FMIS 3241 Data Analytics

Class Information

Term	Fall 2018	Days	TTh
Section	001	Time	2:00-2:50pm
Location	LSBE 237		

Instructor	Nik R. Hassan
Office	LSBE 385A
Email	nhassan@d.umn.edu
Course Homepage	Type http://moodle.umn.edu and log in using regular UMD Internet ID and password.
Instructor Homepage	www.d.umn.edu/~nhassan
Office phone	(218) 726-7453
Office Hours	10am-12pm Mon/Wed or by appointment

Course Information

This course introduces the basic elements of data analytics, often called business intelligence, and how to analytically think about data and its role in business. The goal of the course is to provide students with a broad coverage of the fundamentals of data analytics in different areas of business and exposure to available tools and techniques. These topics are explored at both the micro and macro level. At the micro level, individual applications and techniques will be introduced to students. At the macro level, huge amounts of data are being collected from individuals, businesses and governments, providing opportunities to analyze data systematically for improving decision-making for the whole organization. The course will examine fundamental principles and techniques of descriptive, predictive and prescriptive analytics, illustrate real-world examples in different business contexts working "hands-on" using data analytics software, to develop data-analytic thinking, and ultimately appreciate that proper application is as much an art as it is a science.

Course Resources

Textbooks	Required: 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., 2018, Wiley: Hoboken, NJ. ISBN: 978-1118879368 Required: The Big Book of Dashboards by Steve Wexler, Jeffrey Shaffer, Andy Cotgreave, 2017, Wiley: Hoboken, NJ. ISBN: 978-1119282716
Course Prerequisites	MIS 2201 IT in Business, ECON 2030 Applied Statistics for Business and Economics
Learning Management Software	All materials and assignments are delivered via the Moodle 3.2 site available at https://moodle.umn.edu
Technology Requirements	Data analytics is a technology-intensive activity and the course will introduce students to various levels of technology, from the most basic programming (e.g. R) to the more advanced visualization systems (e.g. Tableau) without

	necessarily spending too much time on the details and technicalities required for each technology. We will also be reusing resources from existing data analytics courses from other universities including a teaching tool provided by the University of Waikato called the Waikato Environment for Knowledge Analysis (nicely packaged into the name of a local New Zealand bird - Weka). However, since many of these courses are rather extensive, we will use only portions that can be fitted into our syllabus. Students will be provided tutorials and access to these technologies with the help of the LSBE Technology Program.	
Learner Outcomes	1) Explain different flavors of data analytics, the fundamentals of the art and science of data-analytic thinking	1,5
	2) Recognize data formats, structures, attributes and different types of data relationships	2,5
	3) Recognize examples of opportunities for business analytics from classic examples, and everyday business practices [HW1] and why data analytics is important and in great demand	4,5
	4) Apply data visualization techniques using appropriate tools such as R and Tableau for exploratory and confirmatory	2,5
	5) Apply data preparation, preprocessing and transformation techniques for business analytics [HW2]	2,5
	6) Contrast SQL and NoSQL methods for analyzing data Big Data analytics to mine massive amounts of information and explain the roles of data Warehousing, OLAP and data cubes	2,5
	7) Apply data analytics software tools for analyzing data, descriptive analytics, model development, predictive and prescriptive analytics including techniques for classification, pattern recognition, clustering and associations and recognize recent trends in business analytics including dealing with big data [HW3 and HW4]	1,2,5
	8) Recognize the significance of and apply analytic techniques on qualitative data including textual and social media data [HW5]	1,4,5
	9) Combine the different business analytics methods into a semester project to provide insights using real datasets from industry	1,2,3,5
BBA Program Level Learning Goals	**Goal 1**: Communicate ideas effectively in written and oral form. **Goal 2**: Acquire quantitative analysis skills that can be used in managerial decision-making. **Goal 3**: Be able to work effectively in a team. **Goal 4**: Demonstrate appreciation of ethical and global issues in managerial decision-making.	

