

ECONOMICS AND STATISTICS

The Economics-Statistics major provides the student with a grounding in economic theory comparable to that provided by the general economics major; and also exposes the student to rigorous and extensive training in Statistics. Students choose between two tracks of the major. The Computational Track consists of coursework in applied statistical methods. It is recommended for students preparing to apply statistical methods in the social sciences. The Theoretical Track consists of calculus-based probability, and the theory of statistical inference. It also provides some practical training in data analysis.

Available to students of the Class of 2021 and later.

Department Administrator: Robert O'Connor

Chair: Rajiv Sethi (Ann Whitney Olin Professor)

Professors: Elizabeth Ananat, André Burgstaller, Alan Dye, Daniel Hamermesh (Distinguished Scholar), Sharon Harrison, Shaw-Hwa Lo (Statistics), Lalith Munasinghe, David Weiman (Alena Wels Hirschorn '58 Professor)

Associate Professors: Yang Feng (Statistics), Jingchen Liu (Statistics), Randall Reback, Ashley Timmer (Adjunct)

Assistant Professors: Belinda Archibong, Biwei Chen (Term), Martina Jasova, Elizabeth Kopko (Adjunct), Peter Orbanz (Statistics), Sonia Pereira (Term), Anja Tolonen, Homa Zarghamee

Associates: John Park

Lecturers in Statistics: Banu Baydil, Ronald Neath, David Rios, Joyce Robbins, Gabriel Young

Computational Track

The Economics-Statistics, Computational Track requires a minimum of 16 courses (52 minimum credits).

10 courses in Economics, Mathematics

ECON BC1003	Introduction to Economic Reasoning
MATH UN1102	CALCULUS II
MATH UN1201	Calculus III
MATH UN2010	LINEAR ALGEBRA
ECON BC3033	Intermediate Macroeconomic Theory
ECON BC3035	Intermediate Microeconomic Theory
ECON BC3041	Theoretical Foundations of Political Economy

Two Upper-level Electives in Economics

ECON BC3063	SENIOR SEMINAR
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6 courses in Statistics

STAT UN1201	Calculus-Based Introduction to Statistics
ECON BC3018	ECONOMETRICS
STAT UN2102	Applied Statistical Computing
STAT UN2104	Applied Categorical Data Analysis

One of the following two courses:

STAT UN3105	Applied Statistical Methods
STAT UN3106	APPLIED MACHINE LEARNING

One Upper-level Elective in Statistics (STAT UN3106, GU4203, GU4204, GU4205, GU4206, or a Computer Science Elective)

Theoretical Track

The Economics-Statistics, Theoretical Track requires a minimum of 16 courses (52 minimum credits).

10 courses in Economics, Mathematics which are the same as in the Computational Track above, plus

6 courses in Statistics which differs from the Computational Track somewhat:

STAT UN1201	Calculus-Based Introduction to Statistics
ECON BC3018	ECONOMETRICS
STAT GU4203	PROBABILITY THEORY
STAT GU4204	Statistical Inference
STAT GU4205	Linear Regression Models
One Elective in Statistics at the 3000+ level (or a Computer Science Elective such as COMS W1004, W1005, W1007, or STAT UN2102)	

Economics, Mathematics

ECON BC1003 Introduction to Economic Reasoning. 3 points.

BC: Fulfillment of General Education Requirement: Social Analysis (SOC I)., BC: Fulfillment of General Education Requirement: Social Analysis (SOC II).

Covers basic elements of microeconomic and macroeconomic reasoning at an introductory level. Topics include Individual Constraints and Preferences, Production by Firms, Market Transactions, Competition, The Distribution of Income, Technological Progress and Growth, Unemployment and Inflation, the Role of Government in the Economy.

Note: Students cannot get credit for ECON BC1003 if they have taken the Columbia introductory course ECON W1105 Principles of Economics.

