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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STAT 200  **Statistical Analysis**  credit: 3 hours.
Principles in statistical design and analysis motivated by real case studies. Statistical computing is introduced and used for data
analysis. Theory and techniques include survey sampling, hypothesis testing, contingency tables, Poisson models, regression analysis,
and response surface analysis. The vital role of statistics in science is illustrated by case studies, and students learn principles related
to study design, data collection, data presentation, and statistical computing, as well as technical writing and communication skills.
This course satisfies the General Education Criteria for a:
Quantitative Reasoning I

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Quant Reasoning I course.
Discovery, and Quant Reasoning I course.
First year Discovery Program course. Registration restricted to freshmen. Students should enroll in only one Discovery course.

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Quant Reasoning I course.
Quant Reasoning I course.

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Quant Reasoning I course.
Quant Reasoning I course.
Statistical Analysis for Biological Sciences

STAT 391  **Honors Individual Study**  credit: 1 OR 2 hours.
May be repeated to a maximum of 8 hours. Prerequisite: Consent of instructor.

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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.

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

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

**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 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
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Restricted to Undergrad - Urbana-Champaign.

STAT 451  **Probability Theory**  credit: 3 OR 4 hours.

Same as MATH 461. See MATH 461.

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

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<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
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<tbody>
<tr>
<td>33571</td>
<td>Laboratory-Discussion</td>
<td>G83</td>
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<td>MWF</td>
<td>156 - Henry Administration Bldg</td>
<td>Reznick, B</td>
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</tbody>
</table>

Credit Hours: 3 hours
This section will be taught on Macintosh or Windows computers using Mathematica Interactive Courseware. Previous computer experience is not necessary. Students may also enroll in Mathematics 290Y. For further details see: http://www-cm.math.uiuc.edu/
STAT 466  **Image and Neuroimage Analysis**  credit: 3 OR 4 hours.
Same as BIOE 466 and PSYC 466. See PSYC 466.

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<th>Location</th>
<th>Instructor</th>
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<tbody>
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<td>AG4</td>
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Credit Hours: 4 hours
Instructor Approval Required
Restricted to Graduate - Urbana-Champaign.

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<th>Location</th>
<th>Instructor</th>
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<tbody>
<tr>
<td>53259</td>
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<td>Wang, M</td>
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</table>

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

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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<th>Location</th>
<th>Instructor</th>
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<tbody>
<tr>
<td>30957</td>
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<td>C1</td>
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<td>MWF</td>
<td>131 - English Building</td>
<td>Martinsek, A</td>
</tr>
</tbody>
</table>

STAT 530  **Bioinformatics**  credit: 4 hours.
Same as ANSC 543, CHBE 571, and MCB 571. See CHBE 571.
Will be held in 113 Illini Hall. Basic problems, algorithms and data analysis approaches in computational biology. Topics include sequence alignment, gene annotation, microarray analysis, transcription regulation, comparative genomics, proteomics, regulatory network, and SNP analysis. Statistical models and algorithms covered include mixture model, hidden Markov model, EM algorithm and Gibbs sampler, clustering and classification methods.

**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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<td>MWF</td>
<td>333 - Armory</td>
<td>Liang, F</td>
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</table>

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

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<td>243 - Altgeld Hall</td>
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**STAT 555  Applied Stochastic Processes**  credit: 4 hours.
Same as MATH 564. See MATH 564.

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**STAT 563  Information Theory**  credit: 4 hours.
Same as CS 578 and ECE 563. See ECE 563.

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<th>Location</th>
<th>Instructor</th>
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<tr>
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<td>08:00 AM - 09:20 AM</td>
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<td>163 - Everitt Laboratory</td>
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Credit Hours: 4 hours

**STAT 575  Large Sample Theory**  credit: 4 hours.
Limiting distribution of maximum likelihood estimators, likelihood ratio test statistics, U-statistics, M-, L-, and R-estimators, nonparametric test statistics, Von Mises differentiable statistical functions; asymptotic relative efficiencies; asymptotic expansions. Prerequisite: STAT 511 and either MATH 561 or STAT 554.

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</table>

STAT 578  **Topics in Statistics**  credit: 4 hours.
May be repeated if topics vary. Prerequisite: Consent of instructor.

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Topic: Semiparametric & Nonparametric Approaches for Correlated Data.

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.

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<tr>
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