Business Analytics

Effective: 1/14/2019 (SUBJECT TO CHANGE; visit Blackboard regularly for updates)

01/14/2019-4/26/2019 (exam week ends 5/5/2019)
Section 01, CRN 25072, Monday 6:00-8:45pm
Room: BUS 239 (Business School Computer Lab)

Academic Calendar: https://registrar.richmond.edu/planning/index.html

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Overview of the course

This course builds and extends the concepts that you learned in MGMT 325 (IT & Data Analytics). You will work with more complicated data sets, more powerful tools & technologies, and more in-depth analytical projects. The focus of this course will primarily be in conducting data analyses to practice evidenced-based management. Most of the tasks/projects are deliberately designed to be unstructured in order to let you use your creativity, business acumen, and technological skills to "tell a story with data" in order to support your business recommendations.

The following snippet was taken (and paraphrased) from Florian Zettelmeyer of Northwestern's Kellogg School of Management (http://insight.kellogg.northwestern.edu/article/a-leaders-guide-to-data-analytics), which succinctly explains the core purpose of this course:

> Can you imagine an EVP going to the CEO and saying, 'I don't really know how to read a balance sheet, but I have someone on my team who is really good at it?' We would laugh that person out of the room and yet I know a whole bunch of people who, without blinking an eye, would go to the CEO and say, 'This analytics stuff is complicated. I don't have a full grasp on it, but I have assembled a crackerjack analytics team that is going to push us to the next level.' This is an answer that is no longer acceptable given the importance of analytics to everyday decision making.

Learning Objectives

- Develop a working knowledge of analytical software tools/technologies such as MySql, SQL, Excel, Tableau, R, and Rapid Miner.
- Be able to use those tools to discover, analyze, and solve business problems by making evidenced based recommendations/decisions.
- Be able to make sense out of and tell a story with raw data to sell your business recommendations to managerial stakeholders.
- Be able to present and discuss complex analytical analyses in "plain" English.
- Understand the challenges associated with practicing evidenced-based management (i.e., different cognitive biases and organizational culture issues).
- Continue to develop your "data analytical" thinking skills (i.e., critically think like a data analyst).

Required Coursepack

The following Harvard Business Coursepack is required:

https://hbsp.harvard.edu/import/598533

It contains a single book (in pdf format) (HBR Guide to Data Analytics Basics for Managers). The coursepack costs $9.95.

Software

We will be using Windows based applications in this class. Each student should be able to install all of this software on his/her personal Windows machine for the semester. If you have a MAC and want to use your own machine, you will have to install Windows boot camp (https://www.apple.com/support/bootcamp/). The business school computer lab (BUS 239) and one of the labs in Jepson will have all of this software installed.

1. Microsoft Excel 2016.
2. Tableau v2018 (http://www.tableau.com/products/desktop). Tableau will send me the student license key at the start of the semester. ***NOTE***: Tableau has historically scheduled new releases in March/April so this application may be upgraded in the middle of the semester. All Tableau releases are not backwards compatible, so make sure to only use this version of Tableau on your personal machine. If you are prompted to upgrade, don't do it until after the semester.
3. MySql & MySql Workbench (https://dev.mysql.com/downloads/workbench/). There is a development release version 8.0 that I will use. The computer lab has version 6 installed. Either one should work with the examples that we will use in this class.
4. R and R Studio (https://www.rstudio.com/products/rstudio/download/ & https://cran.r-project.org/mirrors.html).

General Course Policies & Guidelines

Class preparation & debriefing: To be successful in this course you should expect to devote 10-14 hours each week in class, reading and studying the material, and preparing assignments. Most of the tools and techniques require repetition to learn. How much repetition is required will vary from individual to individual. As such, preparation will require some combination of repeating the in-class exercises, completing the homework problems, and reading the appropriate references. The in-class mini-cases/examples will require you to have the homework completed before the start of the class period in order to successfully follow along.

The instructor as resource: "To teach" means to "pass on knowledge," while "to learn" means "to acquire knowledge and skills." As course instructor, my job is to teach you what I know and understand about data analysis by organizing the course around important topics, key instructional materials and assignments while acting as a facilitator, resource, and guide. You can ask me questions and ask me for extra help (in-person or via email), and I will do my best to assist you, but it is your job to learn … even when learning is hard work!

I took this position because I enjoy teaching. I genuinely care about you and your progress in the class. If you have a problem, complaint, comment, concern, etc., **please** schedule an appointment or drop in during open office hours. If something is not working for you, don't wait until the very end of the semester to speak up. Come in and speak with me so we can work together to maximize your experience in this course.

