

**Illinois Institute of Technology
Stuart School of Business**

SYLLABUS¹

**BUS 221:
STATISTICS FOR MANAGERIAL DECISION MAKING
Spring 2009**

Professor: Jiong Sun
Offices: IGTC 4A 3-2, DTC 444
Phones: 312-567-5009 (M/W), 312-906-6527 (T/H/F)
Email: jsun22@iit.edu
Office hours: Tuesdays Noon-10pm, 4A3-2

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:

- Demonstrate knowledge and understanding of 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.

Class Meeting Times:

Mondays and Wednesdays: 10:00 am – 11:15am

Note: Lectures are “required”, and we will keep track of attendance. Students should sign their name (and only their name) next to their printed name on the attendance sheet.

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

Textbooks and Handouts:

Textbook

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. A copy of it will be kept on reserve in the Garvin library (call number PC 1012). You can check out and read it in the library.

Handouts

Copies of the slides used in class lectures will be available at the start of classes.

Course Website:

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

- Syllabus of the course.
- Course Notes (PowerPoint slides for each class).
- 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.

Assignments:

Readings

Often the concepts are more difficult to truly understand than they may first appear. I will assign reading materials for each lecture (See Table: Course Schedule, Readings, and Assignments). 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.**

Assignments

I will assign a number of individual 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. **The solutions for all individual assignments will be provided on-line.** It is very important for you to follow the course schedule in working on the homework problems.

To satisfy the needs of students who are interested in working on more problems, I will also post solutions for some problems given in the textbook although they are not part of the assignments.

Assignment Submission Policy

Homework reports should be turned in to the instructor at the beginning of the class on the due date. If one cannot attend the class on the due date, use the digital drop box on the blackboard to submit. NO EMAIL SUBMISSION please.

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 TA at least THREE hours before the homework is due. Other late submissions will receive no credit, without exception.

Computer Software:

1. Statistical Analysis

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" will provide some basic information on how to use *Excel* for statistical analyses. This tutorial will be available on the course website.

2. Decision Analysis

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 required to know the first one, *PrecisionTree*, very well in this class. You are encouraged to learn how to use other components in the software package. **You should become familiar with *PrecisionTree* by the end of week 2.**

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 will be available on the course website.

Grading Policy:

Assignments	25%
Quizzes	10%
Midterm	25%
Final Exam	35%
Attendance and Participation	5%
Total	100%

If one fails to turn in 3 or more homework assignments or is absent for 4 or more lectures, he/she will receive a “D” or below.

We will lead a review session prior to each quiz or exam. During the sessions, a review of the key concepts, and example problems will be worked through. Please make sure you are available for these sessions.

What is expected of you?

- Well-prepared for classes.
- Come to class on time.
- Actively involved in the class discussion.
- Do the assignments on time.
- "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. Ask other students. Remember that the longer you wait before dealing with the problem the harder it will be to fix it.

What can you expect from the Instructor?

- High commitment to teaching
- Well-prepared for classes
- Be concerned about students' needs and be available to help.
- Fair treatment of every student
- Provide thorough and prompt evaluations of students' exams

How to Install the CDs that comes with the textbook

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.) Not compatible with MS 2007.
- 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.

There will be a 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 CD, do not hesitate to ask questions by sending e-mails to the TA.

Americans with Disabilities Act (ADA) Policy Statement

Reasonable accommodations will be made for students with documented disabilities. In order to receive accommodations, students must contact the Center for Disability Resources. The Center for Disability Resources (CDR) is located in Life Sciences Room 218, telephone 312 567.5744 or disabilities@iit.edu.

Honor Code

Students must adhere to the school's honor code. An electronic copy can be found at (<http://www.iit.edu/%7Eosa/Handbook/index.html>). Please take the time to read it if you have not yet done so. If you have any questions or concerns regarding appropriate behavior, please do not hesitate to contact me.

I take academic honesty violations extremely seriously, and will seek full academic sanctions for cheating and plagiarism violations. If you use any outside sources (internet, other textbooks, friend's work, etc) to aid you in the completion of any assignment, you must acknowledge the original source. Failure to do so will be considered cheating.

Course Schedule, Readings, and Assignments

Note:

- The instructor will let you know which problems are required to submit. Solutions will be posted on the course website after the due date.

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** (attached)

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: You should become familiar with *PrecisionTree* by the end of week 2.

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

Before Class

- Read Ch. 7.1 to 7.3.
- Read Case: **New Product Introduction** and use *PrecisionTree* to 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.
- Solve Problems in Ch. 7: 7-36(b), 7-63(c) (Perform one-way sensitivity analysis for three variables: 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.
-

Course Review 1

- 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 problem 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 problem 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 problem 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 Liner 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.
-

Lecture 16: Simple and Multiple Regression (Ch. 11.4, 11.5)

Before Class

- Read Ch. 11.4, 11.5. Study the examples.

After Class

- Solve problems in Ch.11: 11-16, 11-19, 11-21, 11-24.

**Lecture 17: *Dummy Variables & Interaction Variables, Nonlinear Transformations*
(Ch. 11.6.1, -- 11.63)**

Before Class

- Read Ch. 11.6.1, 11.6.2. Study the examples.

After Class

- Solve problems in Ch. 11: 11-28, 11-31, 11-35, 11-37, 11-38

Lectures 18: *Time Series and Forecasting* (Ch. 13)

Final Review
