STATISTICS (STAT)

STAT F200X  Elementary Statistics  (m)
3 Credits
Introduction to concepts and applications of elementary statistical methods. Topics include sampling and data analysis, descriptive statistics, elementary probability, probability and sampling distributions, confidence intervals, hypothesis testing, correlation, and simple linear regression.
Prerequisites: Appropriate placement score; or a grade of B or better in DEVEM F105 or DEVEM F105N or in all three of DEVEM F105G and DEVEM F105H and DEVEM F105J; or grade of C- or better in a higher-level math course.
Attributes: UAF GER Mathematics Req
Lecture + Lab + Other: 3 + 0 + 0

STAT F300  Statistics
3 Credits
Offered Spring: Fall Odd-numbered Years
A calculus-based course emphasizing applications. Topics include probability, joint and conditional probability, expectation and variance, parameter estimation (method of moments and maximum likelihood), one and two sample hypothesis tests, simple linear regression and one-way analysis of variance. A student may not use STAT F200X and STAT F300 to meet the requirement of a year's sequence course in statistics.
Prerequisites: MATH F230X or MATH F251X or placement.
Lecture + Lab + Other: 3 + 0 + 0

STAT F401  Regression and Analysis of Variance
4 Credits
Offered As Demand Warrants
Thorough study of multiple regression including multiple and partial correlation, the extra sum of squares principle, indicator variables, polynomial models, model selection techniques and assessment of underlying assumptions. Analysis of variance and covariance for multifactor studies in completely random and randomized complete block designs, multiple comparisons and orthogonal contrasts. Matrix concepts for linear models are taught as needed.
Prerequisites: STAT F200X or STAT F300.
Lecture + Lab + Other: 3 + 3 + 0

STAT F402  Scientific Sampling
3 Credits
Offered Fall
Sampling methods, including simple random, stratified and systematic and one- and two-stage cluster sampling; estimation procedures, including ratio and regression methods; special area and point sampling procedures; optimum allocation. Adaptive and probability sampling; bootstrapping and basic mark-and-recapture.
Prerequisites: STAT F200X or STAT F300.
Lecture + Lab + Other: 3 + 0 + 0

STAT F454  Statistical Consulting Seminar
1 Credit
Offered Spring
Introduction to statistical consulting and data analysis. Emphasis on interaction with researchers and identification of scientific and statistical issues relevant to the research problem. Includes regular class meetings as well as supervised meetings with researchers. Designed to combine mathematical statistics with applications from a variety of fields. Students from any field of study with strong quantitative skills are encouraged to enroll. May be repeated for a total of three credits.
Prerequisites: STAT F200X or STAT F300; STAT F401; and MATH F408.
Stacked with STAT F654.
Lecture + Lab + Other: 1 + 0 + 0

STAT F461  Applied Multivariate Statistics
3 Credits
Offered Spring Even-numbered Years
Estimation and hypothesis testing, multivariate normality and its assessment, multivariate one and two sample tests, confidence regions, multivariate analysis of variance, discrimination and classification, principal components, factor analysis, clustering techniques and graphical presentation. Statistical computing packages utilized in assignments.
Prerequisites: STAT F401.
Lecture + Lab + Other: 3 + 0 + 0

STAT F602  Experimental Design
3 Credits
Offered Fall Even-numbered Years
Constructing and analyzing designs for experimental investigations; completely randomized, randomized block and Latin-square designs, split-plot design, incomplete block design, confounded factorial designs, nested designs, treatment of missing data, comparison of designs.
Prerequisites: STAT F401.
Lecture + Lab + Other: 3 + 0 + 0

STAT F605  Spatial Statistics
3 Credits
Offered Spring Even-numbered Years
Prerequisites: STAT F401; MATH F251X; MATH F252X; MATH F253X.
Lecture + Lab + Other: 3 + 0 + 0

