: Data Visualization in Tableau, Confidence Intervals, Hypothesis Testing, XLSTAT and R, One-way Analysis of Variance, Two-way Analysis of Variance, Designed Experiments, scatter plots and correlations simple linear regression, Introduction to multiple regression, Dummy variables, Interaction Terms, Inference for multiple regression, Testing for and fixing problems, multicollinearity, outliers, heteroscedasticity, non-normality, Stepwise regression, Prediction, Cross-validation, Sparse Methods, Lasso regression, Correlated predictors, Ridge regression, Classification Methods, Logistic regression, Neural networks, Classification trees, Clustering, K-means clustering, Hierarchical clustering, Normal mixtures, Bootstrap methods, Forecasting, Diagnostic tools, Testing for randomness, Linear and exponential trends, Dummy seasonality variables, Moving averages and decomposition, Forecasting, Exponential smoothing, ARIMA models, Time Series Forecasting, Other Text used: [Forecasting: Principles and Practice, 3rd edition, Rob J Hyndman and George Athanasopoulos, OTexts, 2019](#)

### Projects Completed: Statistical Analysis and Modeling

Midterm Report: Descriptive statistics, Confidence intervals, z-test for two independent samples / Two-tailed test, scattergrams, box plots, Analysis of Variance, p-values, root mean square error,  $R^2$ , Akaike's AIC Best model, Multicollinearity Variance Inflation Factors, etc.  
([View Report](#), [Supporting documents](#))

Whiskey Analysis: Logistic regression model to predict the best and worst whiskeys using Confusion Matrix with training and validation samples. Correlation matrix, goodness of fit statistics, Hosmer-Lemeshow test, chi-squared, confusion matrix, Scatter plots, box plots etc.  
([View Report](#))

Other models using .R and R-Studio

- [TSPlots.R](#)
- [TSRegression.R](#)
- [TSDecomposition.R](#)
- [ExponentialSmoothing.R](#)
- [Differencing.R](#) - Must detrend before doing ARIMA
- [ARIMA.R](#)

## SCMA 648 Business Data Analytics

Professor: Dr. Paul Brooks, Phone: 828-1540, Email: [jpbrooks@vcu.edu](mailto:jpbrooks@vcu.edu)

Techniques and skills for leveraging real-world data to support decision-making using computational software. Topics include the analytics workflow, data preparation, visualization, cluster analysis, predictive modeling, and learning-enabled optimization.

### Texts:

- Camm, J.D., Cochran, J.J., Fry, M.J., Ohlmann, J.W., Anderson, D.R., Sweeney, D.J., Williams, T.A. Business Analytics, 3rd Edition. Cengage, 2019. Available via Cengage Unlimited. 4th Edition not available via Cengage Unlimited, but available as an eBook.
- James, G., Witten, D., Hastie, T., Tibshirani, R. An Introduction to Statistical Learning with Applications in R. Springer, 2017. Available online: <http://faculty.marshall.usc.edu/gareth-james/ISL/ISLR%20Seventh%20Printing.pdf>
- Tan, P.-N., Steinbach, M., Karpatne, A., Kumar, V. Introduction to Data Mining, 2<sup>nd</sup> Edition. Pearson, 2019. Chapters available online: <https://www-users.cs.umn.edu/~kumar001/dmbook/index.php>
- Golemund, G. and Wickham, H. R for Data Science. O'Reilly, 2017. Available online: <https://r4ds.had.co.nz/>.
- Leemis, L.M. Learning Base R. Self-published, 2015.

### Course Software: R

### Skills Targeted for Improvement:

- Problem formation: Ability to translate a decision problem into an analytics task.
- Analytics implementation: Ability to choose appropriate methods to support an analytics task.
- Computer software skills: Ability to manipulate software to derive information from data.
- Technical communication: Ability to summarize and communicate results of an analytics investigation.