	Goal 5: Demonstrate competency in the core areas of business		
Grading and Assessment	**Assessment Tool**	**% Total Grade**	**Learner Outcome Assessed**
	Quizzes and exercises (Quiz#1-Quiz#10) The intent of these multiple choices quizzes and exercises are to prepare students for the homework and to reinforce learning. Each exercise should take no more than ½ hour to complete. 10 Short Quizzes and Exercises, 10 points each	**10%**	**1-8**
	Homework Assignments (HW#1-HW#5) The goal of these homework assignments is to give students hands-on experience in using data analytics tools and techniques and to assess the student's understanding and application of the material covered in class. The homework assignments involve hands-on activities analyzing data sets using the content learned. To accommodate the different levels of students in the class each assignment will include an extra credit assignment (5 pts each) that challenges the student beyond the basic content, 5 Homework Assignments, 60 points each	**30%**	**4-8**
	Exams Mid-term Multiple Choice and Short Answer Test -- 150 points The goal of the mid-term is to test each student's comprehension of materials covered. Final Multiple Choice and Short Answer Comprehensive Exam -- 150 points The goal of the final exam is to test the ability of the student to apply and communicate all that they have learned in writing	**30%**	**1-8**
	Group Semester Project and Presentation Students will be grouped into teams and each team will choose a topic preferably based on a subject area (e.g. marketing, operations and management, finance, accounting, economics, healthcare). The team will envision, design, execute, and report on a data analytics-oriented study based on some interesting data available from the web, from your company, or from elsewhere. Project Proposal (1) 50 pts Project Status (2) 100 pts Final Project (3) 150 pts Project total: 300 pts	**30%**	**9**
	MinneMUDAC Competition Every fall, MinneAnalytics, a non-profit organization serving the data analytics community in Minnesota and Upper Midwest organizes a competition called MinneMUDAC with the Midwest Undergraduate Data	**3% extra credit**	

	Analytics Competition (MUDAC) at Optum, in Eden Prairie. Optum which provides data analytics technology services is a spin-off from United Health, now the fifth largest company in the world. Just more than a year ago, they hired more than 15 of our UMD Alumni, mostly who took this course. This competition is a great opportunity for students to showcase their skills and knowledge to prospective employers, who will be reviewing resumes at the competition. This year the competition will be held on Nov 3. Students are strongly encouraged to participate in teams of 4-5. Transportation will be provided by the Management Studies Dept. Team members participating will be given 30 pts extra credit.		
Letter Grade Policy	91.5-100 = A 89.5-91.4 = A- 86.5-89.4 = B+ 82.5-86.4 = B 79.5-82.4 = B- 76.5-79.4 = C+ 72.5-76.4 = C 69.5-72.4 = C- 66.5-69.4 = D+ 60-66.4 = D Less than 60 = F		
Scoring Elements	There will be no make-up assignments or tests unless circumstances are extreme (e.g. death in the family). All make-up exams must be scheduled and completed within one week after return to class or a grade of "F" will be assigned.		
Make Up Policy and Grade Appeal	Must be written in standard business format and submitted within one week after test or homework grades have been handed out to class. Verbal discussions <u>will not</u> substitute for this required method of requesting grade review or recomputation.		
Student Responsibility	1. If the student misses class, it is her or his responsibility to get copies of any material handed out in class from student colleagues, not from the instructor. The instructor can only assume responsibility for the initial distribution of material, and cannot inevitably ensure each student's ultimate receipt of each class handout or returned test grade sheets. 2. Attendance: Students are expected to attend all scheduled class meetings, unless excused by the instructor. Excessive absence will result in lowered grades from original test results. Students may NOT expect to pass the course merely by achieving passing test grades without complete class attendance, except for excused absences. The instructor will not use class time to discuss problems or grades, tests, papers, or discussions. These subjects should be treated more thoroughly in written documentation. These written communications should be respectful, professionally constructed, and should reflect clearly the integrity and ethics of the student.		
Academic Dishonesty	All forms of academic dishonesty will result in a course grade of Failure (F). Students caught copying other students' assignment or showing or cheating will be asked to leave the class and will not be permitted to attend future class meetings for the remainder of the semester. When it comes to classes that involve coding, cheating is very tempting. Remember that you are here to learn and cheating on		

	code not only damages your reputation and corrupts you as a person, you learn very little from cheating. Getting tips from your friend for solutions is not considered cheating if the tips is part of a healthy discussion about how to solve the problem but taking a peek at the code and copying your friend's code or lifting code from the Internet is considered cheating. Here are examples of instances of cheating code: 1) Instructor solution from previous semesters 2) Someone else's work from previous and current semesters 3) Other code found on the Internet which directly leads to the solution to homework problems, unless the homework instruction explicitly allows it 4) Getting code by peeking at your friend's solution even if your friend allows it. When in doubt ASK!

