6500:305- Business Analytics

Fall 2014

Instructor:	**B. Vijayaraman (Vijay)**
Office:	CBA 357
Office Hours:	Mon/Wed from 1:00 pm to 2:00 pm; Mon from 3:15 pm to 5:00 pm; Wed from 3:15 pm to 4:15 pm; OR by appointment and via Email
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First day of Class:	Monday, August 25, 2014
Last day of Class:	Friday, December 5, 2014
Final Exam:	Monday, December 8, 2014, 12:15 pm to 2:15 pm
Class Room:	CBA 106
Class Times/Days:	Mon 12:05 p.m. – 12:55 p.m.
Prerequisites:	6500:304

Recommended Textbook:
Fundamentals of Predictive Analytics with JMP By Ron Klimberg and B. D. McCullough
ISBN: 978-1-61290-425-2. Publisher: SAS Institute. (e-book is available through Ohiolink).

Required Book:
Discovering Knowledge in Data: An Introduction to Data Mining, Daniel T. Larose & Chantal D. Larose, Wiley, Second Edition.

Other materials including articles, cases, videos and data sets will be made available on Springboard.

Turn the notifications "ON" on Springboard and watch the News area on Springboard for this class. Pay attention to your email for any announcements and readings for the class.

Course Description:

Studies core statistical techniques; data retrieval, analysis and mining; and decision modeling to effectively persuade in the project-oriented world of data-driven decisions.

Rationale for this Course:

The explosion of computing power and data acquisition techniques has created a huge amounts of data (BIG DATA) in organizations and that has led to a big demand for professionals with skills in data management, statistics, & business analytics. Over the years, more companies have come to realize that even though it has become much cheaper to collect and store huge amounts of data related to all aspects of business, these data are not of much use unless the company analyzes the data systematically to find trends, patterns, associations, etc. In other words, **having the ability to make sense of data, not just having the data, is what gives a company a competitive advantage**. Companies like Apple, Google, Amazon, Walmart, Netflix and many other leading edge companies are successful because they make good use of data they collect. As a business professional, you will see that there is a vast amount to learn about business analytics (BA), which represents a confluence of information technology, statistics & data mining. Organizations that are ready and willing to change the way they do business based on the insights from data will survive the competition.

Overall Goals for this course:

- Expose you to Business Analytics (visualization, statistics & data mining) techniques that are used in data empowered business strategy. **I focus on application of statistics to data analysis in this class**.
- Increase your Business Analytics IQ
- Get rid of your fear of statistics and make it more fun.
- **Apply what you learn in this class to what you do at work**.
- Expose you to skills that are required to transform data into actionable intelligence & decision-making.
- Enhance your communication (presentation and report writing), creative thinking, problem solving, and analytical skills.

Specific objectives for this course are:

- To **understand** what business and data analytics are; how they differ from business intelligence and data mining; and why organizations are actively adopting this orientation for strategic advantage
- To introduce students to key information technology/system concepts that will allow them to **understand** how they provide the necessary data and information for business analytics.
- To introduce and provide some practice with core and necessary statistics concepts so that students can **participate** in, and lead analytics-based projects
- To introduce and provide some practice with core and necessary data mining techniques so that students understand how to work with large data sets and **apply** the appropriate data mining technique to answer business questions.
- To be able to **analyze & evaluate** output from statistical and data mining procedures and draw correct conclusions from it.
- To be able to **communicate** the results of the data analysis to management by writing a detailed report.
- To be **aware** of the special ethical issues that arises when utilizing these techniques.

Assignments and Grade Percentages

Class Exercises (7 Labs)	– 25%
Team Assignments (2)	– 25%
Exams (2)	– 30%
Final Exam (Comprehensive)	– 20%
Assessment Exam	– 2% (Bonus)
Class Participation	– 3% (Bonus)

Grading Scale:

Grading policies in the current UA's bulletin will be in effect – (A: 93% - 100%, A-: 90% - 92.9%;…..)

Team Assignments

You will be working in teams of 3 or 4 students. You will be assigned to a team randomly. Team assignment details will be provided on Springboard. You will have approximately two week to complete the team assignments. The assignments will include performing JMP analysis and writing a professional report to Management based on the discussions held in class. The goal is for your team to apply the business analytics life cycle/process (identify the problem, describe the data, analyze the data, interpret the results, make recommendations) and write a professional report to the management of the entire process. These assignments are very important in your learning process, so plan ahead to have enough time to complete them well.

Class Exercises

There will be approximately 7 class exercises involving JMP that you will complete in the class for grading. This will help you apply the concepts that you learn in class, run JMP analysis, and interpret the results. A technique will be introduced to you in class and you will be asked to apply it in class using JMP and answer few questions. It will be graded based on how successfully you complete the exercise in class. If you miss the class, you will get a zero for the exercise, unless you make arrangements with the professor ahead of the time. So, it is very important that you come to class regularly.