Course Topics: Introduction to Analytics, Descriptive Analytics (Data Preparation for Analytics, Data Exploration and Visualization, Cluster Analysis and Principal Component Analysis); Predictive Analytics (Introduction to Classification, Empirical Evaluation of Classification, Choosing the Best Classification, Beyond Linear Regression); and Prescriptive Analytics (Using Machine Learning Predictions as Inputs to Optimization Models)

### **Projects Completed:** Business Data Analytics (Machine Learning, Classification Trees, Regression, Random Forests, Support Vector Machines, etc.)

**Alchemy Broker Analysis Project:** Performed segmentation analysis and predictive modeling on insurance broker performance to conclude a random forest model (highest AUC of 73%) predicted whether 2020 Gross Written Premium will increase or decrease from 2019 with a misclassification rate of 35%. Four classification models (classification trees, logistic regression, random forests, and support vector machines) were built, evaluated, and then tuned for prescriptive measures to analyze broker performance. Explored, visualized, and described five groups of brokers using principal component analysis.

[\(View Report\)](#)

**Lending Club Cluster and Principal Component Analysis:** Performed a Kmeans cluster analysis to identify 7 groups or clusters of the borrowers by income, loan amount, employment length, home ownership status, and debt-to-income ratio. Included Data Preprocessing and Removing Outliers.

[\(View Report\)](#)

**Lending Club Classification Analysis:** Built a logistic regression model and a classification tree model for predicting the final status of a loan based on various variables available. Confusion matrix and misclassification rate for each model for a test dataset. Variables that appear to be important for predicting outcome. Plotted and described the ROC curves and AUC for the four models.

[\(View Report\)](#)

**Final Exam:** Terms, classification models, test and training dataset splits, logistic regression models, classification tree models, ROC curves, AUC, confusion matrix, support vector machines, variance, bias, leakage, MAE and RMSE, R squared, LASSO approach (penalty on the coefficients) etc.

[\(View Report\)](#)

Spring 2021

## SCMA 691 Special Topic: Decision and Risk Analytics

Professor: Dr. Jason R. W. Merrick, [jrmerric@vcu.edu](mailto:jrmerric@vcu.edu), Phone: (804) 828 7483

Although difficult decisions are a common fact of life and business, understanding how to rigorously analyze decisions is not so common. Decision analytics is a set of concepts and tools that produce clarity about the best choice in an uncertain and dynamic environment. Decision analytics is most effective in environments with high analytical and organizational complexity.

		Analytical Complexity	
		Low	High
Organizational Complexity	Low	Decide Now	Facilitated Leadership
	High	Business Analysis	Decision Analytics

Focusing on each element of a rational decision and involving the right stakeholders make it possible to create significant value, mitigate risk, and avoid mistakes. Structure complex decisions using diagrams and models that decompose the alternatives, uncertainties, and objectives and reveal the best strategy. Discussed the probabilistic and statistical underpinnings of good decision-making and the psychology of bad decision-making.

Analytics Process:

Information Systems > Descriptive Analytics > Predictive Analytics > Decision/Prescriptive Analytics

Decision Analytics is the final step in the analytics process. You must collect your data (information systems), understand your data (descriptive analytics), make predictions about the outcomes of your decisions (predictive analytics), and then make a rigorous and high-quality decision (decision analytics). Dr. Merrick has used decision analytics throughout his research in oil spill risk management, counterterrorism, and supply chain management. He also served as president of the Decision Analysis Society.

Learning Objectives: Decision analysis and Bayesian statistics; Structuring decisions, uncertainties and values of a decision maker; Identify and formulate decision opportunities; Clearly and concisely present the insights obtained from the analysis.

Textbook: Making Hard Decisions with Decision Tools, 3rd Edition, 2014, Robert T. Clemen and Terence Reilly, ISBN: 9780538797573 (Hardcover), 9781408092880 (Ebook).

Software: Excel, Palisade Decision Tools (Integrated set of programs for risk analysis and decision making under uncertainty. Decision Tools Suite software integrates with Microsoft Excel.)

