IT & Data 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 02, CRN 27778, Tuesday/Thursday from 10:30-11:45am
Section 03, CRN 27779, Tuesday/Thursday from 12:00-1:15pm
Room: BUS 239 (Business School Computer Lab)

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

Instructor: Thomas Mattson
Office: Queally 381, Office Phone: (804) 287-6895
Office Hours: Tuesday & Thursday 2:30pm-5:00pm and by appointment
E-mail: tmattson@richmond.edu

Overview of the course

The purpose of this course is to provide you with the knowledge, skills, and abilities needed to clean, organize, analyze, and visualize raw data in order to practice evidence-based management. You will work with relational databases, spreadsheets, and visualization software to import, integrate, structure, cleanse, transform, filter, analyze, and visualize raw data. The ultimate goal is for you to understand how to turn raw data into actionable information using descriptive, predictive, and prescriptive data analytics.

The goal of this course is not to turn you into computer scientists or techno-business professionals but instead to provide you with a "working knowledge" of data analysis that you can apply to your particular business domain. As a business student, having a working knowledge of data analytics (and data analytical thinking) can save you from making decisions based on inaccurate assumptions or faulty intuition. It is ultimately the manager's job to choose what problems need to be solved and how the company should incorporate analytics into its operations. To do this, you need a working knowledge of data analytics.

Learning Objectives

- Develop a working knowledge of analytical software tools such as Access, Excel, and Tableau.
- Be able to use those tools to discover, analyze, and solve business problems.
- Be able to tell a story with raw data that supports or does not support a particular business recommendation.
- Be able to spot potential business problems and/or trends by analyzing raw data.
- Develop "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/597536

The coursepack costs $15.00. Each student must purchase their own copy of the coursepack because each student will have to do the simulation individually.

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 University's help desk can help you setup your virtual machine if you need/want their help.

1. Microsoft Access 2016 and 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.

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

NOTE: No late assignments will be accepted. If you have a university sanctioned event that conflicts with an exam date, you must contact me at least two weeks before the exam so we can reschedule it.

Excel Activities: You will ***individually*** complete a series of Excel tutorials.

Exam 1: This ***individual*** exam will cover the topics from the first four to five weeks of class.

Exam 2: This ***individual*** exam will cover the topics from the middle four to five weeks of class.

Final Exam: This ***cumulative/individual exam*** will cover any topics covered in the class.

Blue Detergent Simulation: You will ***individually*** complete the simulation and the write-up. Part of your grade will be actively participating in the simulation during class and the other part of your grade will be the case write-up.

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 do not plan on collecting 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 collect them. If you do not have your work completed, then I may reduce your 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	%
Exam 1 (***Individual***)	42	33.6%
Exam 2 (***Individual***)	35	28%
Final Exam 3 (***Individual***)	35	28%
Blue Detergent Simulation (***Individual***)	5.5	4.4%
Excel Activities (***Individual***)	7.5	6%
Total	125	
NOTE: Failure to complete homework assignments may result in negative points (-½ to -1½) added to your total score.		

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**
SUBJECT TO CHANGE; Visit Blackboard regularly for updates

Date	Topic(s)	Homework & Learning Objectives
Class #1 1/15/2019	Course Overview	***Prior*** to Class: 1. Read the syllabus. ***During*** Class Learning Objectives: 1. Understand the course policies and procedures. 2. Understand what data analytics is and what evidenced-based management is.
Class #2 1/17/2019	Blue Detergent Simulation	***Prior*** to Class: 1. Purchase the HBR coursepack. 2. Read the simulation background. This should be included in your HBR coursepack but I have also uploaded it to Blackboard (HBP_DataAnalytics_case.pdf). 3. Read: Pfeffer-Sutton-NYT-Sept-2011-Trust-the-Evidence.pdf. ***During*** Class Learning Objectives: 1. Be able to discuss the pros and cons of practicing evidenced based management. 2. Understand the difficulties of practicing evidenced-based management.
Class #3 1/22/2019	Cognitive Biases and a conceptual framework for Data Analytics Projects	***Prior*** to Class: 1. Simulation write-up. Turn in your printed out copy at the start of class. 2. Read: http://mentalfloss.com/article/68705/20-cognitive-biases-affect-your-decisions ***During*** Class Learning Objectives: 1. Understand different cognitive biases that business analysts (regardless of discipline) must deal with when making decisions. 2. Understand the conceptual framework that is used when undertaking a data analytics type of project (regardless of business discipline).
Class #4 1/24/2019	Introduction to Relational Databases	***Prior*** to Class: 1. Read the Kahneman et al. 2001 (Kahneman-et-al-2001-Before-you-make-that-big-decision-60781382.pdf) article. 2. Read (only page 1) from this link: https://www.databasejournal.com/sqletc/article.php/1469521/Introduction-to-Relational-Databases.htm ***During*** Class Learning Objectives: 1. Understand how to recognize cognitive biases in others. 2. Understand why a relational database is important for the data analyst. 3. Understand that a relational database is one type of database and not the only type of database. Along these lines, be able to identify other types of database structures used to store organizational data. 4. Be able to define the basic terms (language) associated with relational databases (entities, fields, primary keys, foreign keys, and so on). Within this, be able to articulate the difference between a field and a record. 5. Understand the three relationship types in a relational database. 6. Be able to construct a relational data model from a business scenario.
Class #5 1/29/2019	Constructing a Relational Databases in MS Access	***Prior*** to Class: 1. Watch "Introduction to Databases": http://www.gcflearnfree.org/access2016/introduction-to-databases/1/ 2. Watch "Introduction to Objects": http://www.gcflearnfree.org/access2016/introduction-to-objects/1/ 3. Watch "Getting started with Access 2016": http://www.gcflearnfree.org/access2016/getting-started-in-access/1/

