Stuart School of Business
ILLINOIS INSTITUTE OF TECHNOLOGY

Illinois Institute of Technology
Stuart School of Business
Course Syllabus[1]
Spring 2011

Instructor Information

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TA Information:	TBA
TA's Office hours:	TBA

Course Information

Course #:	BUS221
Course name:	STATISTICS FOR MANAGERIAL DECISION MAKING

Course description and objectives:

Business decisions are often difficult and risky because decisions have to be made with incomplete and imperfect information. The primary purpose of this course is to introduce the basics of modeling and analyzing complex problems that involve business decision making under uncertainty. Students learn probability theory and some basic statistical concepts and procedures. The course emphasizes techniques for formulating decision problems and analyzing data. You will also learn how to use computer software in decision and statistical analyses. Learning objectives are summarized below:

- Understand descriptive statistics, probability, discrete and continuous distributions, confidence intervals, hypothesis testing, regression, and other statistical topics.
- Use Microsoft Excel to solve statistical problems such as regression and statistical inference.
- Apply statistical concepts to real-world situations, and solve decision problems.

Course day and time: Tuesdays and Thursdays 10-11:15am, SB 113

[1] **Note**: The instructor reserves the right to change the syllabus. You will be given sufficient advance notice for major changes.

Course Materials

Text:

S. Christian Albright, Wayne Winston, Christopher Zappe, "***Data Analysis and Decision Making with Microsoft Excel"*** (with CD-ROM and Decision Tools and Statistic Tools Suite), 3rd Edition, 2008, South-Western College Pub, ISBN 0324662440.

Note:

- The textbook is available for purchasing at the campus bookstore.
- One book has been kept on reserve in the Galvin library (call number PC 1012). You can check out and read it in the library.
- It is NOT mandatory to purchase the book. My lecture notes will be self-contained.

Lecture Notes:

The following documents will be available on the course website (Blackboard):

- Syllabus of the course
- Course notes (PowerPoint slides for each class)
- Homework assignments
- Data files for the assignment problems
- Solutions for the assignments and quizzes
- Guides for using the software features

Throughout the course, there will be announcements and updated documents posted on our course website, so please visit the website periodically.

Software and Data Files:

1. Statistical Analysis : Microsoft Excel

This course focuses on the use of *Microsoft Excel* for modeling and analysis. However, you are free to use any other software (SPSS, SAS, etc.) for your assignments. I assume that you know (or will immediately learn) how to use a spreadsheet package. *Excel* will be used with some regularity in this course and will be used extensively later in the business program. This course should provide a good opportunity for you to become familiar with this software package before you are asked to do more sophisticated work required in future classes. A tutorial that I wrote, "Excel Guide for Statistical Analysis" provides some basic information on how to use *Excel* for statistical analyses. This tutorial is available on the course website.

2. Decision Analysis: PrecisionTree or TreePlan

The textbook, *"Data Analysis and Decision Making,"* integrates Palisade Corporation's *DecisionTools* suite of software. *DecisionTools* is designed specifically to work with and enhance the capabilities of *Microsoft Excel* for use by decision analysts. Components in this software package include:

PrecisionTree, TopRank, @Risk, Bestfit, and *RiskView*. You are encouraged to learn how to use the software package.

In the textbook, instructions have been included in the appropriate chapters for using the programs that correspond to the chapter topic. The instructions provide guides through the important features of the programs. They are intended to be a self-contained tutorial. Additionally, a tutorial that I wrote, "Guide for *PrecisionTree*", will provide step by step explanations on the usage of this software and will be a guide for learning how to build a decision tree and perform some other analyses. This tutorial is available on the course website.

The *DecisionTools* Suite CD contains:

- Palisade Decision Tools Suite (software that will be used in the course)
- Palisade StatTools Add-in for Excel. (This feature of Excel will be very useful while working on some of the exercises in the textbook.)
- Tutorials

While installing the CD, just insert the CD into your CD-Rom drive and follow the steps that appear on the screen. After the installation, you will have:

- A new program, "Palisade Decision Tools", installed under your "Program Files" in your hard drive and you will be able to run this program by selecting it from the "All Programs" toolbar on your "Start" bar which is at the left bottom corner of your screen.
- A new Add-in for Excel, "StatTools". To make this feature appear on your tool toolbar of Excel, after installation, click on "Tools" at the top of the Excel screen, select "Add-In", on the new screen at the left select the box by "StatTools" and click OK.
- Go to TA's office hours if any difficulties with the installation

Alternatively, you can use *TreePlan*. The installation files of *TreePlan* is available on the Blackboard, along with a tutorial. The functionality is identical to *PrecisionTree*.