Topics	Relevant Reading
Structuring Objectives, Alternatives, and Uncertainties	Chapter 3
Making Rational, Optimal Decisions	Chapter 4
Gaining Clarity through Sensitivity Analysis	Chapter 5
Organizational Decision Making	Chapter 6
Subjective Probability and Behavioral Biases	Chapters 7 & 8

Value of Information	Chapter 12
Monte Carlo Simulation	Chapters 9 and 11
Modeling Risk Attitudes	Chapter 14
Behavioral Decision Making	Chapter 15
Multiple Objective Decision Making	Chapters 16 & 17

**Projects Completed:** Decision and Risk Analytics (Decision Tree and Influence Diagram)

Midterm Report: Probabilities, Decision Trees and Influence Diagram scenarios

([View Report](#) and Precision Tree files)

Project Proposal Decision Tree – Career Moves: Objectives, uncertainties, influence diagram, assumptions, decision tree model, probability and cumulative comparison node chart (supporting documents – proposal, excel analysis and presentation)

([View Documents](#))

## SCMA 669 Developing and Implementing Forecasting Methods

Stephen W. Custer, swcuster@vcu.edu, Office: (804) 828-7170, Personal: (702) 526-8154

This course develops communication, presentation, and consulting skills which helps students explain, in non-technical terms, forecasts to management. The emphasis was on developing practical approaches to forecasting for business. We developed forecasting tools with Microsoft Excel and understood the basic principles underlying to forecasts.

Time series forecasting, new product forecasting, judgmental forecasts, Bayes forecasting and overview several popular forecasting software systems. We will also discuss organizational concerns when implementing a forecasting system in a real organization.

Topics Covered: The Philosophy of Forecasting, Time Series/First Look, Naïve F/C & Moving Averages, Classical Decomposition, Seasonal Adjustments, Goodness of Fit, Simple Exponential Smoothing, Holt's Linear Method, Holt-Winters' Trend & Seasonality Method, Dampen Trend, Level Adjusted Exponential Smoothing, Random Walk, Top-Down or Bottom-Up, Intermittent Demand, New Product Forecasting, Regression and Forecasting, ARIMA models (Box-Jenkins), Forecasting Competitions, Averaging F/C, Telling a Story with Data, Judgmental Forecasts, Evaluation of Forecast, Bayes Forecast, Confidence of Forecast, Implementation Issues

### **Projects Completed: Forecasting Methods**

**Richmond Bank Total Core Deposit Forecasts:** Using MS Excel and R, accurately forecasted total core deposit data from a Richmond Bank. The Holt's Linear Exponential Smoothing had the overall lowest "Quick and Dirty" MAPE (1.2%), the lowest overall Maximum MAPE (3.49%), and consistently more accurate projections for each of the forecast horizons. Overall, the Unaided, Holts Linear Exponential Smoothing, and both regressions overestimated while the Naïve, 12 Month (M) Center Moving Average (CMA), 3M Moving Average (MA), 6M MA, Damped Trend Exponential Smoothing, and Simple Exponential Smoothing underestimated.

[\(View Report, .r File, Excel File\)](#)

**Richmond Casino Proposal Analysis:** Research analysis completed on the proposal of a Richmond, VA Casino presentation including history/background, economic/revenue impact, frustrations, process etc.

[\(View Presentation\)](#)

**New Product Forecasting:** New product forecasting concepts (such as Delphi method, Assumptions Based, ATAR model, and Sensitivity Analysis) used to forecast and present an innovative smart sticky note printer.

[\(View Presentation\)](#)

**Forecasting with R.:** Forecasting described from the perspective of using R and R studio software.

[\(View Report\)](#)

**Midterm Exam:** KJ Manufacturing Company

[\(View Report\)](#)

**Final Exam:** Comprehensive review with questions and answers on all topics learned.

[\(View Report\)](#)

Summer 2021

## MGMT 642 Business Policy and Strategy

Instructor: Robert S. Kelley, [rskelley@vcu.edu](mailto:rskelley@vcu.edu) (cell) (804) 347-0637

Strategic aspects of management. (MBA capstone course)

Strategic Theory: The concepts and tools that are used in *Strategic Thinking*

Strategic Management: *The process* whereby the firm chooses its business, establishes and sustains a strong competitive position in its industry, and enhances long-term performance.