		4. Watch "Managing Databases and Objects": http://www.gcflearnfree.org/access2016/managing-databases-and-objects/1/ 5. Get comfortable using this MS Access online resource: https://www.techonthenet.com/access/ ***During*** Class Learning Objectives 1. Be able to construct a table (base object in a relational database) in Access using design view and datasheet view. 2. Be able to implement one-to-many, one-to-one, and many-to-many relationships in Access. 3. Understand what it means to enforce referential integrity and why this is fundamental to the design of a relational database. 4. Be able to create lookups on fields within the table design window and be able to explain what they are and why they are useful. 5. Be able to create input masks on fields within a table and be able to explain what they are and why they are useful.
Class #6 1/31/2019	Loading Data in MS Access	***Prior*** to Class 1. Redo in-class example: "RelationalDatabaseConcepts_AccessDay1" video on Blackboard. 2. Watch "Working with Tables": http://www.gcflearnfree.org/access2016/working-with-tables/1/ 3. Watch "Sorting and Filtering": http://www.gcflearnfree.org/access2016/sorting-and-filtering-records/1/ 4. Watch "Modifying Tables": http://www.gcflearnfree.org/access2016/modifying-tables/1/ ***During*** Class Learning Objectives 1. Understand the different options to import data into Access. 2. Be able to conceptualize and workaround some of the common data import errors (structure versus data errors). 3. Understand how to use the VLOOKUP function, array functions, and other methods in Excel to locate potentially 'bad' data.
Class #7 2/5/2019	Loading Data in MS Access	***Prior*** to Class 1. Watch the excel functions video: "Excel Functions For Finding Bad data (Day2Demo.zip)" video on Blackboard. 2. Redo in-class example: "AccessDay2" video on Blackboard. ***During*** Class Learning Objectives 1. Reinforce the skills learned in the previous two class periods.
Class #8 2/7/2019	Querying Data in MS Access	***Prior*** to Class 1. Redo in-class example: "Day1_2_ReviewActivity (Art Gallery)" video on Blackboard. 2. Watch "Designing a Simple Query": http://www.gcflearnfree.org/access2016/designing-a-simple-query/1/ 3. Watch "Designing a Multi-table Query": http://www.gcflearnfree.org/access2016/designing-a-multitable-query/1/ 4. Watch "More Query Design Options": http://www.gcflearnfree.org/access2016/more-query-design-options/1/ ***During*** Class Learning Objectives 1. Be able to define and create SELECT queries in the query designer. 2. Be able to set criteria or filtering conditions on a query using hardcoded values and user entered parameters. 3. Be able to create aggregate function queries in the query designer. 4. Be able to construct multi-table queries. 5. Create numerical calculated fields in Access and perform aggregate functions on those calculated fields (if needed).