STAT F611  Time Series
3 Credits
Offered Spring Odd-numbered Years
Prerequisites: STAT F401.
Lecture + Lab + Other: 3 + 0 + 0
STAT F621  Distribution-free Statistics  
3 Credits  
Offered Fall Odd-numbered Years  
Bootstrapping, simulation, randomization tests and jacknifing. Classical distribution-free tests and confidence intervals including the Wilcoxon test, Kolmororov-Smirnov, Friedman test, Spearman’s and Kendall’s correlations, Kruskal-Wallis test, Sign tests and Fisher’s exact tests. The practice of non-parametric regression including methods such as generalized additive models, polynomial and spline regression, penalized splines, regression trees, neural nets, gradient boosting, kernal regression methods, isotonic regression and kriging. Robust and resistant estimation methods. Non-parametric density estimation. Survival analysis including Kaplan-Meier and proportional hazards regression.  
Prerequisites: STAT F401.  
Lecture + Lab + Other: 3 + 0 + 0

STAT F631  Categorical Data Analysis  
3 Credits  
Offered Fall Odd-numbered Years  
Prerequisites: STAT F401.  
Lecture + Lab + Other: 3 + 0 + 0

STAT F641  Bayesian Statistics  
3 Credits  
Offered Fall Even-numbered Years  
Prerequisites: MATH F252X; MATH F371, MATH F401, MATH F404, MATH F405, MATH F408 or STAT F651.  
Lecture + Lab + Other: 3 + 0 + 0

STAT F642  Bayesian Decision Theory for Resource Management  
4 Credits  
Offered Spring Even-numbered Years  
Application of decision theory to problems in natural resources management. Students will learn to perform Bayesian calculations and uncomplicated decision analysis themselves.  
Prerequisites: FISH F621 or FISH F630.  
Cross-listed with FISH F642.  
Lecture + Lab + Other: 2 + 2 + 0

STAT F651  Statistical Theory I  
3 Credits  
Offered Fall  
Probability and distribution of random variables. Conditional probability and stochastic independence. Distributions of functions of random variables. Expected values. Limiting distributions. Distributions derived from the normal distribution. Designed to combine mathematical statistics with applications from a variety of fields. Students from any field of study with strong quantitative skills are encouraged to enroll.  
Prerequisites: MATH F253X; MATH F314; previous statistics course.  
Lecture + Lab + Other: 3 + 0 + 0

STAT F652  Statistical Theory II  
4 Credits  
Offered Spring Odd-numbered Years  
Prerequisites: STAT F651.  
Lecture + Lab + Other: 4 + 0 + 0

STAT F653  Statistical Theory III: Linear Models  
3 Credits  
Offered Spring Even-numbered Years  
Best linear unbiased estimation, Gauss-Markov theory and applications, maximum likelihood estimation for linear models, multivariate normal distributions, linear regression and analysis of variance, weighted regression, robust and nonlinear regression, logistic regression, Poisson regression, autoregressive models and the General Linear Model. Designed to combine mathematical statistics with applications from a variety of fields. Students from any field of study with strong quantitative skills are encouraged to enroll. Student must take 651 or all the other courses listed.  
Prerequisites: STAT F651 or STAT F401; MATH F251X; MATH F252X; MATH F253X; MATH F314.  
Lecture + Lab + Other: 3 + 0 + 0

STAT F654  Statistical Consulting Seminar  
1 Credit  
Offered Spring  
Introduction to statistical consulting and data analysis. Emphasis on interaction with researchers and identification of scientific and statistical issues relevant to the research problem. Includes regular class meetings as well as supervised meetings with researchers. Designed to combine mathematical statistics with applications from a variety of fields. Students from any field of study with strong quantitative skills are encouraged to enroll. May be repeated for a total of three credits.  
Prerequisites: STAT F200X or STAT F300; STAT F401; and MATH F408.  
Stacked with STAT F454.  
Lecture + Lab + Other: 1 + 0 + 0

STAT F661  Sampling Theory  
3 Credits  
Offered As Demand Warrants  
Prerequisites: STAT F200X; STAT F401.  
Lecture + Lab + Other: 3 + 0 + 0

STAT F692  Seminar  
1-6 Credits  
Lecture + Lab + Other: 0 + 0 + 0

STAT F692A  Seminar  
1-6 Credits  
Lecture + Lab + Other: 0 + 0 + 0

STAT F692P  Seminar  
1-6 Credits  
Lecture + Lab + Other: 0 + 0 + 0
STAT F698  Non-thesis Research/Project
1-6 Credits
Lecture + Lab + Other: 0 + 0 + 0