THE UNIVERSITY OF TEXAS AT DALLAS
SCHOOL OF MANAGEMENT

HMGT 6334: Healthcare Analytics

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Course Information

Course

Course Number/Section	HMGT 6334
Course Title	Healthcare Analytics
Term and Dates	Fall 2014
Office Hours	Tuesday 3-4pm; by prior appt. and email at other times

Teaching Assistant

Chenzhang Bao
TA hours and location: 3-4PM Thursday and Friday at PhD Student Lounge at JSOM (location will change when the new building move is finalized)
Email: cxb121930@utdallas.edu

Course Pre-requisites, Co-requisites, and/or Other Restrictions

OPRE 6301 or SYSM 6303.

This course is an approved elective for the M.S. degree in Healthcare Management and for the Healthcare Analytics track in the M.S. degree in Business Analytics. It is also an elective course for the M.S. degree in Information Technology Management and the MBA degree. The course is ideally suited to students who wish to focus on careers in the healthcare industry, as health IT analysts, policy analysts, managers or administrative staff, or healthcare consultants, who wish to develop a better understanding of healthcare analytics.

Course Description

The purpose of this course is to provide an introduction to the use of business intelligence and decision sciences in health-care industry. As the pressures of managed care and increasing health care costs push providers, payers and purchasers of health care to become more efficient, methods for understanding the appropriate basis for how to allocate shrinking health care resources must be understood. Moreover, the health care industry is yet to find ways to make best use of existing data to improve care, reduce costs, and provide more accessible care. In addition to developing a conceptual

understanding of healthcare analytics and medical decision-making, the course will develop some technical skills in business intelligence and prescriptive analytics using decision analysis. The course will include hands-on experience with R and Rattle. Examples from the health care practice and clinical decision making will be discussed. Major topics in this course include:

- Defining Healthcare quality and value
- Data mining for improving health outcomes and reducing costs
- Developing an Analytics Strategy
- Big data in health care
- Basic Statistical methods for health data analysis
- Medical decision making
- Predictive analytics and clinical decision support
- Cost-effectiveness analysis for medical decisions

Student Learning Objectives and Outcomes

- Develop a better understanding of current use of analytics in the healthcare industry.
- Understand the key issues in data mining as applied to healthcare
- Develop basic skills for medical decision making and cost-effectiveness analysis in health care
- To have a basic knowledge of R and Rattle software.

Mandatory Text:
Data Mining with Rattle and R by Graham Williams, 2011, Springer Publishing. ISBN 978-1-4419-9890-3. (Available online at the library webpage)

Healthcare Analytics for Quality and Performance Improvement by Trevor L. Strome, 2013, Wiley Publishing, ISBN: 978-1-118-51969-1

Recommended Text:
Clinical Prediction Models: A Practical Approach to Development, Validation, and Updating by Ewout W. Steyerberg, 2010, Springer Publishing. ISBN 978-1-4419-2648-7. (Available online at the library)

Data Mining Techniques: For Marketing, Sales, and Customer Relationship Management, Third Edition by Gordon Linoff and Michael Berry, 2011, Wiley. ISBN: 0470650931

A Framework for Applying Analytics in Healthcare. By Dwight Mcneill, Pearson Education, Inc., 2013.

Methods for Evaluation of Health Care Programmes, Second Edition by Drummond MF, O'Brien B, Stoddart GL, Torrance GW, Oxford Medical Publications, Oxford 1997.

Required Software:
R software and Rattle add on. These are free software available for download and installation at
Open Source R Software: http://cran.r-project.org/

Rattle: http://rattle.togaware.com/
Computer labs have these software installed if you are not able to install it on personal computers. For Mac users, getting Rattle work may not be as straightforward. If you can't figure it out, you need to use the computer labs to work on homework or project.

Mandatory Readings: The instructor will supplement the text with other relevant course materials as needed including but not limited to executive interviews, case studies, scholarly journal articles, newspaper articles, magazine articles, and other relevant information. Visit eLearning for all course-related information including syllabus, lecture notes, self-quizzes, and assigned discussion problems.

Textbooks and some other bookstore materials can be ordered online through Off-Campus Books or the UTD Bookstore. They are also available in stock at both bookstores.

Course Policies

Make-up exams
No make-up exams will be given. In the event that you miss a midterm exam, the weight of the project will be increased by the weight of the midterm exam that you missed, only if you can provide proof of a serious emergency/illness.

Extra Credit
None

Late Work
Not allowed unless it is a medical emergency.

