Course Syllabus

Data Analytics in Business

MGT 6203

Fall 2019

PROFESSORS:
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With lectures by Prof. Sridhar Narasimhan, Jonathan Clarke, Bob Myers at GeorgiaTech.

TEACHING ASSISTANTS:

- 1 head TA, 2 assistant head TAs
- and 10 teaching assistants. (Details will be announced the first week of the course.)

COURSE BRIEF DESCRIPTION

The primary objective of this course is to teach the scientific process of transforming data into insights for making better business decisions. This course covers basic methodologies, algorithms, and challenges related to analyzing business data. We will also study applications of data analysis in Finance, Marketing and Operations/Logistics.

PREREQUISITE

- Calculus and Linear Algebra
- Probability and Statistics
- Some background in R / willingness to learn R
- Introductory course in Analytics Modeling

COURSE GOALS

After taking this course, students will be able to:

- approach business problems data-analytically. Students should be able to think carefully and systematically about whether and how data and business analytics can improve business performance.
- develop business analytics ideas, analyze data using business analytics software, and generate relevant business insights.

TEXTBOOKS

- Required: (ISLR) *Introduction to Statistical Learning,* by Gareth James, Daniela Witten, Trevor Hastie & Robert Tibshirani. Publ. Springer, New York (2017). ISBN-10: 1461471370. ISBN-13: 978-1461471370
  Downloadable for free at http://faculty.marshall.usc.edu/gareth-james/ISL/
  or available for purchase as a book at Amazon.com or BN.com

- Recommended: (Galit) *Data Mining for Business Analytics: Concepts, Techniques, and Applications in R,* by Galit Shmueli, Peter C. Bruce, Inbal Yahav, Nitin R. Patel, Kenneth C. Lichtendahl Jr. Publ. Wiley, Hoboken, NJ (2018). ISBN-10: 1118879368. ISBN-13: 978-1118879368.
  Downloadable at various rogue sites on the internet or available for purchase from Amazon.com or BN.com

- You will also need to purchase and download a few case studies from Harvard Business School online library. Here is a link to a package that contains them all: https://hbsp.harvard.edu/import/648874

COURSE DESCRIPTION

Today, businesses, consumers and societies create or leave behind massive amounts of data as a by-product of their activities. Leading-edge companies in every industry are using analytics to replace intuition and guesswork in their decision-making. As a result, managers are collecting and analyzing enormous data sets to discover new patterns and insights and running controlled experiments to test hypotheses.

This course prepares students to understand business analytics and become leaders in these areas in business organizations. This course teaches the scientific process of transforming data into insights for making better business decisions. It covers the methodologies, issues, and challenges related to analyzing business data.

This course will illustrate the processes of analytics by allowing students to apply business analytics algorithms and methodologies to business problems. The use of examples places business analytics techniques in context and teaches students how to avoid the common pitfalls, emphasizing the importance of applying proper business analytics techniques.

HARDWARE REQUIREMENTS

Please follow GT's computer ownership guide at http://sco.gatech.edu/. Note that tablets, Chromebooks, and old laptops do not work well for this class. Make sure that you have admin rights on your laptop since occasionally you will need to install R, RStudio, packages in R, and other software like Gephi.

SOFTWARE REQUIREMENTS

We will be learning business analytics with the help of open-source and free software applications that are provided for educational use. Please follow instructions provided in their respective websites and install the following software in your personal laptop:

a. R: https://www.r-project.org/
b. RStudio: https://www.rstudio.com/
c. Gephi: https://gephi.org/

There are many resources on how to learn R:

- *R for Datascience*, http://r4ds.had.co.nz/
- https://www.datacamp.com/courses/free-introduction-to-r
- https://www.rstudio.com/online-learning/

COMMUNICATION

Instructor/TA Communication: All course announcements will be made via Canvas (or EdX if you're on that platform). You are expected to check Canvas (/EdX) every day for important course-related information. By following the instructions provided in the course, you can also ensure that you do not miss important instructions, announcements, etc. by adjusting your account settings to receive important information directly to your email account or cell phone. For more details, log into the Canvas, enter the course, and see the section entitled "Before You Begin: Instructions for Getting Started."

Content Questions and Help: Because questions can often be addressed for the good of the group, please do not email your questions directly to the instructor. Instead, course and content questions will be addressed on Piazza. Set your post to private to ask questions about your issues unique to you.

Office Hours. Live office hours will be conducted every week via Blue Jeans. These sessions will be both an opportunity for the TAs to discuss course logistics and content but also an opportunity for you to ask questions. While it is strongly suggested that you participate in these meetings, all sessions will be recorded and archived if you are unable to attend or wish to reference them later.

