# SOCIAL STATISTICS (ILRST)

**ILRST 2100 - Introductory Statistics and Data Science (4 Credits)**
Crosslisted with STSCI 2100
Statistics is about understanding the world through data. We are surrounded by data, so there is a lot to understand. Covers data exploration and display, data gathering methods, probability, and statistical inference methods through contingency tables and linear regression. The emphasis is on thinking scientifically, understanding what is commonly done with data (and doing some of it for yourself), and laying a foundation for further study. Students learn to use statistical software and simulation tools to discover fundamental results. They use computers regularly; the test includes both multimedia materials and a software package. This course does not focus on data from any particular discipline, but will use real-world examples from a wide variety of disciplines and current events.
**Forbidden Overlaps:** AEM 2100, BTRY 3010, BTRY 6010, CRP 1200, ENGRD 2700, HADM 2010, HADM 2011, ILRST 2100, ILRST 6100, MATH 1710, PSYCH 2500, PUBPOL 2100, PUBPOL 2101, SOC 3010, STSCI 2100, STSCI 2150, STSCI 2200. In addition, no credit for MATH 1710 if taken after ECON 3130, ECON 3140, MATH 4720, or any other upper-level course focusing on the statistical sciences.
**Distribution Requirements:** (DLS-AG, MQL-AG, OPHLS-AG), (ICE-IL, STA-IL), (SDS-AS)
**Last Four Terms Offered:** Summer 2025, Spring 2025, Winter 2025, Fall 2024
Schedule of Classes (https://classes.cornell.edu/)

**ILRST 2110 - Statistical Methods for the Social Sciences II (4 Credits)**
Crosslisted with STSCI 2110
A second course in statistics that emphasizes applications to the social sciences. Topics include simple linear regression, multiple linear regression (theory, model building, and model diagnostics), and the analysis of variance. Computer packages are used extensively.
**Prerequisites:** AEM 2100, CRP 1200, ENGRD 2700, HADM 2010, ILRST 2100, MATH 1710, PUBPOL 2100, PUBPOL 2101, PSYCH 2500, SOC 3010, STSCI 2100, or STSCI 2150.
**Forbidden Overlaps:** BTRY 3020, ILRST 2110, STSCI 2110, STSCI 3200
**Enrollment Information:** Open to: undergraduate students.
**Distribution Requirements:** (DLS-AG, OPHLS-AG), (ICE-IL, STA-IL), (SDS-AS)
**Last Four Terms Offered:** Spring 2025, Fall 2024, Spring 2024, Spring 2023
Schedule of Classes (https://classes.cornell.edu/)

**ILRST 2130 - Applied Regression Analysis (2 Credits)**
Crosslisted with STSCI 2130
This seven week, two-credit class will cover the regression requirements, hypothesis tests, and interpretation of results. Students will learn to identify the data necessary to perform a regression analysis, evaluate the conditions, and apply the statistical tests. Interpretation of overall results will be made. Independent/group projects by each student will be done. These will consist of identifying an issue of interest, a relevant data set, and analysis using the regression methods. Presentation of the results in verbal and written form will be required. Recommended for students who want to develop applied analysis skills.
**Prerequisites:** AEM 2100,CRP 1200, ENGRD 2700, HADM 2010, ILRST 2100, MATH 1710, PUBPOL 2100, PUBPOL 2101, PSYCH 2500, SOC 3010, STSCI 2100, or STSCI 2150.
**Distribution Requirements:** (ICE-IL, STA-IL)
**Last Four Terms Offered:** Fall 2024, Fall 2023, Spring 2023, Fall 2022
Schedule of Classes (https://classes.cornell.edu/)

**ILRST 3080 - Probability Models and Inference (4 Credits)**
Crosslisted with STSCI 3080, BTRY 3080
This course provides an introduction to probability and parametric inference. Topics include: random variables, standard distributions, the law of large numbers, the central limit theorem, likelihood-based estimation, the method of moments, sampling distributions and confidence intervals.
**Prerequisites:** STSCI 2150 or STSCI 2200, MATH 1120 and MATH 2220 or their equivalents.
**Forbidden Overlaps:** BTRY 3080, ECON 3110, ECON 3130, ILRST 3080, ILRST 3110, MATH 4710, STSCI 3080, STSCI 3110
**Distribution Requirements:** (DLS-AG, OPHLS-AG), (ICE-IL), (SDS-AS)
**Last Four Terms Offered:** Spring 2025, Fall 2024, Spring 2024, Fall 2023
**Learning Outcomes:**

- Students will be able to manipulate random variables and their distributions using differential and integral calculus.
- Students will be able to derive properties of standard probability.
- Students will be able to derive maximum likelihood estimators for standard probability distributions and discuss their properties.

