

- Course Title:** Applied Methods in Epidemiologic Research
- Course Number:** EPID 0657 (Spring 2023)
- Course Pre- and Co-requisite(s):** Students must have completed, with minimum grade of B, Intro to Biostatistics (CORE 0504), Principles of Epidemiology (CORE 0502), Intermediate Epidemiologic Research Methods (EPID 0656), and Biometrics Computing (BIST 0535) or obtain written approval from the Instructor.
- Course Location:** Zoom (link on Canvas)
- Course Date & Time:** Wednesdays, 6:00 PM – 8:00 PM
- Course Instructor:** Michelle M. Macaraig, DrPH, MPH  
Instructor, Department of Biostatistics & Epidemiology  
Rutgers School of Public Health  
Riverfront Plaza  
Newark, NJ 07102  
[Michelle.Macaraig@rutgers.edu](mailto:Michelle.Macaraig@rutgers.edu) | (917) 747-8961
- Office Hours:** By appointment
- Course Assistant:** TBD
- Course Website:** [canvas.rutgers.edu](https://canvas.rutgers.edu)
- Required Course Text:** None (required readings will be provided on Canvas)
- Required Readings:** Articles posted on course website (Canvas)
- Required Software:** SAS version 9.4 or higher is required for in-class activities, homework, and an analysis project.

**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 individually or in designated groups throughout the semester. Students will perform a literature review, develop focused research hypotheses, develop an analytic plan, and analyze/interpret data applying the range of methods presented in lecture using SAS software. The data analysis project culminates in a written manuscript. Homework and quizzes are also required.

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

- A. Formulate a specific hypothesis and determine an appropriate study design and analysis plan
- B. Design and implement basic quality control methods during data entry and analysis

- C. Appropriately analyze and interpret epidemiologic data, including large national and state level datasets
- D. Communicate and present study findings to professional audiences

The competencies addressed in this course for the MS degree in *Epidemiology* include:

- A. Develop and test a specific hypothesis using an appropriate study design and analysis plan
- B. Design and implement data quality control and management methods during data collection and/or analysis
- C. Appropriately analyze and interpret epidemiologic data to extend the current knowledge of public health research or practice
- D. Discuss study findings and their implications with professional audiences
- E. Evaluate strengths and limitations of health data for public health research and/or practice

Please visit the Concentration webpages on the School of Public Health’s website at [sph.rutgers.edu](http://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:

- a. Formulate study aims and hypotheses
- b. Use SAS software to run analyses and read SAS output
- c. Build analytic models to test associations
- d. Assess the presence of confounding and interaction
- e. Report and interpret findings from analytic models
- f. Present results in written and verbal form

**Assessment of MPH Competencies:** Course competencies are tied to objectives and assessments as follows:

Competency	Course Objective(s)	Lessons (Week #)	Assessment(s)
A	a	1-2	Quiz 1; Project
B	b	2-14	Homework 2-11; Quiz 1-5; Project
C	b	2-14	Homework 2-11; Quiz 1-5; Project
	c	4-10, 12-13	Homework 4-11; Project
	d	6-9	Homework 6-7; Quiz 3-4; Project
D	e	4-10, 12-13	Homework 4-11; Quiz 2-5; Project
	f	14-15	Project

**Assessment of MS Competencies:** Course competencies are tied to objectives and assessments as follows:

Competency	Course Objective(s)	Lessons (Week #)	Assessment(s)
A	a, c	1-15	Homework 1-11; Quiz 1; Project
B	b	2-14	Homework 2-11; Quiz 1-5; Project
C	b	2-14	Homework 2-11; Quiz 1-5; Project
	c	4-10, 12-13	Homework 4-11; Project
	d	6-9	Homework 6-7; Quiz 3-4; Project
	e	4-10, 12-13	Homework 4-11; Quiz 2-5; Project
D	e	4-10, 12-13	Homework 4-11; Quiz 2-5; Project
	f	14-15	Graded discussions; Project
E	e, f	2, 4, 11-12, 15	Graded Discussion; Analysis Project; Peer Reviews; Paper

**Course Requirements and Grading:**

- Final course grades will be based on the following:
  - Homework 30%
  - Quizzes 20%
  - Project 40%
  - Attendance & Participation 10%
  
- This course utilizes Canvas learning management system. Guidelines for assignments, as well as assigned readings and discussions, will be posted on Canvas throughout the semester, and most assignments will be submitted via Canvas.
  
