BZAN 6350

Quantitative Foundations for Business Analytics

Spring 2023

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Instruction Mode: Asynchronous Online

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Course Learning Management Systems and Support

- Blackboard (submission of Assignments, Project, and Presentation)
- Email: Please include BZAN6350 in the subject line, email to Cheng Wang(cwang@Central.UH.EDU),or Yinliang Tan (yrtan@uh.edu) and copy the IA (spulagam@cougarnet.uh.edu)
- Office Hour: on blackboard

Prerequisites

- BZAN 6351 Basic Programming for Business Analytics

Course Description

Business analytics (BA) refers to the skills, technologies, practices for continuous iterative exploration and investigation of past business performance to gain insight and drive business planning. Business analytics focuses on developing new insights and understanding of business performance based on data and statistical methods.

Recently, Business Analytics has been widely adopted in different functional areas (i.e. Accounting, Finance, Operations, Marketing, and Human Resource) as well as a wide range of different industries (Energy, Healthcare, Sports, Government, etc.). For example, Banks, such as

Capital One, use analytics, to differentiate among customers based on credit risk, usage and other characteristics and then to match customer characteristics with appropriate product offerings. Harrah's, the gaming firm, uses analytics based on tracking the consumer behavior to improve its customer loyalty programs.

This course provides students with the fundamental concepts, tools and applications needed to understand the emerging role of business analytics in organizations, apply basic business analytics tools, and to communicate with analytics professionals to effectively use and interpret analytic models and results for making better business decisions. We will concentrate on the descriptive, predictive, and prescriptive business analytics.

Student Learning Objectives

1. Students will be able to explain and use the mining process for descriptive and predictive analytics.
2. Students will be able to use R for basic data preparation, data exploration and analysis, and predictive modeling.
3. Students will understand and be able to apply the core data mining methods of
    - Data Visualization
    - Cluster Analysis
    - Association Rules
    - Linear Regression
    - Hypothesis Testing
    - Logistics Regression
    - Decision Trees
4. Students will be able to conduct a complete data mining project including research, data preparation, and reporting the results.

Acknowledgements

The material in this course draws significantly from Xianjun Geng at Tulane University, Geoff Parker from Dartmouth College, Hong Guo from Notre Dame University and Lai Wei from

Shanghai Jiaotong University. Thanks are due to these colleagues for sharing their syllabi and teaching materials.

Course Material

Recommended Course Materials

- Data Mining for Business Analytics: Concepts, Techniques, and Applications in R (1st edition) by Galit Shumueli, Peter C. Bruce, Inbal Yahav, Nitin R. Patel, and Kenneth C. Lichtendahl Jr., Wiley

- R for Data Science

Ebook link: *https://r4ds.had.co.nz/* by Garrett Grolemund and Hadley Wickham

- simpleR – Using R for Introductory Statistics

Ebook link: *https://cran.r-project.org/doc/contrib/Verzani-SimpleR.pdf* by John Verzani
This textbook is recommended for students who want to know more about statistics.

Software Requirement (Free)

- Tableau Software (Students can get a free copy of Tableau at http://origin-www.tableau.com/academic/students)
- R latest version (Students can get this open source statistical software at http://cran.r-project.org/bin/windows/base/)
- RStudio Desktop (Open Source Edition) latest version (Available at https://www.rstudio.com/products/rstudio/)
- DataCamp Access (Students will get free access during the course period www.datacamp.com You must use your UH Email to register for the account, otherwise you will have not have the free access to this website.)

Class Format

This class will mainly use asynchronous online teaching format. The exam will be held using synchronous format. Course contents will be delivered online through the Blackboard course system. On the course site, you will access online lessons, course materials, and additional resources. We will also hold online office hours to answer questions and exam reviews.

Please note: It is your responsibility to keep track of course materials available dates, homework dates, exam and review section dates, and project due dates.

