RUTGERS
School of Public Health

Course Title: Applied Methods in Epidemiologic Research (Fall 2021, Newark)

Course Number: EPID 0657

Course Location: School of Public Health, **Distance Learning**

Course Date & Time: Thursdays, 6:00-8:00pm

Course Instructor: **Dennis** Fried, PhD, MPH, MBA - Assistant Professor, Department of Epidemiology, Rutgers School of Public Health
friedda@sph.rutgers.edu

Office Hours: **To be announced**

Course Assistant: Garima Mittal, M.D. (gm605@sph.rutgers.edu)

Course Text *(*optional**):** Cody RP and Smith JF. Applied Statistics and the SAS Programming Language. 2005; 5th edition.

Required Course Materials: SAS® OnDemand for Academics/SAS Studio (web-based)

Additional/Supplemental Readings/Resources:

Special Circumstances During COVID-19: The School of Public Health recognizes that students may experience challenges or be negatively impacted due to the COVID-19 pandemic, mental and emotional health toll from systemic racism, altered personal and professional obligations, and other crises existing at the moment in our local, national, and global communities. Students are encouraged to discuss these challenges and circumstances with their instructor, if they feel they may need additional support or temporary accommodations at the beginning or during this course. The course instructor may consider making reasonable temporary adjustments depending on the student's situation. If additional support is needed, students may reach out to the Office of Student Affairs (studentaffairs@sph.rutgers.edu) or any of the appropriate referral resources listed on the Student Connect Canvas page.

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.

Selected Concentration Competencies Addressed: Each concentration identifies competencies for each degree offered. The competencies addressed in this course for the MPH in Epidemiology include:

- Critique epidemiologic literature, assess its strengths and weaknesses, and determine if conclusion(s) are supported.
- Use epidemiologic techniques to quantitatively assess patterns and changes in disease occurrence.
- Formulate a specific hypothesis and determine an appropriate study design and analysis plan.
- Design, implement, and assess ordinary data collection systems for public health research.
- 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 Concentration webpages on the School of Public Health's website at sph.rutgers.edu for additional competencies addressed by this course for other degrees and concentrations.

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.

- Lateness. Assignments turned in after the official collection period are considered late. Unless the instructor and student come to an arrangement at least one week before

class, there is a **5-POINT PENALTY** for written work turned in late. Assignments are collected at the beginning of class. If you need to turn in something after the date due, please discuss it with the instructor to avoid point penalty.

- The **final grade** for the class will be based on the following:

  1. 5% class participation/attendance
  2. 35% homework assignments, including Online30 assignments (1 point each)
  2. 20% mid-term examination
  3. 40% data analysis report and presentation (10% PowerPoint, 30% paper)

- **Grading Policy:**

94 – 100	A
90– <94	A-
87 – <90	B+
84 – <87	B
80 – <84	B-
77 – <80	C+
70 – <77	C
<70	F

Remote Learning Policies: As you know, we are engaged in this course under extraordinary circumstances. Not only are we now conducting the class remotely, but we are all working under the repercussions of the COVID-19 pandemic. The following are class policies for our class sessions with Zoom. Please read carefully; these policies apply to the Fall 2020 semester. All students are expected to adhere to the policies.

General: Log into Zoom **using your Rutgers NetID and sign-in with your full first name and last name** as listed on the class roster. (If you use a different name than what is listed on the class roster, please email the instructor in advance of the class or send a private Chat message.) Using your full name allows the instructor to know who is in attendance and to quickly sort students into their groups when needed. Users who do not log into Zoom using their Rutgers NetID may have trouble accessing the Zoom classroom.

Video: Please **turn on your video when possible**. We recognize that this is not always easy, but this will help to build our class community. Seeing the faces of your classmates more closely duplicates the typical in-person learning experience and may shift your mindset into more focus and attention. Seeing each other can also provide each of us with positive social interactions.

- If you're unable to find an environment without a lot of visual distractions or prefer to not show your living space as a background, **feel free to use a virtual background** (several virtual background images created by the School of Public Health are available in the Student Connect Canvas page).
- To save bandwidth, there may be times during class when the instructor asks students to turn off videos.
- Add a photo to your Zoom profile. (Then in times when videos are off, we'll see photos of everyone rather than an empty box.)

