BZAN 6352

Quantitative Foundations for Business Analytics

Fall 2021

About the Instructor:

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Bauer Fellow
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Instruction Mode: Asynchronous Online (with some synchronous lectures)

Instructional Assistant: Subhrasweta (Sweta) Pattnaik
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Course Learning Management Systems and Support

- Blackboard (submission of Assignments, Project, and Presentation)
- Email: Please include BZAN6352 in the subject line, email the TA (spattna2@cougarnet.uh.edu) your question, and copy the course instructor.
- Office Hour:
  - Ricky – Friday 1:00-2:00 PM (Zoom ID: 504 661 0309)
  - Sweta – Wednesday and Thursday 2:00-4:00 PM (Zoom ID: 783 416 6909)

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

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 latest version (Available at https://www.rstudio.com/products/rstudio/download/)
- DataCamp Access (Students will get free access during the course period www.datacamp.com/)

Class Format

This class will mainly use asynchronous online teaching format. At the same time, we will also hold synchronous lectures using Zoom. We will switch between synchronous and asynchronous sessions as needed and in response to contingencies and situations that might arise. For the students who are not able to attend the synchronous lectures, the recording of the lectures will also be provided. 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
Course Project	25%
Team Assignment	10%
DataCamp Assignment	5%
Exam 1	30%
Exam 2	30%

- **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 should also finish a few individual assignments and courses on the DataCamp (access will be provided by faculty). Specifically, I expect you to finish the following,

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

Course Group Project (Zoom Recording)

Each group of students (3-5 students per team) should go through all typical steps of a data analytics project, including data understanding and cleanup, data analysis, and presentation of analytical results. The instructional assistant will assign a team leader that will serve as a contact point for the group. You are expected to gain valuable practical experience through the process. You will work on projects that rely upon – and enhance your analytics knowledge and skills.

This is a largely self-directed project, where instructor's role is to provide guidance and suggestions to each team. These team project will apply the concepts and tools introduced in class to "Real-World" problems. The objective is to encourage creative thinking when approaching unstructured problems, and critical thinking in your analysis and recommendations. You need to define the problem and find the relevant data.

For the project, the presentation should be roughly 15 minutes. Your presentation will be evaluated according to the following criteria,

- Clear Background Information (20%);
- Creativity of the topic (10%);
- Appropriate Techniques (30%);
- Convincing Results/Recommendations (20%);
- Presentation (20%);

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.

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 *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.

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.**

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 Center for Students with Disabilities. 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, 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: Plagiarism and cheating are serious offenses and may be punished by failure on exam, paper or project; failure in course; and or expulsion from the University. For more information, refer to the "Academic Honesty Policy" accessible here (http://www.uh.edu/provost/policies/honesty/). The University of Houston Academic Honesty Policy is strictly enforced by the C. T. Bauer College of Business. No violations of this policy will be tolerated in this course. Students are expected to be familiar with this policy. Students may be asked to sign an honor code statement as part of their submission of any graded work, including but not limited to projects, quizzes, and exams: "*I understand and agree to abide by the provisions in the University of Houston Undergraduate Academic Honesty Policy. I understand that academic honesty is taken very seriously and, in the cases of violations, penalties may include suspension or expulsion from the University of Houston*."

Need for Assistance: If you have any condition, such as a physical or learning disability, which will make it difficult for you to carry out the work as outlined in this document, or which will require academic accommodations, please notify me as soon as possible. I will recommend that you contact the Center for Students with Disabilities. The contact person is Justin Dart in the CSD building #568, room 110. The numbers for the CSD office are Ph: 713-743-5400; TDD: 713-749-

1527; Fax: 713-743-5396 or email: uhcsd@central.uh.edu. Also available to you is *Counseling and Psychological Services (CAPS),* which can help students who are having difficulties managing stress, adjusting to college, or feeling sad and hopeless. You can reach CAPS (www.uh.edu/caps) by calling 713-743-5454 during and after business hours for routine appointments or if you or someone you know is in crisis. In addition, there is no appointment necessary for the "Let's Talk" program, which is a drop-in consultation service at convenient locations and hours around campus. http://www.uh.edu/caps/outreach/lets_talk.html.

