MASTER OF SCIENCE IN
STATISTICS, APPLIED
STATISTICS CONCENTRATION

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The Department of Statistics offers the Master of Science in Statistics with specialization in a variety of areas of application. The degree program consists of a core of statistics courses covering statistical theory, linear models, and statistical consulting, and further coursework in the field of application and in statistics. The program offers an additional degree for students earning an advanced degree in the area of application.

To be eligible for this program, students must be pursuing an advanced degree in a department other than Statistics at the Urbana-Champaign campus. Students interested in economic statistics should apply for degree in a department other than Statistics at the Urbana-Champaign campus. Students interested in economic statistics should apply for the applied concentration. Full statements of degree requirements are available from the head of the unit offering a specialization or from the Graduate Advisor of the Department of Statistics. Additional degree for students earning an advanced degree in the area of application.

Five graduate courses must be completed in your primary field, in an area relevant to the field of Statistics.

Select one of the following: 4

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STAT 424 Analysis of Variance 4
or STAT 425 Applied Regression and Design

STAT 427 Statistical Consulting (or experience in applied statistics) 0-4
or STAT 593 STAT Internship

STAT 410/ MATH 464 Statistics and Probability II (or equivalent proficiency) 4

Total hours 32-36

Other Requirements

Other requirements may overlap.
A concentration is not required.

Minimum 500-level Hours Required 12
Overall:
Minimum GPA: 3.0

1 For additional details and requirements refer to the department's Graduate Programs (http://www.stat.illinois.edu/students/graduates.shtml) and the Graduate College Handbook (http://www.grad.illinois.edu/gradhandbook).

Graduate College Courses

GC 500 URAP Graduate Mentor Practicum credit: 0 Hours.
The Office of Undergraduate Research (OUR) and the Graduate College offer the opportunity for first and second-year undergraduate students to assist advanced graduate students with their research projects. Through a one-on-one research experience with their graduate student mentor, undergraduate students will have the opportunity to learn what it means to do research, create knowledge, and produce scholarship. This course will serve as a formal record of the graduate mentoring side of the apprenticeship (i.e., "practicum"). 0 graduate hours. No professional credit. Approved for S/U grading only. May be repeated.

GC 599 Thesis Research credit: 0 Hours.
For doctoral students who have a guaranteed student loan that needs deferral, have completed the credit requirements for the doctorate, have passed the preliminary examination, do not have any financial assistance that would cover tuition and fees, and are eligible to register for 599 in their own academic units. Approved for S/U grading only. May be repeated.

Statistics Courses

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.

STAT 511 Mathematical Statistics II credit: 4 Hours.
Bayes estimates, minimaxity, admissibility; maximum likelihood estimation, consistency, asymptotic efficiency; testing and confidence intervals; Neyman-Pearson lemma, uniformly most powerful tests; likelihood ratio tests and large-sample approximation; nonparametrics. Prerequisite: STAT 510.

STAT 525 Computational Statistics credit: 4 Hours.
Various topics, such as ridge regression; robust regression; jackknife, bootstrap, cross-validation and resampling plans; E-M algorithm; projection pursuit; all with a strong computational flavor. Same as CSE 525. May be repeated if topics vary. Prerequisite: STAT 425, STAT 426, and STAT 511; or consent of instructor.

STAT 530 Bioinformatics credit: 4 Hours.
Same as ANSC 543, CHBE 571, and MCB 571. See CHBE 571.

STAT 534 Advanced Survival Analysis credit: 4 Hours.
Introduction to the analysis of time-to-event outcomes. Topics include censoring, discrete survival, parametric models, nonparametric one- and K-sample methods, Cox regression, regression diagnostics, time-dependent covariates, and multivariate survival outcomes. Emphasis on key underlying concepts. Counting process-based theoretical justification and practical implementation will also be discussed. 4 graduate hours. No professional credit. Prerequisite: STAT 410, STAT 425, and knowledge of R.

Information listed in this catalog is current as of 09/2017
STAT 538  Clinical Trials Methodology  credit: 4 Hours.
The topics of the course focus on clinical trials designs and inferential
techniques that are commonly used in the pharmaceutical industry.
Topics include fixed sample designs for normal and survival data, two-
sided group sequential design, Pocock’s and O'Brien-Fleming boundaries,
general theory of group sequential design, alpha and beta spending
functions, one-sided designs with early stopping to accept the null
hypothesis, non-inferiority designs, and inferential techniques. Computing
in SAS will be emphasized. 4 graduate hours. No professional credit.
Prerequisite: STAT 410, STAT 425, and familiarity with SAS.

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. Same as CSE 542. Prerequisite: STAT 410 and STAT 425.

STAT 543  Appl. Multivariate Statistics  credit: 4 Hours.
Same as CPSC 543. See CPSC 543.

STAT 545  Spatial Statistics  credit: 4 Hours.
Theory and methods for analyzing univariate and multivariate spatial
and spatio-temporal data. Covers both fundamental theories and cutting-
edge research advances for geostatistics, and statistical methods
for aggregated data and point processes. Real data examples will be
provided in class and statistical software will be used to illustrate the
data analysis. 4 graduate hours. No professional credit. Prerequisite:
STAT 425 or equivalent.

STAT 551  Theory of Probability I  credit: 4 Hours.
Same as MATH 561. See MATH 561.

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

STAT 553  Probability and Measure I  credit: 4 Hours.
Measures and probabilities; integration and expectation; convergence
theorems and inequalities for integrals and expectations; independence;
convergence in probability, almost surely, and mean; Three Series
Theorem; laws of large numbers. Prerequisite: MATH 447 or consent of
instructor.

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.

STAT 555  Applied Stochastic Processes  credit: 4 Hours.
Same as MATH 564. See MATH 564.

STAT 558  Risk Modeling and Analysis  credit: 4 Hours.
Same as MATH 563. See MATH 563.

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.

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. Same as ECON 578.
Prerequisite: STAT 511 and either MATH 561 or STAT 554.

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

STAT 587  Hierarchical Linear Models  credit: 4 Hours.
Same as PSYC 587 and EPSY 587. See EPSY 587.

STAT 588  Covar Struct and Factor Models  credit: 4 Hours.
Same as EPSY 588, PSYC 588, and SOC 588. See PSYC 588.

STAT 590  Individual Study and Research  credit: 0 to 8 Hours.
Directed reading and research. Approved for letter and S/U grading. May
be repeated with approval. Prerequisite: Consent of instructor.

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 letter and S/U grading. Prerequisite:
STAT 425 and consent of instructor.

STAT 595  Preparing Future Faculty  credit: 2 Hours.
Prepares Ph.D. students who are interested in an academic career to
develop a successful academic career path, and to prepare graduate
students for their future roles as teachers, and researchers. The course
will focus on profession, job search, research, teaching and service. The
course will involve guest panels, small and large group presentations and
interactive Q&A with student participation.

STAT 599  Thesis Research  credit: 0 to 16 Hours.
Approved for S/U grading only. May be repeated. Prerequisite: Consent of
instructor.