Expectations for student behavior: I expect each student to demonstrate **respect** for his or her fellow students individually and as a class, to me as your instructor, to the Robins School of Business as a place of learning – and to himself or herself. In addition to the typical ways we should be respectful (e.g., language use, politeness, cooperation, openness to new ideas, etc.), being respectful means **no cheating and no plagiarism**. To be clear, **cheating** includes, but is not limited to, copying someone else's work, with or without their knowledge, and turning it in as your own work. **Plagiarism** includes, but is not limited to, copying intellectual property from others (on the web, in books, etc.) and presenting it as your own work, without proper citation. If I identify instances of cheating or plagiarism, *the students involved will receive a failing grade (F) for the class and instances of cheating or plagiarism will be reported to the Honor Council for possible further sanctions*. Make sure you familiarize yourself with Richmond's honor code (http://studentdevelopment.richmond.edu/student-handbook/honor/the-honor-code.html). Not knowing the policies and procedures related to my course AND the University of Richmond is not an excuse to violate those policies and procedures. *When in doubt, don't do it and ask me for clarification*.

Other Resources Available to Students: If you experience difficulties in this course, do not hesitate to consult with me either in-person or via email. I am on-campus all week, so don't be limited by my office hours should you need to consult with me. There are also other resources that can support you in your efforts to meet course requirements and learn the material.

Academic Skills Center (http://asc.richmond.edu, 289-8626 or 289-8956): Helps students assess their academic strengths and weaknesses and hone their academic skills.

Counseling, Psychological & Disability Services (http://caps.richmond.edu or 289-8119): Assists students in meeting academic, personal, or emotional challenges. If you are disabled and require special assistance to complete this course, please contact disability services to process your request at the very beginning of the course. You must complete a "Disability Accommodation Notice" within the first two weeks of the semester (see http://studentdevelopment.richmond.edu/disbility-services/index.html).

Writing Center (http://writing.richmond.edu or 289-8263): Assists writers at all levels of experience, across all majors.

Class Participation & Attendance: My assumption is that all students who are taking my class are adults. If you, as an adult, choose to miss class on a given day, I assume that 1) you understand that you are missing a component of the class, 2) you have decided that whatever you have chosen to attend in lieu of class is more important than what is happening in class that day, and 3) you are willing to accept any consequences of missing what happens in class that day (lecture material, interaction with your classmates, classroom presentations, exams, and so on).

Religious Observance Policy: Students needing to miss class because of religious observance should contact me within the first two weeks of the semester to discuss the absence. The University's full religious observance policy may be found here (http://registrar.richmond.edu/services/policies/religiousobsv.html).

Assignments & Deliverables

Midterm Exam: This *individual* exam will cover the topics from the first six or seven weeks of class.

Case Study: Your *group* will clean, organize, analyze, and visualize data concerning a business scenario. On the day when the case is due, you will be asked to extend the case in some manner (i.e., more data, different data, different assumptions, create new Tableau visuals, and so on).

Final Exam: This will be a **_cumulative_** exam that will be done **_individually_**. This exam will be hands-on in nature and will involve performing several data analysis tasks related to any concept covered in the class. This exam will have a take-home component and an in-class component.

HBR Guide to Data Analytics Summaries: You (**_individually_**) will write brief summaries and personal reflections for each chapter/article in this book. The book is contained in the HBR coursepack.

Homework Assignments: After most class meetings you will be given an assignment to complete. You may work individually or in groups to complete these assignments. That being said, I expect you will get the most value from each assignment if you perform the work independently (and then confer with classmates). **_I will not collect or grade any of these assignments, but these are required_**. If I feel that the class as a whole is not completing the homework assignments, I will randomly ask a student to present his/her homework solution in front of the class. If the student is unprepared or has not completed the assignment, I may reduce his/her final course grade by anywhere from ½ to 1 ½ points. It will be very difficult to succeed in this class if you are not doing the homework assignments.

