Course Title: Applied Regression Analysis for Public Health Studies

Course Number: BIST 0551J

Course Location: One Riverfront Plaza, Suite 1020, Newark, NJ

Course Date & Time: Thursday, 6:00 – 8:00 PM

Course Instructor: Cheongeun Oh, PhD., Adjunct Instructor
cceohh@gmail.com & (646)501-3644

Office Hours: TBD

Course Assistant: TBD

Required Course Text:
- An Introduction to Statistical Learning with Applications in R (ISLR) (http://www-bcf.usc.edu/~gareth/ISL/)
- “Practical Regression and Anova using R” by Julian Faraway (1,014K).

Additional/Supplemental Readings/Resources:

(1) R programming for Data Science

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 also be introduced. The emphasis will be interpretation and applications.

Course Objectives: By the completion of this course, students will be able to:
- Understand the fundamental concepts and assumptions of regression;
- Develop the ability to apply these concepts correctly using R statistical software; and
- Develop the ability to interpret the results of an analysis properly.

Computation: We will be using R for computation. Required R codes/commands will be provided.

Course Requirements and Grading:

Grade. Homework Assignments: 30%
Midterm (in-class exam): 30%
Final project (take-home): 30%
Attendance: 10%
**Requirements**

- You are required to read the relevant bibliography before class. Instructions regarding the required reading for each class are given below.
- Homework assignment will be handed out on a biweekly basis. At the end of the course there will be a final exam.
- Attendance to the lectures is strongly encouraged to be able to keep up with the material.

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

- Integrate relevant scientific background to design experimental and observational studies in biomedical, clinical and public health research;
- Use statistical computer packages to organize, analyze and report collected data;
- Review and critique statistical methods and interpretations presented in published research studies, presentations or reports; and
- Communicate the results of statistical studies 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 [http://sph.rutgers.edu/](http://sph.rutgers.edu/) for additional competencies addressed by this course for other degrees and concentrations.

**Grading policy**

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.
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<td><strong>Lecture 1</strong> Intro to regression, Getting started with R</td>
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<td><strong>Lecture 2</strong> Simple Linear Regression, Least Squares Estimation, Multiple Regression Intro, R graphics</td>
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<td><strong>Lecture 3</strong> Multiple linear regression; interactions; categorical predictors</td>
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<td><strong>Lecture 4</strong> Polynomial and spline models; least squares and properties</td>
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<td><strong>Lecture 5</strong> Identifiability and collinearity; example analysis</td>
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<td><strong>Lecture 6</strong> Inference for MLR, Resampling methods</td>
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<td><strong>Lecture 7</strong> Gauss-Markov, MLE, regression diagnostics, Model Checking</td>
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<td><strong>Lecture 8</strong> Model Selection; Penalized Regression</td>
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<td><strong>Lecture 9</strong> Splines and Penalized Splines; Additive Models; Case study</td>
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<td><strong>Lecture 10</strong> Weighted and Generalized Least Squares; Longitudinal Data Analysis</td>
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<td><strong>Lecture 11</strong> LDA Interpretation, Estimation Random slope models, case studies</td>
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<td><strong>Lecture 12</strong> Multilevel models; Measurement error; mediation; confounding</td>
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<td><strong>Lecture 13</strong> Logistic regression; Writing Statistical Reports; Introduction to Bayesian inference</td>
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<td>5/7 (reading week)</td>
<td>Final</td>
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Learning Management System: Moodle 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 Moodle and check it regularly. If you have difficulties accessing Moodle, please inform the instructor and Moodle Support (moodlehelp@ca.rutgers.edu). Moodle is accessible at moodle.rutgers.edu.

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.

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