STATISTICS (STAT)

STAT 1530 Introduction to Statistical Reasoning (3 credits)
General Education: Mathematics
Cross-listed with MATH 1153
A course in statistical literacy, an introduction with emphasis on examples and case studies. Topics include data sources and the distinction between experiments, observational studies, and surveys; graphical and numerical description of data; understanding randomness; central tendency; correlation versus causation; line of best fit; estimation of proportions; and statistical testing. Typically Offered: Fall, Spring and Summer.

STAT 2040 (s) Special Topics (1-16 credits, max 99)
Credit arranged

STAT 2510 Statistical Methods (3 credits)
General Education: Mathematics
Intro to statistical methods including design of statistical studies, basic sampling methods, descriptive statistics, probability and sampling distributions; inference in surveys and experiments, regression, and analysis of variance. (Credit will not be awarded for STAT 2510 after STAT 3010) Typically Offered: Fall, Spring and Summer.
Prereqs: MATH 1080 (with grade of C or better) or MATH 1143 or MATH 1160 or MATH 1170 or sufficient score on SAT, ACT, or math placement test (see www. uidaho. edu/registrar/registration/placement).

STAT 2990 (s) Directed Study (1-16 credits, max 99)
Credit arranged

STAT 3010 Probability and Statistics (3 credits)
Credit not awarded for STAT 2510 after STAT 3010. Intended for engineers, mathematicians, and physical scientists. Intro to sample spaces, random variables, statistical distributions, hypothesis testing, basic experimental design, regression, and correlation.
Prereqs: MATH 1750

STAT 4040 (s) Special Topics (1-16 credits, max 99)
Credit arranged

STAT 4070 Experimental Design (3 credits)
Joint-listed with STAT 5070
Methods of constructing and analyzing designs for experimental investigations; analysis of designs with unequal subclass numbers; concepts of blocking randomization and replication; confounding in factorial experiments; incomplete block designs; response surface methodology. Additional work required for graduate credit.
Prereqs: STAT 4310 Cooperative: open to WSU degree-seeking students.

STAT 4140 Nonparametric Statistics (3 credits)
Joint-listed with STAT 5140
Conceptual development of nonparametric methods including one, two, and k-sample tests for location and scale, randomized complete blocks, rank correlation, and runs test. Permutation methods, nonparametric bootstrap methods, density estimation, curve smoothing, robust and rank-based methods for the general linear model, and comparison. Comparison to parametric methods. Additional coursework/project required for graduate credit. Typically Offered: Varies.
Prereqs: STAT 4310 Cooperative: open to WSU degree-seeking students.

STAT 4170 Statistical Learning and Predictive Modeling (3 credits)
Joint-listed with STAT 5170
A comprehensive overview of statistical learning and predictive modeling techniques to analyze large data sets in science, social science, and other data-rich fields including, for example, biology, business, and engineering. Topics include regression, classification, resampling methods, model selection and regularization, tree-based methods, support vector machines, clustering, and text mining. The implementation of the methods will be in R and Python as needed. Basic experience with computer programming is assumed. Additional coursework/project required for graduate credit. Typically Offered: Fall.
Prereqs: STAT 4310

STAT 4180 Multivariate Analysis (3 credits)
Joint-listed with STAT 5190
The multivariate normal, Hotelling's T2, multivariate general linear model, discriminant analysis, covariance matrix tests, canonical correlation, and principle component analysis. Additional coursework/project required for graduate credit. Typically Offered: Spring.
Prereqs: STAT 4310 Cooperative: open to WSU degree-seeking students.

STAT 4190 Introduction to SAS/R Programming (3 credits)
An introduction to the SAS and R programming languages. Topics include creating data, importing data, accessing subsets of data, exporting data, plotting and graphing, loops and functions. Course provides a basic knowledge of SAS and R to help students master statistical tools available in SAS and R, including basic statistical analyses.
Prereqs: STAT 2510 or STAT 3010

STAT 4220 Survey Sampling Methods (3 credits)
Introduction to survey sampling designs and inference including simple, stratified, and cluster sampling; ratio and regression estimators, unequal probability sampling, and population size estimation. Typically Offered: Fall.
Prereqs: 'C' or better in either STAT 2510 or STAT 3010

STAT 4260 SAS Programming (3 credits)
Coverage of a variety of methods for data manipulation, data management, and programming in the SAS language. DATA step programming methods including data transformation, functions for numeric and character data, input of complicated data files, and do loop usage. Data management topics include concatenating data files, sorting and merging data files and ARRAY statement usage. SAS programming with SAS modules such as SAS/Graph, SAS/IML, and SAS/Macro language. Other topics in SAS programming, such as covering other SAS modules in depth.
Prereqs: STAT 2510 or STAT 3010