STUDENT EFFORT

Students are expected to devote 10-12 hours per week to complete the course requirements. This guideline encompasses all class activities, including reading the textbook and supplementary resources, watching lesson videos, participating in office hours and forum discussions, completing homework assignments, and studying for exams. Of course, students can spend as much time as necessary, but it is important to be careful not to fall behind.

GRADING

Grades will be assigned on the following basis:

Homework Assignments (3; worth 10% each)	30%
Self-assessment Tests (online in Canvas or EdX)	10%
Midterm Exam – Part 1	15%
Midterm Exam – Part 2	10%
Final Exam, Part 1	20%
Final Exam, Part 2	15%

Typically, the following grading scale will be used in the course:

- 90 – 100%: A
- 80 – 89%: B
- 70 – 79%: C
- 60 – 69%: D
- 0 – 59%: F

Scores will be rounded to the nearest integer. Please note that 80 – 89% is B, and a total score of 89.5% would round to 90% and get an A, while anything less than 89.5 yet more than 89 will still be a B. Similar rounding applies for the other grades.

Additional curving of the grades may be possible, depending how the course progresses and on the disparity of the students during this semester.

COURSE SCHEDULE

Please see Canvas for a copy of the course schedule.

READINGS

The assigned pre-readings are crucial to your success in this course. Exams may include some material in readings that are not covered in the video lessons. Watching the video lessons alone will not sufficiently prepare you for the exams.

LESSONS

Video lessons for this course will be housed in EdX. For more details on creating and linking your EdX account, log into the Canvas, enter the course, and see the section entitled “Before You Begin: Instructions for Getting Started.”

ASSIGNMENTS

There are three individual assignments to be submitted. Each assignment is equally weighted, with each counting as 10% of the overall course grade. (The raw points for each assignment may vary. One assignment could have a total of 200 points and another a total of 50 points, but both carry equal weight as far as the overall course total score is concerned.)

Each assignment should be **submitted on Canvas by 11:59 pm EST on the Sunday of the week that it is assigned**. Each assignment must be submitted **no later than the deadline**. Any submission after this time (regardless of whether it is by minutes, hours or days) will not be accepted, unless you have exceptional circumstances, your assigned TA was made aware of these, and you were granted in advance in writing a postponement. **Students are responsible** for making sure that their individual assignments are submitted in a timely manner according to the course guidelines.

Graded homework assignments will be released on Thursday mornings, giving students opportunities to browse the assignment and organize their weekend plan accordingly. Graded assignments will be due on Wednesday evenings, nearly two weeks later. Students will have plenty of opportunity to ask questions during weekdays to the TAs.

Office hours will be scheduled every week on Tuesday night to be able to respond to the questions about the assignments. Our discussion groups will run on the Piazza.com platform. During these "office hours" we will also answer any open questions. This would apply for graded and ungraded assignments alike.

There are also several online self-assessment tests, that will be graded and worth 10% of your grade. Further details will be given later.

EXAMS

The Midterm Exam will account for 25% of your course grade. The Final Exam will account for 35% of your overall course grade. The Midterm Exam will cover Weeks 1 through 8 of the course; the Final Exam will be cumulative in scope and cover all of the course materials. The exams will cover concepts discussed in the readings, the lectures, and in the homework assignments.

Part 1 of each exam will be comprised of multiple choice questions and will be strictly-timed and proctored. A proctored exam is similar to one that you would take in the classroom. This means no open books, notes, web browsers, or similar resources are allowed, unless otherwise stated by your professor. The use of mobile phones and tablet devices is also prohibited.

Part 2 of each exam will also be strictly-timed and proctored and will comprise of application questions that may require the use of R to determine the correct multiple-

choice answer. This part of the exam will need to be completed in any 4-hour period in a pre-specified 96-hour window (Thursday-Sunday). In addition to answering the questions in Part 2, you will have to upload your R code.

Do not assume that the exams will be similar to the homework.

Total scores for exams may have different points. One exam could have a total of 50 points and another worth 300 points, but both carry the weight for your final grade that is assigned in this syllabus.

The midterm and final exams must be **submitted on Canvas by 11:59 pm EST on the days announced in the course schedule**. Any submission after this time (regardless of whether it is by minutes, hours, or days) will not be accepted. There is no grace period for taking the exam. If you have to travel on day an exam is due, please arrange to complete your work early. **It is the student's responsibility to monitor their time and allow enough time to submit their exam before time is up.**

PLAGIARISM

Plagiarism is considered a serious offense. You are not allowed to copy and paste or submit materials created or published by others, as if you created the materials. All materials submitted and posted must be your own original work.

STUDENT HONOR CODE

You are responsible for completing your own work. All students are expected and required to abide by the *letter* and the *spirit* of the Georgia Tech Honor Code. The teaching assistants and I will also abide by these honor codes. I am very serious about this expectation because ethical behavior is extremely important in all facets of life.