Strategic Thinking: The use of creative problem-solving techniques to develop innovative solutions required for long-term performance

Strategy Execution: How managers convert strategic goals into plans and then *action*.

The objective of strategic management is to make strategic decisions that lead to above-average returns and long-term performance. Superior performance is about meeting stakeholder's needs. One important measure is profitability (i.e., maximizing shareholder value). The firm enhances long-term performance choosing a good business in which it has the resources and competencies to compete, and by establishing a competitive advantage relative to competitors that is sustainable over time. Competitive advantage is driven by executives' effective analysis of the firm's external environment and the development of internal resources and capabilities that lead to a sustainable competitive advantage. The objective of this course is help students to develop better insight into how effective strategy making leads to superior performance, to understand the basic concepts, tools, and models of strategic analysis, and to develop practice in formulating and implementing effective strategy.

Business Policy & Strategy differs from others in that it takes the broad perspective of the general manager rather than the narrower perspective of the functional manager. A general manager must integrate the functional activities of the business into a coherent whole. Thus, the course cuts across the entire spectrum of business and management activities. The course focuses on the total enterprise – the brand's industry and competitive environment, its long-term direction and strategy, its resources and competitive capabilities, and its prospects for long-term success. Throughout the course, the spotlight is trained on the issue of running the business enterprise: "What must managers do, and do well, to make a company a winner in the game of business?" The answer that emerges, as well as the theme of the course, is that good strategy making and good strategy execution are the key ingredients of a company's success and the most reliable signs of good management.

### COURSE OBJECTIVES

#### General Working Knowledge Goals

1. To understand the role and importance of strategy in determining long-term firm success and performance.
2. To understand the process of strategic management, beginning with strategic analysis and extending through strategy formulation and implementation.
3. To develop an awareness that strategy is fundamentally about "preparing the firm to compete in the future" and requires the firm to create, react to, and manage change.
4. To deeply understand the role of leadership in the strategy process.
5. To improve overall understanding of how firms respond to industry forces, create internal capabilities, formulate and implement strategy, establish a sustainable competitive advantage, and increase long-term performance,
6. To understand how the functional strategies of the firm (e.g., accounting, economics, finance, information systems, management, operations, and marketing) are integrated to create an effective firm-level strategy.



#### Management Specific Skills Goals

7. To improve analytical reasoning and problem solving skills. To improve your ability to think critically and systematically about strategic issues, develop effective solutions while remaining sensitive to ethical implications, and present solutions effectively, both orally and in written form.
8. To develop creative problem solving skills
9. More specifically, to develop skills in analyzing complex business situations, evaluating historical trends and current operational conditions, and developing recommendations on how firms can (1) establish a unifying strategy, (2) develop integrated functional strategies, and (3) create a plan of action to achieve strategic objectives.
10. Improve communication, teamwork, and leadership skills.

#### REQUIRED READINGS

- De Brabandere, Luc and Iny, Alan, *Thinking In New Boxes*, Random House, 2013, ASIN BOOBVJG4WM
- Margetta, Joan, *Understanding Michael Porter: The Essential Guide to Competition and Strategy*, Harvard Business Review Press, Cambridge, Mass., 2011 (ISBN # 10: 1422160599; #13: 978-1422160596)
- O'Reilly, Charles A. & Tushman, Michael, *Lead & Disrupt – How To Solve the Innovator's Dilemma*, Stanford Business Books, (ISBN 9780804798655)
- Wallace, Amy & Catmull, Ed, *Creativity Inc.* Random House, (9780812993011)

Group Projects: Project Teams are central to the course design. In management situations, we start off with our own perspectives and understanding of the situation. We then confer with our associates – above, peer and subordinate – to understand their views and convey ours, learning from each other. The conclusions reached and/or decisions made may be a consensus, or our or someone else to make. Whatever the case, group involvement is a key part of the management process.

