ECONOMICS AND STATISTICS

1019 Milstein Learning Center 212-854-3454

Department Administrator. Regina Roberts

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 in 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. Please see the Economics and Statistics major webpage for additional information.

Available to students of the Class of 2021 and later.

Chair: Homa Zarghamee (Professor)

Professors: Elizabeth Ananat, André Burgstaller (Professor Emeritus), Alan Dye. Sharon Harrison, Jingchen Liu (Statistics), Shaw-Hwa Lo (Statistics). Lalith Munasinghe, Randall Reback, David Weiman (Alena Wels Hirschorn '58 Professor of Economics)

Assistant Professors: Martina Jasova, Anja Tolonen

Associate: John Park

Lecturers in Statistics: Banu Baydil, Ronald Neath. David Rios, Joyce

Robbins. Gabriel Young

Adjunct Assistant Professor: Ashley Timmer

Requirements for the 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 | INTERMEDTE MACROECONOMC THEORY |
| ECON BC3035 | INTERMEDIATE MICROECONOMICS |
| ECON BC3041 | THEORETICL FOUNDTNS-POLIT ECON |
| Two Upper-level Electives in Ed | conomics |
| ECON BC3063 | SENIOR SEMINAR |

6 courses in Statistics

| STAT UN1201 | CALC-BASED INTRO TO STATISTICS | | |
|-----------------------------------|--------------------------------|--|--|
| ECON BC3018 | ECONOMETRICS | | |
| STAT UN2102 | Applied Statistical Computing | | |
| STAT UN2104 | APPL 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)

Requirements for the 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 | CALC-BASED INTRO TO STATISTICS |
|----------------------------------|--------------------------------------|
| ECON BC3018 | ECONOMETRICS |
| STAT GU4203 | PROBABILITY THEORY |
| STAT GU4204 | STATISTICAL INFERENCE |
| STAT GU4205 | LINEAR REGRESSION MODELS |
| One Elective in Statistics at th | e 3000+ level (or a Computer Science |
| Elective such as COMS W1004 | 4, W1005, W1007, or STAT UN2102) |

Economics, Mathematics

ECON BC1003 Introduction to Economic Reasoning. 4 points.

Covers basic elements of microeconomic and marcoeconomic 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.

| Spring 2025: ECON BC1003 | | | | | | | |
|--------------------------|------------------------|--|----------------------------------|--------|------------|--|--|
| Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment | | |
| ECON 1003 | 001/00775 | T Th 11:40am - 12:55pm 263 Macy Hall | Alan Dye | 4 | 66/100 | | |
| ECON 1003 | 002/00774 | M W 2:40pm - 3:55pm 263 Macy Hall | Mulu Gebreyohanne | 4 s | 62/65 | | |
| Fall 2025: ECC | Fall 2025: ECON BC1003 | | | | | | |
| Course Number | Section/Call | Times/Location | Instructor | Points | Enrollment | | |
| | Number | | | | | | |
| ECON 1003 | 001/00054 | T Th 11:40am - 12:55pm 405 Milbank Hall | Alan Dye | 4 | 0/50 | | |
| ECON 1003 | | | Alan Dye Mulu Gebreyohanne | 4 | 0/50 | | |

MATH UN1102 CALCULUS II. 3.00 points.

Prerequisites: MATH UN1101 MATH V1101 or the equivalent.

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

Spring 2025: MATH UN1102

| Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment |
|------------------|------------------------|---|------------------------|--------|------------|
| MATH 1102 | 001/00477 | T Th 2:40pm - 3:55pm Ll002 Milstein Center | Lindsay Piechnik | 3.00 | 88/90 |
| MATH 1102 | 002/15285 | M W 10:10am - 11:25am 312 Mathematics Building | Evan Sorensen | 3.00 | 49/100 |
| MATH 1102 | 003/00493 | M W 11:40am - 12:55pm 323 Milbank Hall | Wenjian Liu | 3.00 | 38/100 |
| MATH 1102 | 004/15287 | M W 4:10pm - 5:25pm 606 Martin Luther King Building | Jingbo Wan | 3.00 | 27/30 |
| MATH 1102 | 005/15289 | T Th 10:10am - 11:25am 417 Mathematics Building | Peter Woit | 3.00 | 20/64 |
| MATH 1102 | 006/15291 | T Th 11:40am - 12:55pm 203 Mathematics Building | Dawei Shen | 3.00 | 23/100 |
| MATH 1102 | 007/15294 | T Th 1:10pm - 2:25pm 312 Mathematics Building | Andres Ibanez Nunez | 3.00 | 8/100 |
| Fall 2025: MAT | H UN1102 | | | | |