Fall 2022: ECON BC1003

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
ECON 1003	001/00380	T Th 10:10am - 11:25am LI103 Diana Center	Rajiv Sethi	3	59/60
ECON 1003	002/00381	T Th 4:10pm - 5:25pm 405 Milbank Hall	Camilo Rubbini	3	61/70

Spring 2023: ECON BC1003

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
ECON 1003	001/00294	M W 8:40am - 9:55am 504 Diana Center	Camilo Rubbini	3	54/60
ECON 1003	002/00295	T Th 10:10am - 11:25am LI103 Diana Center	Rajiv Sethi	3	60/60

MATH UN1102 CALCULUS II. 3.00 points.

Prerequisites: MATH UN1101 or the equivalent.

Prerequisites: MATH UN1101 or the equivalent. Methods of integration, applications of the integral, Taylors theorem, infinite series. (SC)

Fall 2022: MATH UN1102

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
MATH 1102	001/12761	M W 1:10pm - 2:25pm 203 Mathematics Building	Rostislav Akhmechet	3.00	69/110
MATH 1102	002/12763	M W 2:40pm - 3:55pm 203 Mathematics Building	Rostislav Akhmechet	3.00	68/110
MATH 1102	003/12765	M W 4:10pm - 5:25pm 407 Mathematics Building	Hindy Drillick	3.00	34/35
MATH 1102	004/12767	T Th 10:10am - 11:25am 312 Mathematics Building	Andres Fernandez Herrero	3.00	37/110
MATH 1102	005/12768	T Th 11:40am - 12:55pm 203 Mathematics Building	Andres Fernandez Herrero	3.00	65/110
MATH 1102	006/12771	T Th 6:10pm - 7:25pm 407 Mathematics Building	Haodong Yao	3.00	16/30

Spring 2023: MATH UN1102

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
MATH 1102	001/00021	T Th 2:40pm - 3:55pm 304 Barnard Hall	Lindsay Piechnik	3.00	99/100
MATH 1102	002/12024	M W 1:10pm - 2:25pm 407 Mathematics Building	Ryuichi Haney	3.00	21/30
MATH 1102	003/12025	M W 2:40pm - 3:55pm 417 Mathematics Building	Richard Hamilton	3.00	12/64
MATH 1102	004/12026	M W 6:10pm - 7:25pm 417 Mathematics Building	Elliott Stein	3.00	51/64
MATH 1102	005/12027	T Th 10:10am - 11:25am 203 Mathematics Building	Allen Yuan	3.00	45/100
MATH 1102	006/12028	T Th 11:40am - 12:55pm 203 Mathematics Building	Andres Fernandez Herrero	3.00	17/100
MATH 1102	007/12029	T Th 6:10pm - 7:25pm 417 Mathematics Building	Patrick Lei	3.00	9/30

MATH UN1201 Calculus III. 3 points.

Prerequisites: MATH UN1101 or the equivalent

Vectors in dimensions 2 and 3, complex numbers and the complex exponential function with applications to differential equations, Cramer's rule, vector-valued functions of one variable, scalar-valued functions of several variables, partial derivatives, gradients, surfaces, optimization, the method of Lagrange multipliers. (SC)

Fall 2022: MATH UN1201

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
MATH 1201	001/12774	M W 10:10am - 11:25am 207 Mathematics Building	Tudor Padurariu	3	106/110
MATH 1201	002/12776	M W 11:40am - 12:55pm 207 Mathematics Building	Tudor Padurariu	3	106/110
MATH 1201	003/12778	M W 1:10pm - 2:25pm 312 Mathematics Building	Sam Collingbourne	3	18/110
MATH 1201	004/12779	M W 2:40pm - 3:55pm 312 Mathematics Building	Sam Collingbourne	3	34/110
MATH 1201	005/12781	T Th 11:40am - 12:55pm 142 Uris Hall	Ilya Kofman	3	28/100
MATH 1201	006/12783	T Th 1:10pm - 2:25pm 203 Mathematics Building	Gyujin Oh	3	58/100
MATH 1201	007/12784	T Th 2:40pm - 3:55pm 207 Mathematics Building	Gyujin Oh	3	63/100
MATH 1201	008/12785	T Th 4:10pm - 5:25pm 312 Mathematics Building	George Dragomir	3	109/116

