Rutgers University
The State University of New Jersey
Department of Economics - CCAS
Fall 2025

Class Information

Course Title:	Foundations of Econometrics (index#07594) Economics 222/Section 92
Instructor:	Dr. I-Ming Chiu
Office:	Armitage Hall #435 Phone (856) 225 6012
E-mail address:	ichiu@camden.rutgers.edu
Class Meeting:	6:00-8:50 PM, Wednesday
Office Hours:	2:00-3:00 PM (Tuesday/Thursday or by appointment)
Course Description:	This class shows students how to apply modern statistical methods to explore and quantify essential variables used in business, economics, and other fields (e.g. Childhood Studies, Computer Science, Political Science, etc.). The class begins with a detailed introduction on mathematical fundamentals that include Set Theory, Functions, Counting Rules, Probability Theory, Random Variables & their corresponding distributions (discrete vs. continuous), and Statistical Inferences. After gaining a solid understanding on fundamental concepts in probability theory and statistical inference, the class continues to introduce students to experimental design, analysis of variance, and data fitting using the linear regression models. Bayesian statistics will be briefly explained at the end of the class. The pros and cons between Classical and Bayesian methods will be addressed. We will utilize real as well as simulated data sets to visualize statistical concepts and implement all the statistical methods. The ultimate goal of this class is to equip students with analytical skills, which are essential in today's dynamic workplace. Meanwhile, the rigorous training from this class will also pave the way for students to learn the subject of Data Science. This class is a prerequisite for students who would like to take 'Applied Data Mining and Machine Learning' economics course (220:422) offered in spring.
References:	Sujit K Sahu, Introduction to Probability, Statistics & R/Foundations for Data-Based Sciences (IPSR), Springer, 2024. (eBook can be downloaded via the school library web site).

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Michael W. Trosset, An Introduction to Statistical Inference and Its Applications with R (ISI), CRC 2009 (eBook can be purchased at Amazon)

Jay L Devore and Kenneth N. Berk, Modern Mathematical Statistics with Applications (MMSA), 2nd Edition, Springer, 2012 (eBook can be downloaded via the school library web site).

David Diez et. al, OpenIntro Statistics (OpenIntro), 4th edition, 2019. (Maybe downloaded as a free PDF at https://www.openintro.org/book/os/

Gary Oehlert, A First Course in Design and Analysis of Experiments (DOX), W. H. Freeman, 2000.
(Download site: http://users.stat.umn.edu/~gary/book/fcdae.pdf)

Babak Shahbaba, Biostatistics with R: An Introduction to Statistics through Biological Data (BioR), Springer, 2012 (eBook can be downloaded via the school library web site).

Computing: Most of the computations will be done using the statistical software R. The Python software will be briefly introduced as a supplemental computation tool.

R Installation: https://www.youtube.com/watch?v=8NvvydRwxEI (for Mac)
https://www.youtube.com/watch?v=hxj0UG4boGU (for PC)
*Install R before install RStudio. **Please notice that the most recent R and RStudio versions are 4.5.1 and 2025.05.1+513, respectively.

Class Material: Data, handouts, readings, and homework problems will be posted on **Canvas** web site.

Useful Websites: https://www.datacamp.com/ (Learn Data Science online)

http://www.ats.ucla.edu/stat/(Computing learning at UCLA)

http://www.statmethods.net/ (Computing using R web site)

Fall '25 Calendar: https://camden.rutgers.edu/registrar/catalogs-calendars/2025-2026

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Grading:	**Contribution to Final Grade**	
	- DataCamp courses	10%
	- Homework assignments	25%
	- Two Midterm Exams	40%
	- Final Exam	25%
	- Attendance/Participation (extra credits)	5%

Grading Policy: Term grades will be based on the final distribution of the above grading weights.

Exam Preparation: The exam questions will be drawn from three sources: (i) homework assignments, (ii) course lectures, and (iii) reading material.

Class Participation: Class attendance is essential for learning achievement. When missing a class, it would cost you more time to learn on your own. I strongly recommend the following steps for your successful learning: (1) attend every class and take notes; (2) review everything you learn from the class immediately, never put it off; (3) ask questions and participate in class discussions.

Academic conduct: Make up exams will be given **only upon prior notice**. I request prior knowledge of any expected absence from an exam. If this is not feasible, you can document a valid reason for missing the exam. Unexcused absence on any exam will result in a grade of zero. Dishonesty in seeking an excused absence or in the examination process will result in a grade of zero on the exam involved and in university discipline. To review the academic integrity policy, go to https://deanofstudents.camden.rutgers.edu/academic-integrity

Disability Services: Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: https://ods.rutgers.edu/students/documentation-guidelines. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide

you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please complete the Registration form at https://webapps.rutgers.edu/student-ods/forms/registration.

Here is the link to the Office of Disability Service: https://success.camden.rutgers.edu/disability-services

Learning Center: I am committed to making course content accessible to all students. The Learning Center provides Learning Specialists who can help you build a learning plan based on your strengths and needs. Tutors, study groups and more services are available you for free. Many services are available in virtual formats and after normal business hours. In addition, if English is not your first language and this causes you concern about the course, the Learning Center can help. You can learn more about these services by calling 856-225-6442, emailing rclc@camden.rutgers.edu or learningcenter@camden.rutgers.edu, or visiting the website https://learn.camden.rutgers.edu/. You can schedule an appointment with Learning Specialist to create a plan of action using the website.

More student resources information can be found from the following link:

https://studentaffairs.camden.rutgers.edu/student-resource-list

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Course Outline:

Topic 1	Data Types & Introduction to R
Topic 2	Mathematical Preliminaries
Topic 3	Probability Theory
Topic 4	Discrete & Continuous Random Variables
Exam I	**Date: TBA in the class**
Topic 5	Sampling Distributions and Major Statistical Theorems
Topic 6	Statistical Inferences (I): Point Estimation, Confidence Interval and Hypothesis Testing
Topic 7	Statistical Inferences (II): Point Estimation, Confidence Interval and Hypothesis Testing
Exam II	**Date: TBA in the class**
Topic 8	Introduction to the Design of Experiments (DOX) and Analysis of Variance (ANOVA)
Topic 9	Joint Distribution, Conditional Mean Function & Linear Regression Models
Topic 10	What's Bayesian Statistics? Frequentist vs Bayesian Thinking
Final Exam (school schedule)	6:00-9:00 PM, Wednesday, December 17