| Fall 2025. MATH UNTTUZ | | | | | | | |
|------------------------|------------------------|---|------------------------|--------|------------|--|--|
| Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment | | |
| MATH 1102 | 001/00297 | M W 11:40am - 12:55pm 263 Macy Hall | 0. FACULTY | 3.00 | 0/65 | | |
| MATH 1102 | 002/00298 | M W 1:10pm - 2:25pm 405 Milbank Hall | 0. FACULTY | 3.00 | 0/65 | | |
| MATH 1102 | 003/12510 | M W 2:40pm - 3:55pm Room TBA | | 3.00 | 0/30 | | |
| MATH 1102 | 004/12512 | T Th 8:40am - 9:55am Room TBA | Andres Ibanez Nunez | 3.00 | 0/100 | | |
| MATH 1102 | 005/12511 | T Th 10:10am - 11:25am Room TBA | Andres Ibanez Nunez | 3.00 | 0/100 | | |
| MATH 1102 | 006/12513 | T Th 6:10pm - 8:15pm Room TBA | Elliott Stein | 3.00 | 0/64 | | |
| | | | | | | | |

MATH UN1201 CALCULUS III. 3.00 points.

Prerequisites: MATH UN1101 MATH V1101 or the equivalent. Prerequisites: MATH UN1101 or the equivalent Vectors in dimensions 2 and 3, complex numbers and the complex exponential function with applications to differential equations, Cramers rule, vector-valued functions of one variable, scalar-valued functions of several variables, partial derivatives, gradients, surfaces, optimization, the method of Lagrange multipliers. (SC)

| Spring 2025: MATH UN1201 | | | | | | | |
|--|---|---|---|------------------------------|--------------------------------|--|--|
| | | | | | | | |
| Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment | | |
| MATH 1201 | 001/00494 | M W 10:10am - 11:25am 405 Milbank Hall | Cristian Iovanov | 3.00 | 31/90 | | |
| MATH 1201 | 002/00496 | M W 11:40am - 12:55pm 405 Milbank Hall | Cristian Iovanov | 3.00 | 56/90 | | |
| MATH 1201 | 003/15298 | M W 2:40pm - 3:55pm 312 Mathematics Building | Deeparaj Bhat | 3.00 | 93/100 | | |
| MATH 1201 | 004/15300 | T Th 1:10pm - 2:25pm 203 Mathematics Building | Deeparaj Bhat | 3.00 | 85/100 | | |
| MATH 1201 | 005/15301 | T Th 4:10pm - 5:25pm 203 Mathematics Building | Rostislav Akhmechet | 3.00 | 90/100 | | |
| MATH 1201 | 006/15302 | T Th 6:10pm - 7:25pm 203 Mathematics Building | Rostislav Akhmechet | 3.00 | 88/100 | | |
| Fall 2025: MA | TH UN1201 | | | | | | |
| Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment | | |
| | Number | | | | | | |
| MATH 1201 | 001/00300 | M W 8:40am - 9:55am 263 Macy Hall | Daniela De Silva | 3.00 | 0/65 | | |
| MATH 1201 MATH 1201 | | | | 3.00 | 0/65 | | |
| | 001/00300 | 263 Macy Hall T Th 4:10pm - 5:25pm | Silva | | | | |
| MATH 1201 | 001/00300 | 263 Macy Hall T Th 4:10pm - 5:25pm Ll002 Milstein Center T Th 2:40pm - 3:55pm | Silva 0. FACULTY | 3.00 | 0/65 | | |
| MATH 1201 MATH 1201 | 001/00300 002/00301 003/00302 | 263 Macy Hall T Th 4:10pm - 5:25pm Ll002 Milstein Center T Th 2:40pm - 3:55pm 405 Milbank Hall M W 4:10pm - 5:25pm | Silva 0. FACULTY 0. FACULTY | 3.00 3.00 3.00 | 0/65 | | |
| MATH 1201 MATH 1201 MATH 1201 | 001/00300 002/00301 003/00302 004/12517 | 263 Macy Hall T Th 4:10pm - 5:25pm Ll002 Milstein Center T Th 2:40pm - 3:55pm 405 Milbank Hall M W 4:10pm - 5:25pm Room TBA M W 6:10pm - 7:25pm | Silva 0. FACULTY 0. FACULTY Deeparaj Bhat | 3.00 3.00 3.00 | 0/65 0/65 0/100 | | |
| MATH 1201 MATH 1201 MATH 1201 MATH 1201 | 001/00300 002/00301 003/00302 004/12517 005/12516 | 263 Macy Hall T Th 4:10pm - 5:25pm Ll002 Milstein Center T Th 2:40pm - 3:55pm 405 Milbank Hall M W 4:10pm - 5:25pm Room TBA M W 6:10pm - 7:25pm Room TBA T Th 10:10am - 11:25am | Silva 0. FACULTY 0. FACULTY Deeparaj Bhat | 3.00 3.00 3.00 3.00 | 0/65 0/65 0/100 0/100 | | |