Special Assignments
None

Class Participation
Students are required to login regularly to the online class site on eLearning. The instructor will use the tracking feature in eLearning to monitor student activity. Students are also required to participate in all class activities such as classroom case discussions, and group projects.

Course Format
Classes will include a mixture of lectures, case discussions, published articles, student participation, and class presentation by students. The textbook and readings articles will provide the basis for lectures on various healthcare analytics topics. Students will be evaluated based on a mid-term exam, final project report and presentation, group case analysis and presentation, and in-class participation.

Lecture notes will be provided electronically via elearning. Lecture notes are meant only for students who register for this course will not be provided to students who are not registered. Students are expected to come prepared for the assigned readings prior to class. Occasionally, I will invite guest speakers from industry to lecture on specific topics related to healthcare

analytics and discuss specific applications within their organizations.

Grading: Course grades will be based on the following components:

1. **Class participation (10%)**: You are expected to prepare beforehand for each class, participate actively in the discussion of cases and readings, and contribute to the learning experience of the class. Attendance will be taken.

2. **Course Project (30%)**: The class will be split into groups. Each group will be responsible for selecting a project on applying analytics to a healthcare problem, presenting their findings to the class, and submitting a final report. There will be milestones for the project progress and groups will present their progress as indicated in the course schedule. The project may pertain to any topic related to healthcare where analytics techniques are applied using data. Student may choose to work on a real life problem, possibly collaborating with a healthcare organization, or acquire data from publicly available resources and identify a research problem. The instructor must approve the project that is selected for analysis before the group can proceed with developing the analysis. "We couldn't find a project to work on" or "we could not find data" will not be accepted as an excuse for delays in project progress. Group members will evaluate each other at the end of the semester. It is at the Professor's discretion to how these evaluations will be used in case there is a strong negative evaluation on a group member

3. **Group case analysis and presentation (15%)**: The class will be split into several groups. Each group will discuss an assigned case in class. Each team will submit its written analyses in Word format and presentation in the PowerPoint format to the Instructor before class and also submit both at the eLearning submission page before the class. Each team is also responsible for preparing a question to be asked to the presenters of a case assigned to any other team. Group members will evaluate each other at the end of the semester. It is at the Professor's discretion to how these evaluations will be used in case there is a strong negative evaluation on a group member.

4. **Mid-term Exam (25%)**: There will be a in class mid-term exam. Students will be tested on the course material taught until that time.

5. **Assignments (20%)**: There will be three to four homework assignments throughout the course each worth 5% of the overall grade (if three assignments same weight will be given with an a bonus of 5%). Homework exercises will include written exercises and computational exercises in R/Rattle. You **must** turn in your own assignments. The homework assigned and the dates on which the assignments are due are shown in the course schedule. Each HW assignment is due by the class start time unless indicated otherwise. Assignments **have to be submitted via the eLearning website**. Emailed assignments will not be accepted. Late submissions will be penalized by 20% of the individual homework grade at the initial few hours and will not be accepted beyond the midnight the same day. If you are not in class when the assignment is given, it is your responsibility to check the elearning for the assignment. More details will be provided in class.

Group Cases

Six cases (depending on class enrollment) will be used during the course of the semester for group case analyses and presentation. These cases will be available at the Harvard Business Publishing website. The class will be divided into teams, with each team composed of five students (on average). The unique link at the Harvard Business Review website for purchasing the course pack is:
https://cb.hbsp.harvard.edu/cbmp/access/28754397

The cases to be assigned to each group (GR) are as follows:

GR1. Electronic Medical Records at the ISS Clinic in Mbarara, Uganda (HBS case)
GR2. Boston Children's Hospital: Measuring Patient Costs (HBS case)
GR3. In-Vitro Fertilization: Outcomes Measurement (HBS case)
GR4. Performance Management at Intermountain Healthcare (HBS case)
GR5. Predilytics (HBS Case)
GR6. Recorded Future: Analyzing Internet ideas About What Comes Next (HBS case)

Academic Calendar

The timelines mentioned in the Academic Calendar are approximate and subject to change at the discretion of the Professor based on the course progress. Students are required to follow any updates on the course plan through eLearning. HA refers to Strome's Healthcare Analytics and RR refers to R an Rattle

Week	Date	Topic	Readings	Assignment Due
1	8/27	Introduction Analytics in health care	Lecture notes, Chapter 1-2 (HA)	
2	9/03	Developing an Analytics Strategy to Drive Change	Lecture notes, Chapter 3 (HA)	Assignment 1
3	9/10	Introduction to data mining and basic statistics	Lecture notes, Chapter 6, 9 (HA) Chapter 1 (RR)	GR1 Case Presentation
4	9/17	Intro to R and Rattle	Lecture notes, Chapter 2-5 (RR)	Assignment 2, Confirm the Project topic with the instructor,

