MASTER OF SCIENCE IN APPLIED STATISTICS

Admission Requirements

Admission to the Master Program in Life Sciences requires fulfilling all requirements of the Deanship of Graduate Studies. For admission to the MS program in applied statistics, an undergraduate degree in Mathematics or Statistics is not necessary. An applicant, however, must have the equivalent of MATH 101, MATH 102, MATH 201 and STAT 201. Moreover, an applicant with a non-statistics degree has to take STAT 500 to remedy the deficiency.

MASTER OF SCIENCE IN APPLIED STATISTICS

(Thesis Option)

Degree Requirements

(a) Core Courses (15 credit hours)		Credit Hours
Probability and Mathematical Statistics	STAT 501	3
Statistical Inference	STAT 502	3
Regression Analysis	STAT 510	3
Seminar	STAT 599	0
Thesis	STAT 610	6

(b) Elective Courses (15 credit hours)		
Three STAT Elective Courses	STAT xxx	9
Two Free Elective Courses	XXX xxx	6

Degree Plan

COURSE	TITLE	LT	LB	CR	COURSE	TITLE	LT	LB	CR
First Year									
STAT 501	Probability and Mathematical Statistics	3	0	3	STAT 502	Statistical Inference	3	0	3
STAT xxx	STAT Elective I	3	0	3	STAT xxx	STAT Elective III	3	0	3
STAT xxx	STAT Elective II	3	0	3	XXX xxx	Free Elective I	3	0	3
		9	**0**	**9**			**9**	**0**	**9**
Second Year									
STAT 510	Regression Analysis	3	0	3	STAT 610	Thesis	0	0	6
STAT 599	Seminar	1	0	0					
XXX xxx	Free Elective II	3	0	3					
STAT 610	Thesis	0	0	IP					
		7	**0**	**6**			**0**	**0**	**6**
Total credit hours required in Degree Program : 30									

MASTER OF SCIENCE IN APPLIED STATISTICS

(Non-Thesis Option)

Degree Requirements

(a) Core Courses (18 credit hours)		Credit Hours
Probability and Mathematical Statistics	STAT 501	3
Statistical Inference	STAT 502	3
Regression Analysis	STAT 510	3
Design and Analysis of Experiments	STAT 530	3
Sampling Methods	STAT 565	3
Seminar	STAT 599	0
Project	STAT 600	3

(b) Elective Courses (24 credit hours)		
Four STAT Elective Courses	STAT xxx	12
Two STAT/MATH Elective courses	STAT/MATH xxx	6
Two Free Elective Courses	XXX xxx	6

Degree Plan

COURSE	TITLE	LT	LB	CR	COURSE	TITLE	LT	LB	CR
First Year									
STAT 501	Probability and Mathematical Statistics	3	0	3	STAT 502	Statistical Inference	3	0	3
STAT xxx	STAT Elective I	3	0	3	STAT 565	Sampling Methods	3	0	3
STAT xxx	STAT Elective II	3	0	3	XXX xxx	Free Elective I	3	0	3
		9	**0**	**9**			**9**	**0**	**9**
Second Year									
STAT 510	Regression Analysis	3	0	3	STAT xxx	STAT Elective III	3	0	3
STAT 530	Design and Analysis of Experiments	3	0	3	XXX xxx	STAT/MATH Elective II	3	0	3
XXX xxx	STAT/MATH Elective I	3	0	3	XXX xxx	Free Elective II	3	0	3
		9	**0**	**9**			**9**	**0**	**9**
Third Year									
STAT xxx	STAT Elective IV	3	0	3					
STAT 600	Project	2	3	3					
STAT 599	Seminar	1	0	0					
		6	**3**	**6**					
Total credit hours required in Degree Program : 42									

STATISTICS

STAT 500 Statistics for Experimenters (3-3-4)
Probability. Probability distributions. Fundamentals of statistical inference. Estimation. Hypothesis testing. Correlation and regression. Multiple regression. One-way Classification. Analysis of variance. Introduction to categorical data analysis. Nonparametric methods.
Note: Deficiency course which can not be taken for credit by STAT students.
Prerequisite: Graduating Standing

STAT 501 Probability and Mathematical Statistics (3-0-3)
Axioms and foundations of probability. Conditional probability and Bayes' theorem. Independence. Random variables and distribution functions and moments. Characteristic functions. Laplace transforms and moment generating functions. Function of random variables. Random vectors and their distributions. Convergence of sequences of random variables. Laws of large numbers and the central limit theorem. Random samples, sample moments and their distributions. Order statistics and their distributions.
Note: Can not be taken for credit with MATH 561 or MATH 563.
Prerequisite: Graduating Standing

STAT 502 Statistical Inference (3-0-3)
Methods of estimation. Properties of estimators: consistency, sufficiency, completeness and uniqueness. Unbiased estimation. The method of moments. Maximum likelihood estimation. Techniques for constructing unbiased estimators and minimum variance unbiased estimators. Bayes estimators. Asymptotic property of estimators. Introduction to confidence intervals. Confidence intervals for parameters of normal distribution. Methods of finding confidence intervals. Fundamental notions of hypotheses testing. The Neyman-Pearson lemma. Most powerful test. Likelihood ratio test. Uniformly most powerful tests. Tests of hypotheses for parameters of normal distribution. Chi-square tests, t-tests, and F-tests.
Note: Can not be taken for credit with MATH 561 or MATH 563.
Prerequisite: STAT 501

STAT 510 Regression (3-0-3)
Simple linear regression and multiple regressions with matrix approach. Development of linear models. Inference about model parameters. Residuals Analysis. Analysis of variance approach. Selection of the best regression equation. Using statistical packages to analyze real data sets.
Note: Can not be taken for credit with MATH 560 or ISE 535.
Prerequisite: STAT 501

STAT 511 Applied Regression and Experimental Design (3-0-3)
Simple linear regression. Estimating and testing of intercept and slope. Multiple linear regressions. Estimation parameters and testing of regression coefficients. Prediction and correlation analysis. Analysis of variance technique. Completely randomized and randomized block designs. Latin Square designs. Incomplete block design. Factorial design, 2^k factorial designs and blocking and confounding in 2^k factorial designs. Using statistical packages to analyze real data sets.
Note: Can not be taken for credit with MATH 560 or ISE 530. Can not be taken for credit by STAT students.