Spring 2023: MATH UN1201

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
MATH 1201	001/12030	M W 10:10am - 11:25am 207 Mathematics Building	Xi Shen	3	47/100
MATH 1201	002/12031	M W 11:40am - 12:55pm 312 Mathematics Building	Chen-Chih Lai	3	61/100
MATH 1201	003/12032	M W 1:10pm - 2:25pm 203 Mathematics Building	Xi Shen	3	81/100
MATH 1201	004/12033	T Th 1:10pm - 2:25pm 207 Mathematics Building	Inbar Klang	3	108/100
MATH 1201	005/12034	T Th 2:40pm - 3:55pm 207 Mathematics Building	Inbar Klang	3	112/100
MATH 1201	006/19536	M W 6:10pm - 7:25pm 203 Mathematics Building	Tomasz Owskiak	3	37/100

MATH UN2010 LINEAR ALGEBRA. 3.00 points.

Prerequisites: MATH UN1201 or the equivalent.

Matrices, vector spaces, linear transformations, eigenvalues and eigenvectors, canonical forms, applications. (SC)

Fall 2022: MATH UN2010

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
MATH 2010	001/00061	T Th 8:40am - 9:55am 328 Milbank Hall	David Bayer	3.00	41/56
MATH 2010	002/00062	T Th 10:10am - 11:25am 328 Milbank Hall	David Bayer	3.00	55/56
MATH 2010	003/12793	M W 10:10am - 11:25am 312 Mathematics Building	Marco Castronovo	3.00	47/100
MATH 2010	004/12794	M W 11:40am - 12:55pm 312 Mathematics Building	Marco Castronovo	3.00	63/100
MATH 2010	005/12796	T Th 4:10pm - 5:25pm 417 Mathematics Building	Elliott Stein	3.00	52/64

Spring 2023: MATH UN2010

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
MATH 2010	001/12504	M W 10:10am - 11:25am 203 Mathematics Building	Amadou Bah	3.00	78/100
MATH 2010	002/12541	M W 11:40am - 12:55pm 203 Mathematics Building	Amadou Bah	3.00	86/100
MATH 2010	003/12543	T Th 1:10pm - 2:25pm 312 Mathematics Building	Jie Jun Morris Ang	3.00	78/100
MATH 2010	004/12546	T Th 4:10pm - 5:25pm 203 Mathematics Building	Konstantin Aleshkin	3.00	58/100
MATH 2010	005/12563	T Th 6:10pm - 7:25pm 203 Mathematics Building	Konstantin Aleshkin	3.00	30/100
MATH 2010	006/15466	M W 6:10pm - 7:25pm Room TBA	Tomasz Owsiak	3.00	0/100

ECON BC3033 Intermediate Macroeconomic Theory. 4 points.

Prerequisites: An introductory course in economics and a functioning knowledge of high school algebra and analytical geometry or permission of the instructor.

Systematic exposition of current macroeconomic theories of unemployment, inflation, and international financial adjustments.

Fall 2022: ECON BC3033

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
ECON 3033	001/00388	T Th 6:10pm - 7:25pm 304 Barnard Hall	Elham Saeidinezhad	4	30/50

Spring 2023: ECON BC3033

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
ECON 3033	001/00375	T Th 11:40am - 12:55pm LI103 Diana Center	Miguel Casares	4	62/70

ECON BC3035 Intermediate Microeconomic Theory. 4 points.

Prerequisites: An introductory course in microeconomics or a combined macro/micro principles course (ECON BC1003 or ECON W1105, or the equivalent) and one semester of calculus or ECON BC1007, or permission of the instructor.

