

Applied Statistics Graduate Curriculum July, 2020

STAT 511 and STAT 512

STAT 511 and 512 (Design and Data Analysis for researchers I and II) form the core of the applied statistics curriculum for graduate students that are not in statistics.

- The content of these courses has unchanged.
- There will be 4 sections of STAT 511 in each academic year:
 - 2 sections in the Fall Semester,
 - 1 section in the Spring Semester,
 - 1 section (accelerated) in the Summer Term.
- STAT 511 will be taught as a “video delivered” course in the Spring and Summer, which means that there is a live instructor who holds office hours and makes/grades assignments, but the lectures are provided as video recordings. Students only have to come to campus for office hours and exams.
- STAT 512 will be focused on those students that wish to undertake intensive project-based course work.

Schedule for applied statistics curriculum

	Fall Semester	Spring Semester	Summer Term
STAT 511	Live Lecture	Video Delivered	Video Delivered
	Live Lecture		
STAT 512		Live Lecture	
2 credit STAR courses	2-3 Live Lecture	2-3 Live Lecture	

2-credit topical statistics STAR courses

We will offer a suite of 2-credit topical statistics courses on a rotating basis. The 2-credit topical courses will have one lecture per week throughout the semester. The planned courses are given below.

STAR #	Course Name	Description of Topics	Prerequisites
	R Boot Camp	Free elementary introduction to R offered in August and January offered to graduate students taking graduate statistics courses	None
501	Applied Data Wrangling and Visualization for Researchers	Data manipulation in R, importing and exporting data, variable transformation, converting dataset formats, generating summary statistics, principles of effective graphs, data visualization methods, exploratory data analysis using graphics, multi-panel plotting, high-density plotting, 3D plotting.	STAT 301 and STAT 158 or STAT 511

502	Applied Multivariate Analysis for Researchers	Principal component analysis, factor analysis, cluster analysis, discriminant analysis.	STAT 301 and STAT 158 or STAT 511
503	Applied Time Series for Researchers	Exploratory analysis of time series, including periodicity and trends, moving average and auto-regressive models, estimation and forecasting. Financial and environmental applications.	STAT 301 and STAT 158 or STAT 511
513	Applied Regression Models for Researchers	Model estimation and goodness of fit for linear models; confidence intervals for prediction and estimation; lack of fit, model diagnostics, transformations, model selection, influential observations, collinearity, interaction, polynomial regression, regression with dummy variables, weighted least squares, imputation.	STAT 511
514	Applied Experimental Design for Researchers	Analysis of variance, covariance, randomized block, latin square, factorial, balanced and unbalanced designs. Applications to agriculture, biosciences.	STAT 511
515	Applied Nonparametric Methods for Researchers	Rank-based methods, nonparametric inferential techniques, scatterplot smoothing, nonparametric function estimation, environmental applications.	STAT 511
516	Applied Ecological Statistics for Researchers	Population estimation using capture/recapture, line transect and line intercept methods; spatial point pattern analysis; modelling environmental and ecological data; environmental monitoring.	STAT 511
517	Applied Survival Analysis for Researchers	Time-to-event data, estimating survival and hazard functions, comparing survival curves, proportional hazards regression, extensions of proportional hazards regression, parametric models for survival data	STAT 511
518	Applied Categorical Data Analysis for Researchers	Inference for binary and categorical data using proportions and odds ratios; estimation and testing for contingency tables; logistic regression; conditional logistic regression; multinomial logistic regression	STAT 511
519	Applied Survey Statistics for Researchers	Survey design, simple random, stratified, and cluster samples. Estimation and variance estimation.	STAT 511
531	Applied Generalized Regression Models for Researchers	Introduction to generalized linear models, logit and probit models for binary regression, extensions to nominal and ordinal multcategory responses, count data, Poisson and negative binomial regression, log-linear models.	Regression Models or STAT 512
532	Applied Mixed Models for Researchers	Topics in linear models that have both fixed and random predictors: split-plot and related designs, mixed-effects factorials, repeated measures, random coefficients, and spatial models for designed experiments. Introduction to generalized linear and nonlinear mixed models.	Experimental design or STAT 512

533	Applied Data Mining for Researchers	Applications-oriented overview into how to use statistical methods to do data mining, inference, and prediction.	Regression Models or STAT 512
534	Applied Machine Learning for Researchers	Classification and decision trees, support vector machines, kernel methods, maxent models, ranking, ensemble methods, neural networks, reinforcement learning, on-line learning, clustering algorithms, dimension reduction, nonlinear embedding, and generalizing error.	Regression models or STAT 512, linear algebra
535	Applied Bayesian Statistics for Researchers	Bayesian analysis of statistical models, prior and posterior distributions, computing methods, interpretation.	Regression Models or STAT 512
536	Applied Spatial Statistics for Researchers	Introduction to spatial data analysis emphasizing concepts and interpretation, spatial point processes, clustering, spatial autocorrelation, semivariograms, kriging, spatial regression and analysis of variance.	Regression Models or STAT 512

Additional Applied Statistics Training Opportunities

Certificate Programs

The Certificate Programs offered by Statistics are being changed to reflect the changes to the graduate applied statistics curriculum and the many applied statistics courses offered across campus.

Coding and Cookies

The Department of Statistics has partnered with the Library to offer Coding and Cookies to the campus community. Workshops include R basics, Reproducible Reports Using Rmarkdown, Data Visualization using ggplot2, and Version Control Using.