I INF 300: *Probability and Statistics for Data Analytics* (3 credit hours)

Spring 2016, Class number 8839

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Course Information
Meeting time: MW 4:15-5:35
Meeting Location: SLOG12

Course description from *Undergraduate Bulletin*:
Probability and statistical methods applied to the analysis of various kinds of data. Includes underlying theoretical justification and appropriateness for different models and analyses. Conceptual and implemented approaches to data analysis.

 Prerequisite(s): A MAT 108, I CSI 131

The primary concepts from the prerequisite(s) which are relevant in this course are
- Frequency Distributions
- Probability
- Sampling
- Linear Regression
- Correlation

The course will build on these concepts, and add several more.

Course Goals
By the end of the semester, you should be able to
- Understand the implications of different data distributions for analysis.
- Understand the conceptual difference between Bayesian and frequentist statistics.
- Be able to apply several basic statistical data analysis models.
- Understand and be able to demonstrate properties of data that affect analysis, such as sample size, bias, *etc*.
- Demonstrate both conceptual and practical knowledge of pattern recognition.
- Demonstrate both conceptual and practical knowledge of predictive modeling techniques.
- Demonstrate knowledge of advanced techniques in statistically based data analysis.

Readings
Required readings
Business Analytics: Data Analysis & Decision Making, S.C. Albright & W.L. Winston, 2015, 5th Edition, Cengage. ISBN 13: 978-1-133-62960-3.

Supplemental readings
Introduction to MS Excel 2007, University of Cape Town. Available online at:
https://vula.uct.ac.za/web/learnonline/manuals/CET%20MS%20Excel%202007%20Training%20Manual%20v1.1.pdf
Additional readings will be distributed via Blackboard or in class as appropriate

Additional Materials
Students will require access to a computer, various software, a modern generation browser, and the Internet.
A basic calculator is also required.
Recommended: USB Flash Drive

Course Policies

Attendance
Attendance is mandatory in every class and students are expected to arrive on time. Your in-class performance is key to your success in this course. Attendance, itself, is not graded. Instead, graded in-class activities and assignments constitute an important part of the course grade. It is not possible to maintain a passing average without consistent attendance. Missing class means the student earns an automatic zero for the activities or assignments missed. Because of the nature of the assignments, no make-up opportunities will be available.

Tardiness
Missing an assignment or activity that happened before a student arrives or after a student leaves also earns a zero. No make-up opportunities will be available.

If you know that it will be difficult for you to consistently get to class on time and stay for the entire period, you should take this course at a time that better fits your schedule. Being late frequently will guarantee a low grade for the course.

Make-up Policy
There are generally no make-up opportunities for missed assignments except in extenuating circumstances. Instead of asking to make up missed work, please see the course 'safety valves' described below.

Since there will be occasions in your life when missing a class meeting is simply unavoidable, this course has a no-fault safety valve.

Safety valve 1
You may miss one in-class activity or quiz grade. So, if you must miss class for any reason, it will be possible to drop the zero you would automatically receive for missing the activity or quiz. Be careful not to waste your drop on frivolous things early in the semester, since you

may need it if you catch a cold or need to leave town for a day later in the semester. If you do not use your safety valve for a missed classe, you will be able to use your safety valve to improve your grade, by dropping your lowest in-class activity or quiz score.

Plan carefully for classes that you know you will need to miss. Work, religious practice, sports team travel, military duty, club activities, fraternity/sorority obligations, family responsibilities, assignments for other courses, and even brief illnesses, etc—these are your responsibility to manage by using your safety valve. If you need to be out of class for any of these, make sure you have conserved your droppable grade to cover the class you need to miss.

Safety valve 2
If you become seriously ill during the semester, or become derailed by unforeseeable life problems, and have to miss so many assignments that it will ruin your grade, schedule a meeting with me in order to make arrangements for you to drop the course to save your grade point average. Don't wait until it's too late to see me when you get in trouble.

Late homework
Homework is due on the due date at the specified time, in class or submitted through Blackboard, depending on the assignment. Late homework assignments will be accepted, but at the cost of a full letter grade for missing the deadline. Late homework will be accepted up to 24 hours late, at which point an automatic 0 will be assigned. In-class assignments, activities, quizzes, and tests may be done only on the days they are scheduled.

Extra Credit
There may be extra credit work. All students will be expected to complete, and be graded on, the same set of assignments. Details to follow. All extra-credit opportunities are capped at no more than 5 points on your overall grade.

Withdrawal from the course
The drop date for the Spring 2016 semester is April 5 for undergraduate students. That is the last date you can drop a course and receive a 'W'. It is your responsibility to take action by this date if you wish to drop the course. In particular, grades of "incomplete" will not be awarded to students because they missed the drop deadline.

Cell phones & laptops
Please make sure your electronic devices are turned off before entering the classroom unless we are doing a class exercise where they are helpful. Use of phones, tablets, computers, etc. for non-class purposes during class will count against you in your class participation grade. While you may be using computers in class, texting, using Facebook, *etc.*, are not appropriate uses of class time and your instructor-evaluated grade will suffer for it.

Incompletes
As per the Undergraduate Bulletin, the grade of Incomplete (I) will be given "only when the student has nearly completed the course requirements but because of circumstances beyond the student's control the work is not completed." A student granted an incomplete

will make an agreement specifying what material must be made up, and a date for its completion. The incomplete will be converted to a normal grade on the agreed upon completion date based upon whatever material is submitted by that time.

Important: Incompletes will not be given to students who have not fulfilled their classwork obligations, and who, at the end of the semester, are looking to avoid failing the course. This is asking for special treatment.