STAT 4270 R Programming (3 credits)
Credit not awarded for STAT 4270 after STAT 4190. Introduction to the R computing language for scientific graphics, statistical analysis, simulation, and mathematical modeling. Topics include functions, data management and manipulation, loops and logical structures, vector and matrix calculations, contemporary graphical displays, probability and simulation, dynamic models, numerical optimization, standard methods of statistical analysis.
Prereqs: STAT 2510 or STAT 3010

STAT 4310 Statistical Analysis (3 credits)
Concepts and methods of statistical research including multiple regression, contingency tables and chi-square, experimental design, analysis of variance, multiple comparisons, and analysis of covariance.
Prereqs: STAT 2510 or STAT 3010 Cooperative: open to WSU degree-seeking students.

STAT 4330 Econometrics (3 credits)
Cross-listed with ECON 4530
Application of statistical methods to economics and business studies; emphasis on regression analysis methods.
Prereqs: STAT 2510 or STAT 3010

STAT 4350 Introduction to Bayesian Statistics (3 credits)
Joint-listed with STAT 5350
Exploring the basics of Bayesian thinking with a comparative approach to interpretations of probability. Statistical methods, Bayesian approach to statistical inference. Methods include point and interval estimation under the Normal model, and inference under hierarchical models with emphasis on statistical model building. Computational methods, applications of methods useful for sampling posterior distributions such as rejection sampling, importance sampling, and Markov Chain Monte Carlo. Additional coursework/project required for graduate credit. Typically Offered: Varies.
Prereqs: STAT 4310 or equivalent

STAT 4360 Applied Regression Modeling (3 credits)
General Education: Capstone Experience
Joint-listed with STAT 5160
Statistical modeling and analysis of scientific data using regression model including linear, nonlinear, and generalized linear regression models. Topics also include analysis of survival data, censored and truncated response variables, categorical response variables, and mixed models. Emphasis is on application of these methods through the analysis of real data sets with statistical packages. Additional coursework/projects will be assigned at the 5000-level. Typically Offered: Spring.
Prereqs: STAT 4310

STAT 4510 Probability Theory (3 credits)
Cross-listed with MATH 4510
Random variables, expectation, special distributions (normal, binomial, exponential, etc.), moment generating functions, law of large numbers, central limit theorem. Typically Offered: Fall. Prereqs or
Coreqs: MATH 2750 or Permission Cooperative: open to WSU degree-seeking students

STAT 4520 Mathematical Statistics (3 credits)
Cross-listed with MATH 4520
Estimation of parameters, confidence intervals, hypothesis testing, likelihood ratio test, sufficient statistics. Typically Offered: Spring.
Prereqs: MATH 4510 or STAT 4510 or Permission Cooperative: open to WSU degree-seeking students.

STAT 4530 Stochastic Models (3 credits)
Cross-listed with MATH 4530
Joint-listed with MATH 5380, STAT 5440
Markov chains, stochastic processes, and other stochastic models; applications. Additional projects/assignments required for graduate credit.
Prereqs: MATH 4510 or STAT 4510 or Permission. Cooperative: open to WSU degree-seeking students.

STAT 4560 Enterprise Quality Management (3 credits)
Cross-listed with OM 4560
Principles of quality management, with a focus on Lean Six Sigma concepts and Define-Measure-Analyze-Improve-Control (DMAIC) approach to managing and improving enterprise quality. Additional work required for graduate credit. May include evening exams. May involve field trips. Typically Offered: Varies.
Prereqs: STAT 2510 or STAT 3010 or Permission

STAT 4980 (s) Internship (1-16 credits, max 99)
Credit arranged
Prereqs: Permission

STAT 4990 (s) Directed Study (1-16 credits, max 99)
Credit arranged

STAT 5000 Master's Research and Thesis (1-16 credits, max 99)
Credit arranged

STAT 5010 (s) Seminar (1-16 credits, max 99)
Credit arranged. This course addresses statistical ethics; statistically oriented research; and deeper and more extensive consideration of topics relevant to but not addressed in other graduate level statistics courses offered during that semester. Formal presentations and reports in journal format are used to enhance written, oral, and presentation communication experience and ability.

STAT 5020 (s) Directed Study (1-16 credits, max 99)
Credit arranged

STAT 5030 (s) Workshop (1-16 credits, max 99)
Credit arranged

STAT 5040 (s) Special Topics (1-16 credits, max 99)
Credit arranged

STAT 5070 Experimental Design (3 credits)
Joint-listed with STAT 4070
Methods of constructing and analyzing designs for experimental investigations; analysis of designs with unequal subclass numbers; concepts of blocking randomization and replication; confounding in factorial experiments; incomplete block designs; response surface methodology. Additional work required for graduate credit. Cooperative: open to WSU degree-seeking students.

