Course Title: Applied Methods in Epidemiologic Research

Course Number: EPID 0657

Course Location: School of Public Health, Computing Lab (Newark MSB, C-Level)

Course Date & Time: Tuesdays, 6:00-9:00pm

Course Instructor: Dennis Fried, PhD, MPH, MBA (Department of Epidemiology)
dennis.fried@optimum.net (preferred), friedda@sph.rutgers.edu

Office Hours: By Appointment Only

Course Assistant: None


Required Course Materials: USB Thumb Drive (at least 4 GB)

Additional/Supplemental Readings/Resources:

Course Description: This is an intermediate course designed to provide students with hands-on experience in the integration of epidemiologic theories and concepts with the analysis of study data. Students are introduced to various analytic approaches and quantitative methods for investigating public health issues, with a particular focus on logistic regression models. Students work on a publicly available dataset and work in designated groups throughout the semester. Students develop focused research hypotheses to investigate, build analytic models, and analyze and interpret the data applying the range of methods presented in lecture using SAS software. The data analysis project culminates in both oral and written presentations. Homework and a closed-book midterm examination are also required.

Competencies Addressed: Each department identifies competencies for each degree offered. The competencies addressed in this course for the MPH degree in the Department of Epidemiology include:

- Formulate a specific hypothesis and determine an appropriate study design and analysis plan
- Design and implement basic quality control methods during data entry and analysis;
- Appropriately analyze and interpret epidemiologic data, including large national and state level datasets
- Communicate and present study findings to professional audiences.

Please visit the School of Public Health’s website at http://sph.rutgers.edu for additional competencies addressed by this course for other departments or degrees.

Course Objectives: By the completion of this course, students will be able to:
Formulate study aims and hypotheses
Build analytic models to test associations
Use SAS software to run analyses and read SAS output
Report and interpret findings from analytic models
Present results in written and verbal form

Course Requirements and Grading:

- Students must have completed Intro to Biostats (CORE 0504), Principles of Epidemiology (CORE 0502), and Intermediate Epidemiologic Research Methods (EPID 0656) or the equivalent, or obtain written approval from the Instructor.

- Late submission of homework or the data analysis report will not be accepted. Homework must be completed and turned in by hard copy at the beginning of class on the due date. The final data analysis report may be sent via email or submitted in person. Each student is responsible for ensuring that their report is received by the course instructor by the date and time indicated.

- The final grade for the class will be based on the following:
  1. 40% homework assignments
  2. 20% mid-term examination
  3. 40% data analysis report and presentation (30% report; 10% presentation)

Course Schedule:

CLASS 1: SEPTEMBER 5

A. Introductions
B. Form groups
C. Review of Course Goals
   i. Syllabus
      1. Lectures
      2. Laboratory time (computer session/hands on)
      3. Bring thumb drive to every class (instructor will download course materials onto your thumb drive)
      4. Get text and use as a reference guide
   ii. Homework’s
   iii. Readings/Student Presentations
   iv. Mid-Term Examination
   v. Data Analysis Project
      a. Use NHIS Data
      b. Topic Selection
      c. Final presentation and write-up
Lecture 1: Review of epidemiologic concepts and analytic approaches
Homework: Read/be prepared to discuss National Health Interview Survey Brochure (https://www.cdc.gov/nchs/data/nhis/brochure2010january.pdf)

CLASS 2: SEPTEMBER 12

Lecture 2: Creating databases, data entry and data quality
Developing testable epidemiologic hypotheses
Getting Started in SAS
Introduction to NHIS data

Suggested Reading: Cody and Smith, Ch. 1, 12-14

Homework: Visit NHIS Homepage www.cdc.gov/nchs/nhis.htm - explore code books/variables

Student Presentations: [FOR NEXT CLASS] The Use of E-Cigarettes Among U.S. Immigrants: The 2014 National Health Interview Survey, Wang et al., Public Health Reports; 2016, 131(4): 605-613. Format: 10-15 minutes, no power point required. Just summarize the background, methods, and major findings. Be sure to explain how the NHIS was used (type of data, year, sample size, major variables etc…don’t discuss/worry about the weighting). As a reference, use the NHIS 2014 Survey Description and Variable Summary documents provided on your thumb drive.

