



COURSE INFORMATION

Course Number and Title: BUAD 5707: Business Analytics

Credits: 4

Description

Business analytics (BA) is designed to introduce you to how data is (and can be) used by organizations. BA allows us to understand and quantify performance, explore problems, make evidence-based decisions, and ultimately survive in increasingly competitive environments. Clever and timely use of data has become a competitive tool for many firms,¹ and all firms require a fundamental use of data for reporting and decision-making. BA will take a broad perspective on data analytics and provide you with a wide range of understanding plus the capability to apply numerous techniques.

Course Goals

By the end of the course, students will be able to:

- Understand the data. “Any fool can know. The point is to understand.” – Albert Einstein
 - Metrics
 - Collection
 - “Wrangling, Manipulation, and Scrubbing”
 - Plan a data-gathering effort
 - Introduction to basic tools: Excel
- Perform descriptive analysis. “That's one small step for man, one giant leap...” – Neil Armstrong
 - Descriptive measures
 - Data modeling
 - Familiar distributions of data
 - Sampling and estimation
 - Statistical inference
- Perform predictive analysis. “Study the past if you would define the future.” – Confucius
 - Trends, systematic behavior, and regression
 - Data mining—advanced data visualization, clustering, and classification
 - Sophisticated spreadsheet models
 - Monte Carlo simulation and analysis of risk

¹ Thomas Davenport and Jeanne Harris (2007). *Competing on Analytics: The New Science of Winning*. Harvard Business School Press.



- Perform prescriptive analysis. “Action is the fundamental key to all success.” – Pablo Picasso
 - Constrained optimization
 - Interpretation of complex results
 - Extending deterministic models by “what-if” scenarios

PROGRAM INFORMATION

Mission of Mason School of Business

The mission of the Raymond A. Mason School of Business at William & Mary is to serve the Commonwealth, the nation, and the global community both by offering high-quality educational programs at the undergraduate, graduate, and professional levels and by creating and communicating new knowledge.

Program Goals

The goals of the W&M MBA programs are to develop students who:

- Have executive-level communication skills
- Are principled strategic decision-makers
- Have the skills to make complex decisions
- Have mastery of specialized and core business knowledge

COURSE DETAILS

Text and Resource List

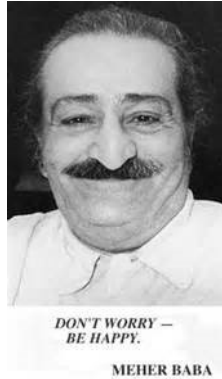
Required Books

- Evans, J. R. (2019). *Business analytics* (3rd ed.). New York: Pearson. ISBN: 978-0135231678

Required Software

We will be using Microsoft Excel (in the Office Suite—you may already have it or you may find it available through W&M IT).

I recall an incident in 1970 at a Bob's Big Boy at 4:00 a.m. in Berkeley, CA. As I sat contemplating my pathetic life, I was approached by a man dressed in what appeared to be a sheet. He looked at me with an infectious smile and said, “Be HAPPY. Don't worry, I will help you.” It was the sagacious Meher Baba, Indian spiritualist. In spite of my non-spiritual leanings, it was good advice that I still heed to this day.



Additional Readings

Articles, websites, and other resources pertinent to the weeks' topics will be posted for students on Canvas. This is an opportunity to get a different perspective on a topic area. Some of our topics are complex and may need a number of efforts to be fully digested. As the course progresses, other materials of interest might be added.

Course Structure

The course will follow this general pattern:

- Readings are to be done early in the week—this includes your required textbook, suggested resources, etc. It is essential that you read the book. Our assignments are directly related to the readings.
- There is additional information provided by the professor in the form of short videos, recorded problem-solving sessions, etc. that help clarify difficult points, work through problem sets, and summarize the week. Some of these are anticipated, while others will occur as the class progresses through the material.
- Here is a recommended course of action for each week in a specific order:

Early in Week

- *Novice Problems:* There will be a set of novice problems provided at the beginning of the week. The problems are an opportunity to assess your understanding. They will appear in a downloadable Excel workbook. Make a good-faith effort at these problems and you will receive solutions after you submit your work online. This is an **UNGRADED** exercise and it is important because it signals what is to come in the advanced problems, which are graded.

Midweek

- *Quiz:* A weekly quiz will be required. The quiz assesses your broader understanding of the materials in the textbook. You will have two attempts at the quiz and the highest score will be recorded; thus, this is a **GRADED** exercise.