#### **Projects Completed:** Business Policy and Strategy

##### DoorDash Strategic Analysis (Presentations)

- [Industry Analysis](#)
- [Environmental Assessment](#)
- [Strategic Review](#)
- [Growth through Acquisition](#)

Uber's Failing Brand: Uber Technologies Inc. brand analysis research report describing brand culture and change strategy. Historical strategic context of the brand, the role culture played in the performance decline of the brand, how the culture impacted financial performance, and how they are attempting to transform and renew the culture ([View Report](#))

Lowe's Case Assessment: Lowe's industry analysis for the market space, brand positioning, environmental assessment, and strategic opportunities/dilemmas. ([View Report](#))

Fall 2021

## SCMA 677, Quality Mgmt & 6 Sigma

Stephen W. Custer  
Monroe Park Campus  
Snead Hall, Room B2152

swcuster@vcu.edu

Office: (804) 828-7170

Course Objectives: The consumer of a product or service experiences quality as a characteristic of the product or service; however, quality is not an attribute of the product or service itself, but a result of the system that produces it. An organization with a sustained quality cultural will produce quality products and services, delighted customers, fulfilled employees, pleased investors, and be positioned to respond to changing conditions. An organization without such a culture may do well enough during good times but be marginal during tough times, and likely to fail completely during extended bad times. We've seen too many examples of this; Kodak, Lehman Brothers, Bear Stearns, Bethlehem and US Steel, Enron, Borders Books, Sears and too many more.

We've seen other organizations faced with equally difficult environments survive and prosper; Ford Motors, Harley Davison, Xerox, Boeing, Caterpillar, Motorola, IBM to name a few. What's the difference?

The companies that prevailed made difficult wrenching changes in their organizational cultural. It wasn't quick; it wasn't easy. It started at the very top and flowed throughout the organization. No employee or supplier was untouched. Using Crosby's analogy, the existing fabric of the culture was rent and a new fabric created.

Many of the companies in the list of failed organization also invested heavily in quality and continuous improvement programs. However, much of the resulting changes were superficial, layered on top of the old culture. When push came to shove management retrenched into comfortable behaviors that had served them well in the past but were ill-suited for their current situation. They failed to adopt the new philosophy. (Deming's second principle: Adopt the new philosophy.)

We will elucidate both the new philosophy of quality management and the tools that support it. Quality programs are sometimes thought of as a bag of statistical tools. However tools without the philosophy is like building a house with the saws, hammers, and other tools but no blueprint or plan. There is likely to be a lot of activity, but unlikely to produce anything of use. Similarly a philosophy without supporting tools is just that - a philosophy. Philosophy alone is unlikely to produce either activity or results.

Texts: The Six Sigma Memory Jogger II by Brassard, Finn, Ginn & Ritter  
Second Edition of The Deming Route to Quality and Productivity by William Scherkenbach and W Edwards Deming (July 1, 2011)

### **Projects Completed:** Quality Management and Six Sigma

Time Series Apple Watch Workout Analysis: Time series health workout data was extracted from my Apple watch to analyze workout variables. A Scope, descriptive statistics, pivot tables, C-Chart and scatter plots were created to check workouts outside of control. Tableau work was used to display correlations.

[\(View Report\)](#)

## INFO 609 Data Centric Reengineering

Instructor Peter Aiken, PhD [peter.aiken@vcu.edu](mailto:peter.aiken@vcu.edu) • 804.382.5957

Teaches methods of monetizing or otherwise valuing intangible data practice improvement opportunities in the context of organizational strategy as part of a semester long participation with regional organizations. (Department of Social Services DSS) Students use data-centric business case development to gain practical experience (all the fun of work experience without the pay). Student teams will work closely with organizational leadership to articulate a specific business case. Teams will evaluate data-centric means of improving operational effectiveness and/or innovation opportunities and recommend specific approaches and estimated benefits.