CLASS 3: SEPTEMBER 19

Lecture 3: Generalized Linear Models: Linear Regression
Model assumptions and components of model
Data exploration
Plots, descriptive statistics, correlations, Simple linear regression modeling

Suggested Reading: Cody and Smith, Ch. 2, 5

Homework: [DUE NEXT CLASS] Homework #1 – linear regression

CLASS 4: SEPTEMBER 26

Lecture 4: Generalized Linear Models: Logistic Regression I
From linear to logistic models: Methods, advantages, limitations
Estimating power in various study designs
Data Exploration/ 2X2 Tables

Suggested Reading: Cody and Smith, Ch.2,3

Homework: [DUE NEXT CLASS] Homework #2A - Idea for project
CLASS 5: OCTOBER 3
Lecture5: Power analysis
Suggested Reading: Cody and Smith, Ch.9
Homework: [DUE NEXT CLASS] Homework #2B – Power Analysis

CLASS 6: OCTOBER 10
Lecture6: Generalized Linear Models: Logistic Regression II
Data exploration / 2x2 Tables
Recoding of Variables
Simple logistic regression
Suggested Reading: Cody and Smith, Ch.9

CLASS 7: OCTOBER 17
Lecture7: Generalized Linear Models: Logistic Regression III
Multiple logistic regression
Stratification and confounding
Selecting confounders
Confounding vs. Mediation
Suggested Reading: Cody and Smith, Ch.9
Homework: None

CLASS 8: OCTOBER 24
Lecture8: Generalized Linear Models: Logistic Regression IV
Model building
Stratification and Effect Measure Modification
Testing for Effect Measure Modification
Role of Risk Ratios, Rate Ratios, and Odds Ratios in EMM
Homework: [DUE NEXT CLASS] Homework #3 – Recoding, confounders, preliminary analysis

CLASS 9: OCTOBER 31
Lecture9: Measurement Issues
• Test-retest
• Internal consistency
• Intraclass correlation coefficient
• Kappa
Suggested Reading: Cody and Smith, Ch.11; Journal Article

Homework: None

CLASS 10: NOVEMBER 7 ** MID-TERM EXAMINATION (2 hours) **

CLASS 11: NOVEMBER 14 ** Review mid-term **

CLASS 12: NOVEMBER 21 ** NO CLASS (THURSDAY CLASSES MEET) **

CLASS 13: NOVEMBER 28

Lecture 10: Complex survey design
Weighted analyses
Model stability/fit
Presenting and reporting logistic regression results
Scientific writing and presentation

Suggested Reading: STROBE checklist for cross-sectional studies

Homework: [DUE NEXT CLASS] Homework #4 - Final project models and tables

CLASS 14: DECEMBER 5

Lecture 11: Survival analysis with Cox Regression Models
Purpose and assumptions of model
Kaplan-Meier estimator, Cox regression models

Homework: [DUE NEXT CLASS] Homework #5A – Survival Analysis

CLASS 15: DECEMBER 12 **Student Presentations**

REMEMBER TO RETURN YOUR MID-TERM ON DECEMBER 13

DECEMBER 19: FINAL PAPER DUE (Submit via email or hard copy by 5 pm!)

SCHOOL'S OUT
School of Public Health Honor Code: The School of Public Health Honor Code is found in the student bulletin (sph.rutgers.edu/academics/catalog/index.html). Each student bears a fundamental responsibility for maintaining academic integrity and intellectual honesty in his or her graduate work. For example, all students are expected to observe the generally accepted principles of scholarly work, to submit their own rather than another’s work, to refrain from falsifying data, and to refrain from receiving and/or giving aid on examinations or other assigned work requiring independent effort. In submitting written material, the writer takes full responsibility for the work as a whole and implies that, except as properly noted by use of quotation marks, footnotes, etc., both the ideas and the works used are his or her own. In addition to maintaining personal academic integrity, each student is expected to contribute to the academic integrity of the school community by not facilitating inappropriate use of her/his own work by others and by reporting acts of academic dishonesty by others to an appropriate school authority. It should be clearly understood that plagiarism, cheating, or other forms of academic dishonesty will not be tolerated and can lead to sanctions up to and including separation from the Rutgers School of Public Health.

Policy Concerning Use of Recording Devices and Other Electronic Communications Systems: When personally owned communication/recording devices are used by students to record lectures and/or classroom lessons, such use must be authorized by the faculty member or instructor who must give either oral or written permission prior to the start of the semester and identify restrictions, if any, on the use of mobile communications or recording devices.