STAT 5140 Nonparametric Statistics (3 credits)
Joint-listed with STAT 4140
Conceptual development of nonparametric methods including one, two, and k-sample tests for location and scale, randomized complete blocks, rank correlation, and runs test. Permutation methods, nonparametric bootstrap methods, density estimation, curve smoothing, robust and rank-based methods for the general linear model, and comparison. Comparison to parametric methods. Additional coursework/project required for graduate credit. Typically Offered: Varies. Cooperative: open to WSU degree-seeking students.

STAT 5160 Applied Regression Modeling (3 credits)
General Education: Capstone Experience
Joint-listed with STAT 4360
Statistical modeling and analysis of scientific data using regression model including linear, nonlinear, and generalized linear regression models. Topics also include analysis of survival data, censored and truncated response variables, categorical response variables, and mixed models. Emphasis is on application of these methods through the analysis of real data sets with statistical packages. Additional coursework/projects will be assigned at the 5000-level. Typically Offered: Spring.

STAT 5170 Statistical Learning and Predictive Modeling (3 credits)
Joint-listed with STAT 4170
A comprehensive overview of statistical learning and predictive modeling techniques to analyze large data sets in science, social science, and other data-rich fields including, for example, biology, business, and engineering. Topics include regression, classification, resampling methods, model selection and regularization, tree-based methods, support vector machines, clustering, and text mining. The implementation of the methods will be in R and Python as needed. Basic experience with computer programming is assumed. Additional coursework/project required for graduate credit. Typically Offered: Fall.

STAT 5190 Multivariate Analysis (3 credits)
Joint-listed with STAT 4180
The multivariate normal, Hotelling's T2, multivariate general linear model, discriminant analysis, covariance matrix tests, canonical correlation, and principle component analysis. Additional coursework/project required for graduate credit. Typically Offered: Spring. Cooperative: open to WSU degree-seeking students.

STAT 5350 Introduction to Bayesian Statistics (3 credits)
Joint-listed with STAT 4350
Exploring the basics of Bayesian thinking with a comparative approach to interpretations of probability. Statistical methods, Bayesian approach to statistical inference. Methods include point and interval estimation under the Normal model, and inference under hierarchical models with emphasis on statistical model building. Computational methods, applications of methods useful for sampling posterior distributions such as rejection sampling, importance sampling, and Markov Chain Monte Carlo. Additional coursework/project required for graduate credit. Typically Offered: Varies.

STAT 5440 Stochastic Models (3 credits, max 3)
Cross-listed with MATH 5380
Joint-listed with MATH 4530, STAT 4530
Markov chains, stochastic processes, and other stochastic models; applications. Additional projects/assignments required for graduate credit. Cooperative: open to WSU degree-seeking students.

STAT 5500 Regression (3 credits)
Theory and application of regression models including linear, nonlinear, and generalized linear models. Topics include model specification, point and interval estimators, exact and asymptotic sampling distributions, tests of general linear hypotheses, prediction, influence, multicollinearity, assessment of model fit, and model selection. Recommended preparation: MATH 3300 and STAT 4520. Typically Offered: Varies.

STAT 5550 Statistical Ecology (3 credits)
Cross-listed with WLF 5550
Stochastic models in ecological work; discrete and continuous statistical distributions, birth-death processes, diffusion processes; applications in population dynamics, population genetics, ecological sampling, spatial analysis, and conservation biology. Typically Offered: Spring.
Prereqs: MATH 4510 or Permission Cooperative: open to WSU degree-seeking students.

STAT 5650 Computer Intensive Statistics (3 credits)
Numerical stability, matrix decompositions for linear models, methods for generating pseudo-random variates, interactive estimation procedures (Fisher scoring and EM algorithm), bootstrapping, scatterplot smoothers, Monte Carlo techniques including Monte Carlo integration and Markov chain Monte Carlo. (Alt/years)
Prereqs: STAT 4510, STAT 4520, MATH 3300, and computer programming experience or Permission Cooperative: open to WSU degree-seeking students.

STAT 5970 (s) Consulting Practicum (1-16 credits, max 99)
Credit arranged. Students will gain experience in statistical consulting and data analysis, using multiple statistical software packages in the analysis process. Topics include communication of statistical information and analysis to non-statisticians, ethics, and computing. Emphasis is placed on written and oral presentation of statistical analysis plans and results.

STAT 5980 (s) Internship (1-16 credits, max 99)
Credit arranged. Students gain experience in statistical consultation and/or statistical data analysis in their present place of employment or an arranged internship organization. Students are jointly accountable to a faculty advisor and a person providing oversight of the individual's efforts within the organization. All internship experiences must be pre-approved.

STAT 5990 (s) Research (1-16 credits, max 99)
Credit arranged. Research not directly related to a thesis or dissertation.