Preferences and demand; production, cost, and supply; behavior of markets in partial equilibrium; resource allocation in general equilibrium; pricing of goods and services under alternative market structures; implications of individual decision-making for labor supply; income distribution, welfare, and public policy. Emphasis on problem solving.

Fall 2022: ECON BC3035

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
ECON 3035	001/00400	T Th 4:10pm - 5:25pm LI103 Diana Center	Lalith Munasinghe	4	37/50

Spring 2023: ECON BC3035

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
ECON 3035	001/00407	T Th 1:10pm - 2:25pm LI104 Diana Center	Lalith Munasinghe	4	43/50

ECON BC3041 Theoretical Foundations of Political Economy. 3 points.

BC: Fulfillment of General Education Requirement: Reason and Value (REA)., BC: Fulfillment of General Education Requirement: Ethics and Values.

Prerequisites: An introductory course in economics or permission of the instructor.

Intellectual origins of the main schools of thought in political economy. Study of the founding texts in classical political economy, Marxian economics, neoclassicism, and Keynesianism.

Fall 2022: ECON BC3041

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
ECON 3041	002/00390	M W 2:40pm - 3:55pm 328 Milbank Hall	David Weiman	3	42/45
ECON 3041	003/00391	M W 10:10am - 11:25am 302 Barnard Hall	David Weiman	3	43/45

Spring 2023: ECON BC3041

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
ECON 3041	001/00409	T Th 2:40pm - 3:55pm 323 Milbank Hall	Belinda Archibong	3	58/58

ECON BC3063 SENIOR SEMINAR. 4.00 points.

Prerequisites: Permission of the instructor and the completion of all courses (except for the senior requirement) required for the economics track, political economy track, or economics and mathematics majors. Exceptions to these prerequisites may be granted by the chair of the department only. Seminar sections are limited to 15 students. A topic in economic theory or policy of the instructors choice. See department for current topics and for senior requirement preference forms

Fall 2022: ECON BC3063

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
ECON 3063	001/00396	T 10:10am - 12:00pm 407 Barnard Hall	Morgan Williams	4.00	16/16
ECON 3063	002/00397	T 4:10pm - 6:00pm 407 Barnard Hall	Rajiv Sethi	4.00	16/16
ECON 3063	003/00630	W 11:00am - 12:50pm 404 Barnard Hall	Elham Saeidinezhad	4.00	16/16

Spring 2023: ECON BC3063

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
ECON 3063	001/00451	T 2:10pm - 4:00pm 805 Altschul Hall	Anja Tolonen	4.00	15/16
ECON 3063	002/00452	W 2:10pm - 4:00pm LI016 Milstein Center	Homa Zarghamee	4.00	15/16
ECON 3063	003/00453	Th 4:10pm - 6:00pm 227 Milbank Hall	Lalith Munasinghe	4.00	15/16
ECON 3063	004/00454	M 2:10pm - 4:00pm 501 Diana Center	Mulu Gebreyohannes	4.00	10/16

Statistics, Computer Science**STAT UN1201 Calculus-Based Introduction to Statistics. 3 points.**

CC/GS: Partial Fulfillment of Science Requirement, BC: Fulfillment of General Education Requirement: Quantitative and Deductive Reasoning (QUA).

Prerequisites: one semester of calculus.

Designed for students who desire a strong grounding in statistical concepts with a greater degree of mathematical rigor than in *STAT W1111*. Random variables, probability distributions, pdf, cdf, mean, variance, correlation, conditional distribution, conditional mean and conditional variance, law of iterated expectations, normal, chi-square, F and t distributions, law of large numbers, central limit theorem, parameter estimation, unbiasedness, consistency, efficiency, hypothesis testing, p-value, confidence intervals, maximum likelihood estimation. Serves as the pre-requisite for *ECON W3412*.