To review the Georgia Tech Honor Code, please visit http://osi.gatech.edu/content/honor-code . Any OMS Analytics degree student suspected of behavior in violation of the Georgia Tech Honor Code will be referred to Georgia Tech's Office of Student Integrity. Please see also the GeorgiaTech Honor Advisory Council: http://www.honor.gatech.edu.

Students with Learning Differences:

This course offers accommodations to students with learning differences. If you need an online classroom accommodation, please contact GeorgiaTech's ADAPTS office at http://www.adapts.gatech.edu and let us know about your need and accomodation.

General Comments

- The Modules of this course follow a logical sequence
- You are responsible for completing your own work.
- Graded assignments should be completed by their due dates
- Self-Assessment tests must be completed within the time allotted
- You will have access to the course content for the scheduled duration of the course.

Attendance Policy

- This is a fully online course.
- Log in on a regular basis to complete your work, so that you do not have to spend a lot of time reviewing and refreshing yourself regarding the content.

Plagiarism Policy

- Plagiarism is considered a serious offense. You are not allowed to copy and paste or submit materials created or published by others, as if you created the materials. All materials submitted and posted must be your own.

Communication

- All learners should ask questions, and answer their fellow learners' questions, on the course discussion forums. Often, discussions with fellow learners are the sources of key pieces of learning.

Netiquette

- Netiquette refers to etiquette that is used when communicating on the Internet. Review the Core Rules of Netiquette. When you are communicating via email, discussion forums or synchronously (real-time), please use correct spelling, punctuation and grammar consistent with the academic environment and scholarship.

- Conner, P. (2006-2014). Ground Rules for Online Discussions, Retrieved 4/21/2014 from http://teaching.colostate.edu/tips/tip.cfm?tipid=128

- Learners who do not adhere to this guideline may be removed from the course.

INTELLECTUAL PROPERTY AND CONFIDENTIALITY

We highly recommend that you avoid disclosing any confidential information in your assignments and discussion forum posts (including intellectual property and "third party" confidential information, such as information in relation to your employer that is not publicly available).

Although you are encouraged to draw on real-world experience, posting material or sharing links to material that is harassing, intimidating, or defamatory, or encourages or condones piracy or infringes on intellectual property rights is not appropriate. GeorgiaTech reserves the right to remove any postings that contravene the well-being of other students or goes against accepted integrity standards.

We would urge you to use only first names (or pseudonyms) wherever possible. You are entirely responsible for ensuring that you do not disclose any information that is protected by confidentiality undertakings – we will ensure that all information is treated

in accordance with our privacy policy, but we will not sign any separate confidentiality agreements or non-disclosure agreements.

If, during the program, you disclose or create any intellectual property (for example, trading names, designs, written materials, know-how and other products of your independent thought, creativity and intellectual effort), then you accept all and any risks in relation to disclosure, including the risk that a fellow participant will use this intellectual property without your consent, or that disclosure weakens or erases any legal protections.

We won't use any intellectual property created by you and submitted in, or forming part of, your assignments without your written consent.

Our discussion forums operate on the basis of the **Chatham House Rule**: *"Participants are free to use the information received, but neither the identity nor the affiliation of the speaker(s), nor that of any other participant, may be revealed."* Please ensure that you take account of this Rule when posting on the discussion forum and using information learnt from discussion forum posts. https://www.chathamhouse.org/chatham-house-rule

Georgia Tech

Data Analysis for Business (MGT 6203) Course Outline

Weeks	Course Topics	Release Dates
	Module 1: Basics (Weeks 1-5)	
Week 1	Linear Regression & Learning R. Real Estate Example.	19 August 2019
Week 2	Customer Analytics using Indicator Variables and Interaction Terms	26 August 2019
Week 3	Nonlinear Transformation Models	2 September 2019
Week 4	Logistic Regression. Customer Default Example	9 September 2019
Week 5	Treatment Effect, Randomized Controlled Experiments, and Natural Experiments.	16 September 2019
	Module 2: Finance (Weeks 6-8)	
Week 6	Introduction and measuring risk and return	23 September 2019
Week 7	Measuring Risk Adjusted Performance	30 September 2019
Week 8	Factor Investing	7 October 2019
	Module 3: Marketing (Weeks 9-11)	
Week 9	Marketing, Advertising, and Data	14 October 2019
Week 10	Implementing Integrated Digital Marketing	21 October 2019
Week 11	Implementing Predictive Marketing Across Channels	28 October 2019
	Module 4: Operation Management (Weeks 12-15)	
Week 12	Introduction and Managing Queues	4 November 2019
Week 13	Statistical Process Control	11 November 2019
Week 14	Forecasting Demand	18 November 2019
Week 15	Inventory Management	25 November 2019