- If you have limited internet bandwidth or other issues impacting your video use, please inform the instructor.

Audio: **Mute your microphone when you are not talking**. This helps eliminate background noise.

- Use a headset, if possible. If you own headphones with a microphone, please use them. This improves audio quality.
- Be in a quiet place, if possible. Turn off any music, videos, etc. in the background.

Chat: Stay on topic and be respectful. Use the chat window for questions and comments that are relevant to class.

Course Schedule:

CLASS 1: SEPTEMBER 2

A. Introductions
B. Form groups-next class
C. Review syllabus

- **CANVAS (all materials except optional textbook):**
  - **Lectures**
  - **Online30** = 30 minutes of independent work each week (do *not hand in*)
  - **Homework:** *email to Garima on due date*
- **SAS Studio**/SAS On Demand for Academics (SODA)
- Recommendation: students should create a folder on your personal computer ("Applied Epi Fall 2021") where you will store course documents
- **Mid-term exam** – November 4
- **Final group Project**:
  - Group PowerPoint presentation - December 16
  - Group Paper – December 16
  - See "Final Group Project Description" document on CANVAS

Lecture 1: Review of epidemiologic concepts and analytic approaches (**please review on your own prior to next class**)

Online30_class 1: "Getting Acquainted with SAS Studio" (**complete prior to next class**)

Guest Speakers: SAS Education Team (Cary, NC) will demonstrate SAS Studio/SAS On Demand for Academics (SODA).

Group meeting: Starts next week

CLASS 2: SEPTEMBER 9

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

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

Online30_class 2: "Getting Acquainted with NHIS" (**complete prior to next class**)

Group meeting: First in-class meeting via breakout rooms; review project description; group assignment in document called "Student Roster".

CLASS 3: SEPTEMBER 16

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

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

Homework 1: Linear regression (**DUE 9/23**)

Online30_class 3: (1) "Gaining Proficiency with SAS Studio & NHIS datasets and variables" (individual and group work); (2) "Online30_Class 3 gaining proficiency with SAS Studio NHIS datasets and variables_Sep 12 2021"(**complete both prior to next class**)

Group meeting: Study sample/outcome; literature review; project description; next steps – main exposure/hypothesis/covariates.

CLASS 4: SEPTEMBER 23

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

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

Homework 2: Idea for project (**DUE 9/30**) -- strongly suggest focus on prevalent outcomes (e.g., diabetes, hypertension)

Online30_class 4: TBA

Group meeting: Based on a review of the relevant literature, what is the relationship you are interested in studying? For example, is low socioeconomic status significantly associated with

type 2 diabetes. What NHIS dataset(s) will you use (e.g., NHIS 2015 adult file merged with the disability file)? What variable(s) will be used to create your outcome? your main exposure? your covariates (e.g., age, sex, race)?

CLASS 5: SEPTEMBER 30

Lecture 5: Power analysis with SAS

Optional Reading: Cody and Smith, Ch.9

Homework 3: Power analysis (**DUE 10/7**)

Online30_class 5: Lab (**complete prior to next class**)

Group meeting: Continue the literature review; start creating dataset and variables.

CLASS 6: OCTOBER 7

Lecture 6: Generalized Linear Models: Logistic Regression II; Data exploration / 2x2 Tables Recoding of Variables; Simple logistic regression

Optional Reading: Cody and Smith, Ch.9

Online30_class 6: TBA

Group meeting: Continue the literature review; begin working with your data.

CLASS 7: OCTOBER 14

Lecture 7: Generalized Linear Models: Logistic Regression III; Multiple logistic regression; Stratification and confounding; Selecting confounders; Confounding vs. Mediation

Optional Reading: Cody and Smith, Ch.9

Online30_class 7: "Creating an analytic sample" (**in-class demo**)

Group meeting: Create analytic sample, once you've finalized outcome variable

CLASS 8: OCTOBER 21

Lecture 8: 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 4: Recoding, confounding, preliminary analysis (**DUE 10/28**).