Fall 2022: STAT UN1201

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
STAT 1201	001/13781	T Th 10:10am - 11:25am 602 Hamilton Hall	Joyce Robbins	3	84/86
STAT 1201	002/13782	M W 6:10pm - 7:25pm 517 Hamilton Hall	Johannes Wiesel	3	67/86
STAT 1201	003/13783	M W 10:10am - 11:25am 517 Hamilton Hall	Dobrin Marchev	3	74/86
STAT 1201	004/13784	T Th 2:40pm - 3:55pm 517 Hamilton Hall	Chenyang Zhong	3	64/86

Spring 2023: STAT UN1201

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
STAT 1201	001/14233	M W 10:10am - 11:25am 602 Hamilton Hall	Philip Protter	3	63/86
STAT 1201	002/14234	M W 8:40am - 9:55am 602 Hamilton Hall	Banu Baydil	3	61/86
STAT 1201	003/14235	T Th 10:10am - 11:25am 602 Hamilton Hall	Joyce Robbins	3	91/86
STAT 1201	004/14236	M W 6:10pm - 7:25pm 702 Hamilton Hall	Alex Pijyan	3	80/86

ECON BC3018 ECONOMETRICS. 4.00 points.

Prerequisites: ECON BC3033 or ECON BC3035, and ECON BC2411 or STAT W1111 or STAT W1211, or permission of the instructor.

Prerequisites: ECON BC3033 or ECON BC3035, and ECON BC2411 or STAT W1111 or STAT W1211, or permission of the instructor.

Specification, estimation and evaluation of economic relationships using economic theory, data, and statistical inference; testable implications of economic theories; econometric analysis of topics such as consumption, investment, wages and unemployment, and financial markets

Fall 2022: ECON BC3018

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
ECON 3018	001/00386	T Th 1:10pm - 2:25pm LI03 Diana Center	Morgan Williams	4.00	36/60

Spring 2023: ECON BC3018

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
ECON 3018	001/00391	M W 1:10pm - 2:25pm LI002 Milstein Center	Camilo Rubbini	4.00	54/60

STAT UN2102 Applied Statistical Computing. 3.00 points.

Corequisites: An introductory course in statistic (STAT UN1101 is recommended).

Corequisites: An introductory course in statistic (STAT UN1101 is recommended). This course is an introduction to R programming. After learning basic programming component, such as defining variables and vectors, and learning different data structures in R, students will, via project-based assignments, study more advanced topics, such as conditionals, modular programming, and data visualization. Students will also learn the fundamental concepts in computational complexity, and will practice writing reports based on their data analyses

Fall 2022: STAT UN2102

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
STAT 2102	001/13786	T Th 4:10pm - 5:25pm 614 Schermerhorn Hall	Anthony Donoghue	3.00	66/120

Spring 2023: STAT UN2102

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
STAT 2102	001/14237	T Th 4:10pm - 5:25pm 402 Chandler	Alex Pijyan	3.00	83/125

STAT UN2104 Applied Categorical Data Analysis. 3 points.

Prerequisites: STAT UN2103 is strongly recommended. Students without programming experience in R might find STAT UN2102 very helpful.

This course covers statistical models and methods for analyzing and drawing inferences for problems involving categorical data. The goals are familiarity and understanding of a substantial and integrated body of statistical methods that are used for such problems, experience in analyzing data using these methods, and proficiency in communicating the results of such methods, and the ability to critically evaluate the use of such methods. Topics include binomial proportions, two-way and three-way contingency tables, logistic regression, log-linear models for large multi-way contingency tables, graphical methods. The statistical package R will be used.

Spring 2023: STAT UN2104

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
STAT 2104	001/14239	M W 8:40am - 9:55am 413 Kent Hall	Ronald Neath	3	48/60

STAT UN3105 Applied Statistical Methods. 3 points.

Prerequisites: At least one, and preferably both, of STAT UN2103 and UN2104 are strongly recommended. Students without programming experience in R might find STAT UN2102 very helpful.

