ECON 2142 Statistical Decision Making

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Office Hours: Monday-Thursday 5:00 – 6:00

This course, **Statistical Decision Making,** is the second course of statistics required for major in Economics and Business undergraduate degree. The first course, which is a prerequisite for this course, is **Statistics I** (introductory Statistics). If you have not taken and passed **Statistics I,** you should not take this course**.**

The primary objective of this course is to provide an elementary but comprehensive introduction to statistical decision making process, without resorting to matrix algebra, calculus or statistics beyond what is learned at the introductory level Statistics. In this course we learn how the tools of economic theory, mathematics and statistics are applied to model building and application in real world economic and business setting. In Statistics I we learned how Classical Hypothesis Testing (CHT) helps us to make statistical decision based on probabilities of committing Type I and Type II errors. In this course we further explore how based on limited information and under uncertainty, with an eye on potential costs and benefits, decisions and estimation are made. We will also cover the basic elements of *Statistical Quality Control*, an extremely important aspect of modern production processes, associated with the name of statisticians like Walter Shewhart and W. Edward Deming.

As part of this course we utilize some of the Statistical tools embedded in the ***Microsoft Excel.*** Simple and Multiple Regression routines of MS Excel are used to do problems that normally require massive amount of computations. Fordham University now provides Microsoft Office 365 -- Word, Excel, PowerPoint and Access—for Mac or PC free to all students. To download, go to My.Fordham.edu under "My Apps" on your Student tab and follow the link. The software will remain accessible on your computer while you are an active student at Fordham.

If we have time, I will introduce students to **R**; a powerful free software developed collaboratively by a large number of contributors from all over the world. **R** is an integrated suite of software facilities for data manipulation, calculation and graphic display.

Text: **Text that was used for Statistics I, or you can download a comprehensive Introductory Statistics text from the OpenStax College of Rice University for a voluntary small donation or even free (I recommend $10 donation).** The site is http://cnx.org/content/col11562/latest/

(***OpenStax College at Rice University – see OpenStax.org -- is a non-profit organization committed to improving student access to quality learning materials. OpenStax free textbooks are developed and peer-reviewed by educators to ensure they are readable, accurate, and meet the scope and sequence requirements of modern college courses. Through partnerships with companies and foundations committed to reducing costs for students, OpenStax College is working to improve access to higher education for all***.)

You can also download an Introductory Statistics textbook from Open Textbook Library site

https://www.saylor.org/site/textbooks/Introductory%20Statistics.pdf

(Go to http://open.umn.edu/opentextbooks/ and learn more about University of Minnesota textbooks that are freely available.)

Finally, if you rather have a hard copy of an Introductory Statistics book, I have a stack of them in my office and you are welcome to borrow a copy.

Topics covered first half of the course:

- Review of Statistical Tools form Stat I:
    - Measures of Central Tendencies and Dispersion.
    - Coefficient of Variations (hand out) and Correlation Coefficient
    - Central Limit Theorem and Sampling Distribution of Estimators (hand out)
    - Interval estimations
    - Hypothesis Testing; Probability of Type I and Type II errors; P-value; Power of the Test
- Test of Hypothesis involving two populations, paired samples t test
- χ^2 Chi-Square goodness of fit test and test of independence.
- Simple Linear Regression Model, covering
    - Estimation
    - Hypothesis Testing
    - Forecasting and Prediction

- Multiple Regression Model.

At this juncture students are encouraged to read the article "What Educated Citizens Should Know About Statistics and Probability" by Jessica Utts (a PDF copy will be provided.) This article that appeared in the *American Statistician* May 2003 edition is recommended by the American Statistical Association to be read by students in Statistics classes.

First Exam

Topics covered second half of the course:

- Special Topics in Multiple Regression Analysis.
    - Models involving Polynomial.
    - Estimating Equations in Logarithmic Form

      (I will cover logarithm and provide handout)
    - Use of Dummy Variables in Regression Models.
- Time Series Analysis:
    - Estimation of Trend Component
        - Linear trend
        - Polynomial Trend
        - Exponential Trend
    - Autoregressive Models
- (If we have time) Elements of Statistical Quality Control
    - Monitoring Process Mean
    - Monitoring Process Variation
    - Monitoring Proportion of Defectives

Final Exam

Grading and other Policies

Your course grade will be based on two in-class examinations, a mid-term and a final, each worth 45%. The remaining 10% is for weekly homework and class attendance. I will assign homework at the end of each class. The assigned problems will be due the following Monday. I will grade and record at least 3 of the major home works. I encourage you to form small study group and study together, but home works must be done independently.

You need a calculator on the exams; use of calculator function of a cell phone on the exams is not allowed. Students with graphic calculators cannot use the statistical functions of their calculator to do the exam problems. On the test you must show all the necessary computations.

It is very important that you do all the assignments on time and very neatly. ***Class attendance in this course is a necessity.***