3. Data Files

There will be another CD at the back of the textbook which contains data files for the examples, problems and cases of the textbook. Please install it by following instructions.

Note: If you encounter any problems with installation or have any question related to the CDs, please stop by TA's office hours.

Course & Instructor Policies

Assignments Submission Policy:

I will assign a number of exercises for each lecture, which will help you to understand the concepts and the methods introduced in lectures and how to apply them to solve business decision problems.

All problem sets can be done in groups of THREE. If one cannot attend the class on the due date, use the digital drop box on the blackboard to submit.

EMAIL SUBMISSIONS WILL BE DISREGARDED.

We permit a 24-hour extension on ONE homework assignment during the semester. In order to take advantage of this extension, an email needs to be sent to the instructor at least THREE hours before the homework is due. Other late submissions will receive no credit, without exception.

Class attendance, conduct and discipline:

- We keep track of your attendance.
- Come to class on time.
- Well-prepared for classes.
- Actively involved in the class discussion.
- Do the assignments on time.
- Make good use of our office hours!
- "Ownership" and responsibility for the success of the course.

It is your responsibility to keep up with the material. But if you find that you are falling behind and you feel that the course material is extremely difficult, do not hesitate to seek help. Make an appointment with the instructor or the TA. Ask other students. Remember that the longer you wait before dealing with the problem the harder it will be to fix it.

Readings and review sessions:

Often the concepts are more difficult to truly understand than they may first appear. I will assign reading materials for each lecture (See Course Schedule). You should read the assigned material thoroughly at least twice: once before coming to class, and again soon afterward. The true test of your comprehension of this material is your ability to apply it to problems.

We will conduct a review session prior to each quiz or exam. During each session, a review of key concepts, and example problems will be worked through.

Grading System/Policy

Grading Scheme:

Attendance	5%
Homework	10%
Quizzes	10%
Mid-Term	35%
Final	40%

Grade Scale: TBA

Disabilities

Reasonable accommodations will be made for students with documented disabilities. In order to receive accommodations, students must obtain a letter of accommodation from the Center for Disability Resources and make an appointment to speak with me as soon as possible. My office hours are listed on the first page of the syllabus. The Center for Disability Resources is located in the Life Sciences Building, room 218, 312-567-5744 or disabilities@iit.edu

Copyright/Plagiarism/Academic Integrity
Rules on Plagiarism and Academic Integrity

Plagiarism and other violations of academic integrity are strictly prohibited and subject to penalty as defined by the University. Information about the IIT academic requirements for graduate students can be found at:

http://www.iit.edu/graduate_admission/admitted_students/orientation/pdfs/Graduate_Student_Handbook.pdf

The academic integrity material in the handbook is found at page 31 in the IIT student handbook. Other parts of the handbook also contain material and rules that apply to graduate students. Students will be expected to conform to the rules and procedures set forth in the handbook.

The code of conduct governing writing by students at IIT requires original writing, prohibits plagiarism and provides severe sanctions for plagiarism. Original writing consists of thinking through ideas and expressing them in your own way. If the ideas are from other sources, use footnotes or other citation methods to indicate the source of the ideas. Plagiarism is the act of passing off someone else's work or ideas as your own. The sanctions include, but are not limited to, expulsion and the imposition of a punitive grade of 'E'.

What is Plagiarism?

Often there is some confusion as to what constitutes plagiarism. Plagiarism is the act of passing off someone else's work as your own. To assist in providing an understanding of the types of writing that constitute plagiarism, three types of are each discussed below. Also discussed below is the problem of "string citations." String citations are not plagiarism, but many professors will reject string citations because they are not the student's original work.

Word for Word copying: The use of any phrase or excerpt from another source requires the use of quotation marks around the copied material, or if the material is more than a few lines, the copied material should be placed in its own indented paragraph. A citation in proper form is always required to identify the source.

