STATISTICS (STAT)

College of Natural Science and Mathematics
Department of Mathematics and Statistics (https://www.uaf.edu/dms/) 907-474-7332

STAT F200X  Elementary Statistics  (m)
3 Credits
Offered Fall and Spring
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 MATH F105 or MATH F105N or in all three of MATH F105G and MATH F105H and MATH F105J; or grade of C- or better in a math course numbered F122 or above.
Attributes: UAF GER Mathematics Req
Lecture + Lab + Other: 3 + 0 + 0
Grading System: Letter Grades with option of Plus/Minus

STAT F300  Statistics
3 Credits
Offered Fall and Spring
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.
Prerequisites: MATH F230X or MATH F251X or placement.
Lecture + Lab + Other: 3 + 0 + 0
Grading System: Letter Grades with option of Plus/Minus

STAT F401  Regression and Analysis of Variance
4 Credits
Offered Fall and Spring
Multiple regression including multiple and partial correlation, extra sum of squares principle, indicator variables, polynomial models, model selection, 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 are taught as needed.
Prerequisites: STAT F200X or STAT F300.
Corequisites: STAT F401L.
Lecture + Lab + Other: 3 + 3 + 0
Grading System: Letter Grades with option of Plus/Minus

STAT F401L  STAT F401 Laboratory
0 Credit
Offered Fall and Spring
Computer laboratory section for STAT F401 Regression and Analysis of Variance. Activities may include case studies involving the application of lecture topics and methods in R software.
Corequisites: STAT F401.
Lecture + Lab + Other: 0 + 3 + 0
Grading System: Non-Graded

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
Grading System: Letter Grades with option of Plus/Minus

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.
Prerequisites: MATH F408; STAT F200X or STAT F300; STAT F401.
Stacked with STAT F654.
Special Notes: Students from any field of study with strong quantitative skills are encouraged to enroll.
Lecture + Lab + Other: 1 + 0 + 0
Grading System: Pass/Fail Grades
Repeatable for Credit: May be taken 3 times for up to 3 credits

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
Grading System: Letter Grades with option of Plus/Minus

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
Grading System: Letter Grades with option of Plus/Minus

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
Grading System: Letter Grades with option of Plus/Minus
STAT F611  Time Series
3 Credits
Offered Spring Odd-numbered Years
Prerequisites: STAT F401.
Lecture + Lab + Other: 3 + 0 + 0
Grading System: Letter Grades with option of Plus/Minus

STAT F621  Nonparametric Statistics and Machine Learning
3 Credits
Offered Fall Odd-numbered Years
A survey course in nonparametric statistical techniques. Distribution-free methods for small samples including sign, rank and randomization tests and bootstrapping. Modern techniques including kernel density estimation, survival analysis, spline regression and generalized additive models. Classification methods including regression trees, support vector machines and neural net models.
Prerequisites: STAT F401.
Lecture + Lab + Other: 3 + 0 + 0
Grading System: Letter Grades with option of Plus/Minus

STAT F631  Categorical Data Analysis
3 Credits
Offered Fall Odd-numbered Years
Prerequisites: STAT F401.
Lecture + Lab + Other: 3 + 0 + 0
Grading System: Letter Grades with option of Plus/Minus

STAT F641  Bayesian Statistics
3 Credits
Offered Fall Even-numbered Years
Prerequisites: MATH F252X; (MATH F371 and MATH F408) or STAT F651.
Lecture + Lab + Other: 3 + 0 + 0
Grading System: Letter Grades with option of Plus/Minus

STAT F651  Statistical Theory I
3 Credits
Offered Fall
Prerequisites: MATH F253X; MATH F314; previous statistics course.
Special Notes: Students from any field of study with strong quantitative skills are encouraged to enroll.
Lecture + Lab + Other: 3 + 0 + 0
Grading System: Letter Grades with option of Plus/Minus

STAT F652  Statistical Theory II
3 Credits
Offered Spring Odd-numbered Years
Data reduction concepts, including sufficiency, ancillarity, completeness. Point estimation and interval estimation of parameters. Bootstrapping. Hypothesis testing, including the Neyman-Pearson paradigm and likelihood ratio tests. Asymptotic properties of estimators. Bayesian inference. Designed to combine mathematical statistics with applications from a variety of fields.
Prerequisites: STAT F651.
Special Notes: Students from any field of study with strong quantitative skills are encouraged to enroll.
Lecture + Lab + Other: 3 + 0 + 0
Grading System: Letter Grades with option of Plus/Minus

STAT F653  Statistical Theory III: Linear Models
3 Credits
Offered Spring Even-numbered Years
Best linear unbiased estimation in the general linear model, 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 and generalized linear models. Designed to combine mathematical statistics with applications from a variety of fields.
Prerequisites: STAT F651 or MATH F371; MATH F253X; MATH F314.
Special Notes: STAT F401 or equivalent course in applied linear regression modeling is strongly recommended.
Lecture + Lab + Other: 3 + 0 + 0
Grading System: Letter Grades with option of Plus/Minus

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.
Prerequisites: MATH F408; STAT F200X or STAT F300; STAT F401.
Stacked with STAT F454.
Special Notes: Students from any field of study with strong quantitative skills are encouraged to enroll.
Lecture + Lab + Other: 1 + 0 + 0
Grading System: Pass/Fail Grades
Repeatable for Credit: May be taken 3 times for up to 3 credits

STAT F661  Sampling Theory
3 Credits
Offered Fall
Prerequisites: STAT F200X; STAT F401.
Lecture + Lab + Other: 3 + 0 + 0
Grading System: Letter Grades with option of Plus/Minus
STAT F671  Statistical Computing
3 Credits
Offered Spring Odd-numbered Years
Topics in statistical programming which may include Advanced R, program design, parallel processing, object oriented programming, functions, environments, debugging, loops and their replacements, C++ in R and code optimization. Optimizers, linear programming, random number generators including MCMC. Web applications. Writing R packages. Reproducible research. Text mining and relational databases.
Prerequisites: STAT F401; MATH F251X or MATH F230X; Knowledge of basic R highly recommended.
Lecture + Lab + Other: 3 + 0 + 0
Grading System: Letter Grades with option of Plus/Minus

STAT F692  Seminar
1-6 Credits
Lecture + Lab + Other: 0 + 0 + 0
Grading System: Letter Grades with option of Plus/Minus
Repeatable for Credit: May be taken unlimited times for up to 99 credits

STAT F692P  Seminar
1-6 Credits
Lecture + Lab + Other: 0 + 0 + 0
Grading System: Pass/Fail Grades
Repeatable for Credit: May be taken unlimited times for up to 99 credits

STAT F698  Non-thesis Research/Project
1-6 Credits
Lecture + Lab + Other: 0 + 0 + 0
Grading System: Pass/Fail Grades
Repeatable for Credit: May be taken unlimited times for up to 99 credits