				GR2 Case Presentation
5	9/24	Predictive Analytics I: Multiple Regression, Logistic Regression	Lecture notes	
6	10/1	Defining healthcare quality and value+ Guest lecture	Lecture notes, Chapter 4 (HA)	Initial Project Presentations
7	10/8	Data Governance + Guest lecture	Lecture notes, Chapter 5 (HA)	GR3 Case Presentation
8	10/15	Descriptive Analytics I: Probability Review	Lecture notes Chapter 7 (RR)	Assignment 3
9	10/22	In class mid-term exam		
10	10/29	Descriptive Analytics II: Performance Evaluation	Lecture notes Chapter 9-11 (RR)	GR4 Case presentation
11	11/5	Prescriptive Analytics: Decision Analysis	Lecture notes	GR5 Case Presentation
12	11/12	Cost-effectiveness	Lecture notes	Assignment 4
13	11/19	Big Data	Lecture notes	GR6 Case presentation
14	12/3	Project Presentations I		
15	12/10	Project Presentations II		

Discussion Forum

The instructor will assign discussion questions to the class periodically during the course of the semester. These questions will be discussed in class and will count toward the "Class Participation" grade.

Grading Policy:
The following grading policy will be adopted for the class: **A, A-, B+, B, B-, C+, C, C-, P (pass), F (Fail)**. The weighted average score (based on the above) table will be used to determine your grades at the end of the course.

Accessing Grades
Students can check their grades by clicking "My Grades" under Course Tools after the grade for each assessment task is released.

Course & Instructor Policies Assignments: All assignments should be completed on time. A penalty of **10% of the assignment value per day** (including weekends) is assessed on late assignments beginning on the day due.

Attendance: Your class attendance and participation is highly recommended for this course. There is no make-up for missed in-class assignments. **Much of the content of course will be covered in class**.

Field Trip Policies Off-campus Instruction and Course Activities
Off-campus, out-of-state, and foreign instruction and activities are subject to state law and University policies and procedures regarding travel and risk-related activities. Information regarding these rules and regulations may be found at the website address http://www.utdallas.edu/BusinessAffairs/Travel_Risk_Activities.htm. Additional information is available from the office of the school dean. Below is a description of any travel and/or risk-related activity associated with this course.

Student Conduct & Discipline
The University of Texas System and The University of Texas at Dallas have rules and regulations for the orderly and efficient conduct of their business. It is the responsibility of each student and each student organization to be knowledgeable about the rules and regulations that govern student conduct and activities. General information on student conduct and discipline is contained in the UTD publication, *A to Z Guide*, which is provided to all registered students each academic year.

The University of Texas at Dallas administers student discipline within the procedures of recognized and established due process. Procedures are defined and described in the *Rules and Regulations, Board of Regents, The University of Texas System, Part 1, Chapter VI, Section 3*, and in Title V, Rules on Student Services and Activities of the university's *Handbook of Operating Procedures*. Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations (SU 1.602, 972/883-6391).

A student at the university neither loses the rights nor escapes the responsibilities of citizenship. He or she is expected to obey federal, state, and local laws as well as the Regents' Rules, university regulations, and administrative rules. Students are subject to discipline for violating the standards of conduct whether such conduct takes place on or off campus, or whether civil or criminal penalties are also imposed for such conduct.

Academic Integrity
The faculty expects from its students a high level of responsibility and academic honesty. Because the value of an academic degree depends upon the absolute integrity of the work done by the student for that degree, it is imperative that a student demonstrates a high standard of individual honor in his or her scholastic work.

Scholastic dishonesty includes, but is not limited to, statements, acts or omissions related to applications for enrollment or the award of a degree, and/or the submission as one's own work or material that is not one's own. As a general rule, scholastic dishonesty involves one of the following acts: cheating, plagiarism, collusion and/or falsifying academic records. Students suspected of academic dishonesty are subject to disciplinary proceedings.

Plagiarism, especially from the web, from portions of papers for other classes, and from any other source is unacceptable and will be dealt with under the university's policy on plagiarism (see general catalog for details). This course will use the resources of turnitin.com, which searches the web for possible plagiarism and is over 90% effective.