Academic Integrity

It is every student's responsibility to become familiar with the standards of academic integrity at the University. Claims of ignorance, of unintentional error, or of academic or personal pressures are not sufficient reasons for violations of academic integrity. See http://www.albany.edu/undergraduate_bulletin/regulations.html

Course work and examinations are considered individual exercises. Copying the work of others is a violation of university rules on academic integrity. Individual course work is also key to your being prepared and performing well on tests and exams. Forming study groups and discussing assignments and techniques in general terms is encouraged, but the final work must be your own work. For example, two or more people may not create an assignment together and submit it for credit. If you have specific questions about this or any other policy, please ask.

The following is a list of the types of behaviors that are defined as examples of academic dishonesty and are therefore unacceptable. Attempts to commit such acts also fall under the term academic dishonesty and are subject to penalty. No set of guidelines can, of course, define all possible types or degrees of academic dishonesty; thus, the following descriptions should be understood as examples of infractions rather than an exhaustive list.
- Plagiarism
- Allowing other students to see or copy your assignments or exams
- Examining or copying another student's assignments or exams
- Lying to the professor about issues of academic integrity
- Submitting the same work for multiple assignments/classes without prior consent from the instructor(s)
- Getting answers or help from people, or other sources (*e.g.* research papers, web sites) without acknowledging them.
- Forgery
- Sabotage
- Unauthorized Collaboration (just check first!)
- Falsification
- Bribery
- Theft, Damage, or Misuse of Library or Computer Resources

Any incident of academic dishonesty in this course, no matter how "minor" will result in
1. No credit for the affected assignment.
2. A written report will be sent to the appropriate University authorities (*e.g.* the Dean of Undergraduate Studies)
   And may result in:

3. One of -
    o   A final mark reduction by *at least* one-half letter grade (*e.g.* B → B-, C- → D+),
    o   A Failing mark (E) in the course, and referral of the matter to the University Judicial System for disposition.

Responsible Use of Information Technology
Students are required to read the University at Albany Policy for the Responsible Use of Information Technology available at the ITS Web Site: https://wiki.albany.edu/display/public/askit/Responsible+Use+of+Information+Technology+Policy

Time Management
For every credit hour that a course meets, students should expect to work 3 additional hours outside of class every week (3 x 3= 9). For a three-credit course you should expect to work 9 hours outside of class every week. Manage your time effectively to complete readings, assignments, and projects.

Available Support Services

Reasonable accommodation
Reasonable accommodation will be provided for students with documented physical, sensory, cognitive, learning and psychiatric disorders. If you believe you have a disability requiring accommodation in this class, please notify the Director of Disability Resource Center (Business Administration 120, 442-5490). That office will provide the course instructor with verification of your disability, and will recommend appropriate accommodations. In general, it is the student's responsibility to contact the instructor at least one week before the relevant assignment to make arrangements.

Grading

The grade breakdown for the course is:

*   Individual Assignments: 40%
*   Project: 10%
*   In-Class Assessments: 20%
*   In-Class Activities and unannounced reading quizzes: 30%

A-E graded

93 – 100% A	77 – 79% C+	60 – 62% D-
90 – 92% A-	73 – 76% C	0 – 59% E
87 – 89% B+	70 – 72% C-	
83 – 86% B	67 – 69% D+	
80 – 82% B-	63 – 66% D	

Course Outline and Schedule

The following schedule of lecture topics and reading assignments is preliminary and may be changed as the semester progresses. The final schedule and specific homework and lab assignments and materials will be provided in Blackboard. Students are expected to have read the listed material before it is covered in class.

Week	Topics	Readings Due	Homework
20-Jan	• Introduction to course	Syllabus	
24-Jan	• Introduction data analysis • Describing Distributions	Ch 1 and 2	
31-Jan	• Relationships • Probability	Ch 3 and 4	Assignment #1, Ch 1,2 &3 (income and households) -Given Mon. Feb 1, Due Sun. Feb 7
7-Feb	• Distributions • Decision Making	Ch 5 and 6	Assignment #2, Ch 4,5 & 6 (standard normal FINC) -Given Weds. Feb 10, Due Tues. Feb 16
14-Feb	• Sampling • Confidence Intervals	Ch 7 and 8	
21-Feb	• The Hypothesis • Review	Ch 9	Assignment #3, Ch 7, 8, & 9 (hypothesis testing) -Given Mon. Feb 22, Due Sun. Feb 28
28-Feb	• Assessment #1 • Regression	Ch 10	
6-Mar	• Regression continued • Advanced Topic: Logistical Regression	Ch. 11, 17-4a, & See Blackboard (Logistical Regression)	
13-Mar	• Spring break		
20-Mar	• Time Series and Forecasting • TBD	Ch 12	Assignment #4, Ch 10, 11, 12, & 17-4a (Prediction with logistical regression) -Given Mon. Mar. 21, Due Sun. Mar. 27
27-Mar	• Optimization Modeling	Ch 13 and 14	
3-Apr	• Simulation/Predictive Modeling	Ch 15 and 16	Project -Given Weds. Apr. 6, Due Tues. Apr. 26
10-Apr	• Advanced Topics: Data mining • Markov models	Ch 17 & See Blackboard (Markov models)	
17-Apr	• Machine Learning and Image Classification • Review	See Blackboard (Machine Learning)	
24-Apr	• Assessment #2 • Final Projects	Final Project	
1-May	• Final Projects • Last Class, Wed May 4	Final Project	Final project