Plagiarizing by Paraphrase: When a writer uses a source, substitutes words and sentences, or even changes the order but keeps the meaning of the original, a citation is required. In the example given below, the original is on the left. The paraphrase in the right box constitutes plagiarism.

Original: It is not generally recognized that at the same time when women are making their way into every corner of our work-world, only one percent of the professional engineers in the nation are female. A generation ago, this statistic would have raised no eyebrows, but today, it is hard to believe.	Paraphrase: Few people realize now that women are finding jobs in all fields, that a tiny percentage of the country's engineers are female. Years ago this would have surprised no one, but now it seems incredible.

The writer could avoid plagiarism here by acknowledging the source and providing a proper citation.

Mosaic Plagiarism: Here the writer lifts phrases and terms from the source and embeds them in his own prose. An example follows in which the lifted phrases are underlined:

The pressure is on to get more women into engineering. The engineering schools and major corporations have opened wide their gates and are recruiting women zealously. Practically all women engineering graduates can find attractive jobs. Nevertheless, at the moment, only one percent of the professional engineers in the country are female.

Mosaic plagiarism is sometimes caused by careless note taking. However, it looks dishonest and is judged as such. The use of quotation marks around the original wording and citation avoid the problem of plagiarism. Often a better approach is to use paraphrase or to quote directly (with appropriate citations).

Plagiarism can be avoided by providing citations for the sources of any material, including *ideas, phrases, or sentences* that you have used in your paper. A number of different systems are available for providing citations. The key to all of them is that the writer must clearly identify for the reader the sources of all material (including ideas) that have come from somewhere else.

String Quotation Problem: Sometimes a student will write a paper consisting of a string of quotations. It is usually much better for a student to provide his or her own analysis and write the paper in his or her own words. Many professors will reject a paper consisting primarily of material quoted from other sources because they do not view such a paper as the student's own work. You should understand your professor's view with respect to string quotations prior to writing your paper.

Course Schedule and Important Dates

Course Schedule

Lecture 1: *Introduction & Decision Trees* (Albright Ch. 1 and 7)

Before Class

- Browse Ch. 7.1 to 7.3 "Decision Tree Model" Section
- Read Case: **Warren Agency** (See Page 12)

After Class

- Browse Ch. 1
- Read Ch. 7.1 to 7.3 "Decision Tree Model" Section
- Read "*Guide for Precision Tree*"
- Solve the decision tree for Warren's problem first by hand then using PrecisionTree.
- Solve Problems in Ch. 7: 7-36(a), 7-37(a,b)

Additional Problems

- Solve Problems in Ch. 7: 7-64 (a, b)

Note:

- ***After Class* problems are NOT your homework assignments.**

Lecture 2: *Risk Profiles* (Ch. 7)

Before Class

- Read Ch. 7.1 to 7.3.
- Read Case: **New Product Introduction** and construct a decision tree for the case.
- For each of the strategies in **Warren Agency Case**, (a) construct a risk profile (table) and (b) calculate the expected monetary value.

After Class

- Create risk profiles and cumulative risk profiles for **"New Product Introduction Case"**
- Solve Problems in Ch. 7:
  7-36 (c) Generate a risk profile for each of Carlisle's possible decisions in this problem,
  7-37 (d) Generate a risk profile for each of the landowner's possible decisions.
  7-38 (a,b) and (d) Generate a risk profile for each of Techware's possible decisions.
  7-63 (a,b) and (d) Generate a risk profile for each of Mr. Maloy's possible decisions.

Additional Problems

- Case: **Westhouser Paper Company**

Lecture 3: *Sensitivity Analysis* (Ch.7)

Before Class

- Read Ch. 7.3 "Sensitivity Analysis" Section
- Read Case: **Rainbow Airlines.**

After Class

- Read "Guide for Precision Tree"
- Case: **Rainbow Airlines**. Read the case and solve the questions by using PrecisionTree or by hand.

- Solve Problems in Ch. 7: 7-36(b), 7-63(c) (Perform one-way sensitivity analysis for three varaibles: the probability of being in an accident, the collision insurance premium, and deductible amount).

