# Statistics

Statistics
Head of Department: Douglas G. Simpson
Department Office: 101 Illini Hall, 725 South Wright St., Champaign
Phone: 333-2167
www.stat.uiuc.edu

**STAT 100  Statistics  credit: 3 hours.**

First course in probability and statistics at a precalculus level; emphasizes basic concepts, including descriptive statistics, elementary probability, estimation, and hypothesis testing in both nonparametric and normal models. Same as MATH 161. Credit is not given for both STAT 100 and any one of the following: ECON 202, PSYC 235, or SOC 485. Prerequisite: MATH 012.

This course satisfies the General Education Criteria for a:
Quantitative Reasoning I

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Quant Reasoning I course.
First Time Freshman Only

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Quant Reasoning I course.

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Quant Reasoning I course.

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Quant Reasoning I course.
Restricted to NDEG:Undergrad Nondeg-CE-UIUC.
Online & Continuing Education (OCE) restrictions and assessments apply, see [http://www.oce.illinois.edu](http://www.oce.illinois.edu).
Graduate - Urbana-Champaign OCE Tuition $387.00 per Bill Hour, Undergrad - Urbana-Champaign OCE Tuition $353.00 per Bill Hour, and OCE Fees $50.00 per Bill Hour.

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**STAT 200  Statistical Analysis**  credit: 3 hours.
Survey of statistical concepts, data analysis, designed and observational studies and statistical models. Statistical computing using a statistical package such as R or a spreadsheet. Topics to be covered include data summary and visualization, study design, elementary probability, categorical data, comparative experiments, multiple linear regression, analysis of variance, statistical inferences and model diagnostics. May be taken as a first statistics course for quantitatively oriented students, or as a second course to follow a basic concepts course.

This course satisfies the General Education Criteria for a:
Quantitative Reasoning I

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**STAT 212  Biostatistics**  credit: 3 hours.
Application of statistical reasoning and statistical methodology to biology. Topics include descriptive statistics, graphical methods, experimental design, probability, statistical inference and regression. In addition, techniques of statistical computing are covered. Credit is not given for both STAT 212 and STAT 200.

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Credit Hours: 3 hours
Quantitative Reasoning I course.

**STAT 391  Honors Individual Study**  credit: 1 OR 2 hours.
May be repeated to a maximum of 8 hours. Prerequisite: Consent of instructor.
STAT 400  **Statistics and Probability I**  credit: 4 hours.
Introduction to mathematical statistics that develops probability as needed; includes the calculus of probability, random variables, expectation, distribution functions, central limit theorem, point estimation, confidence intervals, and hypothesis testing. Offers a basic one-term introduction to statistics and also prepares students for STAT 410. Same as MATH 463. Prerequisite: MATH 241 or equivalent.

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### STAT 409  Actuarial Statistics II  credit: 4 hours.
Continuation of STAT 408. Examines parametric point and interval estimation, including maximum likelihood estimation, sufficiency, completeness, and Bayesian estimation; hypothesis testing; linear models; regression and correlation. Same as MATH 409. Credit is not given for both STAT 409 and STAT 410. Prerequisite: STAT 408.

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### STAT 410  Statistics and Probability II  credit: 3 OR 4 hours.
Continuation of STAT 400. Includes moment-generating functions, transformations of random variables, normal sampling theory, sufficiency, best estimators, maximum likelihood estimators, confidence intervals, most powerful tests, unbiased tests, and chi-square tests. Same as MATH 464. 3 undergraduate hours. 4 graduate hours. Credit is not given for both STAT 410 and STAT 409. Prerequisite: STAT 400; or STAT 100 and MATH 461.

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Credit Hours: 4 hours
Restricted to Graduate - Urbana-Champaign.
Some seats are reserved for incoming Statistics graduate students. If you receive a Reserved-Closed error, that means the course is full except for the reserved seats.

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Credit Hours: 3 hours
Restricted to Undergrad - Urbana-Champaign. Some seats are reserved for incoming Statistics transfer students. If you receive a Reserved-Closed error, that means the course is full except for the reserved seats.

35707  Lecture-Discussion  U3  10:00 AM - 10:50 AM  MWF  112 - Chemistry Annex  Stepanov, A

Credit Hours: 3 hours
Restricted to Undergrad - Urbana-Champaign. Some seats are reserved for incoming Statistics transfer students. If you receive a Reserved-Closed error, that means the course is full except for the reserved seats.

STAT 420  Methods of Applied Statistics  credit: 3 OR 4 hours.
Systematic, calculus-based coverage of the more widely used methods of applied statistics, including simple and multiple regression, correlation, analysis of variance and covariance, multiple comparisons, goodness of fit tests, contingency tables, nonparametric procedures, and power of tests; emphasizes when and why various tests are appropriate and how they are used. Same as MATH 469.
3 undergraduate hours. 4 graduate hours. Prerequisite: STAT 408 or STAT 400; MATH 231 or equivalent; knowledge of basic matrix manipulations; or consent of instructor.

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Credit Hours: 4 hours
Restricted to Graduate - Urbana-Champaign.

62027  Lecture-Discussion  N1G  12:30 PM - 01:50 PM  TR  103 - Transportation Building  Stepanov, A

Credit Hours: 4 hours
Restricted to Graduate - Urbana-Champaign.

62029  Lecture-Discussion  N1U  12:30 PM - 01:50 PM  TR  103 - Transportation Building  Stepanov, A

Credit Hours: 3 hours
Restricted to Undergrad - Urbana-Champaign.