Outcomes: To provide advanced knowledge, understanding, and practice of various systems and business (re)engineering techniques as they should be encountered in business contexts. Approximately one half of class is devoted to lecture material and one-half to the semester project(s). This course typically involves the development of working information solutions to real-life organizational problems. These problems are addressed using group and individual assignments. The solutions to these challenges are not typically known at the beginning of the semester.

Objectives To provide the opportunity to gain:

- 1) Demonstrate they have a grasp of data reengineering concepts and techniques by specifically articulating the precise challenge;
- 2) Experience the thrill of an evolving project; and
- 3) Illustrate how to select and apply appropriate tools and techniques.

Readings: A series of texts/articles-texts are provided in downloadable .pdf format.

Aiken & Harbour, *Data Strategy and the Enterprise Data Executive*, Technics Publications, LLC, ISBN: 1634622170

Aiken & Gorman, *The Case for the Chief Data Officer*, Elsevier Publishing, ISBN: 978-0-12-411463-0

Aiken & Billings, *Monetizing Data Management* Technics Publications, LLC, ISBN: 978-1-935504-66-5

### **Projects Completed:** Data Centric Reengineering

Opioid Prescribing Rates Analysis: Semester long project working with Virginia Department of Social Services to assist in Data Centric Reengineer useful data into a major FAACT database. Tableau dashboard

[\(View Report\)](#)

Children's Bureau Race and Ethnicity Analysis: General statistics on the race and ethnicity of children in foster care analyzing statistics on variables such as Child Maltreatment, Children Waiting for Adoption, children adopted etc.

[\(View Report\)](#)

## VCU Recommendation Letters:

**Mike Beavers**

October 12, 2018

To whom it may concern:

It is my honor to recommend Mr. Bryce Bowles as a candidate for the Master of Decision Analytics (M.D.A.) program at VCU. I have had the pleasure of working with Bryce for the past 18 months in his role as an Insurance Market Examiner in the Information Technology Section of the Virginia State Corporation Commission's Bureau of Insurance. Bryce has quickly proven himself to be an asset to the Bureau with his technical skills, his above average professional maturity, and his ability to multi-task in many different directions. Bryce has assisted my division on many technical projects during his tenure and exhibits a knack for explaining complex processes in a user-friendly method. Bryce has been selected to participate in the Business Intelligence and Communication Committees as part of the Bureau's Strategic Plan and Information Technology project.

Bryce's attention to detail, analytical thought process, and his collaboration skills led me to seek his direct involvement in what can only be described as the largest agent licensing project that the Bureau of Insurance has undertaken in over 30 years. Bryce participates as part of the core team of professionals who are guiding this project and has been tasked as the primary lead for the fingerprinting implementation process. This requires a great deal of technical skill in analyzing the various methods by which we can accomplish this process and ensuring that the Bureau of Insurance has all of the physical, technical, and administrative safeguards in place to meet the security requirements of the Virginia State Police and the Federal Bureau of Investigation. Bryce is also the lead contact in dealing with the system developer/vendor and has exhibited excellent people skills in his contacts. Bryce participates in all of the project meetings and his suggestions show a great understanding of not only the parts of the project he is involved in, but in the entire project as a whole. Bryce provides well thought out ideas and suggestions and quickly absorbs information from other participants.

I believe Bryce would be an outstanding fit for the M.D.A. program since much of the coursework directly relates to the type of work he performs at the Bureau of Insurance. Bryce has discussed with me on several occasions his desire to continue his education in this selected field and I can only see his admission to this program as benefitting the Bureau of Insurance with his future work, benefitting Bryce with new and expanded capabilities, and benefitting VCU by having such a professional carry one of your advanced degrees.

I hope to continue working with Bryce on numerous projects in the future especially with the increased skills and abilities he would garner from your program. In my opinion, Bryce would make an excellent and highly successful candidate and seems tailor made for a program such as this one.