Grading

- **Course grades:** The course grades will be determined by assigning the following weights to the following course components (subject to change):

Grade component	Percentage weight
Team Assignment	30%
Exam 1	25%
Exam 2	25%
Project	20%

- **Final grades:** The final grades will be curved subject to the college grading policy, and letter grades assigned according to natural breaks in the grades that are near the following cutoffs:

Letter grade	Approximate cutoff (subject to natural breaks)
A	92
A-	88
B+	86
B	82
B-	78
C+ or lower	TBD

Grades will be curved based on the grading rule provided by the college. Grades are earned on the basis of performance in this course, not given on the basis of need or effort. Grades will not be rounded up. No exceptions. NOTE: Grades are not negotiable. I do not reply to email requesting a grade change or extra credit.

Team Assignments and Peer Evaluation

Team-based learning has been widely acknowledged for its effectiveness. Throughout this course, we will emphasize the role of team-based learning in assignment, class exercise, and project. Students will be assigned to teams of a group 3-5. Students are encouraged to use team communication tools to manage their teamwork communications, such as Microsoft Teams, Discord, or Slack.

To ensure *every team member* *contribute the fair amount of time and effort* to the group, we will conduct the peer evaluations near the end of the course. Peer evaluation is going to affect your assignment, and project score. The peer evaluation result is strictly confidential, which is only

shared between the individual student and the instructor. Please write your truthful and objective comments to your peers.

Assignment

Skill-building exercises will be assigned throughout the semester.

- Each homework assignment must be submitted no later than 5:00PM on its due day. NO LATE HOMEWORK WILL BE ACCEPTED. A grade of zero will be assigned if you do not turn in the homework.
- Answers to homework problems should be submitted as a team to Blackboard.

In addition to the traditional assignments, you can boost your grade by finishing a few individual bonus assignments on the DataCamp (access will be provided by faculty and please use your UH email instead of your personal one to register the account). Each is worth 2 points directly added to your final weighted average grade.

1) Introduction to R (4 Hours)
2) Intermediate R (4 Hours)
3) Cluster Analysis in R (4 Hours)
4) Hypothesis Testing in R (4 Hours)
5) Machine Learning with Tree-Based Models in R (4 Hours)

Exams.

We have 2 exams. Exams are not cumulative. Exams will be open book/note and will test materials that is covered in the course. Exams will be conducted through synchronous lecture format. Webcams must be turned on during exams to ensure the academic integrity of exam administration The exams cannot be retaken or taken at other than the scheduled time except under the most extreme circumstances, subject to approval from the instructor. Permission must be granted *at least 1 week before* the missed exam.

You are expected to take the exams on your own laptops. It is your responsibility to have **all the needed programs installed** (i.e., R, RStudio, Internet access).
Further information about the Exam time and logistics will be provided under the appropriate tabs or links on our Blackboard site.

Collaboration of any kind is strictly forbidden. Violations will be reported to Bauer College administration, and result in severe academic sanction. Previous students have received F grade in this course due to cheating.

Specific Course Policies:

Missed Exams: The student is responsible for obtaining material. This can be done through contacting a classmate or by contacting the Professor. Missed or late exams cannot be made up

under any circumstances, unless an official excuse is provided. **Any uncoordinated, unexcused missed exam will result in a score of 0 for that exam.**

Covid-19 Information: Students are encouraged to visit the University's COVID-19 website for important information including diagnosis and symptom protocols, on-campus testing, and vaccine information. Please check the website throughout the semester for updates.

Vaccinations: Data suggests that vaccination remains the best intervention for reliable protection against COVID-19. Students are asked to familiarize themselves with pertinent vaccine information and to consult with their health care provider. The University strongly encourages all students, faculty and staff to be vaccinated.

Reasonable Academic Adjustments/Auxiliary Aids: The University of Houston complies with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990, pertaining to the provision of reasonable academic adjustments/auxiliary aids for disabled students. In accordance with Section 504 and ADA guidelines, UH strives to provide reasonable academic adjustments/auxiliary aids to students who request and require them. If you believe that you have a disability requiring an academic adjustments/auxiliary aid, please contact the Justin Dart Jr. Student Accessibility Center (formerly the Justin Dart, Jr. Center for Students with Disabilities).

