Course Description:

“The sexy job in the next ten years will be statisticians.”

- Hal Varian, Google Chief Economist, 2009

Advancing information technology has greatly expanded the approach to data analysis and opened many new frontiers and opportunities for statisticians. Enormous amounts of digital data are now collected, stored, processed, and transmitted rapidly at relatively low cost. Longitudinal data systems are developing and evolving as new data sources for longitudinal and time series analyses. However, abundance of available data does not replace the need for properly designed data collection and statistical thinking in applying effective longitudinal analytical methods to visualize and extract maximum information. This course will discuss and impart important ideas and methods in the creation and analysis of longitudinal data with emphasis on practical real-life issues and fundamental statistical concepts.

Learning Outcome: Upon completion of the course, the student will be able to

- Understand and apply principles and methods to collect and analyze longitudinal data
- Explore new opportunities in longitudinal data systems and analysis with statistical thinking
- Appreciate the practical real-life considerations and challenges

Grading:

- Weekly Homework/Reading Assignments 30%
- Class Participation 10%
- Quizzes (5-7) 30%
- Final Project 30%


Additional reading on recommended sources will be assigned.
Software: Primarily SAS with some use of R (download from
Visit http://citl.gwu.edu/pages/sas.html for a copy of SAS on your PC
Visit http://cran.r-project.org/bin/macosx/ for a copy of R for Mac OS X
Visit http://cran.r-project.org/bin/windows/base/ for a copy of R for Windows
Visit http://math.illinoisstate.edu/dhkim/rstuff/rtutor.html for simple R tutorial
detailed R tutorial

Prerequisite: STAT 6201-6202 Introduction to Mathematical Statistics or equivalent

Course Outline:
- Review of statistical fundaments
  Mathematical Statistics; Multivariate/Time Series Analysis; Modeling
- Introduction to Longitudinal Studies
  Exploratory Data Analysis; Visualization; Traditional Analysis
- Consequences and Implications of The Internet Age
  Data Availability; Data Integration; System Design; Longitudinal Data Systems; Data Mining
- Modeling and Analysis of Longitudinal Data
- Practical Issues and Challenges
  Missing Values; Imputation; Statistical Computing; Confidentiality Protection; Data Quality
- Public Policy and Advanced Topics

Blackboard:
Check http://blackboard.gwu.edu/ for the latest course information.

Class Lectures/Notes:

Class Policy:
Students are expected to attend class, participate, and turn in assignments regularly and on time. Late
homework will not be accepted.

Academic Integrity:
I personally support the GW Code of Academic Integrity. It states: “Academic dishonesty is defined as
cheating of any kind, including misrepresenting one’s own work, taking credit for the work of others
without crediting them and without appropriate authorization, and the fabrication of information.” For
the remainder of the code, see: http://www.gwu.edu/~ntegrity/code.html.

Security:
In the case of an emergency, if at all possible, the class should shelter in place. If the building that the
class is in is affected, follow the evacuation procedures for the building. After evacuation, seek shelter at
a predetermined rendezvous location.