- Attendance and Participation: Students are expected to attend class in person on Wednesday from 6 to 8 PM, as well as complete up to 30 minutes of additional web-based instructional activities such as videos or graded discussions ('Online 30'). **Active participation in both lecture and Online 30 activities is required.** Unless otherwise noted, the following 3-point rubric will be used to assess graded web-based discussions:
  - Provocative (3/3) – Response goes beyond simply answering the prompt, attempts to stimulate further thought and discussion, is relevant to epidemiology and concepts learned in class, and is respectful of others' posts
  - Substantial (2/3) – Response adequately answers the prompt but does not stimulate further analysis/discussion of the subject, is somewhat relevant to epidemiology and concepts learned in class, and is respectful of others' posts
  - Superficial (1/3) – Response provides obvious information without further analysis of the concept, lacks depth of knowledge or reasoning, or has very little relevance to epidemiology and concepts learned in class
  - None (0/3) – Response is not complete or is not respectful of others' posts

- Homework assignments will be assigned throughout the semester, approximately weekly. Homework must be completed on Canvas by the designated due date/time. Late submission will result in the following deduction:
  - 25% automatic deduction if submitted within 24 hours following the due date/time
  - 50% automatic deduction if submitted within 48 hours following the due date/time
  - Homework will not be accepted after 48 hours following the due date/time
- An applied analysis project will consist of an initial proposal, proposed table shells and SAS code, final results and SAS code, and a paper. Details will be provided during the semester.
- Participation grades will be assigned as a function of class attendance, active participation in classroom activities, and participation in 'Online 30' activities.
- Quizzes will be given in the classroom via Canvas at the start of select classes (see below schedule). All quizzes are "closed book" (no notes allowed) and should take approximately 15 minutes to complete.
- The following school-wide grade scale will be used to determine final course grades. Please note that grades will not be "rounded" or "curved," and do not rely on Canvas grade calculations (they are sometimes incorrect):
  - 94 – 100      A
  - 90 – 93.99    A-
  - 87 – 89.99    B+
  - 84 – 86.00    B
  - 80 – 83.00    B-
  - 77 – 79.99    C+
  - 70 – 76.99    C
  - < 70          F
- Collaborative learning is encouraged, and students may work on lab and homework assignments together. However, each student must submit their own work (in other words – you may not submit exactly the same thing as a peer).
- Communication: Although you are always welcome to email your instructor privately, **I encourage you to ask (and answer) general course and content questions in class or in our Canvas forum, so the entire class can benefit from the discussion.** Working with your classmates, explaining concepts to each other, and interacting with your instructors are the most effective ways to understand the principles of epidemiology and succeed in this course!

**Course Schedule:** Below is a PRELIMINARY course schedule. Updates to this schedule, as well as additional readings, assignments, and 'Online 30' activities, will be posted to Canvas.