Exams (Individual)

There will be two exams during week 6 and week 12. The quizzes will focus on the materials covered in class prior to the exam. Focus will be on the materials covered in class and the readings. You need to keep up with the readings and come to every class prepared. The final exam will be comprehensive and cover the entire material covered in class.

Statistical/Data Mining Software – JMP from SAS

I will be using JMP Pro (Version 11) statistical software from SAS in this course. JMP encompasses an exploratory, graphical approach to both traditional statistics and data mining techniques. This software is available for use in CBA labs and on CBA laptops. Remotely it is available via a virtual lab (Cloud). **JMP software is also available for free to you for use on your own computers** (I strongly recommend installing the software on your computer. Check Springboard on how to download and install JMP on your computer). Considerable materials, including tutorials and webcasts about JMP are available on their website and on the Internet.

Class Policies

1. Course Expectations

You are expected to attend all classes unless prevented from doing so by an emergency. **You are expected to do the reading in advance of each class session.** Each reading may take a few hours of good concentrated study time, so make sure you leave enough time each week for doing them. My class presentations will help you make better sense of the readings and put them together into a broader context. I will give a high level of effort in teaching this class, and expect the same from you. Everyone is expected to participate regularly in class discussions.

2. Attendance and Participation

Attendance is important in this class. You can only get credit for in-class exercises if you are in class on the day exercises are given.

3. Collaboration Guidelines

Here are the guidelines for acceptable boundaries for collaboration on assignments done outside the classroom. Collaboration within your group (if you are working in a group) is acceptable and encouraged. **Collaboration with people outside your group is not permitted.**

Copying part or all of someone else's assignment is plagiarism and is not permitted. If someone outside your group calls you over to his or her screen and says "I can't figure out what's wrong with this?" it is acceptable to try to spot something and give an answer like "you are missing a comma in the formula." It is not acceptable to escort the questioner to your computer and show him/her exactly how you did it. If

someone in the class needs that much help, he or she should get it from the tutor or me. When someone asks you for help, you should play the role of a teacher, not a collaborator. You should help the other person to discover the answer, thus learning in the process. Merely giving the person the answer neither tests your ability to explain concepts, nor encourages learning for the person who is asking the question. **It is my policy that no one should benefit from cheating.** If I discover copying, plagiarism, or any other form of cheating, I will do any of the following: lower the grade, give a zero on the assignment, give an "F" in the course, and/or refer the case the Office of Student Judicial Affairs. ***Keep in mind that if your group partner copies (or allows someone to copy from him or her), you too are responsible***. You bear responsibility for any work with your name on it.
Finding help for specific problems you are having by looking on the Internet (Google) is perfectly fine. There are numerous resources available there. But soliciting specific help that will result in parts of the assignment being done for you is not permitted. This kind of cheating will incur a particularly severe penalty.

For any of the analytical parts of the assignments where you are required to interpret your results with written answers, you may discuss these with others outside your group before you start writing. Once you are writing your analysis, however, you should not consult anyone for any help on the substance of the assignment/paper. Asking your classmate "what did you think of X?" and then formulating your own opinion is okay. On the other hand, having a group discussion in which you all "make an outline for the homework" during the discussion is not okay. For example, a session where someone says "what are we going to say about X?" where someone else suggests something, and everybody then writes it down and uses it directly in their paper, is essentially writing and therefore is not okay. Reading someone else's paper and copying or paraphrasing the ideas therein, or taking a diskette/file with someone's work and revising/editing it into your own paper or homework assignment, is **not** okay.

Using parts of sentences from a published source, from the Internet, or from someone else's paper, is NOT OK unless you put quotation marks around the phrase, sentence, or group of sentences you are citing and then provide a proper footnote to the source. If you have any questions about plagiarism and the mechanics of doing citations, ask me. I will provide you with more resources. If I discover that you have plagiarized by taking chunks of text from another source and 1) not using quotation marks and/or 2) not indicating the source with a complete citation, I will apply any of the penalties mentioned above. I know that there are different cultural norms for what is considered acceptable use of others' works. I also know that some may feel pressure to produce "perfect" English and will therefore want to use parts of or all of others' sentences. This is not acceptable without a citation. If you wish to improve your written English, you may seek help from a tutor, ask me, and/or use a grammar/spelling checker on the computer. I would rather read grammatical mistakes that reflect 100% your own work than to read a patchwork of other people's work. Nevertheless, to get an excellent grade, you should write well.

4. Appeals

Grades that I have assigned may be appealed. To appeal a grade, submit the original graded work I handed back to you along with a written statement defining why your grade should be changed. I will not be able to keep track of oral appeals made before or after class. Appeals may not be made based on comparison with other students' work. There is a "statute of limitations" on appeals: they must be filed within two weeks of the time a grade is communicated to a student and, in any event, no later than the last regular class session. Once I receive an appeal, I will respond by either a) raising your grade per your request or b) explaining why I cannot do so. In no case will an appeal result in the lowering of a previously assigned grade. In evaluating appeals, I try to provide a fair solution when viewed from the perspective of all the students in the course.