Sincerely,  
Michael T. Beavers, CFE, CPCU, CIC, CIE  
(B.S. Administration of Justice, V.C.U. 1987)  
Deputy Commissioner  
Agent Regulation Division

**Vicki Ayers**

October 24, 2018

To whom it may concern:

It is my honor to write a letter of recommendation for Bryce Bowles as a candidate for the Master of Decision Analytics (M.D.A.) program at VCU. In just one year, Bryce has risen from an Insurance Trainee to Insurance Market Examiner. Evidence of his ability to advance quickly is shown by his exceptional work here at the Bureau of Insurance (B01). He strives to help BOI employees work efficiently and effectively. Bryce approaches his work with energy, enthusiasm, and commitment. He would be an outstanding candidate for the M.D.A. program.

I am the Chief Insurance Market Examiner of the Automated System section of the Bureau of Insurance. In addition to overseeing the section, I am responsible for managing IT projects for the Bureau; I am also the contract administrator on vendor contracts. Bryce has learned the business of the Bureau in just over a year. His knowledge was gained by analyzing information to help the Bureau with system enhancements and determining the best software available for the Bureau's utilize. For example, the Bureau is currently using Microsoft BI. Bryce has learned the software and has offered ways the software can benefit the Bureau.

Bryce has been instrumental with numerous Bureau projects. For example, he is analyzing certain aspects of a project with the Agent's Regulation Division. His involvement requires him to work with developers and vendors. He leads meetings and acts as a liaison between the Agent Regulation Team and the developers. His involvement in projects often require him to test and write-up his findings for the vendor.

Bryce participates in system related committees and working groups. He participates in monthly calls with vendors to learn about system enhancements and communicates them back to Bureau. He recently became involved in three new Bureau working groups for Microsoft B1, Technology Education and Communication.

Please consider Bryce for the M.D.A. program. This program aligns with Bryce's duties here at the Bureau and his commitment for education. I am certain that he will be successful.

Vicki M. Ayers  
Chief Insurance Market Examiner - Automated Systems  
Virginia Bureau of Insurance  
(804) 371-91115  
Vicki.ayers@scc.virginia.gov

**Trish Todd**

October 24, 2018

To whom it may concern:

It is my pleasure to write a letter of recommendation for Bryce Bowles as a candidate for the Master of Decision Analytics (M.D.A.) program at VCU. Bryce joined the Bureau of Insurance's Automated Systems team in June 2017. I am Bryce's direct manager and I can say with certainty, that Bryce has many qualities that make him the ideal candidate for this M.D.A. program.

Some primary responsibilities of the Automated Systems section are to provide business systems support to the nearly 200 team members of the Bureau of Insurance (Bureau), which includes processing systems security requests, and participating in Bureau systems projects. Bryce's participation in system projects has revealed his strong analytical skills. Examples of these skills include, but are not limited to, testing and reporting findings on new and enhanced systems, analyzing data via various reports and research.

Bryce is committed to learning and developing his skills and those of his co-workers. He voluntarily committed to a SharePoint certification program offered within the State Corporation Commission. He recently attended a conference on Teammate software that is currently used in the Bureau's Financial Regulation Division. The knowledge he gained at this conference has already shown to be invaluable. He shares information well and enjoys empowering other employees with the many skills he has learned. In addition, he has outstanding customer service skills, which is essential considering the interaction necessary for assisting the Bureau's entire team. I am certain that the knowledge Bryce will gain by the M.D.A. program will benefit him in his current position and the Bureau as a whole, as we are evolving with the many technological advances of today and tomorrow.

Since joining the team, Bryce's professionalism, work ethic, his ability to analyze and to grasp new systems and procedures is very impressive. I am confident that he will demonstrate the same commitment and competence in his pursuit of a Master of Decision Analytics degree that he has shown during his career with the Bureau.

Patricia C. Todd, CPCU, AIC, AIT  
Manager - Automated Systems Virginia Bureau of Insurance  
(804) 371-9195  
trish.todd@scc.virginia.gov