Course Title: Applied Regression Analysis for Public Health Studies
Course Number: BIST 0551J
Course Pre- and Co-requisite(s): PHCO 0504 and BIST 0535
Course Location: RM 1A/B, School of Public Health, Piscataway, NJ
Course Date & Time: Thursday, 6-8pm
Course Instructor: Sinae Kim, PhD., Assistant Professor
Department of Biostatistics and Epidemiology
Rutgers School of Public Health
sinae.kim@rutgers.edu & (732) 235-8816
Office Hours: Thursday, 4:30 – 5:30 pm, RM 130
Course Assistant: Yanzeng Li, 2nd year BIST-MS student, yl1271@sph.rutgers.edu
(Office hours: Tuesday, 5 – 6 pm, RM 116)
Course Website: canvas.rutgers.edu
Course Description: This course introduces students in graduate programs in public health to regression analyses methods. The primary topics are simple, multiple linear regression models, including analysis of covariance (ANCOVA), model diagnostics and model building. Logistic regression for binary outcome will be introduced. The emphasis will be interpretation and applications. Students will learn how to use SAS for implementing regression analyses.

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

1. Use statistical computer packages to organize, analyze, and report collected data
2. Integrate relevant scientific background to design experimental and observational studies in biomedical, clinical, and public health research.
3. Communicate the results of statistical analyses both in writing and orally to investigators and lay community members.

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:

a. Understand the fundamental concepts and assumptions of regression;
b. Develop the ability to apply these concepts correctly using statistical software; and
c. Develop the ability to interpret the results of an analysis properly.
# Course Requirements and Grading: *In this section, Instructor should include*

- Items evaluated for course grade:
  
  a. Midterm (in class, Mar 26) 25%
  b. Final (in class, May 7) 25%
  c. Homework (6 assignments) 20%
  d. Canvas quiz (10 quizzes; see the schedule) 10%
     - Solve a quiz posted in the Canvas, and upload your answer.
  e. Class participation 5%
     - Participating in polls (pollev.com/sinaekim454) using devices in class
     - Other activities through Canvas course page.
     - Visit during office hours
  f. Data analysis group project 15%
     - Exploratory analyses 15pt
     - Analyses using simple linear regression 25pt
     - Analyses using multiple linear regression including diagnostics and model building 50pt
     - Peer evaluation within group 10pt

  **Total 100%**

**Homework:**

1. Homework will be **collected at the beginning of lecture on due date**. Unless notifying the instructor beforehand, later submission of homework will NOT be graded.
2. On all homework assignments/problem sets, students are encouraged to discuss with one another, but **work should be carried out and written up independently**. If any two identical write-ups are found, both homework assignments are considered failed.
3. It is the students’ responsibility to make their papers legible. Unreadable work will NOT be graded.
4. The students are asked to answer each question as accurately and concisely as possible. **If it is necessary to attach the computer output with the homework assignment, ONLY the “essential” segments are required.** DO NOT SUBMIT the complete output section or the log file. Otherwise, 50% of the points will be taken away.

**Data analysis project:**

1. A group of three students will work together on data analyses using linear regression methods.
2. You have to provide a dataset to work on the project.
Please add the school-wide uniform grading scale:

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

Course Schedule: This table provides a general plan for the course; some deviations may be necessary. Please visit the course web in the Canvas on a regular basis to check any update. Online 30 will be updated weekly via Canvas.

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Course Topic</th>
<th>Online 30</th>
<th>Assignments/Assessments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>01/23</td>
<td>Measuring association; correlation coefficient (chap 4,6)</td>
<td>Review on intro biostatistics [watch YouTube videos listed below to review]</td>
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<td><a href="https://www.youtube.com/watch?v=z0Ry_3_qhDw">https://www.youtube.com/watch?v=z0Ry_3_qhDw</a> [Introduction to Sampling distribution]</td>
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<td><a href="https://www.youtube.com/watch?v=KS6KEWaoOE">https://www.youtube.com/watch?v=KS6KEWaoOE</a> [Hypothesis testing]</td>
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<td><a href="https://www.youtube.com/watch?v=5ABpqVSx33l">https://www.youtube.com/watch?v=5ABpqVSx33l</a> [Z-test vs. t-test]</td>
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<tr>
<td>2</td>
<td>01/30</td>
<td>Introduction to simple linear regression with model assumptions and interpretation; regression parameter estimation and inference including confidence interval &amp; hypothesis testing; applications (chap 5, 7);</td>
<td>Review on correlation coefficient and simple linear regression Online Quiz 1</td>
<td>Homework 1 assigned</td>
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<tr>
<td>3</td>
<td>02/06</td>
<td>Continued in estimation of regression parameters; prediction and predictive interval; assessing model fit (chap 5, 7);</td>
<td>Review on SLR testing procedure Online Quiz 2</td>
<td>Homework 1 due</td>
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<td>Homework 2 assigned</td>
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<tr>
<td>4</td>
<td>02/13</td>
<td>Residual analysis to check model assumptions; (chap 14.1 – 14.4);</td>
<td>Review on SLR prediction and model fit Online Quiz 3</td>
<td>Homework 2 due</td>
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<tr>
<td>Week</td>
<td>Date</td>
<td>Activity</td>
<td>Review/Assignment</td>
<td>Dataset/research plan DUE</td>
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<tr>
<td>5</td>
<td>02/20</td>
<td>Continued in model diagnostics (outlier; leverage point; influential point) (chap 14.1-14.4);</td>
<td>Review: SLR residual analysis Online Quiz 4</td>
<td>Homework 3 assigned</td>
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<tr>
<td>6</td>
<td>02/27</td>
<td>Introduction of multiple linear regression (MLR); interpretation and point estimation (chap 8);</td>
<td>Review: Model diagnostics (outliers, influential observations Online Quiz 5</td>
<td>Homework 3 due</td>
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<tr>
<td>7</td>
<td>03/05</td>
<td>Inference procedure in MLR including confidence interval and hypothesis testing for a single variable; categorical covariates in MLR (chap 9, 10, 12); Introduction to analysis of covariance (ANCOVA).</td>
<td>Reviews: MLR estimation Online Quiz 6</td>
<td>Homework 4 assigned</td>
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<td>Exploratory analyses DUE</td>
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<td>8</td>
<td>03/12</td>
<td>ANCOVA; confounding factors. Review for midterm</td>
<td>Reviews for midterm exam</td>
<td>Homework 4 due</td>
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<td>03/19</td>
<td>Spring Break</td>
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<td>9</td>
<td>03/26</td>
<td>Midterm</td>
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<td>10</td>
<td>04/02</td>
<td>Interaction; further testing procedures; testing for multiple effects</td>
<td>Review on Binomial distribution</td>
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<td>11</td>
<td>04/09</td>
<td>Model building and variable selection (chap 14, 16)</td>
<td>Review on interaction and partial F-tests Online Quiz 7</td>
<td>Homework 5 assigned</td>
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<td>Analyses using simple linear regression DUE</td>
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<tr>
<td>12</td>
<td>04/16</td>
<td>Model diagnostics for MLR (chap 14, 16)</td>
<td>Review on model building and variable selection Online Quiz 8</td>
<td>Homework 5 due</td>
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<tr>
<td>13</td>
<td>04/23</td>
<td>Introduction to logistic regression models; maximum likelihood estimation (chap 21); Parameter estimation and inference;</td>
<td>Review on model diagnostics for MLR Online Quiz 9</td>
<td>Homework 6 assigned</td>
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### 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