MATH UN2010 LINEAR ALGEBRA. 3.00 points.

Prerequisites: MATH V1201, or the equivalent.

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

Spring 2025: MATH UN2010

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|------------------|------------------------|---|---------------------|--------|------------|
| Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment |
| MATH 2010 | 001/00487 | M W 8:40am - 9:55am 263 Macy Hall | Wenjian Liu | 3.00 | 82/100 |
| MATH 2010 | 002/00491 | M W 2:40pm - 3:55pm Ll002 Milstein Center | Lindsay Piechnik | 3.00 | 79/90 |
| MATH 2010 | 003/15325 | T Th 10:10am - 11:25am 312 Mathematics Building | Qiao He | 3.00 | 62/100 |
| MATH 2010 | 004/15328 | T Th 11:40am - 12:55pm 312 Mathematics Building | Qiao He | 3.00 | 78/100 |
| MATH 2010 | 005/15331 | T Th 4:10pm - 5:25pm 312 Mathematics Building | Elliott Stein | 3.00 | 55/64 |
| Fall 2025: MAT | H UN2010 | | | | |
| Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment |
| MATH 2010 | 001/00303 | M W 10:10am - 11:25am 405 Milbank Hall | 0. FACULTY | 3.00 | 0/70 |
| MATH 2010 | 002/12525 | M W 8:40am - 9:55am Room TBA | Yoonjoo Kim | 3.00 | 0/100 |
| MATH 2010 | 003/12524 | M W 11:40am - 12:55pm Room TBA | Yoonjoo Kim | 3.00 | 0/100 |
| MATH 2010 | 004/12523 | T Th 10:10am - 11:25am Room TBA | Andrew Blumberg | 3.00 | 0/100 |
| MATH 2010 | 005/12522 | T Th 4:10pm - 5:25pm Room TBA | Yujie Xu | 3.00 | 0/100 |
| | | | | | |

ECON BC3033 INTERMEDTE MACROECONOMC THEORY. 4.00 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

Spring 2025: ECON BC3033

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|------------------|------------------------|---|--------------|--------|------------|--|--|--|
| Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment | | | |
| ECON 3033 | 001/00755 | M W 11:40am - 12:55pm 302 Barnard Hall | Nuria Quella | 4.00 | 47/50 | | | |
| ECON 3033 | 002/00756 | M W 1:10pm - 2:25pm 418 Barnard Hall | Nuria Quella | 4.00 | 58/70 | | | |
| Fall 2025: ECO | N BC3033 | | | | | | | |
| Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment | | | |
| ECON 3033 | 001/00069 | M W 10:10am - 11:25am 408 Zankel | 0. FACULTY | 4.00 | 0/50 | | | |

ECON BC3035 INTERMEDIATE MICROECONOMICS. 4.00 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

Spring 2025: ECON BC3035

| Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment |
|------------------|------------------------|--|----------------------|--------|------------|
| ECON 3035 | 001/00754 | T Th 1:10pm - 2:25pm Ll003 Barnard Hall | Lalith Munasinghe | 4.00 | 47/65 |
| Fall 2025: ECO | N BC3035 | | | | |
| Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment |
| ECON 3035 | 001/00070 | M W 11:40am - 12:55pm Ll003 Barnard Hall | Elizabeth Ananat | 4.00 | 0/50 |
| ECON 3035 | 002/00078 | T Th 1:10pm - 2:25pm 152 Horace Mann Hall | John Park | 4.00 | 0/50 |

ECON BC3041 THEORETICL FOUNDTNS-POLIT ECON. 3.00 points.

