



School of Public Health

Course Title: Fundamentals of Biostatistics

Course Number: BIST 0625

Course Location: RM 234 SPH, Piscataway, New Jersey

Course Date & Time: Thursday afternoons, 3:00 – 5:00 pm, Fall Semester, 2022

Course Instructor: **Dirk F. Moore, PhD, Associate Professor**
Biostatistics, Rutgers School of Public Health
dirk.moore@rutgers.edu & (732) 235-7594

Office Hours: Thursday 2:00 – 3:00

Course Assistant: TBD

Required Course Text: *Fundamentals of Biostatistics, 8th Edition*. Bernard Rosner, Cengage Learning, 2016. ISBN: 978-1-305-26892-0 (available for rent)

Additional/Supplemental Readings/Resources: SAS and R statistical packages (available in the SPH computer lab or for download)

Course Description: At the conclusion of this course, students will be able to distinguish among the basic types of data; describe the normal curve and its major characteristics in relation to parametric statistics; calculate descriptive statistics such as the mean, median, variance, and standard error; describe the relationship of statistics to hypothesis testing; understand the nature of Type I and Type II errors; explain the concept of statistical power and how it can be calculated; apply basic statistical test procedures including t-tests, chi-square, non-parametric tests, and correlation; decide which parametric or non-parametric test to apply to test a statistical hypothesis; understand the concepts and applications of linear regression; apply statistical software programs to solve common public health problems; and critically review and comprehend basic statistical discussions in the public health literature.

Selected Concentration Competencies Addressed:

The competencies addressed in this course for the MS in Biostatistics include:

- Apply probability and statistical methods to design experimental and observational studies in biomedical, clinical, and public health research;
- Conduct appropriate statistical analysis of data to solve medical and public health problems;
- Use a variety of statistical computer packages; and
- Communicate the results of statistical studies both in writing and orally to investigators and lay community members.



School of Public Health

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:

- Distinguish among the basic types of data
- Calculate descriptive statistics such as the mean, median, variance, and standard error
- Understand probability concepts including independence, mean, and variance
- Understand and apply the normal, binomial, and Poisson distributions to solve probability problems, and distinguish between continuous and discrete distributions
- Describe the relationship of statistics to hypothesis testing; understand the nature of Type I and Type II errors
- Explain the concept of statistical power and how it can be calculated
- Apply basic statistical test procedures including t-tests, chi-square, non-parametric tests, and correlation
- Decide which statistical test to apply to test a statistical hypothesis
- Apply the statistical software systems SAS and R to solve common public health problems
- Set up statistical simulations in R to illustrate biostatistics fundamentals
- Critically review and comprehend basic statistical discussions in the public health literature.

Course Requirements and Grading:

- Homework will be assigned weekly, and all homework assignments will be due the following week. Homework should be neat, clear, and easily readable. Late homework or emailing homework to instructor or course assistant (without prior instructor approval) will not be accepted.
- Most classes will begin with a brief quiz reviewing material from the previous lecture. Exams will consist mainly of problems to be solved; written solutions should clearly show how the problem is solved as well as presenting a final answer.
- A calculator is necessary for lectures, quizzes and exams. Be sure to bring your own calculator and know how to use it. It should be able to calculate square root and exponential function.
- Grading: Midterm exam, 30%; Final exam, 40%; Homework, 20%; Quizzes 10%. Grading scale: 94 - 100 is A, 90 - 93 is A-, 87 - 89 is B+, 84 - 86 is B, 80 - 83 is B-, 77 - 79 is C+, 70 - 76 is C, <70 is F.



School of Public Health

Course Schedule: This table provides a general plan for the course; some deviations may be necessary. Each class will include a “Plus 30” component to expand on the respective topics.

Lecture	Date	Chapters	Quiz	HW Due	Topics
1	09/08	1, 2			Introduction, Types of data, Summary statistics, SAS and R
2	09/15	3, 4, 5	1	1	Basic Probability
3	09/22	6	2	2	Population, samples, sampling distribution of the mean; R simulations
4	09/29	6	3	3	Estimation, confidence intervals
5	10/06	7	4	4	Hypothesis Testing I; one sample
6	10/13	8	5	5	Hypothesis Testing II; two sample
7	10/20		6	6	Review for midterm
8	10/27				Midterm
9	11/03	9	7	7	Nonparametric statistics
10	11/10	10	8	8	Inference on proportions
11	11/17	10	9	9	Contingency tables
12	11/22	11	10	10	(Tuesday class) Correlation and simple linear regression
13	12/01	12			Multiple regression and analysis of variance
14	12/08		11	11	Review for final
15	12/15				Final Exam

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 (studentaffairs@sph.rutgers.edu) or any of the appropriate referral resources listed on the SPH Student Connect Canvas page.

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.

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.

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.

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.

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_requirements.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.



School of Public Health

Withdrawal/Refund Schedule: Students who stop attending their course(s) without processing an [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/registration/school_calendars.html