Email Use
The University of Texas at Dallas recognizes the value and efficiency of communication between faculty/staff and students through electronic mail. At the same time, email raises some issues concerning security and the identity of each individual in an email exchange. The university encourages all official student email correspondence be sent only to a student's U.T. Dallas email address and that faculty and staff consider email from students official only if it originates from a UTD student account. This allows the university to maintain a high degree of confidence in the identity of all individual corresponding and the security of the transmitted information. UTD furnishes each student with a free email account that is to be used in all communication with university personnel. The Department of Information Resources at U.T. Dallas provides a method for students to have their U.T. Dallas mail forwarded to other accounts.

Withdrawal from Class
The administration of this institution has set deadlines for withdrawal of any college-level courses. These dates and times are published in that semester's course catalog. Administration procedures must be followed. It is the student's responsibility to handle withdrawal requirements from any class. In other words, I cannot drop or withdraw any student. You must do the proper paperwork to ensure that you will not receive a final grade of "F" in a course if you choose not to attend the class once you are enrolled.

Student Grievance Procedures
Procedures for student grievances are found in Title V, Rules on Student Services and Activities, of the university's Handbook of Operating Procedures.

In attempting to resolve any student grievance regarding grades, evaluations, or other fulfillments of academic responsibility, it is the obligation of the student first to make a serious effort to resolve the matter with the instructor, supervisor, administrator, or committee with whom the grievance originates (hereafter called "the respondent"). Individual faculty members retain primary responsibility for assigning grades and evaluations. If the matter cannot be resolved at that level, the grievance must be submitted in writing to the respondent with a copy of the respondent's School Dean. If the matter is not resolved by the written response provided by the respondent, the student may submit a written appeal to the School Dean. If the grievance is not resolved by the School Dean's decision, the student may make a written appeal to the Dean of Graduate or Undergraduate Education, and the deal will appoint and convene an Academic Appeals Panel. The decision of the Academic Appeals Panel is final. The results of the academic appeals process will be distributed to all involved parties.

Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations.

Incomplete Grade Policy
As per university policy, incomplete grades will be granted only for work unavoidably missed at the semester's end and only if 70% of the course work has been completed. An incomplete grade must be resolved within eight (8) weeks from the first day of the subsequent long semester. If the required work to complete the course and to remove the incomplete grade is not submitted by the specified deadline, the incomplete grade is changed automatically to a grade of **F**.

Disability Services
The goal of Disability Services is to provide students with disabilities educational opportunities equal to those of their non-disabled peers. Disability Services is located in room 1.610 in the Student Union. Office hours are Monday and Thursday, 8:30 a.m. to 6:30 p.m.; Tuesday and Wednesday, 8:30 a.m. to 7:30 p.m.; and Friday, 8:30 a.m. to 5:30 p.m.

The contact information for the Office of Disability Services is:

The University of Texas at Dallas,
SU 22 PO Box 830688
Richardson, Texas 75083-0688
(972) 883-2098 (voice or TTY)

Essentially, the law requires that colleges and universities make those reasonable adjustments necessary to eliminate discrimination on the basis of disability. For example, it may be necessary to remove classroom prohibitions against tape recorders or animals (in the case of dog guides) for students who are blind. Occasionally an assignment requirement may be substituted (for example, a research paper versus an oral presentation for a student who is hearing impaired). Classes enrolled students with mobility impairments may have to be rescheduled in accessible facilities. The college or university may need to provide special services such as registration, note-taking, or mobility assistance.

It is the student's responsibility to notify his or her professors of the need for such an accommodation. Disability Services provides students with letters to present to faculty members to verify that the student has a disability and needs accommodations. Individuals requiring special accommodation should contact the professor after class or

during office hours.

Religious Holy Days
The University of Texas at Dallas will excuse a student from class or other required activities for the travel to and observance of a religious holy day for a religion whose places of worship are exempt from property tax under Section 11.20, Tax Code, Texas Code Annotated.

The student is encouraged to notify the instructor or activity sponsor as soon as possible regarding the absence, preferably in advance of the assignment. The student, so excused, will be allowed to take the exam or complete the assignment within a reasonable time after the absence: a period equal to the length of the absence, up to a maximum of one week. A student who notifies the instructor and completes any missed exam or assignment may not be penalized for the absence. A student who fails to complete the exam or assignment within the prescribed period may receive a failing grade for that exam or assignment.

If a student or an instructor disagrees about the nature of the absence [i.e., for the purpose of observing a religious holy day] or if there is similar disagreement about whether the student has been given a reasonable time to complete any missed assignments or examinations, either the student or the instructor may request a ruling from the chief executive officer of the institution, or his or her designee. The chief executive officer or designee must take into account the legislative intent of TEC 51.911(b), and the student and instructor will abide by the decision of the chief executive officer or designee.

These descriptions and timelines are subject to change at the discretion of the Professor.