This course is intended to give students practical experience with statistical methods beyond linear regression and categorical data analysis. The focus will be on understanding the uses and limitations of models, not the mathematical foundations for the methods. Topics that may be covered include random and mixed-effects models, classical non-parametric techniques, the statistical theory causality, sample survey design, multi-level models, generalized linear regression, generalized estimating equations and over-dispersion, survival analysis including the Kaplan-Meier estimator, log-rank statistics, and the Cox proportional hazards regression model. Power calculations and proposal and report writing will be discussed.

Fall 2022: STAT UN3105

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
STAT 3105	001/13788	T Th 11:40am - 12:55pm 702 Hamilton Hall	David Rios	3	37/86

STAT UN3106 APPLIED MACHINE LEARNING. 3.00 points.

Prerequisites: STAT UN2103. Students without programming experience in R might find STAT UN2102 very helpful.

Prerequisites: STAT UN2103. Students without programming experience in R might find STAT UN2102 very helpful. This course is a machine learning class from an application perspective. We will cover topics including data-based prediction, classification, specific classification methods (such as logistic regression and random forests), and basics of neural networks. Programming in homeworks will require R

Spring 2023: STAT UN3106

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
STAT 3106	001/14240	T Th 2:40pm - 3:55pm 703 Hamilton Hall	Gabriel Young	3.00	45/45

STAT GU4203 PROBABILITY THEORY. 3 points.

Prerequisites: At least one semester, and preferably two, of calculus. An introductory course (STAT UN1201, preferably) is strongly recommended. A calculus-based introduction to probability theory. A quick review of multivariate calculus is provided. Topics covered include random variables, conditional probability, expectation, independence, Bayes' rule, important distributions, joint distributions, moment generating functions, central limit theorem, laws of large numbers and Markov's inequality.

Fall 2022: STAT GU4203

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
STAT 4203	001/13792	M W 10:10am - 11:25am 602 Hamilton Hall	Carsten Chong	3	48/86
STAT 4203	002/13793	M W 6:10pm - 7:25pm 301 Pupin Laboratories	Cristian Pasarica	3	37/86
STAT 4203	003/13794	M W 6:10pm - 7:25pm 301 Pupin Laboratories	Cristian Pasarica	3	18/35

Spring 2023: STAT GU4203

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
STAT 4203	001/14244	M W 6:10pm - 7:25pm 614 Schermerhorn Hall	David Rios	3	54/61

STAT GU4204 Statistical Inference. 3 points.

CC/GS: Partial Fulfillment of Science Requirement, BC: Fulfillment of General Education Requirement: Quantitative and Deductive Reasoning (QUA).

Prerequisites: STAT GU4203. At least one semester of calculus is required; two or three semesters are strongly recommended. Calculus-based introduction to the theory of statistics. Useful distributions, law of large numbers and central limit theorem, point estimation, hypothesis testing, confidence intervals maximum likelihood, likelihood ratio tests, nonparametric procedures, theory of least squares and analysis of variance.

Fall 2022: STAT GU4204

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
STAT 4204	001/13795	T Th 6:10pm - 7:25pm 501 Schermerhorn Hall	Hammou El Barmi	3	31/86
STAT 4204	002/13796	T Th 6:10pm - 7:25pm 501 Schermerhorn Hall	Hammou El Barmi	3	5/15

Spring 2023: STAT GU4204

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
STAT 4204	001/14246	T Th 2:40pm - 3:55pm 702 Hamilton Hall	Johannes Wiesel	3	48/86
STAT 4204	002/14247	T Th 6:10pm - 7:25pm 142 Uris Hall	Cristian Pasarica	3	21/45
STAT 4204	003/14248	T Th 6:10pm - 7:25pm 142 Uris Hall	Cristian Pasarica	3	21/24

STAT GU4205 Linear Regression Models. 3 points.

CC/GS: Partial Fulfillment of Science Requirement

Prerequisites: STAT GU4204 or the equivalent, and a course in linear algebra.