Schedule of Classes (https://classes.cornell.edu/)

**ILRST 3100 - Statistical Sampling (4 Credits)**
Crosslisted with STSCI 3100, BTRY 3100
Theory and application of statistical sampling, especially in regard to sample design, cost, estimation of population quantities, and error estimation. Assessment of nonsampling errors. Discussion of applications to social and biological sciences and to business problems.
**Prerequisites:** STSCI 2150 or STSCI 2200/BTRY 3010 or equivalent, STSCI 3200/BTRY 3020 or BTRY 6020.
**Distribution Requirements:** (DLS-AG, OPHLS-AG), (ICE-IL), (SDS-AS)
**Last Four Terms Offered:** Fall 2024, Fall 2023, Fall 2022, Fall 2021
Schedule of Classes (https://classes.cornell.edu/)

**ILRST 3110 - Applied Probability and Statistics (4 Credits)**
Crosslisted with ECON 3110, STSCI 3110
This course provides an introduction to probability and parametric inference. Topics include: random variables, standard distributions, the law of large numbers, the central limit theorem, likelihood-based estimation, sampling distributions and hypothesis testing.
**Prerequisites:** MATH 1106 or MATH 1110.
**Forbidden Overlaps:** BTRY 3080, ECON 3110, ECON 3130, ILRST 3080, ILRST 3110, MATH 4710, STSCI 3080, STSCI 3110
**Enrollment Information:** Open to: undergraduate students.
**Distribution Requirements:** (DLG-AG, MQL-AG, OPHLS-AG), (ICE-IL, STA-IL), (SDS-AS, SMR-AS)
**Last Four Terms Offered:** Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

**ILRST 3900 - Causal Inference (3 Credits)**
Crosslisted with STSCI 3900, INFO 3900
Causal claims are essential in both science and policy. Would a new experimental drug improve disease survival? Would a new advertisement cause higher sales? Would a person's income be higher if they finished college? These questions involve counterfactuals: outcomes that would be realized if a treatment were assigned differently. This course will define counterfactuals mathematically, formalize conceptual assumptions that link empirical evidence to causal conclusions, and engage with statistical methods for estimation. Students will enter the course with knowledge of statistical inference: how to assess if a variable is associated with an outcome. Students will emerge from the course with knowledge of causal inference: how to assess whether an intervention to change that input would lead to a change in the outcome.
**Prerequisites:** STSCI 2100 or PSYCH 2500 or SOC 3010 or ECON 3110 or equivalent.
**Distribution Requirements:** (DLS-AG), (ICE-IL, STA-IL)
**Last Four Terms Offered:** Fall 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

**ILRST 4100 - Multivariate Analysis (4 Credits)**
Crosslisted with STSCI 4100, BTRY 4100
This course is on the basics of multivariate statistical analysis. The focus ison the applied side, and the students will learn by examples of multiple real-life datasets. Studentswill learn to visualize the datasets and conduct simple statistical analysis using linear/nonlinearmethods. We will also cover web-scraping and data cleaning.
**Prerequisites:** STSCI 2100 or equivalent.
**Distribution Requirements:** (DLS-AG, OPHLS-AG), (ICE-IL), (SDS-AS)
**Last Four Terms Offered:** Spring 2025, Spring 2024, Spring 2023, Spring 2016
**Learning Outcomes:**

- Prepares the students for real-life multivariate data analysis. The students will get their hands dirty in messy datasets and learn that each dataset calls for its own approach of analysis. They will get more familiar with manipulate datasets in R, collaborate with others, and enhance their skills in creative thinking and presentation.
- Students will be able to analyze multivariate data using modern statistical software.