WEEK 1	
<b>Date:</b>	January 18
<b>Agenda:</b>	Review Syllabus and course format/expectations; Review of epidemiology concepts and analytic approaches Review of SAS programming language Conducting a Literature Review Developing Aims and Hypotheses
<b>Online 30:</b>	Graded discussion – Personal Introductions;
<b>Readings:</b>	Review the syllabus, honor code Bramer et al (2018) A systematic approach to searching Video: Literature Review
<b>Assignments:</b>	Homework #1 – Due 1/25/23 Initial Project Proposal – Due 2/1/23
WEEK 2	
<b>Date:</b>	January 25
<b>Agenda:</b>	National and State-Based Surveillance Systems Downloading and merging NHIS and NHANES datasets
<b>Online 30:</b>	Recorded video tutorial: Week 2 lab activity
<b>Readings:</b>	NHIS/NHANES codebooks
<b>Assignments:</b>	Homework #2 – Due 2/1/23 Initial Project Proposal – Due 2/1/23
WEEK 3	
<b>Date:</b>	February 1
<b>Agenda:</b>	Data Management and Exploration Descriptive Statistics
<b>Online 30:</b>	Graded Discussion – Background sections
<b>Readings:</b>	TBA – See Canvas
<b>Assignments:</b>	Homework #3 – Due 2/8/23 Proposed Table Shells, SAS Code – Due 2/22/23
WEEK 4	
<b>Date:</b>	February 8
<b>Agenda:</b>	Linear Regression
<b>Online 30:</b>	Graded Discussion – Background sections Recorded video tutorial: Linear regression
<b>Readings:</b>	TBA – See Canvas
<b>Assignments:</b>	Homework #4 – Due 2/15/23 Proposed Table Shells, SAS Code – Due 2/22/23

**WEEK 5**

<b>Date:</b>	February 15
<b>Agenda:</b>	Quiz 1 (covering weeks 1-3) Binary Logistic Regression
<b>Online 30:</b>	Recorded video tutorial: Logistic regression
<b>Readings:</b>	SAS documentation – PROC LOGISTIC; Persoskie & Ferrer (2016) A Most Odd Ratio
<b>Assignments:</b>	Homework #5 – Due 2/22/23 Proposed Table Shells, SAS Code – Due 2/22/23

**WEEK 6**

<b>Date:</b>	February 22
<b>Agenda:</b>	Categorizing for Regression Confounding and Mediation
<b>Online 30:</b>	Graded Discussion: 'Methods' sections
<b>Readings:</b>	Walter & Tiemeier (2009) Variable selection practices
<b>Assignments:</b>	Homework #6 – Due 3/8/23

**WEEK 7**

<b>Date:</b>	March 1
<b>Agenda:</b>	Quiz 2 (covering weeks 4-5) Multiple regression, model building
<b>Online 30:</b>	Graded Discussion: 'Methods' sections
<b>Readings:</b>	TBA
<b>Assignments:</b>	Homework #6 – Due 3/8/23 Project Results, SAS Code – Due 3/29/23

**WEEK 8**

<b>Date:</b>	March 8
<b>Agenda:</b>	Effect Modification and Interaction
<b>Online 30:</b>	TBA
<b>Readings:</b>	Van der Weele (2009): On the Distinction between Interaction and Effect Modification Knol & Van der Weele (2012) Recommendations for presenting analyses of effect modification and interaction
<b>Assignments:</b>	Homework #7 – Due 3/22/23 Project Results, SAS Code – Due 3/29/23

**NO CLASS ON 3/15 (SPRING BREAK)**

**WEEK 9**

<b>Date:</b>	March 22
<b>Agenda:</b>	Quiz 3 (covering weeks 6-7) Complex survey analysis;
<b>Online 30:</b>	Recorded video tutorial: Complex Survey Data Analysis;
<b>Readings:</b>	Keyes et al (2017) Mortality among survey respondents vs gen pop
<b>Assignments:</b>	Homework #8 – Due 3/29/23 Project Results, SAS Code – Due 3/29/23

**WEEK 10**

**Date:** March 29

**Agenda:** Measurement

**Online 30:** Graded Discussion: 'Results' sections

**Readings:** Kimberlin & Winterstein (2008) Validity and reliability of measurements  
Andrews & Slade (2001) Interpreting scores on the K10 scale