5. Late assignments

Late assignments will be penalized at the rate of 10% per day, including weekends. This means that if you turn in your assignment more than 10 days late, it will be worth zero! **Make-ups and extra credit assignments will not be allowed**. It is up to you to make sure you are doing your work on time. I understand that you are busy professionals and that special circumstances may arise. Please advise me in advance of the deadline and we will try to work out a mutually acceptable arrangement.

Discrimination and Harassment: *"The classroom should be an environment that is free of discrimination and harassment based on a person's sex, race, color, age, religion, disability, ancestry, or national origin, consistent with applicable laws. All students and employees should respect the rights, opinions, and beliefs of others. Discrimination against or harassment of any person because of sex, race, color, age, religion, disability, ancestry, or national origin is strictly prohibited whether directed at an employee, student or other's associated with the University. No one may subject another employee or student to any unwelcome conduct of a sexual nature."* – The University of Akron General Counsel Office

Special Accommodation: Only those students who are registered with the Office of Accessibility and have presented a letter dated for the current semester are entitled to special accommodation. Information will be treated confidentially. Any student who feels she/he may need an accommodation based on the impact of a disability should contact the Office of Accessibility.

Collection of Labs & Assignments: I will be using Springboard to collect all labs & assignments.

Concepts & Techniques covered in this class:

Module 1: Introduction

1. Introduction to Business Analytics and Big Data

Module 2: Business Analytics Life Cycle

2. Business Analytics Process, CRISP-DM, introduction to JMP

Module 3: Basic Analytics + Labs

3. Data concepts, review of basic statistics
4. Data exploration & visualization
5. Hypothesis testing, Type 1 & 2 errors
6. T-test, ANOVA, Chi-Square, and correlation

Module 4: Advanced Analytics + Labs

7. Linear Regression Analysis
8. Logistic Regression
9. Decision Tree, Model comparison and evaluation
10. Cluster Analysis
11. Market Basket Analysis

Module 5: Technology & Tools

12. Data Warehousing and OLAP concepts
13. Tools & Technologies for Big Data
14. Ethical Issues, Final Exam Review

SCHEDULE OF CLASSES and READINGS (Tentative and subject to changes)

Date	Week No	Topics covered	Readings/Assignments Due
8/25	1	Introduction to Course Introduction to Business Analytics.	Chapter 1.1, 1.2, 1.3 Check readings on Springboard **Assessment Exam**
9/1	2	Introduction to Business Analytics. Introduction to Big Data.	
9/8	3	Business Analytics Lifecycle Introduction to Data Mining Data Mining Process - CRISP-DM In-class Continental Case discussion,	Continental Airlines (Springboard) Readings on CRISP-DM (Springboard) Chapter 1.4, 1.5, 1.6
9/15	4	What You Should Know About Data Data cleaning, handling missing data, outliers Statistics Review – Normal Distribution, sampling, etc Introduction to JMP	Textbook - Chapter 2
9/22	5	Data Visualization & Data exploration using JMP In class Harrah's case	Textbook – Chapter 3, Appendix Harrah's case (Springboard)
9/29	6	Hypothesis Testing, Type 1 & II error	C Textbook – Chapter 4 **Exam 1**
10/6	7	T-test, ANOVA, Chi-Square, Correlation Analysis Lab 1: Basic Statistics & Visualization	Textbook - Chapter 5
10/13	8	Linear Regression Analysis (Simple & Multiple) Lab 2: T-test, ANOVA, Chi-Square	Textbook - Chapter 5
10/20	9	Logistic Regression Lab 3: Regression Analysis exercise	Textbook - Chapter **Team Case 1 Due**
10/27	10	Evaluating Classification and Predictive Performance Decision Trees Lab 4: Logistic Regression exercise	Textbook – Chapter 14, 8,
11/3	11	Cluster Analysis Lab 5: Decision Tree Exercise	Textbook - Chapter 10 **Team Case 2 due**
11/10	12	Market Basket Analysis Lab 6: Cluster Analysis exercise	Textbook - Chapter 12 **Exam 2**
11/17	13	Data Warehouse (DW) as a data source for advanced analysis (BA) Lab 7: Market Basket Analysis exercise	Readings on Data Warehouse (Springboard)
11/24	14	Exploring data with Online Analytical Processing (OLAP) Hadoop, Mapreduce Western Digital case discussion	Article on OLAP (Springboard) Western Digital Case (Springboard) The Dark Side of Customer Analytics
12/1	15	Ethical Issues of Big Data Final exam Review	
12/8		**Final Exam – 12:15 pm to 2:15 pm**	