Excused Absence Policy: Regular class attendance, participation, and engagement in coursework are important contributors to student success. Absences may be excused as provided in the University of Houston Undergraduate Excused Absence Policy and Graduate Excused Absence Policy for reasons including: medical illness of student or close relative, death of a close family member, legal or government proceeding that a student is obligated to attend, recognized professional and educational activities where the student is presenting, and University-sponsored activity or athletic competition. Under these policies, students with excused absences will be provided with an opportunity to make up any quiz, exam or other work that contributes to the course grade or a satisfactory alternative. Please read the full policy for details regarding reasons for excused absences, the approval process, and extended absences. Additional policies address absences related to military service, religious holy days, pregnancy and related conditions, and disability.

Recording of Class: Students may not record all or part of class, livestream all or part of class, or make/distribute screen captures, without advanced written consent of the instructor. If you have or think you may have a disability such that you need to record class-related activities, please contact the Justin Dart, Jr. Student Accessibility Center. If you have an accommodation to record class-related activities, those recordings may not be shared with any other student, whether in this course or not, or with any other person or on any other platform. Classes may be recorded by the instructor. Students may use instructor's recordings for their own studying and notetaking. Instructor's recordings are not authorized to be shared with anyone without the prior written approval of the instructor. Failure to comply with requirements regarding recordings will result in a disciplinary referral to the Dean of Students Office and may result in disciplinary action.

Syllabus Changes: Due to the changing nature of the COVID-19 pandemic, please note that the instructor may need to make modifications to the course syllabus and may do so at any time. Notice of such changes will be announced as quickly as possible through.

Academic Dishonesty: High ethical standards are critical to the integrity of any institution, and bear directly on the ultimate value of conferred degrees. All UH community members are expected to contribute to an atmosphere of the highest possible ethical standards. Maintaining such an atmosphere requires that any instances of academic dishonesty be recognized and addressed. The UH Academic Honesty Policy is designed to handle those instances with fairness to all parties involved: the students, the instructors, and the University itself. All students and faculty of the University of Houston are responsible for being familiar with this policy.

Title IX/Sexual Misconduct: Per the UHS Sexual Misconduct Policy, your instructor is a "responsible employee" for reporting purposes under Title IX regulations and state law and must report incidents of sexual misconduct (sexual harassment, non-consensual sexual contact, sexual assault, sexual exploitation, sexual intimidation, intimate partner violence, or stalking) about which they become aware to the Title IX office. Please know there are places on campus where you can make a report in confidence. You can find more information about resources on the Title IX website at https://uh.edu/equal-opportunity/title-ix-sexual-misconduct/resources/.

Security Escorts and Cougar Ride: UHPD continually works with the University community to make the campus a safe place to learn, work, and live. Our Security escort service is designed for the community members who have safety concerns and would like to have a Security Officer walk with them, for their safety, as they make their way across campus. Based on availability either a UHPD Security Officer or Police Officer will escort students, faculty, and staff to locations beginning and ending on campus. If you feel that you need a Security Officer to walk with you for your safety please call 713-743-3333. Arrangements may be made for special needs.

COURSE SCHEDULE:

Important: If necessary, this syllabus will be modified or updated. Any modifications to the syllabus will be posted on the course site.

Week	Date	Topics	Assignments
1	Jan 17-Jan 20	Introduction to Business Analytics and Course Set-up **(Course introduction Synchronous Jan 20 10:30 AM)**	
2	Jan 23-Jan 27	Data Visualization using Tableau	
3	Jan 30-Feb 3	Data Visualization using Tableau	
4	Feb 6-Feb 10	Data Visualization using Tableau **Data Visualization Team Exercise (Synchronous)**	
5	Feb 13-Feb 17	Overview of Data Mining Process Cluster Analysis	

6	Feb 20-Feb 24	Cluster Analysis Association Rules	
7	Feb 27-Mar 3	Association Rules	Assignment 1 (Mar 5th)
8	Mar 6-Mar 10	**Exam 1 (Synchronous)** Multiple Linear Regression	
9	Mar 20-Mar 24	Multiple Linear Regression	
10	Mar 27-Mar 31	Hypothesis Testing Logistic Regression	
11	Apr 3 - Apr 7	Logistic Regression Classification and Regression Trees	Assignment 2 (Apr 9th)
12	Apr 10-Apr 14	Classification and Regression Trees	
13	Apr 17- Apr 21	Classification and Regression Trees	
14	Apr 24- Apr 28	**Exam 2 (Synchronous)**	Assignment 3 & Bonus Assignments (Apr 28th)