Online30_class 8: TBA

Group meeting: Continue to work on project

CLASS 9: OCTOBER 28

Lecture 9: Measurement Issues; Test-retest; Internal consistency; Intraclass correlation coefficient; Kappa

Optional Reading: Cody and Smith, Ch.11

Online 30_class 9: TBA

Group meeting: Continue to work on project

CLASS 10: NOVEMBER 4 ********** *MID-TERM EXAMINATION (3 hours)* **********

CLASS 11: NOVEMBER 11

Lecture 10: Multivariate Modeling; Mid-term exam review, time-permitting

Online 30_class 11: TBA

Group meeting: Dennis will review homework4 ("Recoding, confounding, preliminary analysis") with each group.

CLASS 12: NOVEMBER 18

Lecture 11: SAS Education Team (Cary, NC) will present: Logistic Regression multivariable modeling with SAS Studio/SAS On Demand for Academics.

Optional Reading: STROBE checklist for cross-sectional studies

Homework 5: Final project models and tables (**DUE 12/2**).

Group meeting: Continue to work on project

****
******* **NO CLASS NOVEMBER 25 HAPPY THANKSGIVING** **********
****

CLASS 13: DECEMBER 2

Lecture 12: Complex survey design; Weighted analyses; Model stability/fit; Presenting and reporting logistic regression results; Scientific writing and presentation

Online30_class 13: TBA

Group meeting: Continue to work on project

CLASS 14: DECEMBER 9

Lecture 13: Survival analysis with Cox Regression Models; Purpose and assumptions of model; Kaplan-Meier estimator, Cox regression models; Hierarchical Regression Models (time permitting)

Online30_class 14: TBA

Group meeting: Continue to work on project

CLASS 15: DECEMBER 16 **S*tudent Presentations & Final Papers***

RUTGERS
School of Public Health

WEEK	DATE	COURSE TOPIC	LINK TO COMPETENCIES AND ASSESSMENTS	ASSIGNMENTS/ASSESSMENTS
CLASS 1	Sep 3	Review of epidemiologic concepts and analytic approaches	Use epidemiologic techniques to quantitatively assess patterns and changes in disease occurrence • **Assessed by homework's 1-3 and midterm**	
CLASS 2	Sep 10	Database creation; developing testable hypotheses; intro to National Health Interview Survey (NHIS)	Design and implement basic quality control methods during data entry and analysis • **Assessed by final presentations/papers**	
CLASS 3	Sep 17	Generalized linear models: linear regression	Use epidemiologic techniques to quantitatively assess patterns and changes in disease occurrence • **Assessed by homework 1/2**	Homework 1 – linear regression (**DUE 9/24**)
CLASS 4	Sep 24	Generalized linear models: logistic regression part I	Use epidemiologic techniques to quantitatively assess patterns and changes in disease occurrence • **Assessed by midterm**	Homework 2 - idea for project (**DUE 10/1**)
CLASS 5	Oct 1	Power analysis	Critique epidemiologic literature, assess its strengths and weaknesses, and determine if conclusion(s) are supported • **Assessed by homework 3**	Homework 3 – power Analysis (**DUE 10/8**)
CLASS 6	Oct 8	Generalized linear models: logistic regression part II	Design, implement, and assess ordinary data collection systems for public health research • **Assessed by homework 4/midterm**	
CLASS 7	Oct 15	Generalized linear models: logistic regression part III	Use epidemiologic techniques to quantitatively assess patterns and changes in disease occurrence • **Assessed by homework 4/midterm**	
CLASS 8	Oct 22	Generalized linear models: logistic regression part IV	Use epidemiologic techniques to quantitatively assess patterns and changes in disease occurrence • **Assessed by midterm**	Homework 4 – recoding, confounders, preliminary analysis (**DUE 10/29**)
CLASS 9	Oct 29	Measurement issues: test-retest, internal consistency, intraclass correlation coefficient, kappa	Use epidemiologic techniques to quantitatively assess patterns and changes in disease occurrence • **Assessed by midterm**	
CLASS 10	Nov 5	**MID-TERM EXAM**		
CLASS 11	Nov 12	Multivariable modeling	Use epidemiologic techniques to quantitatively assess patterns and changes in disease occurrence (**Assessed by Homework #4**)	
CLASS 12	Nov 19	Presenting and reporting logistic regression results; scientific writing and presentation	Appropriately analyze and interpret epidemiologic data, including large national and state level datasets (Assessed by homework #4)	Homework 5 – final project models and tables (**DUE 12/3**)