Adding up the points

	Points	%
Midterm Exam (**_Individual_**)	30	30%
Case Study (**_Teams or Individual_**)	30	30%
Final Exam (**_Individual_**)	30	30%
HBR Guide to Data Analytics (**_Individual_**)	10	10%
Total	100	

A >=93%	A- >=90% & <93%	B+ >=87% & <90%
B >=83% & <87%	B- >=80% & <83%	C+ >=77% & <80%
C >=73% & <77%	C- >=70% & <73%	D+ >=67% & <70%
D >=63% & <67%	D- >=60% & <63%	F < 60%

TENTATIVE Course Schedule
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Date	Topic	Homework/Readings Due on Date of Class	Learning Objectives
1/14/2019 Week 1	Evidenced-Based Management *Software*: Excel (time permitting)	1. Review the syllabus	1. Understand the structure of the course, policies, and procedures. 2. Understand evidenced-based management and data driven decision making and to be able to contrast axiom (theory) based management versus evidenced based management. 3. Understand the analysis framework that will be used in this class.
1/21/2019 Week 2 ***Online Only due to MLK Holiday***	Relational Database Design & Logical Data Modeling *Software*: MySQL	1. Complete the "Practice Process" Problem 2. Read *Analytics: The New Path to Value* 3. Read *Evidenced-Based Management* 4. Read *Before You Make That Big Decision*	1. Understand why we use a relational database to store, organize, and structure data. 2. Conceptually understand one-to-one, one-to-many, and many-to-many relationships and understand the difference between identity and non-identity relationships. 3. Understand the difference between modality and cardinality. 4. Be able to construct logical ER models in MySql. 5. Understand how to forward engineer and reverse engineer a database schema in MySql.
1/28/2019 Week 3	Building the Physical Model & Loading Data *Software*: MySQL	1. Homework #1 (construct logical model and build the physical tables and relationships in MySql)	1. Understand the process of loading data into a relational database. 2. Understand how to use the LOAD DATA statement. 3. Understand the basics of Action queries (UPDATE, INSERT, & DELETE). 4. Understand how permissions work in MySql and how to set permissions via SQL statements 5. Be able to resolve common data loading issues.
2/04/2019 Week 4	Visual Basic for Applications *Software*: Excel	1. Watch the Common Excel functions video. 2. Homework #2 (data loading) 3. Homework #3 (action queries)	1. Understand what Visual Basic for Applications is. 2. Understand the structure of the developer environment in Excel. 3. Be able to write basic VBA procedures and modules.
2/11/2019 Week 5	Visual Basic for Applications *Software*: Excel & MySQL	1. Homework #4 (VBA)	1. Be able to load data into a database using VBA.
2/18/2019 Week 6	Analysis Queries *Software*: Excel & MySQL	1. Homework #5 (VBA)	1. Be able to write a series of SELECT queries. 2. Execute a select query in VBA and output the results to a range in Excel.

2/25/2019 Week 7	Analysis Queries *Software*: Excel & MySQL	1. Homework #6 (select query videos)	1. Understand the concept of Euclidean distance as it pertains to a neighborhood analysis.
3/4/2019 Week 8	Midterm Exam		
03/18/2019 Week 9	Multiple Regression *Software*: MySQL & R	1. Read *The Benefits and Limits of Decision Models*	1. Understand the concepts behind multiple regression. 2. Be able to run regressions in R. 3. Understand how to pull data from MySQL to run different types of regressions.
03/25/2019 Week 10	Multiple Regression *Software*: MySQL & R	1. Homework #7 (regression examples) 2. Look at the spurious correlations website (http://tylervigen.com/spurious-correlations)	1. Conceptually understand regression assumptions. 2. Test those regression assumptions in R.
4/1/2019 Week 11	Analysis Queries & Data Visualization *Software*: MySQL, Tableau & R	1. Homework #8 (regression examples) 2. Watch Introduction to Tableau video 3. Read/Skim: goodenoughtogreat.pdf	___NOTE___: Tableau is covered in MGMT 325, so this will be a review. The Tableau videos cover a wide range of Tableau topics (from beginner to advanced). The in-class demonstration will focus on connecting Tableau to MySql (and possibly to R). 1. Be able to construct Tableau dashboards and storyboards to build your business case. 2. Understand the importance of visuals in order to tell a story with your data.
4/8/2019 Week 12	Constrained Optimization *Software*: MySQL & Excel	1. Homework #9 (Tableau examples)	1. Conceptually understand constrained optimization. 2. Be able to execute a series of different constrained optimization problems using MySQL and Excel.
4/15/2019 Week 13	Case Day		
4/22/2019 Week 14	Class Wrap-up & Exam Review *Software*: MySQL, Tableau, R, and Excel	1. Homework #10 (Constrained Optimization)	1. Understand next steps in your data analysis journey. 2. Be able to perform a constrained optimization problem using all of the different tools and technologies that we used in this course.
4/29/2019 Week 15	Final Exam from 7-10pm Last day to turn in the HBR summaries		