Course Title:	Biostatistics Theory I
Course Number:	BIST 0613
Course Location:	Rutgers SPH, Rm 2A, Piscataway
Course Date & Time:	Tuesdays 6:00–8:00 PM
Course Instructor:	Wei Vivian Li, PhD, Assistant Professor
	Department of Biostatistics and Epidemiology
	vivian.li@rutgers.edu
Office Hours:	Tuesdays 4:00–5:00 PM or by appointment
Course Assistant:	NA
Course Website:	https://rutgers.instructure.com/courses/151178

Course Text:

Hogg, McKean, and Craig (2005), Introduction to Mathematical Statistics, 8th Edition, Pearson Education. ISBN-13: 978-0134686998

Additional/Supplemental Readings/Resources:

Casella, G. and Berger R.L. (2002) *Statistical Inference*, 2nd edition. Brooks Cole, ISBN: 0534243126

Course Description: Statistics is a branch of science dealing with the collection, analysis, interpretation, and presentation of numerical data. This course is an introduction to probability modeling as a basis for statistical inference. The underlying strategy in prediction and inference involves the determination of a probability modeling. This can be approached from two perspectives: analytical (mathematical) and computational (algorithmic). It is important for students to master both perspectives. Advanced calculus is sufficient background for the analytical. This course serves to lay a foundation in statistical theory for M.S., M.PH, DrPH and Ph.D. students so that they can pursue more advanced technical materials.

Selected Concentration Competencies Addressed: The competencies addressed in this course for the MPH and MS in Biostatistics include:

• Apply basic probability theory and standard statistical methods to biomedical, clinical and public health research;
• Use probability and statistical theory to evaluate and identify appropriate methods of analysis;
• Conduct appropriate statistical analysis of data to solve medical and public health problems;
• Review and critique statistical methods and interpretations presented in published research studies, presentations or reports.

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:

1. Describe, prove, and apply the basic probability theory.
2. Develop probability models for experiments.
3. Apply basic probability and standard statistical methods to design experimental and observational studies in biomedical, clinical and public health research.

Course Requirements and Grading:

The course grade will be based on class participation, homework assignments, and midterm and final exams. The relative weight given to each of these components is

1. Participation   5%
2. Homework   30%
3. Midterm Exam   30%
4. Final Exam   35%
   Total   100%

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

1. On all homework assignments/problem sets, students are encouraged to discuss with one another, but work should be carried out and written up independently.
2. It's the students' responsibility to make their papers legible. Unreadable work will NOT be graded.
3. Answer each question as accurately and concisely as possible.
4. Do NOT skip derivation steps.
5. Unless the instructor is notified beforehand, late homework will NOT be graded. Late homework will be graded with a 10% per day penalty.

Course Schedule:
(Tentative)

Week	Date	Course Topic	Online30
1	Sep 7	Introduction, Set Theory, and Probability Set Function	Ch 1.1-1.3
2	Sep 14	Conditional Probability and Independence, Random Variables	Ch 1.4-1.5

3	Sep 21	Discrete Random Variables, Continuous Random Variables	Ch 1.6, 1.7
4	Sep 28	Expectation of a Random Variable, Some Special Expectations, Important Inequalities	Ch 1.8, 1.9, 1.10
5	Oct 5	Distribution of Two Random Variables	Ch 2.1
6	Oct 12	Bivariate Random Variables	Ch 2.2
7	Oct 19	**Midterm Exam**	
8	Oct 26	Conditional Distributions and Expectations, Correlation Coefficient	Ch 2.3, 2.4
9	Nov 2	Independent Random Variables	Ch 2.5
10	Nov 9	Binomial and Related Distributions, Poisson Distributions	Ch 3.1, 3.2
11	Nov 16	Normal Distribution, Γ, χ^2, and β Distributions	Ch 3.3, 3.4
12	Nov 23	Multivariate Normal Distribution, t and F-distributions	Ch 3.5, 3.6, 3.7
13	Nov 30	Expectations of Functions, Convergence in Probability	Ch 4.1, 4.2
14	Dec 7	Convergence in Distribution and Central Limit Theorem	Ch 4.3, 4.4
15	Dec 14	**Final Exam**	

Special Circumstances During COVID-19, For Fall 2021: To keep our on-campus communities safe, compliance with all current guidance and policies as set forth in the Guide to Returning to Rutgers is required at all times and without exception. Students, faculty, staff, or visitors who do not comply with these policies will not be permitted to remain on-site. The use of face-coverings indoors *IS* required in classrooms and offices as well as shared spaces (such as hallways and bathrooms). Rutgers employees and students must use the My Campus Pass symptom checker, a self-screening application, each day when traveling to campus or entering a Rutgers building. Please remember to wash your hands, wear a mask while indoors, particularly in crowded spaces and groups, and stay up-to-date on university guidance by consulting the Guide to Returning to Rutgers and the university's COVID-19 website.

In addition, 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 SPH Student Connect Canvas page.

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