Schedule of Classes (https://classes.cornell.edu/)

**ILRST 4110 - Categorical Data (3 Credits)**
Crosslisted with STSCI 4110, BTRY 4110
Categorical data analysis, including logistic regression, log-linear models, stratified tables, matched pairs analysis, polytomous response, and ordinal data. Applications in biological, biomedical and social sciences.
**Prerequisites:** BTRY 3020, BTRY 6020, or equivalent with BTRY 3080 or MATH 4710 also highly recommended.
**Distribution Requirements:** (DLS-AG, OPHLS-AG), (ICE-IL), (SDS-AS)
**Last Four Terms Offered:** Fall 2024, Fall 2023, Fall 2022, Fall 2021
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**ILRST 4140 - Applied Design (4 Credits)**
Crosslisted with STSCI 4140, BTRY 4140
This course begins with a discussion of some general principles of experimental design. Classical designs are covered in detail, motivated by real data applications. These include completely randomized, randomized block, balanced incomplete block, split-plot, repeated measures and fractional factorial designs. If time permits rank-based nonparametric versions of the classical designs will also be covered.
**Prerequisites:** STSCI 3200 or equivalent.
**Distribution Requirements:** (ICE-IL), (OPHLS-AG), (SDS-AS)
**Last Four Terms Offered:** Spring 2022, Spring 2021, Spring 2020, Spring 2019
**Learning Outcomes:**

- Students will be able to explain the basic design principles such as randomization, blocking and stratification.
- Students will be able to determine an appropriate design based on design principles.
- Students will be able to apply standard designs to date using modern statistical software and interpret the results.

Schedule of Classes (https://classes.cornell.edu/)

**ILRST 4550 - Applied Time Series Analysis (4 Credits)**
Crosslisted with STSCI 4550
Introduces statistical tools for the analysis of time-dependent data. Data analysis and application will be an integral part of this course. Topics include linear, nonlinear, seasonal, multivariate modeling, and financial time series.
**Prerequisites:** BTRY 3080 or equivalent, STSCI 4030 or ECON 3140, or permission of instructor.
**Distribution Requirements:** (DLS-AG, OPHLS-AG), (ICE-IL), (SDS-AS)
**Last Four Terms Offered:** Spring 2025, Spring 2024, Spring 2023, Spring 2022
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**ILRST 4950 - Honors Program (3 Credits)**
Students are eligible for the ILR senior honors program if they: (1) earn a minimum 3.700 cumulative GPA at the end of junior year; (2) propose an honors project, entailing research leading to completion of a thesis, to an ILR faculty member who agrees to act as thesis supervisor; and (3) submit an honors project, endorsed by the proposed faculty sponsor, to the Academic Standards and Integrity Committee. Accepted students embark on a two-semester sequence. The first semester consists of determining a research design, familiarization with germane scholarly literature, and preliminary data collection. The second semester involves completion of the data collection and preparation of the honors thesis. At the end of the second semester, the candidate is examined orally on the completed thesis by a committee consisting of the thesis supervisor and a second faculty member.
**Distribution Requirements:** (ICE-IL)
**Exploratory Studies:** (CU-UG)

**Last Four Terms Offered:** Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

**ILRST 4970 - Field Research (4 Credits)**
All requests for permission to register for an internship must be approved by the faculty member who will supervise the project and the chairman of the faculty member's academic department before submission for approval by the director of off-campus credit programs. Upon approval of the internship, each student will be enrolled in ILRST 4970, for 4 letter-graded credits for individual research, and in ILRST 4980, for 8 S/U credits, for completion of a professionally-appropriate learning experience, which is graded by the faculty sponsor.
**Distribution Requirements:** (ICE-IL)
**Exploratory Studies:** (CU-UG)

**Last Four Terms Offered:** Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

**ILRST 4980 - Internship (8 Credits)**
All requests for permission to register for an internship must be approved by the faculty member who will supervise the project and the chairman of the faculty member's academic department before submission for approval by the director of off-campus credit programs. Upon approval of the internship, each student will be enrolled in ILRST 4970, for 4 letter-graded credits for individual research, and in ILRST 4980, for 8 S/U credits, for completion of a professionally-appropriate learning experience, which is graded by the faculty sponsor.
**Distribution Requirements:** (ICE-IL)
**Exploratory Studies:** (CU-UG)