Inclement Weather or Technical Problems: In case of inclement weather or technological problems that prevent the University from providing access to course materials you may contact the Professor by phone via the numbers given above or send the Professor an email inquiry. In addition, the Professor will notify students as soon as possible in such instances and provide instructions on how the course will proceed.

Counseling and Emotional Wellness: Counseling and Psychological Services (CAPS) can help students who are having difficulties managing stress or anxiety, adjusting to college, or feeling sad and hopeless. This is especially important during this time of social isolation due to the distancing protocols required to control the spread of COVID-19. You can reach CAPS through the website (http://www.uh.edu/caps) or by calling 713-743-5454 during and after business hours for routine appointments or if you or someone you know is in crisis. CAPS has someone on call 24/7 so do not wait if you or someone you know needs immediate help. The university also partners with Crisis Intervention Houston, 832-416-1177.

Student Responsibility and Expectations • College Ethics • Academic Honesty • Daily Health Self-Assessment • Face Covering Policy • Improve Online Synchronous Experience • Video Recording Class • Reporting Technical Issues • Student Accessibility Center • Counseling and Psychological Services (CAPS)	Behavioral expectations and etiquette students should follow during class and/or when posting information online within an email, Blackboard, or other online sites. UH Responsibility http://catalog.uh.edu/content.php?catoid=6&navoid=1082 UH Student Behavior and Conduct https://www.uh.edu/dos/behavior-conduct/ College of Education General Ethics Guide https://www.coe.uh.edu/mycoe/collegedata/COE_Ethics_Guide.pdf Academic Honesty http://catalog.uh.edu/content.php?catoid=6&navoid=1025 COVID-19 Guidelines and Protocols https://www.uh.edu/covid-19/guidelines-protocols/ Student Accessibility Center http://www.uh.edu/accessibility Counseling and Psychological Services (CAPS) • UH Main Campus: http://www.uh.edu/caps/outreach/lets_talk.html • UH Sugarland: http://www.uh.edu/dsaes/uhsugarland

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	Aug 23 - Aug 27	Introduction to Business Analytics and Course Set-up	
2	Aug 20 - Sep 3	Data Visualization using Tableau	DataCamp Assignment 1
3	Sep 7 -Sep 10	Data Visualization using Tableau	
4	Sep 13 - Sep 17	Data Visualization using Tableau Data Visualization Team Exercise (Synchronous with IA)	DataCamp Assignment 2
5	Sep 20 - Sep 24	Overview of Data Mining Process Cluster Analysis	
6	Sep 27 - Oct 1	Cluster Analysis Association Rules	DataCamp Assignment 3
7	Oct 4 - Oct 8	Association Rules Guest Lecture (Synchronous, TBD)	Assignment 1 Due (Oct 8)
8	Oct 11 -Oct 15	Exam 1 (Synchronous, TBD) Multiple Linear Regression	
9	Oct 18 - Oct 22	Multiple Linear Regression	
10	Oct 25 - Oct 29	Hypothesis Testing Logistic Regression	DataCamp Assignment 4
11	Nov 1 - Nov 5	Logistic Regression Classification and Regression Trees	DataCamp Assignment 5 Assignment 2- due on Nov 5
12	Nov 8 - Nov 12	Classification and Regression Trees	DataCamp Assignment 6
13	Nov 15 - Nov 19	Review Session (Synchronous, TBD) Exam 2 (Synchronous, TBD)	
14	Nov 22 - Nov 23	Course Project Preparation Thanksgiving Holiday	Assignment 3- due on Nov 23
15	Nov 29 - Dec 3	Project Presentation	