STAT430 Syllabus

Benjamin Kedem

Fall 2021

STAT 430 Introduction to Statistical Computing with SAS
August 30, 2021 - Decmber 13, 2021
MWF 10:00am - 10:50am, PHY 2124

Prerequisite: STAT400 or STAT410.
Instructor: Professor Benjamin Kedem, bnk@umd.edu
Office Hours: After class until 12pm.

Text: R.P. Cody and J.K. Smith, *Applied Statistics and the SAS Programming Language*, 5th Edition, Prentice Hall.

Course Description: This very useful applied statistics course provides an introduction to statistical computing with SAS software. SAS will be used to execute a large number of statistical procedures and manipulate data sets. We'll cover topics in estimation and hypothesis testing, particularly in regression problems, followed by SAS applications. See the lectures at:

$$\textbf{http}://\textbf{www.math.umd.edu}/\sim \textbf{bnk}/\textbf{STAT430}/$$

Specific Topics Include:

- Review of some important probability distributions.
- Review of hypothesis testing and confidence intervals, significance, p-value.
- Introduction to SAS, PROCS: MEANS, PRINT, SORT, UNIVARIATE, CHART, PLOT. If, Else.
- Categorical data analysis, Questionnaire design, PROC FREQ, Two by two tables, Tests of independence, χ^2 and Likelihood ratio tests, Odds ratio, Risk, Fisher exact test, Meta analysis.
- Correlation (Pearson, Spearman), PROC CORR.

- Simple linear regression, PROC REG, Sums of squares decomposition, F and t-tests, R^2, Degrees of freedom.
- Multiple linear regression, Gauss-Markov Theorem, Dummy variables, Simple time series models, PROC REG, Forward and Stepwise selection, PROC MIXED to get AIC and BIC.
- Logistic regression, Logit, PROC LOGISTIC, Probit regression, PROC PROBIT.
- t-test, Wilcoxon Rank-Sum test, Paired t-Test, Independence of the sample mean and variance in normal samples.
- PROC NPAR1WAY, PROC TTEST, Analysis of variance, PROC ANOVA, Multiple comparison, SNK, SCHEFFE, Interactions.
- Generation of random data, do loops, a time series example.
- Analysis of covariance, PROC GLM
- Repeated measures design, Mixed effects models,
- Reading external files using INFILE and INPUT, Writing to an external file using FILE and PUT, Data manipulation (Subsetting, Merging, Look-up table).

Homework and Quizzes (15%**):** About 10 HW assignmnts. Occasional pop quizzes. HW Assignments in pdf must be emailed to the TA.

Exams (75%**):** One midterm (35%), Final (40%).

Individual Project (10%**):** Each student is to formulate his/her own statistical problem, and apply SAS to it. This requires: a. Description of the problems. b. Collection of data. c. Running SAS. d. Conclusions. e. Presenting the results in class. f. Writing a short paper addressing a-e. The paper in pdf must be emailed to the TA after the presentation. It is a good idea to start working on the project, at least its formulation, as early as possible.

Learning Outcomes: 1. Understanding of important statistical ideas in estimation and hypothesis testing. 2. Being able to apply useful SAS procedures to real world problems. 3. Ability to make reasonable assumptions to match theoretical and practical considerations. 4. Interpretation of SAS output.

Creating SAS Acct Online

1. Go to https://odamid.oda.sas.com/SASODARegistration/
2. Select a region: United States

3. Fill out the registration information, including email.
4. You will get a link by email to activate your registration. Click on the link.
5. You'll be directed to a web page to create an account and set a password.
6. After creating the account, you'll be able to log on to the SAS website and start using **SAS Studio** over a web interface.
7. Note: For ID you may use your email address.

Calculator

Students are requested to bring calculators to each class.

Re: Student Masking in Campus Classrooms

According to the University's COVID-19 compliance guidelines, any student with an approved COVID-19 vaccination exemption must wear a mask at all times while indoors and outdoors when around others. These students must also be tested twice each week for COVID-19 and must sign the University Health Center's Memorandum to Unvaccinated Individuals. Additionally, current County and University guidelines require all individuals to wear a mask indoors. Any student not abiding by these expectations may be in violation of the Code of Student Conduct, Part 10(e)(3): Failure to comply with a directive of University officials.