Later in Week



- *Advanced Problems:* These problems will be GRADED and are an assessment of your understanding of our readings. You will see similarity between the novice and advanced problems. Again, the problems will be provided in a downloadable Excel workbook. A solution to the novice problems will be provided to “close the loop” on your understanding of the material.
- Some modules (3-6) will have a discussion topic posted to which students must post both an initial contribution by midweek and a reply to a few other students’ posts by the end of the week. More on this topic later.

Outline of Course

This course will be divided into seven weekly modules. The following outline presents the topics to be covered in each module.

Module 1: Introduction to Business Analytics Using Excel

- What is BA?
- How is BA used?
- Why is BA used?
- Data—sometimes BIG; sometimes small
- Where does data come from?
- What flavors and varieties of data are there?
- How do I prep data for use?
- What’s a model?
- Effective use—collaboration with models
- Platforms for analysis—Excel, the mother of all platforms!
- Important Excel functions

Module 2: Descriptive Analytics—To Visualize Is to Understand (Most of the Time!)

- Data visualization—charting/dashboards/other tools
- Data exploration—sorting/filtering/summarization/manipulation
- Data exploration—pivot analysis

Module 3: Probability Distributions, Sampling, Estimation, and Statistical Inference

- Probability concepts
- Random variables—discrete and continuous
- Random sampling
- Estimation
- Interval estimates and confidence intervals
- Hypothesis testing—one sample and two-sample

Module 4: Introduction to Predictive Analytics

- Analysis of variance (ANOVA)
- Categorical variables—chi-square test for independence



- Modeling relationships and trends in variables
- Trend lines
- Simple regression
- Multiple regression
- Analysis of regression models

Module 5: Introduction to Data Mining—Data Classification System and Data Clustering Methods

- What is data mining?
- Data exploration, visualization, and reduction
- Cluster analysis—hierarchical
- Classification systems—k-nearest neighbors
- Classifying new data

Module 6: Spreadsheet Modeling and Monte Carlo Simulation

- Planning for model building—structure, applications, and design
- Model choices—complexity and realism
- What-if in deterministic models
- Goal seek and data tables
- Monte Carlo methods for risk management and assessment
- Building Monte Carlo models
- Modeling applications and complexity

Modules 7: Prescriptive Analytics With Linear Optimization

- Optimization models
- Building constrained optimization models
- Linear programming (LP)
- Graphical LPs
- Solver for LPs
- Interpretation of results
- Sensitivity analysis
- Solver parametric analysis



Grading Methodology

Achievement in this course will be assessed through completion of the following activities:

Assignment Name	Points	Percentage
Case Study Discussions	80	8%
Advanced Excel Workbooks	700	70%
Knowledge Check Quizzes	140	14%
Wicked Problem	80	8%
Total	1000	100%

Case Study Discussions

Contributions to class discussion forums will be graded. Credit will only be given for contributions and posts that are on time. POINTS CAN BE LOST for posting inappropriate or irrelevant comments.

Advanced Excel Workbooks

We discussed the novice and final questions above. These will be Excel workbooks based on exercises. The problems in the advanced workbooks will be GRADED and are an assessment of your understanding of our readings.

Knowledge Check Quizzes

These weekly quizzes assess your broader understanding of the materials in the textbook. You will have two attempts at each quiz and the highest score will be recorded; thus, this is a GRADED exercise.

Wicked Problem

There will be two assignments detailing how concepts covered in this course can be used to help you frame and analyze the Wicked Problem you are exploring in this program.



Grading Scale

Grades are determined on straight percentages as follows:

Letter	Range	Range
A	930+	93% +
A-	900-929	90-92%
B+	870-899	87-89%
B	830-869	83-86%
B-	800-829	80-82%
C+	770-799	77-79%
C	730-769	74-76%
C-	700-729	70-73%
F	699 or less	69% or less

Any grade of C- or lower requires students to retake the course. Incompletes are not approved without instructor approval. Students should not expect any incomplete requests unless in extreme circumstances. Terms of any incompletes should be negotiated with the instructor and under no circumstances will they remain for more than one (1) year.

PROGRAM POLICIES

Online Learning Student Expectations

All students in this course are expected to have completed the Online Student Orientation course. Through this orientation, you will learn how to navigate the course and use the various tools that you will need in order to participate effectively and submit assignments. You are also expected to have all the equipment and software needed to be successful in the course.