Week	Date	Topics	Readings (S-Shmueli, W-Wexler, L-Lock)	Assignments Due (including Fri exercises)
1	8/27	Introduction & Course overview Getting familiar with resources and technology	Syllabus Slides – Setting up technology resources for the course	
	8/29	Introduction to Data Analytics and Statistics Refresher	Complete at least the R Crash Course and the Introductory R Walkthrough available on Moodle Slides – Introduction to Data Analytics S-Chap 1 Introduction	Install R, R Studio, Weka, Tableau
	8/31	Statistics Refresher and Regression	Slides- Statistics Refresher	Technology Exercise
2	9/3	Labor Day		
	9/5	Exploring Data Using Spreadsheets and Visualization tools	Slides-Descriptive Analytics and Visualization Slides-Using Tableau W-Ch1 Principles of Visualization	
	9/7	Data Exploration	S-Ch3 Data Visualization	Tableau Visualization exercise **Quiz#1**
3	9/10	Data Visualization	Slides-Data Preprocessing and Transformation	

	9/12	Data Visualization	Slides-Data Preprocessing and Transformation	
	9/14	Data Visualization	Slides-Data Preprocessing and Transformation	R and Weka Preprocessing Exercise **Quiz#2**
4	9/17	Preprocessing and dimension reduction	Slides-Data Preprocessing and Transformation S-Ch4 Dimension Reduction	
	9/19	Preprocessing and dimension reduction	Slides-Data Preprocessing and Transformation	**HW#1 Visualization and preprocessing data**
	9/21	Predictive modeling – Multiple Linear Regression	S – Ch 6-Multiple Linear Regression Slides – Predictive Modeling	Discuss presentation **PROJECT GROUPS CONFIRMED**
5	9/24	NO CLASS		**DISCUSS PROJECTS AND SUBMIT PRELIMINARY PROJECT PROPOSAL BY END OF CLASS**
	9/26	Review board presentations		
	9/28			**Presentation to MIS Advisory board**
6	10/1	Entropy and Decision trees	Slides-Predictive Analytics S – Ch9 Classification and Regression Trees	**Quiz#3**
	10/3	Logistic regression and Naïve Bayes Classifier	Slides – Linear and Logistic Regression and classification S-Ch10 Logistic Regression S – Ch8 Naïve Bayes Classifier	
	10/5	Neural Networks and support vector machines (SVM)	S – Ch 11 Neural Nets Slides – Support Vector Machines (SVM)	Predictive modeling exercise **Quiz#4**
7	10/8	Evaluating predictive models	Slides – Model evaluation S – Ch 5 Evaluating Predictive Performance	
	10/10	Evaluating predictive models	Slides – Model evaluation S – Ch 5 Evaluating Predictive Performance	**HW#2 Building a predictive model I**
	10/12	Midterm Review	Midterm review sheet	**Quiz#5**
8	10/15	**MIDTERMS EXAM**		
	10/17	Go over Midterms Exam		**Present Project Proposal (PROJECT #1) by Class Time**
	10/19	Patterns and classification – K-nearest neighbors	S – Ch7 K-Nearest Neighbors	Patterns and classification exercise

9	10/22	Association	Slides – Association S – Ch 14 Association Rules	
	10/24	Unsupervised Cluster Analysis	Slides-Ensemble models S – Ch 13 Combining Methods and Uplift Modeling	**HW#3 Predictive Model II**
	10/26	Fall Break		
10	10/29	Improving models and ensembles	Slides-Ensemble models S – Ch 13 Combining Methods and Uplift Modeling	
	10/31	Improving models and ensembles	Slides-Ensemble models S – Ch 13 Combining Methods and Uplift Modeling	
	11/2	Improving models and ensembles	Slides-Ensemble models S – Ch 13 Combining Methods and Uplift Modeling	Improving models / MinnMUDAC exercise **MinneMUDAC Weekend**
11	11/5	Text analytics	S – Ch 20 Text mining	
	11/7	Text analytics	Slides – Text analytics	
	11/9	Text analytics	Slides – Text analytics	
12	11/12	Web and social media mining	Slides – Web analytics	
	11/14	Presentations		**STATUS REPORT (PROJECT #2)**
	11/16	Web and social media mining	Slides – Web analytics	**Quiz#6 & #7**
13	11/19	Prescriptive Analytics	Slides – Prescriptive analytics: Optimization and simulation-based modeling	
	11/21	Prescriptive Analytics	Slides – Prescriptive analytics: Optimization and simulation-based modeling	**HW#4 Text Analytics**
	11/23	**THANKSGIVING**		Prescriptive analytics exercise **Quiz#8 & Quiz#9**
14	11/26	Big Data Analytics and NoSQL	Slides – Big Data Analytics	
	11/28	Big Data Analytics and NoSQL	Slides – Big Data Analytics	**HW#5 Prescriptive Analytics**
	11/30	Big Data Analytics and NoSQL	Slides – Big Data Analytics	Big data exercise **Quiz#10**
15	12/3	Presentations		
	12/5	Presentations		
	12/7	Final Exam Review		**FINAL SEMESTER PROJECT DUE**

				(PROJECT #3)
16	12/12	**Final Exam, Wed Dec 12, 2:00-3:55pm LSBE 237**		

**This schedule is subject to change without notice. Check the online syllabus often for latest updates.