Additional Problems

- Problems in Ch.7: 7-67

Lecture 4: *Probability Theory I* (Ch. 5)

Before Class

- Read Ch. 5.1, 5.2, 5.6, 5.7. Study the examples in these chapters.

After Class

- Solve Problems : 5-6, 5-32 (a-d), 5-54

Additional Problems

- 5-7

Lecture 5: *Probability Theory II* (Ch. 7)

Before Class

- Read "Bayes' Rule" in Ch. 7. Study the examples in these chapters.

After Class

- Solve Problems in Ch. 7: 7-45, 7-46.

Additional Problems

Case 5.1: ***Simpson's Paradox.*** Solve the case and prepare a joint probability table(s) for the given probabilities.

Lecture 6: *Value of Information (Ch. 7.5)*

Before Class

- Read Ch. 7.5. Study the related examples.

After Class

- Solve Problems in Ch. 7: 7-48, 7-50, 7-52, 7-71.

Additional Problems

- Solve Problems in Ch. 7: 7-68.

Note:

- By now you should have read "Excel Guide for Statistical Analysis" and become familiar with some basic Excel functions (e.g., Average, Stdev, Var, Min, Max, Count, Median, Mode, Sqrt, Sum). You should also learn how to use the other functions (e.g., Rand, Binomdist, Normdist, Norminv) and tools (e.g., Descriptive Statistics Tool) from the tutorial "Excel Guide for Statistical Analysis " which will help you to work though assignments in the next several weeks.
- StatTool Add-In feature of Excel can be installed from the CD that comes with your textbook. I suggest that you familiarize yourself with this feature of Excel by scanning Ch.2 of your textbook.

Lecture 7: *Describing Data* (Ch. 3), *Probability Distributions I* (Ch. 5.3-5.8)

Before Class

- Read Ch. 2.1-2.3, Ch. 3, Ch. 5.3 -5.8. Study the examples.

- Read Case 3.1 (The Dow Jones Averages) and 3.2 (Other Market Indexes). Do not try to answer the questions, just look over the cases.

After Class

- Solve problems 3-5, 3-8, 3-23, 5-11, 5-67 (a,b,e,f)

Additional Problems

- 5-73

Lecture 8: *Probability Distributions II* (Ch. 6.4- 6.5)

Before Class

- Read Chs. 6.1, 6.4, and 6.5. Study the examples and get familiar with the functions in Excel.
- Read Case**: *Overbooking By Airlines***.

After Class

- Solve Case**: *Overbooking By Airlines***
- Solve problems in Ch. 6: 6-19, 6-35 and 6-64.

Additional Problems

- Case 6.1 **(EuroWatch Company):** Solve questions 1 and 2 by reasonable trials

Lecture 9: *Probability Distributions III* (Ch. 6.2 - 6.3*)*

Before Class

- Read Chs. 6.2 and 6.3. Study the examples and get familiar with the functions in Excel.

After Class

- Solve problems in Ch. 6: 6-2, 6-6, 6-17 and 6-51.

Additional Problems

- 6-58

Lecture 10: *Sampling I* (Ch.8)

Before Class

- Read Ch. 8. Study the related examples.

After Class

- Solve problems 8- 21, 8-32, 8-33.

Lecture 11: *Sampling II* (Ch.8)

Before Class

- Read Ch. 8.4 and study the related examples.

After Class

- Solve problems 8-46(a,b,c), 8-74.

Lecture 12: *Interval Estimation (Ch. 9.1 to 9.5)*

Before Class

- Read Ch. 9.1 to 9.5. Study the examples.

After Class

- Solve Problems in Ch. 9: 9-1, 9-2, 9-15, 9-19, 9-43, 9-44(a,b), 9-45

Lecture 13: *Hypothesis Testing* (Ch.10.1 to 10.4.1)

Before Class

- Read Ch. 10.1 to 10.4.1. Study the examples.

After Class

- Solve Problems in Ch.10: 10-1, 10-2, 10-5, 10-6, 10-7

Lecture 14: *Two Populations* (Ch. 9.7, 9.8, 10.4.2, 10.4.4)

Before Class

- Read Ch. 9.7, 9.8 and Ch. 10.4.2, 10.4.4. Study the examples.