All students are expected to contribute to their own learning as active and well-prepared participants. Weekly modules will provide various opportunities for reading, reflection, applied experiences, collaboration, and writing. Since these activities are woven through the entire week and generally do not require your “electronic presence” at any particular time or day, there should be no need to “miss” class. You should plan on spending the same amount of preparation and “in class” time on this course as you would if you were taking the course in a face-to-face environment.

Technology Support

Technical support is available using the contact information on the “Support Resources” page in Module 0. Your instructor will always take technical problems into account if the situation warrants it.

Logging On

The learning activities for each week are carefully sequenced, so you can accomplish a reasonable amount of work throughout the week. You should log on to the course website regularly to work through course materials and participate in course discussions.

Posting Responses

Interaction between students is an important part of this course and requires prompt postings and responses. In an attempt to be efficient with our time and considerate of everyone’s schedules—beyond the requirements of this course—we will operate under a consistent time structure for posting assignments and responses to online discussions.

Submitting Assignments

Individually written assignments should be submitted to the appropriate assignment dropbox. Unless otherwise noted, assignments will be due by 11:59 pm ET on the date noted on the course calendar.

Citation Expectations

All research work submitted should be properly cited using APA standards. For more information and tools to assist, refer to the information available through the McLeod Business Library at Mason. There are many resources available at: <http://mason.wm.edu/about/library/researchfaq/index.php>.

Teamwork

As you advance in your careers, it becomes increasingly important to develop the skill of influencing others and working collaboratively. Similarly, in most workplaces, you will need to collaborate or negotiate with others in order to accomplish their goals.

Teamwork in many courses offers an opportunity for you to learn virtual team leadership and team theory. It is important that you treat your team members with the same respect that you would treat coworkers. Team members will become part of your professional network, so if you work effectively with them, they may become a lifetime resource.



Remember that everyone's style of communication is different, and that it is important to listen carefully and adjust your style when necessary to communicate effectively. You should be proactive when you feel there might be a problem in the group. The situation will not improve if you do not address it.

Academic Integrity and the Honor Code

The origin of our Honor Code at William & Mary dates back to 1736 when the college first demonstrated its highest commitment to the character of its students. The Honor Code has evolved along with the college and has gone from being a "gentlemen's code" into a codified student honor system promoting individual responsibility on the part of all who are members of the William & Mary community relating to a student's honor. The same high commitment to student character exists today, and the Honor Code is administered by the student body to help build a community of trust.

Upon matriculation at William & Mary, all students are asked to sign the Honor Code, expressing their commitment to not lie, cheat, or steal.

"As a member of the William & Mary community, I pledge on my honor not to lie, cheat, or steal, either in my academic or personal life. I understand that such acts violate the Honor Code and undermine the community of trust, of which we are all stewards."

Upon graduation, the Honor Code becomes the brand with which all William & Mary alumni will be judged.

Honor and integrity are fundamental assets to the Mason School of Business community, and therefore they must be cherished and protected. All too often today, headlines read of business leaders participating in dishonorable and unethical behavior. Our conduct during our time as graduate students and beyond reflects our character, the character of the Mason School of Business, and our college. Therefore, we encourage students to be actively committed to safeguarding the Honor Code's "community of trust of which we are stewards."

Plagiarism

The following identifies the university policy on plagiarism:

Plagiarism: the presentation, with intent to deceive, or with disregard for proper scholarly procedures of a significant scope, of any information, ideas or phrasing of another as if they were one's own without giving appropriate credit to the original source.

- a) One commits plagiarism when one includes the words of another without quotation or when one includes the substantive work of another without properly crediting the source with footnotes, quotation marks, or other appropriate citation.
- b) A student's intent may be inferred based on the extent and context of the improperly cited material and whether the student has provided false citation or has manipulated the original text such that a reasonable person may conclude the student did so in order to avoid detection.



- c) Disregard for proper scholarly procedure that is minimal in scope may be addressed solely as an academic matter, and the instructor may determine whether an academic penalty should be applied without pursuing resolution under the Honor Code. But any intentional acts of plagiarism or disregard for scholarly procedure of a significant scope should be treated as a violation of the Honor Code and addressed under either Sec. VIII or Sec. IX of the Student Handbook.

Accessibility Services

William & Mary accommodates students with disabilities in accordance with federal laws and university policy. Any student who feels they may need an accommodation based on the impact of a learning, psychiatric, physical, or chronic health diagnosis should contact Student Accessibility Services staff at 757-221-2509 or at sas@wm.edu to determine if accommodations are warranted and to obtain an official letter of accommodation. For more information, please see www.wm.edu/sas.