

**Course Title:** Applied Regression Analysis for Public Health Spring 2023

**Course Number:** BIST 0551J – 033 (57617)

**Course Pre- and Co-requisite(s):** PHCO 0504 and BIST 0535 (*both with minimum grade of B*) or BIST 0625 (*with minimum grade of B*)

**Course Location:** Remote course campus via Zoom

**Course Date & Time:** Thursdays 6:00-8:00 PM

**Course Instructor:** Yen-Hong Kuo, Ph.D.  
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**Office Hours:** Thursdays after class for 1 hour

**Course Assistant:** Peng Wang  
Course Assistant  
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**Office Hours:** Mondays 5:00-6:00 PM and Thursdays 5:00-6:00 PM

**Course Website:** Rutgers Canvas ► 2023SP - Appl Regression Anal for PH BIST0551J033

**Required Course Text:**

- *Applied Regression Analysis and Other Multivariable Methods, 5<sup>th</sup> Edition (2013)*, by D. G. Kleinbaum, L. L. Kupper, A. Nizam and E. S. Rosenberg, published by Cengage Learning. ISBN-13: 978-1-285-05108-6
- *SAS/STAT ® User's Guide*. Cary, NC: SAS Institute Inc.  
<https://support.sas.com/en/software/sas-stat-support.html> (free online document)

**Additional/Supplemental Readings/Resources:**

- *Statistical Modeling for Biomedical Researchers: A Simple Introduction to the Analysis of Complex Data, 2nd Edition (2009)*, by W. D. Dupont, published by Cambridge University Press. ISBN-13: 978-0521614801
- *Applied Logistic Regression, 3<sup>rd</sup> Edition (2013)*, by D. W. Hosmer Jr., S. Lemeshow, R. X. Sturdivant, published by Wiley. ISBN-13: 978-0470582473
- *Regression Modeling Strategies: With Applications to Linear Models, Logistic and Ordinal Regression, and Survival Analysis, 2<sup>nd</sup> Edition (2015)*, by F. E. Harrell Jr., published by Springer. ISBN-13 : 978-3319194240
- *Step-by-Step Programming with Base SAS® 9.4, 2<sup>nd</sup> Edition (2020)*. Cary, NC: SAS Institute Inc.  
<https://documentation.sas.com/api/docsets/basess/9.4/content/basess.pdf> (free online book)

**Course Software: SAS**

- School of Public Health Computing Requirements
  - <https://sph.rutgers.edu/student-life/computer-requirements.html>
- SAS
  - SAS Studio in SAS OnDemand for Academics (for class activities)
    - Freely available
      - [https://www.sas.com/en\\_us/software/on-demand-for-academics.html](https://www.sas.com/en_us/software/on-demand-for-academics.html)
    - Sign in
      - <https://welcome.oda.sas.com>

**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 lay community members.

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:** Upon completion of the course, the 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
- c. Develop the ability to interpret the results of an analysis properly

Competency	Course Objectives(s)	Lessons	Assessment(s)
1	a, b	1-15	HW1-HW3; project; classwork
2	a, c	1-15	HW1-HW3; project; classwork midterm exam; final exam
3	a, b, c	1-15	HW1-HW3; project; classwork

**Course Schedule: (tentative)**

Lecture	Date	Activities	Chapter	Online 30 (update will be available via Canvas)	Assignment Due
1	01/19/23	Measuring association Correlation coefficient	1-3, 4, 6	Review on introduction to biostatistics and SAS	
2	01/26/23	Simple linear regression: assumption, estimation	5, 6, 7	Review on correlation coefficient	
3	02/02/23	Simple linear regression: prediction, assessing model fitting	5, 6, 7	Review on SLR estimation	
4	02/09/23	Multiple linear regression: assumptions, estimation	8, 9	Review on SLR assessing model fitting	HW #1
5	02/16/23	Multiple linear regression: prediction, confounding, interaction	10, 11, 12	Review on MLR estimation	Project Task #1
6	02/23/23	Regression diagnostics	14	Review on MLR prediction	HW #2
7	03/02/23	Model building and variable selection	16	Review on regression diagnostics and midterm exam	
8	03/09/23	Midterm exam		Readings on reporting regression analysis of public health research	
	03/16/23	<i>Spring Recess</i>			
9	03/23/23	Logistic regression: assumption, estimation	21, 22	Review on binomial distribution and analysis of 2x2 table	Project Task #2
10	03/30/23	Logistic regression: prediction, assessing model fitting, diagnostics	21, 22	Review on LR estimation	HW #3
11	04/06/23	Polytomous and ordinal logistic regression	23	Review on LR model fitting and diagnostics	Project Task #3
12	04/13/23	Analysis of variance (ANOVA) Analysis of covariance (ANCOVA)	13, 17-20	Review on polytomous and ordinal logistic regression	
13	04/20/23	Polynomial regression	15	Review on ANOVA and ANCOVA	Project Task #4
14	04/27/23	Poisson regression; Review	24	Review on polynomial Regression	
15	05/04/23	Final exam			

## **Course Requirements and Grading:**

### Course format

- Remote lectures via Zoom
  
- Classwork assignments
  - Tasks randomly assigned during a lecture with the specified completed time during that lecture.
  
