STATISTICS (STAT)

STAT 530 Applied Regression Analysis 3 Credit Hours
Topics include single variable linear regression, multiple linear regression and polynomial regression. Model checking techniques based on analysis of residuals will be emphasized. Remedies to model inadequacies such as transformation will be covered. Basic time series analysis and forecasting using moving averages and autoregressive models with prediction errors are covered. Additional assignments in logistic regression and forecasting will distinguish this course from its undergraduate version, STAT 430. Statistical packages will be used. Students cannot receive credit for both STAT 430 and STAT 530. (F, W).
Prerequisite(s): STAT 425 or STAT 325 or IMSE 317 or (STAT 301 and STAT 305)
Restriction(s):
Can enroll if Level is Rackham or Graduate

STAT 531 Machine Learning and Computational Statistics 3 Credit Hours
Computational models trained with high dimensional data are increasingly important in industry and many academic disciplines. We will cover a wide range of topics in machine learning and statistical programming that enhance learning from data. Topics include an introduction to statistical learning, a review of simple and multiple linear regression, logistic regression, classification with linear and quadratic discriminant analysis and naïve Bayes, variable selection, shrinkage methods, dimension reduction methods, decision trees, deep learning (neural networks), and clustering methods. (W).
Prerequisite(s): STAT 325 or MATH 325 or IMSE 317 or ME 364 or IMSE 510 or (STAT 301 and STAT 305)

STAT 535 Data Analysis and Modeling 3 Credit Hours
Linear models including models with factors associated with both fixed and random effects together with covariates. Models containing more complex covariance structure including repeated measures and time dependence. The statistical processing package SAS will be used extensively to analyze data associated with such models. The SAS procedures Proc GLM, Proc REG, and Proc Mixed will be used extensively in examples, assignments, and projects. (OC).
Restriction(s):
Can enroll if Class is Graduate

STAT 545 Reliability & Survival Analys 3 Credit Hours
"Reliability and Survival Analysis" primarily refers to the study of time-to-event data. The phrase "reliability analysis" is primarily used in the engineering domain and the phrase "survival analysis" is popularly used in the medical and public health domain referring to the study of underlying risk factors of different diseases. We will discuss the power and limitations of proportional hazard models to explain modern research problems: risk assessment, treatment evaluation, product liability, and school dropout to name a few. In particular, we will discuss descriptive methods of survival data, Kaplan-Meier curves, regression models for survival data, and accelerated failure time models. A software called "R" will be a major computing workhorse for this course. This course has four major objectives: 1) Introduce proportional hazard and accelerated failure time models; 2) Develop and strengthen statistical computing skills in "R" for survival data; 3) Understand and critique applied research papers in the field of reliability and survival analysis; 4) Guide students through the process of writing a research paper, from data cleaning to variable selection and prediction accuracy. (OC).
Prerequisite(s): STAT 430 or STAT 530
Restriction(s):
Can enroll if Class is Graduate

STAT 550 Multivariate Stat Analysis 3 Credit Hours
An introduction to commonly encountered statistical and multivariate techniques, while assuming only a limited knowledge of higher-level mathematics. Topics include: multivariate analysis of variance, multivariate regression, principal components and factor analysis, canonical correlation, and discriminant analysis.
Prerequisite(s): STAT 530

STAT 555 Environmental Statistics 3 Credit Hours
A wide variety of statistical tests important in environmental sciences will be covered through the use of case studies. Theory and applications of datasets, data displays, and formal statistical inference will be discussed. Students will obtain direct experience with the study and analysis of data, do projects, and write reports. (W, AY)
Restriction(s):
Can enroll if Class is Graduate

STAT 560 Time Series Analysis 3 Credit Hours
An introduction to time series, including trend effects and seasonality, while assuming only a limited knowledge of higher-level mathematics. Topics include: linear Gaussian processes, stationarity, autocovariance and autocorrelation; autoregressive (AR), moving average (MA) and mixed (ARMA) models for stationary processes; likelihood in a simple case such as AR(1); ARIMA processes, differencing, seasonal ARIMA as models for non-stationary processes; the role of sample autocorrelation, partial autocorrelation and correlograms in model choice; inference for model parameters; forecasting: dynamic linear models and the Kalman filter.
Prerequisite(s): STAT 530

STAT 590 Topics in Applied Statistics 3 Credit Hours
A course designed to offer selected topics in applied statistics. The specific topic will be announced together with the prerequisites when offered. Course may be repeated for credit when specific topic differs. (OC)
Restriction(s):
Can enroll if Level is Rackham or Graduate

STAT 597 Ind Studies in Statistics 1 to 3 Credit Hours
Independent Study in statistics for topics at the graduate level. Topics and objectives chosen bt agreement between students and instructor.

*An asterisk denotes that a course may be taken concurrently.

Frequency of Offering

The following abbreviations are used to denote the frequency of offering: (F) fall term; (W) winter term; (S) summer term; (F, W) fall and winter terms; (YR) once a year; (AY) alternating years; (OC) offered occasionally