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

Spring 2025: ECON BC3041

| Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment | | |
|------------------------|------------------------|--|----------------------|--------|--------------------|--|--|
| ECON 3041 | 001/00863 | M W 4:10pm - 5:25pm 418 Barnard Hall | Kurt Semm | 3.00 | 79/72 | | |
| ECON 3041 | 002/00923 | T Th 2:40pm - 3:55pm Ll003 Barnard Hall | Kurt Semm | 3.00 | 79/72 | | |
| Fall 2025: ECON BC3041 | | | | | | | |
| 1 all 2023. LCC | 314 000041 | | | | | | |
| Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment | | |
| Course | Section/Call | Times/Location M W 10:10am - 11:25am 418 Barnard Hall | Instructor Kurt Semm | Points | Enrollment 0/55 | | |

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

Spring 2025: ECON BC3063

| Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment |
|------------------|------------------------|--|-----------------------|--------|------------|
| ECON 3063 | 001/00864 | Th 4:10pm - 6:00pm 214 Milbank Hall | Lalith Munasinghe | 4.00 | 20/20 |
| ECON 3063 | 002/00764 | T 6:10pm - 8:00pm 912 Milstein Center | Elham Saeidinezhad | 4.00 | 19/18 |
| ECON 3063 | 003/00769 | M 6:10pm - 8:00pm 308 Diana Center | Rajiv Sethi | 4.00 | 16/16 |
| Fall 2025: ECO | N BC3063 | | | | |
| Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment |
| ECON 3063 | 001/00851 | M 2:10pm - 4:00pm 113 Milstein Center | Sharon Harrison | 4.00 | 0/16 |
| ECON 3063 | 002/00854 | W 2:10pm - 4:00pm 119 Milstein Center | Ashley Timmer | 4.00 | 0/16 |

Statistics, Computer Science

STAT UN1201 CALC-BASED INTRO TO STATISTICS. 3.00 points.

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

| Spring 2025: S | Spring 2025: STAT UN1201 | | | | | | |
|------------------|--------------------------|--|--------------------|--------|------------|--|--|
| Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment | | |
| STAT 1201 | 001/13992 | M W 10:10am - 11:25am 717 Hamilton Hall | Hammou El Barmi | 3.00 | 81/86 | | |
| STAT 1201 | 002/13993 | M W 10:10am - 11:25am 602 Hamilton Hall | Joyce Robbins | 3.00 | 70/85 | | |
| STAT 1201 | 003/13994 | T Th 10:10am - 11:25am 717 Hamilton Hall | Joyce Robbins | 3.00 | 74/86 | | |
| STAT 1201 | 004/13995 | M W 6:10pm - 7:25pm 417 International Affairs Bldg | Banu Baydil | 3.00 | 138/180 | | |

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

| Spring 2023. ECON BC3010 | | | | | | | |
|--------------------------|------------------------|---|--------------|--------|------------|--|--|
| Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment | | |
| ECON 3018 | 001/00848 | M W 1:10pm - 2:25pm 504 Diana Center | Sinem Sonmez | 4.00 | 16/60 | | |
| Fall 2025: ECON BC3018 | | | | | | | |
| Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment | | |
| ECON 3018 | 001/00067 | M W 10:10am - 11:25am 152 Horace Mann Hall | 0. FACULTY | 4.00 | 0/60 | | |

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

Spring 2025: STAT UN2102

| Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment |
|------------------|------------------------|--|-------------|--------|------------|
| STAT 2102 | 001/13996 | T Th 4:10pm - 5:25pm 428 Pupin Laboratories | Alex Pijyan | 3.00 | 97/120 |

STAT UN2104 APPL CATEGORICAL DATA ANALYSIS. 3.00 points.