- Homework assignments
  - Due at 6:00 PM on the scheduled date via Canvas submission.
  - Solutions to each assignment will be discussed right after the submission is due.
    - This is to ensure that you know your performance right away.
  - Students may be called upon to present homework solutions to the class.
  
- Midterm Exam and Final Exam
  - 6:00-7:00 PM on the scheduled date via Canvas.
  - Close book and close notes exam.
  - Multiple choice questions
  - Solutions to each exam will be discussed right after the exam is ended.
    - This is to ensure that you know your performance right away.
  
- A class project of data analysis

### Grading Policy

- The course overall grade will be determined by the grades of
  - Classwork assignments (20%)
  - Homework assignments (15%)
  - Midterm exam (20%)
  - Final exam (25%)
  - Class project (20%)
  
- There will be no early, late, or makeup Midterm exam and Final exam.
  - Solutions to each exam will be available after the exam is ended.
    - This is to ensure that you know your performance right away.
  - A grade of zero will be assigned to the missed exam.
  
- There will be no late homework assignment submission.
  - Solutions to each assignment will be discussed right after the submission is due.
    - This is to ensure that you know your performance right away.
  - A grade of zero will be assigned to missed homework assignments.
  
- One of the lowest scores of classwork will not be counted for final grade.
  
- Tasks of the class project submitted after the deadline will receive a 10% grade point deduction for each day following the due date and time.

**Tips for Enjoying This Course:**

- Attend all the classes and show your face
  - You can ask the Course Instructors questions during the lecture.
  - Showing your face can help you with focus and concentration during the lecture, and help the Course Instructor with getting the non-verbal feedback to improve the quality of lecture to help yourself.
- Review and understand the Lecture Notes, SAS codes, and Instructions before working on homework assignments and class project
  - All the needed knowledge and information are available in the Lecture Notes and Instructions.
- Write your own SAS codes after studying the provided codes.
  - You will be able to communicate with SAS much better to perform statistical analysis.
  - If you encounter errors and cannot resolve, providing all the relevant codes and logs in the SAS Program Summary format to the Course Assistant / Course Instructor will be the most efficient way to get feedback.
- Set your own deadlines to be one lecture before the posted deadlines in the Syllabus.
  - The design of a deadline for an assignment is to provide the interval of at least 2 lectures. It provides sufficient time and opportunity to work on the assignment and ask questions.
  - If you have any questions, you can ask the Course Assistant / Course Instructor during the office hours. Then you can submit the assignment one lecture earlier.
- Use the textbook
  - You can understand more details by reviewing the relevant contents.
  - You can use many Problems in each chapter for further practice.
- Keep up the good work
  - You will be able to enjoy this course by improving your knowledge and achieving your anticipated grade.

Course Grade Assignment

- Course grade will be assigned based on the following School-wide Uniform Grading Scale and posted to Rutgers BANNER Web system by May 10, 2023.

<b>Grade</b>	<b>Total Score (100 points)</b>
A	94 – 100
A-	90 – <94
B+	87 – <90
B	84 – <87
B-	80 – <84
C+	77 – <80
C	70 – <77
F	<70

**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)

**Remote Learning Policies:** The following are class policies for our class sessions with Zoom. Please read carefully; these policies apply to the Spring 2023 semester. All students are expected to adhere to the policies.

**General:** Log into Zoom using your Rutgers NetID and sign-in with your full first name and last name as listed on the class roster. (If you use a different name than what is listed on the class roster, please email the instructor in advance of the class or send a private Chat message.) Using your full name allows the instructor to know who is in attendance and to quickly sort students into their groups when needed. Users who do not log into Zoom using their Rutgers NetID may have trouble accessing the Zoom classroom.

**Video:** Please turn on your video when possible. We recognize that this isn't always easy but this will help to build our class community. Seeing the faces of your classmates more closely duplicates the typical in-person learning experience and may shift your mindset into more focus and attention. Seeing each other can also provide each of us with positive social interactions.

- If you're unable to find an environment without a lot of visual distractions or prefer to not show your living space as a background, feel free to use a virtual background (several virtual background images created by the School of Public Health are available in the [SPH Student Connect Canvas page](#)).
- To save bandwidth, there may be times during class when the instructor asks students to turn off videos.
- Add a photo to your Zoom profile. (Then in times when videos are off, we'll see photos of everyone rather than an empty box.)
- If you have limited internet bandwidth or other issues impacting your video use, please inform the instructor.

**Audio:** Mute your microphone when you are not talking. This helps eliminate background noise.

- Use a headset, if possible. If you own headphones with a microphone, please use them. This improves audio quality.
- Be in a quiet place, if possible. Turn off any music, videos, etc. in the background.

**Chat:** Stay on topic and be respectful. Use the chat window for questions and comments that are relevant to class.

**NOTE:** Class meetings on Zoom will be recorded and made available for students in the course on Canvas only.