35711  Lecture-Discussion  U3  09:30 AM - 10:50 AM  TR  1002 - Lincoln Hall  Stepanov, A

Credit Hours: 3 hours
Restricted to Undergrad - Urbana-Champaign.

STAT 425  Applied Regression and Design  credit: 3 OR 4 hours.
Explores linear regression, least squares estimates, F-tests, analysis of residuals, regression diagnostics, transformations, model building, factorial designs, randomized complete block designs, Latin squares, split plot designs. Computer work is an integral part of the course. 3 undergraduate hours. 4 graduate hours. Prerequisite: STAT 410.

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Credit Hours: 4 hours  
Restricted to Graduate - Urbana-Champaign.

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Credit Hours: 3 hours  
Restricted to Undergrad - Urbana-Champaign. 
This course is a graduate level only course.

STAT 429  **Time Series Analysis**  credit: 3 OR 4 hours.  
Studies theory and data analysis for time series; examines auto-regressive moving average model building and statistical techniques; and discusses spectral model building and statistical analysis using windowed periodograms and Fast Fourier Transformations. Same as MATH 494. 3 undergraduate hours. 4 graduate hours. Prerequisite: STAT 410.

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Credit Hours: 4 hours  
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Credit Hours: 3 hours  
Restricted to Undergrad - Urbana-Champaign.

STAT 430  **Topics in Applied Statistics**  credit: 3 OR 4 hours.  
Formulation and analysis of mathematical models for random phenomena; extensive involvement with the analysis of real data; and instruction in statistical and computing techniques as needed. Same as MATH 468. 3 undergraduate hours. 4 graduate hours. May be repeated with approval. prerequisite: STAT 410 or STAT 420; or consent of instructor.

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Credit Hours: 4 hours  
Applied Multivariate Analysis  
Restricted to Graduate - Urbana-Champaign.
STAT 440  **Statistical Data Management**  credit: 3 OR 4 hours.

The critical elements of data storage, data cleaning, and data extractions that ultimately lead to data analysis are presented. Includes basic theory and methods of databases, auditing and querying databases, as well as data management and data preparation using standard large-scale statistical software. Students will gain competency in the skills required in storing, cleaning, and managing data, all of which are required prior to data analysis. 3 undergraduate hours. 4 graduate hours. Prerequisite: STAT 400 or STAT 409.

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Credit Hours: 4 hours  
Restricted to Graduate - Urbana-Champaign.

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<th>Section</th>
<th>Time</th>
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Credit Hours: 3 hours
STAT 448  **Advanced Data Analysis**  credit: 4 hours.
Several of the most widely used techniques of data analysis are discussed with an emphasis on statistical computing. Topics include linear regression, analysis of variance, generalized linear models, and analysis of categorical data. In addition, an introduction to data mining is provided considering classification, model building, decision trees, and cluster analysis. Prerequisite: STAT 400 or STAT 409, and credit for or concurrent registration in STAT 410.

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STAT 510  **Mathematical Statistics I**  credit: 4 hours.
Distributions, transformations, order-statistics, exponential families, sufficiency, delta-method, Edgeworth expansions; uniformly minimum variance unbiased estimators, Rao-Blackwell theorem, Cramer-Rao lower bound, information inequality; equivariance. Prerequisite: STAT 410.

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</table>

STAT 542  **Statistical Learning**  credit: 4 hours.
Modern techniques of predictive modeling, classification, and clustering are discussed. Examples of these are linear regression, nonparametric regression, kernel methods, regularization, cluster analysis, classification trees, neural networks, boosting, discrimination, support vector machines, and model selection. Applications are discussed as well as computation and theory. Prerequisite: STAT 410 and STAT 425.

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STAT 552  **Theory of Probability II**  credit: 4 hours.
Same as MATH 562. See MATH 562.
**STAT 554  Probability and Measure II**  credit: 4 hours.

Measure extensions, Lebesque-Stieltjes measure, Kolmogorov consistency theorem; conditional expectation, conditional probability, martingales; distribution functions and characteristic functions; convergence in distribution; Central Limit Theorem; Brownian Motion. Credit is not given for both STAT 554 and either MATH 561 or MATH 562.

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<tr>
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**STAT 555  Applied Stochastic Processes**  credit: 4 hours.

Same as MATH 564. See MATH 564.

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**STAT 571  Multivariate Analysis**  credit: 4 hours.

Inference in multivariate statistical populations emphasizing the multivariate normal distribution; derivation of tests, estimates, and sampling distributions; and examples from the natural and social sciences. Prerequisite: STAT 410 and MATH 415, or consent of instructor.

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**STAT 578  Topics in Statistics**  credit: 4 hours.

May be repeated if topics vary. Prerequisite: Consent of instructor.

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Advanced Monte Carlo Methods

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Stochastic Processes
Restricted to Statistics PhD, MS and MS-Analytic Students.
STAT 587  **Hierarchical Linear Models**  credit: 4 hours.
Same as PSYC 587 and EPSY 587. See EPSY 587.

<table>
<thead>
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STAT 593  **STAT Internship**  credit: 0 TO 8 hours.
Supervised, off-campus experience in a field in which statistical science plays an important role. Approved for both letter and S/U grading. Prerequisite: STAT 425 and consent of instructor.

<table>
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Restricted to Statistics major(s). Restricted to Graduate - Urbana-Champaign.