Prerequisites: STAT UN2103 is strongly recommended. Students without programming experience in R might find STAT UN2102 very helpful. Prerequisites: STAT UN2103 is strongly recommended. Students without programming experience in R might find STAT UN2102 very helpful. This course covers statistical models amd methods for analyzing and drawing inferences for problems involving categofical data. The goals are familiarity and understanding of a substantial and integrated body of statistical methods that are used for such problems, experience in anlyzing data using these methods, and profficiency 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 2025: STAT UN2104

| Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment |
|------------------|------------------------|--|--------------|--------|------------|
| STAT 2104 | 001/13999 | M W 8:40am - 9:55am 717 Hamilton Hall | Ronald Neath | 3.00 | 45/86 |

STAT UN3105 APPLIED STATISTICAL METHODS. 3.00 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.

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, multilevel 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

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 2025: STAT UN3106

| Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment |
|------------------|------------------------|---|------------|--------|------------|
| STAT 3106 | 001/14000 | T Th 2:40pm - 3:55pm 602 Hamilton Hall | Wayne Lee | 3.00 | 36/86 |

STAT GU4203 PROBABILITY THEORY. 3.00 points.

Prerequisites: At least one semester, and preferably two, of calculus. An introductory course (STAT UN2101, preferably) is strongly recommended.

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

Spring 2025: STAT GU4203

| Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment |
|------------------|------------------------|---|------------------------|--------|------------|
| STAT 4203 | 001/14011 | T Th 6:10pm - 7:25pm 312 Mathematics Building | Marco Avella Medina | 3.00 | 82/116 |
| STAT 4203 | 002/14010 | T Th 6:10pm - 7:25pm 517 Hamilton Hall | Gabriel Young | 3.00 | 2/3 |

STAT GU4204 STATISTICAL INFERENCE. 3.00 points.

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

Spring 2025: STAT GU4204

| Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment |
|------------------|------------------------|---|---------------|--------|------------|
| STAT 4204 | 001/14012 | T Th 1:10pm - 2:25pm 503 Hamilton Hall | Banu Baydil | 3.00 | 39/45 |
| STAT 4204 | 002/14013 | T Th 7:10pm - 8:25pm 501 Schermerhorn Hall | Pratyay Datta | 3.00 | 25/35 |
| STAT 4204 | 003/17906 | T Th 7:10pm - 8:25pm 501 Schermerhorn Hall | Pratyay Datta | 3.00 | 22/25 |

STAT GU4205 LINEAR REGRESSION MODELS. 3.00 points.

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

Spring 2025: STAT GU4205

| Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment |
|------------------|------------------------|--|--------------|--------|------------|
| STAT 4205 | 001/14014 | M W 6:10pm - 7:25pm 517 Hamilton Hall | Ronald Neath | 3.00 | 31/50 |

STAT GU4206 STAT COMP # INTRO DATA SCIENCE. 3.00 points.

Prerequisites: STAT GU4204 and GU4205 or the equivalent. 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, paralleizing data analyses, and working with large data sets. Examples from data science will be used for demonstration

Spring 2025: STAT GU4206

| Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment |
|------------------|------------------------|---|------------------|--------|------------|
| STAT 4206 | 001/14015 | F 10:10am - 12:40pm 329 Pupin Laboratories | Yongchan Kwon | 3.00 | 6/10 |

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 problemsolving 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.

| Spring 2025: COMS W1004 | | | | | | |
|-------------------------|------------------------|---|-------------|--------|------------|--|
| Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment | |
| COMS 1004 | 001/11948 | T Th 11:40am - 12:55pm 417 International Affairs Bldg | Adam Cannon | 3 | 111/398 | |
| COMS 1004 | 002/11949 | T Th 1:10pm - 2:25pm 417 International Affairs Bldg | Adam Cannon | 3 | 87/398 | |
| Fall 2025: COM | IS W1004 | | | | | |
| Course Number | Section/Call Number | Times/Location | Instructor | Points | Enrollment | |
| COMS 1004 | 001/12794 | M W 2:40pm - 3:55pm Room TBA | Paul Blaer | 3 | 0/320 | |
| COMS 1004 | 002/12795 | M W 5:40pm - 6:55pm Room TBA | Paul Blaer | 3 | 0/164 | |

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*.