Theory and practice of regression analysis. Simple and multiple regression, testing, estimation, prediction, and confidence procedures, modeling, regression diagnostics and plots, polynomial regression, colinearity and confounding, model selection, geometry of least squares. Extensive use of the computer to analyse data.

Fall 2022: STAT GU4205

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
STAT 4205	001/13797	M W 8:40am - 9:55am 602 Hamilton Hall	Ronald Neath	3	25/86
STAT 4205	002/13798	T Th 2:40pm - 3:55pm 301 Pupin Laboratories	Philip Protter	3	10/15
STAT 4205	003/13799	M W 1:10pm - 2:25pm 428 Pupin Laboratories	Banu Baydil	3	11/11
STAT 4205	004/13800	T Th 6:10pm - 7:25pm 428 Pupin Laboratories	Alex Pijyan	3	4/25
STAT 4205	005/13801	M W 8:40am - 9:55am 312 Mathematics Building	Yuqi Gu	3	8/25

Spring 2023: STAT GU4205

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
STAT 4205	001/14249	M W 7:40pm - 8:55pm 428 Pupin Laboratories	Jeonghoe Lee	3	13/35

STAT GU4206 Statistical Computing and Introduction to Data Science. 3 points.

Prerequisites: STAT GU4204 and GU4205 or the equivalent.

Introduction to programming in the R statistical package: functions, objects, data structures, flow control, input and output, debugging, logical design, and abstraction. Writing code for numerical and graphical statistical analyses. Writing maintainable code and testing, stochastic simulations, parallelizing data analyses, and working with large data sets. Examples from data science will be used for demonstration.

Fall 2022: STAT GU4206

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
STAT 4206	001/14194	F 10:10am - 12:40pm 301 Pupin Laboratories	Wayne Lee	3	6/10

Spring 2023: STAT GU4206

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
STAT 4206	001/14250	M W 6:10pm - 7:25pm 301 Pupin Laboratories	Yongchan Kwon	3	19/40

COMS W1004 Introduction to Computer Science and Programming in Java. 3 points.

Lect: 3.

A general introduction to computer science for science and engineering students interested in majoring in computer science or engineering. Covers fundamental concepts of computer science, algorithmic problem-solving capabilities, and introductory Java programming skills. Assumes no prior programming background. Columbia University students may receive credit for only one of the following two courses: *1004* or *1005*.

Fall 2022: COMS W1004

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
COMS 1004	001/10985	M W 2:40pm - 3:55pm 417 International Affairs Bldg	Paul Blaer	3	391/398
COMS 1004	002/10986	M W 5:40pm - 6:55pm 501 Northwest Corner	Paul Blaer	3	171/164
COMS 1004	H01/20439	M W 2:40pm - 3:55pm Online Only	Paul Blaer	3	4/40
COMS 1004	H02/20440	M W 5:40pm - 6:55pm Online Only	Paul Blaer	3	3/40

Spring 2023: COMS W1004

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
COMS 1004	001/12396	T Th 11:40am - 12:55pm 417 International Affairs Bldg	Adam Cannon	3	257/350
COMS 1004	002/12398	T Th 1:10pm - 2:25pm 417 International Affairs Bldg	Adam Cannon	3	149/350

COMS W1005 Introduction to Computer Science and Programming in MATLAB. 3 points.

CC/GS: Partial Fulfillment of Science Requirement

A general introduction to computer science concepts, algorithmic problem-solving capabilities, and programming skills in MATLAB. Assumes no prior programming background. Columbia University students may receive credit for only one of the following two courses: *W1004* or *W1005*.

COMS W1007 Honors Introduction to Computer Science. 3 points.

Lect: 3.

Prerequisites: AP Computer Science with a grade of 4 or 5 or similar experience.

An honors-level introduction to computer science, intended primarily for students considering a major in computer science. Computer science as a science of abstraction. Creating models for reasoning about and solving problems. The basic elements of computers and computer programs. Implementing abstractions using data structures and algorithms. Taught in Java.