Class #9 2/12/2019	Querying Data in MS Access	***Prior*** to Class 1. Watch "Creating Calculated Fields & Totals Rows": http://www.gcflearnfree.org/access2016/how-to-create-calculated-fields-and-totals-rows/1/ 2. Watch "Creating a Parameter Query": http://www.gcflearnfree.org/access2016/creating-a-parameter-query/1/ 3. Watch "How to Create and Find Duplicates": http://www.gcflearnfree.org/access2016/how-to-create-a-find-duplicates-query/1/ ***During*** Class Learning Objectives 1. Understand the different join types associated with multi-table queries. 2. Be able to concatenate text fields together in a single column in the query designer. 3. Enhance your general querying skills
Class #10 2/14/2019	Querying Data in MS Access	***Prior*** to Class 1. Watch "AccessDay3" video on Blackboard. ***During*** Class Learning Objectives 1. Reinforce querying skills from prior two class periods
Class #11 2/19/2019	Exam Review	***Prior*** To Class 1. Review all prior Access material as necessary 2. Watch "QueryReviewActivity" video on Blackboard. ***During*** Class Learning Objectives 1. Prepare for the Exam!
Class #12 2/21/2019	Exam #1	
Class #13 2/26/2019	Access/Excel Integration	***Prior*** to Class 1. Watch "Using Access or Excel to Manage your Data": https://support.office.com/en-us/article/Using-Access-or-Excel-to-manage-your-data-09576147-47D1-4C6F-9312-E825227FCAEA 2. Excel Activities Due ***During*** Class Learning Objectives 1. Understand when to use Access and when to use Excel. 2. Be able to functionally connect an Access table and/or query to an Excel table (or Pivot Table). 3. Understand the basics of data modelling in Excel.
Class #14 2/28/2019	Access/Excel Integration	***Prior*** to Class 1. Redo the activities from the previous class. ***During*** Class Learning Objectives 1. Understand PowerQuery in Excel. 2. Understand PowerPivot in Excel.
Class #15 3/5/2019	Access/Excel Integration	***Prior*** to Class 1. Watch "PowerPivot" video on Blackboard. ***During*** Class Learning Objectives 1. Reinforce the concepts from the previous two class periods.
Class #16 3/7/2019	Regression	***Prior*** to Class 1. Read: https://www.techopedia.com/definition/27369/multiple-regression 2. Read: https://sciencing.com/advantages-disadvantages-multiple-regression-model-12070171.html ***During*** Class Learning Objectives 1. Understand multiple linear regression and how to run a regression model in MS Excel. 2. Understand how to interpret the Excel regression output.
Class #17 3/19/2019	Regression	***Prior*** to Class 1. Redo the examples from the prior class period.

		2. Read: regression_notes.pdf (on Blackboard). ***NOTE***: You do not need to memorize any of the formulas in this document but you do need to conceptually understand what Excel is doing behind the scenes (at a high level). ***During*** Class Learning Objectives 1. Understand how to run a regression model when the dependent variable is binary.
Class #18 3/21/2019	Regression Wrap-up and Exam Review	***Prior*** to Class 1. Redo the examples from the prior class periods. ***During*** Class Learning Objectives 1. Reinforce the skills from the previous two class periods.
Class #19 3/26/2019	Exam #2	
Class #20 3/28/2019	Optimization using Solver	***Prior*** to Class 1. Read price optimization article ***During*** Class Learning Objectives 1. Understand the basics of optimization using Solver. 2. Understand the types of business problems that can solved using Solver. 3. Understand the limitations of Solver.
Class #21 4/2/2019	Optimization using Solver	***Prior*** to Class 2. Redo the examples from the prior class period ***During*** Class Learning Objectives 1. Understand the basics of optimization using Solver. 2. Understand the types of business problems that can solved using Solver. 3. Understand the limitations of Solver.
Class #22 4/4/2019	Optimization using Solver	***Prior*** to Class 1. Redo the examples from the prior class periods. ***During*** Class Learning Objectives 1. Reinforce the skills from the previous two class periods.
Class #23 4/9/2019	Tableau	***Prior*** to Class 1. Read: "which_chart_v6_final_0.pdf" 2. Read: "visual_analysis_guidebook.pdf" ***During*** Class Learning Objectives 1. Understand the basics (interface, terminology, etc.) of Tableau 2. Be able to connect to Excel and Access data sources 3. Be able to construct basic views/visuals
Class #24 4/11/2019	Tableau	***Prior*** to Class 1. Redo examples from the previous class period 2. Read: "designing-efficient-workbooks.pdf" ***During*** Class Learning Objectives 1. Be able to use quick table calculations 2. Be able to use parameters 3. Be able to build calculated fields 4. Forecasting tool/utility
Class #25 4/16/2019	Tableau	***Prior*** to Class 1. Redo the examples from the prior class period. 2. Read: https://www.geckoboard.com/blog/building-great-dashboards-6-golden-rules-to-successful-dashboard-design/ ***During*** Class Learning Objectives 1. Be able to create dashboards and stories 2. Be able to create and use action filters
Class #26 4/18/2019	Simulation	***Prior*** to Class 1. Read: "The_Flaw_Of_Averages.pdf" ***During*** Class Learning Objectives

		1. Understand the basics of monte-carlo simulations (what they are and when & why an analysts would use them). 2. Understand dynamic functions in Excel. 3. Understand different distributions and their implementation in Excel.
Class #27 4/23/2019	Simulation	***Prior*** to Class 1. Redo the examples from the previous class period ***During*** Class Learning Objectives 1. Be able to solve a series of business problems using Monte-carlo simulations in Excel. 2. Be able to correctly interpret the output of a simulation in Excel.
Class #28 4/25/2019	Simulation & Course Conclusion	***Prior*** to Class 1. Redo the examples from the previous class periods ***During*** Class Learning Objectives 1. Reinforce the skills learned in the previous two class periods
Final Exam	10:30am section – 2-5pm on 5/1/2019 in the business school computer lab. 12:00pm section – 2-5pm on 4/30/2019 in the business school computer lab.	