**Last Four Terms Offered:** Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

**ILRST 4990 - Directed Studies (1-4 Credits)**
For individual or group research projects conducted under the direction of a member of the ILR faculty, in a special area not covered by regular course offerings. Sophomores, juniors, and seniors with a preceding semester GPA average of 3.0 are eligible to submit projects for approval by the Academic Standards and Integrity Committee. Students should consult with an advisor in the Office of Student Services at the time of course enrollment to arrange for formal submission of their directed study.
**Distribution Requirements:** (ICE-IL)
**Exploratory Studies:** (CU-UG)

**Last Four Terms Offered:** Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

**ILRST 5100 - Statistical Methods for the Social Sciences I (4 Credits)**
A first course in statistics for graduate students in the social sciences. Descriptive statistics, probability and sampling distributions, estimation, hypothesis testing, simple linear regression, and correlation. Students are instructed on the use of a statistics computer package at the beginning of the term and use it for weekly assignments.
**Enrollment Information:** Enrollment limited to: graduate students.
**Last Four Terms Offered:** Summer 2025, Winter 2025, Summer 2024, Winter 2024
Schedule of Classes (https://classes.cornell.edu/)

**ILRST 5110 - Statistical Methods for the Social Sciences II (4 Credits)**
Crosslisted with STSCI 5110
Second course in statistics that emphasizes applications to the social sciences. Topics include simple linear regression, multiple linear regression (theory, model building, and model diagnostics), and the analysis of variance. Computer packages are used extensively.
**Prerequisites:** STSCI 5200, BTRY 6010, ILRST 5100, or BTRY 5010.
**Distribution Requirements:** (ICE-IL)
**Last Four Terms Offered:** Spring 2025, Fall 2024, Spring 2024, Spring 2023
Schedule of Classes (https://classes.cornell.edu/)

**ILRST 6100 - Statistical Methods I (4 Credits)**
Crosslisted with BTRY 6010
Develops and uses statistical methods to analyze data arising from a wide variety of applications. Topics include descriptive statistics, point and interval estimation, hypothesis testing, inference for a single population, comparisons between two populations, one- and two-way analysis of variance, comparisons among population means, analysis of categorical data, and correlation and regression analysis. Introduces interactive computing through statistical software. Emphasizes basic principles and criteria for selection of statistical techniques.
**Forbidden Overlaps:** AEM 2100, BTRY 3010, BTRY 6010, CRP 1200, ENGRD 2700, HADM 2010, HADM 2011, ILRST 2100, ILRST 6100, MATH 1710, PSYCH 2500, PUBPOL 2100, PUBPOL 2101, SOC 3010, STSCI 2100, STSCI 2150, STSCI 2200. In addition, no credit for MATH 1710 if taken after ECON 3130, ECON 3140, MATH 4720, or any other upper-level course focusing on the statistical sciences.
**Enrollment Information:** Enrollment limited to: graduate students or permission of instructor.
**Last Four Terms Offered:** Fall 2024, Fall 2023, Fall 2022, Fall 2021
**Learning Outcomes:**

- Learn to develop and use statistical methods to analyze data arising from a wide variety of applications. Students should learn to apply methodologies which include descriptive statistics, point and interval estimation, hypothesis testing, inference for a single population, comparisons between two populations, one- and two-way analysis of variance, comparisons among population means, analysis of categorical data, and correlation and regression analysis.

Schedule of Classes (https://classes.cornell.edu/)

**ILRST 7170 - Theory of Linear Models (3 Credits)**
Crosslisted with STSCI 7170, ORIE 7170
Properties of the multivariate normal distribution. Distribution theory for quadratic forms. Properties of least squares and maximum likelihood estimates. Methods for fixed-effect models of less than full rank. Analysis of balanced and unbalanced mixed-effects models. Restricted maximum likelihood estimation. Some use of software packages and illustrative examples.
**Prerequisites:** BTRY 4090 or MATH 4720, BTRY 6020, or equivalents.
**Last Four Terms Offered:** Fall 2024, Fall 2023, Fall 2022, Fall 2021
Schedule of Classes (https://classes.cornell.edu/)

**ILRST 9990 - Doctoral Dissertation Research (1-12 Credits)**
**Last Four Terms Offered:** Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)