Prerequisite: Graduate Standing

STAT 512 Demographic Methods (3-0-3)
Demographic fundamentals, Measurement of mortality, Life table, Multiple decrement life table, Analysis of Marriage, Measurement of fertility, Parity progression, Determinants of fertility, Population growth, Models of population structure, Survival analysis, Cox proportional hazards (single and multiple events), Competing events, Parametric demographic models.
Prerequisite: Graduate Standing

STAT 515 Stochastic Processes (3-0-3)
Basic classes of stochastic processes. Poisson processes. Renewal processes. Regenerative processes. Markov chains. Stochastic population models and branching processes. Queuing processes. Applications of Stochastic process models.
Note: Can not be taken for credit with EE 570. Cross listed with ISE 543.
Prerequisite: STAT 501

STAT 525 Nonparametric Methods (3-0-3)
The binomial test. The quantile test. Tolerance limits. The sign test. The Wlicoxon signed ranked test. The Mann-Whitney tests. Contingency tables. The median test. Measures of dependence. The chi squared goodness-of-fit test. Cochran's test. Tests for equal variances. Measures of rank correlation. Linear regression methods. One and two ways analysis of variance. Using statistical packages to analyze real data sets.
Prerequisite: STAT 501

STAT 530 Design and Analysis of Experiments (3-0-3)
Completely randomized design. Randomized block design. Latin square designs. Models: Fixed, random, and mixed models. Incomplete block design. Factorial experiments 2k designs. Confounding in 2k designs. Nested and Split-plot designs. Fractional and orthogonal designs. Fractional replicate and orthogonal designs. Using statistical packages to analyze real data sets.
Note: Can not be taken for credit with MATH 560 or ISE 535.
Prerequisite: STAT 502

STAT 540 Multivariate Analysis (3-0-3)
Aspects of multivariate analysis. Matrix algebra and random vectors. The multivariate normal distribution. The Wishart distribution. Distribution of a correlation matrix. Inference about a mean vector. Comparing several multivariate means. Multivariate linear regression models. Principal components. Factor analysis. Canonical correlation analysis. Discrimination and classification. Using statistical packages to analyze real data sets.
Prerequisite: STAT 502

STAT 560 Time Series Analysis (3-0-3)
General approach to time series. Stationary models and autocorrelation. Linear processes and ARMA Models. Forecasting stationary time series. ARMA (p, q) models. Preliminary estimation and Yule-Walker approach. Method of moments and maximum likelihood estimations. ARIMA models for non-stationary time series. Forecasting non-stationary time series. Forecasting ARIMA models. Seasonal ARIMA models. Using statistical packages to analyze real data sets.
Prerequisite: STAT 502

STAT 565 Sampling Methods (3-0-3)
Simple random sample. Sampling proportion. Sample size estimation. Stratified random sampling. Ratio, regression, and difference estimators. Systematic sampling. Single stage cluster sampling. Multi-stage cluster sampling. Unequal probability sampling.
Prerequisite: Graduate Standing

STAT 575 Categorical Data Analysis (3-0-3)
Two-way and three-way contingency tables. Log linear model and logistic regression model. Building and applying logit and loglinear models. Multicategory logit models. Models for matched pairs. Using statistical packages to analyze real data sets.
Prerequisite: STAT 502

STAT 590 Special Topics in Statistics I (3-0-3)
Advanced topics are selected from the broad area of Statistics. The contents of the course are given in detail one semester in advance of that in which it is to be offered. The approval of the Graduate Council will be necessary for offering this course.
Prerequisite: Graduate Standing

STAT 591 Special Topics in Statistics II (3-0-3)
Advanced topics are selected from the broad area of Statistics. The contents of the course are given in detail one semester in advance of that in which it is to be offered. The approval of the Graduate Council will be necessary for offering this course.
Prerequisite: Graduate Standing

STAT 599 Seminar (1-0-0)
Graduate students are required to attend the seminars by faculty members, visiting scholars, and fellow graduate students. Additionally, each student must present at least one seminar on a timely research topic. Among other things, this course is designed to give the students an overview of research in Statistics, and a familiarity with research methodology, journals and professional societies in his discipline. Graded on a Pass or Fail basis.
Prerequisite: Graduate Standing

STAT 600 Project (2-3-3)
The project course is arranged between a student and faculty member to train students in research methodology and to undertaking a real data set to analyze this set and make recommendations to the client. Students may study specific problems in the era of Applied Statistics. In this course students are asked to prepare a report and possibly publish a paper in reflecting advanced knowledge in the Statistics field. The work will be evaluated based on a report, a seminar and oral examination.
Prerequisite: Graduate Standing

STAT 606 Independent Research (3-0-3)
This course is intended to allow the student to conduct research in advanced problems in his MS research area. The faculty offering the course should submit a research plan to be approved by the Graduate Program Committee at the department of Mathematics and Statistics. The student is expected to deliver a public seminar and a report on his research outcomes at the end of the course.
Prerequisite: Consent of Instructor

STAT 610 M.S. Thesis (0-0-6)
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Prerequisite: STAT 599