CLASS 13	Dec 3	Complex survey design: weighted analysis; model stability and fit	Design, implement, and assess ordinary data collection systems for public health research (**Assessed by midterm**)	Homework 6 – complex survey designs (**DUE 12/10**)
CLASS 14	Dec 10	Survival analysis with Cox regression modeling	Use epidemiologic techniques to quantitatively assess patterns and changes in disease occurrence	
CLASS 15	Dec 17	**FINAL GROUP PRESENTATIONS AND PAPERS**	Communicate and present study findings to professional audiences (Assessed by Final Group Presentations)	Final Paper & Project (**DUE 12/17**)

Learning Management System: Canvas will be used extensively throughout the semester for course syllabus, assignments, announcements, communication and/or other course-related activities. It is the student's responsibility to familiarize themselves with Canvas and check it regularly. If you have difficulties accessing Canvas, please inform the instructor and Canvas Support (help@canvas.rutgers.edu). Canvas is accessible at canvas.rutgers.edu.

School of Public Health Honor Code: The School of Public Health Honor Code is found in the School Catalog (sph.rutgers.edu/academics/catalog.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.

Students with Disabilities: Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student must apply for Services by first completing a Registration Form with the Rutgers Office of Disability Services (ODS) at ods.rutgers.edu. The student will also be required to participate in an ODS intake interview and provide documentation. If reasonable accommodations are granted, ODS will provide you with a Letter of Accommodations which should be shared with your instructors as early in your courses as possible.

Commitment to Safe Learning Environment: The Rutgers School of Public Health is committed to helping create a safe learning environment for all students and for the School as a whole. Free expression in an academic community is essential to the mission of providing the highest caliber of education possible. The School encourages civil discourse, reasoned thought, sustained discussion, and constructive engagement. Provocative ideas respectfully presented are an expected result. An enlightened academic community, however, connects freedom with responsibility. The School encourages all students to disclose any situations where you may feel unsafe, discriminated against, or harassed. Harassment or discrimination of any kind will be not tolerated and violations may lead to disciplinary actions.

Reporting Discrimination or Harassment: If you experience any form of gender or sex-based discrimination or harassment, including sexual assault, sexual harassment, relationship violence, or stalking, know that help and support are available. You may report such incidents to the RBHS Title IX Office or to the School of Public Health's Office of Student Affairs. Rutgers University has staff members trained to support survivors in navigating campus life, accessing health and counseling services, providing academic and housing accommodations, and more. If you experience any other form of discrimination or harassment, including racial, ethnic, religious, political, or academic, please report any such incidents to the School's Office of Student Affairs. The School strongly encourages all students to report any incidents of discrimination or harassment to the School. Please be aware that all Rutgers employees (other than those designated as confidential resources such as advocates, counselors, clergy and healthcare providers as listed in Appendix A to Policy 10.3.12) are required to report information about such discrimination and harassment to the School and potentially the University. For example, if you tell a faculty or staff member about a situation of sexual harassment or sexual violence, or other related misconduct, the faculty or staff member must share that information with the RBHS Title IX Coordinator. If you wish to speak to a confidential employee who does not have this reporting responsibility, you can find a list of resources in Appendix A to University Policy 10.3.12. For more

information about your options at Rutgers, please visit Rutgers Violence Prevention and Victim Assistance.

Graduate Student Computer Policy: Students are required to possess a personal laptop, no older than approximately two years, that must meet minimum requirements which may be found online at: sph.rutgers.edu/student-life/computer-support.html

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.

Policy Concerning Use of Turnitin: Students agree that by taking this course all required papers may be subject to submission for textual similarity review to Turnitin.com (directly or via learning management system, i.e. Canvas) for the detection of plagiarism. All submitted papers will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. Use of the Turnitin.com service is subject to the Usage Policy posted on the Turnitin.com site. Students who do not agree should contact the course instructor immediately.

Withdrawal/Refund Schedule: Students who stop attending their course(s) without submitting a completed Add/Drop Course form will receive a failing grade. Furthermore, students dropping to zero credits for the semester are considered withdrawn and must submit a completed Leave of Absence form from the School of Public Health's Office of Student Affairs. The School of Public Health refunds tuition only. Administrative and technology fees are non-refundable. You may find the Withdrawal/Refund Schedule on the School of Public Health website at: sph.rutgers.edu/academics/academic-calendar.html