**Assignments:** Assignment #9 – Due 4/5/23

**WEEK 11**

**Date:** April 5

**Agenda:** Quiz 4 (covering weeks 8-9)  
Power & Sample Size

**Online 30:** Graded Discussion: 'Results' sections

**Readings:** Hoenig & Keisey (2001) Abuse of Power

**Assignments:** Assignment #10 – Due 4/12/23  
Project Paper Full Draft – Due 4/26/23

**WEEK 12**

**Date:** April 12

**Agenda:** Survival analysis

**Online 30:** Graded Discussion: 'Discussion' sections

**Readings:** Sutradhar & Austin (2017) Relative Rates not Relative Risks

**Assignments:** Homework #11 – Due 4/19/23  
Project Paper Full Draft – Due 4/26/23

**WEEK 13**

**Date:** April 19

**Agenda:** Quiz 5 (covering weeks 10-11)  
Hierarchical regression; Longitudinal analysis

**Online 30:** Graded Discussion: 'Discussion' sections

**Readings:** Hubbard et al (2010) To GEE or not to GEE;  
Hayes (2006) A Primer on Multilevel Modeling

**Assignments:** Project Paper Full Draft – Due 4/26/23

**WEEK 14**

**Date:** April 26

**Agenda:** Peer Reviews

**Online 30:** Review peer feedback

**Readings:** ---

**Assignments:** Final paper due 5/3/23

**WEEK 15**

**Date:** May 3

**Agenda:** Submit final paper on Canvas by 6PM – No class

**Online 30:** ---

**Readings:** ---

**Preliminary Course Map (Topics and Due Dates)**

Week	Date	Lecture/Lab	Quiz (Topic)	Homework Due	Project
1	Jan 18	Intro & Review Literature Reviews, Aims & Hypotheses	---	---	---
2	Jan 25	NHIS & NHANES Downloading & Merging Datasets	---	HW 1 Due	---
3	Feb 1	Data Management and Exploration Descriptive Statistics	---	HW 2 Due	Proposal Due
4	Feb 8	Linear Regression Reporting Results	---	HW 3 Due	---
5	Feb 15	Logistic Regression	Quiz 1 (Weeks 2-3)	HW 4 Due	---
6	Feb 22	Confounding & Mediation	---	HW 5 Due	Table Shells Due
7	Mar 1	Multiple Regression, Model Building	Quiz 2 (Weeks 4-5)	---	---
8	Mar 8	Multiple Logistic Regression, Effect Measure Modification and Interaction	---	HW 6 Due	---
--	Mar 15	<b>SPRING BREAK</b>			
9	Mar 22	Complex Samples	Quiz 3 (Weeks 6-7)	HW 7 Due	---
10	Mar 29	Measurement	---	HW 8 Due	Results Due
11	Apr 5	Power & Sample Size	Quiz 4 (Weeks 8-9)	HW 9 Due	---
12	Apr 12	Survival Analysis	---	HW 10 Due	---
13	Apr 19	Repeated Measures	Quiz 5 (Weeks 10-11)	HW 11 Due	---
14	Apr 26	Peer Reviews	---	---	Full Draft Due
15	May 3	No class	---	---	Final Paper Due

**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](mailto:help@canvas.rutgers.edu)). Canvas is accessible at [canvas.rutgers.edu](https://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](https://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](https://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.

**Student Well-Being:** The School of Public Health recognizes that students may experience stressors or challenges that can impact both their academic experience and their personal well-being. If the source of your stressors or challenges is academic, 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. For personal concerns or if additional support is needed, students may reach out to the [Office of Student Affairs](#) or any of the appropriate referral resources listed on the [SPH Student Connect](#) Canvas page.

**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](#).

**Overview of School Policies:** Academic and non-academic policies and procedures, such as Auditing a Course, Retaking Courses, Grade Grievance and others that cover registration, courses and grading, academic standing and progress, student rights and responsibilities, graduation and more may be found under [Policies](#) on the School of Public Health website. Below are select specific policies; however, students are responsible for keeping informed about academic and non-academic policies and procedures beyond those noted on this syllabus.

**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](http://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](http://sph.rutgers.edu/academics/academic-calendar.html)