Major in Sciences and Letters Curriculum

E-mail: stat-office@illinois.edu

Degree title: Bachelor of Science in Liberal Arts and Sciences

Minimum required major and supporting course work normally equates to 41-42 hours

General education: Students must complete the Campus General Education (https://courses.illinois.edu) requirements.

Minimum hours required for graduation: 120 hours

Departmental distinction: Distinction will be awarded on the basis of the selection of 300- or 400-level courses and the grade point average in required courses. A GPA of 3.25 is required for Distinction, 3.5 for High Distinction, and 3.75 for Highest Distinction.

Calculus through MATH 241 - Calculus III

Select one from:

- MATH 415 Applied Linear Algebra
- MATH 416 Abstract Linear Algebra
- STAT 200 Statistical Analysis
- or STAT 212 Biostatistics
- STAT 400 Statistics and Probability I
- STAT 410 Statistics and Probability II
- STAT 420 Methods of Applied Statistics
- STAT 425 Applied Regression and Design

Select four of the following:

- STAT 424 Analysis of Variance
- STAT 426 Sampling and Categorical Data
- STAT 427 Statistical Consulting
- STAT 428 Statistical Computing
- STAT 429 Time Series Analysis
- STAT 430 Topics in Applied Statistics
- STAT 440 Statistical Data Management
- MATH 444 Elementary Real Analysis
- or MATH 44 Real Variables
- STAT 448 Advanced Data Analysis

Twelve hours of 300- or 400-level courses in the major must be taken on this campus.

All foreign language requirements must be satisfied.

A Major Plan of Study Form must be completed and submitted to the LAS Student Affairs Office before the end of the fifth semester (60-75 hours). Please see your adviser in room 101 Illini Hall or phone (217)-333-2167.
STAT 408  Actuarial Statistics I credit: 4 Hours.
Examines elementary theory of probability, including independence, conditional probability, and Bayes' theorem; combinations and permutations; random variables, expectations, and probability distributions; joint and conditional distributions; functions of random variables; sampling; central limit theorem. Same as MATH 408. 4 undergraduate hours. 4 graduate hours. Credit is not given for both STAT 408 and either MATH 461 or STAT 400. Prerequisite: MATH 241 or equivalent.

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. 4 undergraduate hours. 4 graduate hours. Credit is not given for both STAT 409 and STAT 410. Prerequisite: STAT 408.

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.

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.

STAT 424  Analysis of Variance credit: 3 or 4 Hours.
Estimation and hypotheses testing in linear models; one-, two-, and higher-way layouts; incomplete layouts; analysis of covariance; and random effects models and mixed models. 3 undergraduate hours. 4 graduate hours. Prerequisite: Credit or concurrent registration in MATH 415 and STAT 410.

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.

STAT 426  Sampling and Categorical Data credit: 3 or 4 Hours.
Sampling: simple random, stratified, systematic, cluster, and multistage sampling. Categorical data: multiway contingency tables, maximum likelihood estimation, goodness-of-fit tests, model selection, logistic regression. Computer work is an integral part of the course. 3 undergraduate hours. 4 graduate hours. Prerequisite: STAT 410.

STAT 427  Statistical Consulting credit: 3 or 4 Hours.
Students, working in groups under the supervision of the instructor, consult with faculty and graduate students through the Statistical Consulting Service; readings from literature on consulting. 3 undergraduate hours. 4 graduate hours. Prerequisite: STAT 425 or consent of instructor.

STAT 428  Statistical Computing credit: 3 or 4 Hours.
Examines statistical packages, numerical analysis for linear and nonlinear models, graphics, and random number generation and Monte Carlo methods. Same as CSE 428. 3 undergraduate hours. 4 graduate hours. Prerequisite: STAT 410 or equivalent; knowledge of a programming language.

STAT 429  Time Series Analysis credit: 3 or 4 Hours.
Studies theory and data analysis for time series; examines autoregressive moving average model building and statistical techniques; and discusses spectral model building and statistical analysis using windowed periodograms and Fast Fourier Transformations. 3 undergraduate hours. 4 graduate hours. Prerequisite: STAT 410.

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. 3 undergraduate hours. 4 graduate hours. May be repeated with approval. Prerequisite: STAT 410 or STAT 420; or consent of instructor.

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. Same as CSE 440. 3 undergraduate hours. 4 graduate hours. Prerequisite: STAT 400 or STAT 409.

STAT 443  Professional Statistics credit: 3 or 4 Hours.
This project-based course emphasizes written, visual, and oral communication of statistical results and conclusions. An introduction to statistical consulting is also provided. Additional topics include introductions to statistical methodologies in industry and aspects of careers in statistics. 3 undergraduate hours. 4 graduate hours. Prerequisite: STAT 420 or consent of instructor.

STAT 444  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. Same as CSE 448. 4 undergraduate hours. 4 graduate hours. Prerequisite: STAT 400 or STAT 409, and credit for or concurrent registration in STAT 410.

STAT 458  Math Modeling in Life Sciences credit: 3 or 4 Hours.
Same as ANSC 448 and IB 487. See ANSC 448.

STAT 466  Image and Neuroimage Analysis credit: 3 or 4 Hours.
Same as PSYC 466. See PSYC 466.
STAT 480  Data Science Foundations  credit: 3 or 4 Hours.
Examines the methods of data management and analysis for “big data”,
characterized by high volume, variety, velocity, and veracity. Attention
will be focused on advanced statistical analysis and visualization in
data science applications employing parallel processing, storage and
distribution techniques necessary for analysis of massive data sets.
Data mining techniques, machine learning methods, and streaming
technologies will be utilized for real-time analysis. Students must
have access to a computer on which they can install software. 3
undergraduate hours. 4 graduate hours. Prerequisite: STAT 425 and
familiarity with high-level language (e.g. Python, Java, C, F#), and
command line programming.

STAT 484  Ethical Practice of Statistics  credit: 3 or 4 Hours.
Same as PSYC 484. See PSYC 484.