After Class

- Solve Problems in Ch. 10: 10-9, 10-11, 10-19, 10-31
- Solve Case: ***Delivery Times at SnowPea Restaurant*** (AWZ Case 9.3, page 476)

Lecture 15: *Correlation and Simple Linear Regression* (Ch. 11.1 to Ch. 11.4)

Before Class

- Read Ch. 11.1 to 11.4. Study the examples.

After Class

- Solve Problems in Ch. 11: 11-1, 11-5.

Lectures 16: *Time Series and Forecasting* (Ch. 13)

Before Class

- Read Ch. 13. Study the examples.

After Class

- Solve problems in Ch.11: 11-16, 11-35, 12-2.

Important Dates[2]

	Date	Lectures	Homework Due	Quiz
1	T, 01/11	L0 Introduction		
2	H, 01/13	L1 Decision Trees		
3	T, 01/18	L2 Risk Profiles		
4	H, 01/20	L3 Sensitivity Analysis		
5	T, 01/25	L4 Probability Theory I	HW #1 (L1-2)	
6	H, 01/27	L4 Probability Theory I		
7	T, 02/01	L5 Probability Theory II	HW #2 (L3-4)	Quiz #1 (L1-4)
8	H, 02/03	L6 Value of Information		
9	T, 02/08	Review Session		
10	H, 02/10	L7 Data and Distributions I		
11	T, 02/15	L7 Data and Distributions I	HW #3 (L5-6)	Quiz #2 (L5-6)
12	H, 02/17	L8 Distributions II		
13	T, 02/22	L9 Distributions III		
14	H, 02/24	Review Session		
15	T, 03/01	Review Session	HW #4 (L7-9)	Quiz #3 (L7-9)
16	H, 03/03	L10 Sampling I		
	T, 03/08	**Midterm Exam**		
	H, 03/10	TBA		
	03/14-18	*Spring Break, No class*		
17	T, 03/22	L11 Sampling II		
18	H, 03/24	L12 Interval Estimation		
19	T, 03/29	L12 Interval Estimation	HW #5 (L10-11)	Quiz #4 (L10-11)
20	H, 03/31	L13 Hypothesis Testing		
21	T, 04/05	Review Session		
22	H, 04/07	L14 Two Populations		
23	T, 04/12	L15 Regression Analysis	HW #6 (L12-13)	Quiz #5 (L12-13)
24	H, 04/14	L15 Regression Analysis		
25	T, 04/19	L16 Time Series		
26	H, 04/21	L16 Time Series		
27	T, 04/26	Review Session	HW #7 (L14-16)	Quiz #6 (L 14-16)
28	H, 04/28	Review Session		
	05/02-06	**Final Exam Period**		

Last Day to Add/Drop the class: January 21
Last Day for Official Withdrawal: March 28
Final Grades Due: May 11

[2] **Note**: The instructor reserves the right to change the dates. You will be given sufficient advance notice for major changes.

CASE:
Warren Agency, Inc.

Mr. Thaddeus Warren operates a real estate agency, which specializes in finding buyers for commercial properties. One day, Mr. Warren is approached by a prospective client who has three properties in and adjoining Cambridge, Massachusetts, which he wishes to sell. The client indicates the prices he wishes to receive for these properties as follows: **Allston**: $25,000, **Belmont**: $50,000, **Cambridge**: $100,000

Warren would receive a commission of 4 percent on any of the properties he is able to sell.

The client lays down the following conditions for an exclusive listing: "Warren, you have to sell the Allston property first. If you can't sell it within a month, the entire deal is off—no commission and no chance to sell the other properties. If you sell the Allston property within a month, then I'll give you the commission for Allston and the option of (a) stopping at this point, or (b) trying to sell either the Belmont or Cambridge properties next under the same conditions (i.e., sell within a month or no commission on the second property and no chance to sell the third)."

After the client leaves, Warren proceeds to analyze the proposal to determine whether or not to accept it. He figures his selling costs and his chances of selling each property to be:

Property	*Cost*	*Warren's assessment of probability of sale*
Allston (A)	$800	0.7
Belmont (B)	$200	0.6
Cambridge (C)	$400	0.5

Should Mr. Warren accept this deal? Why?