STATISTICS (STAT)

STAT 153 Introduction to Statistical Reasoning
3 credits
Cross-listed with MATH 153
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.

STAT 204 (s) Special Topics
Credit arranged

STAT 251 Statistical Methods
3 credits
Gen Ed: Mathematics
Credit not awarded for STAT 251 after STAT 301 or STAT 416, or for STAT 416 after STAT 251 or STAT 301.
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.
Prereq: One of the following: MATH 108, MATH 143, MATH 160, MATH 170, or sufficient score on SAT, ACT, or math placement test (see www.uidaho.edu/registrar/registration/placement).

STAT 299 (s) Directed Study
Credit arranged

STAT 301 Probability and Statistics
3 credits
Credit not awarded for STAT 251 after STAT 301 or STAT 416, or for STAT 416 after STAT 251 or STAT 301.
Intended for engineers, mathematicians, and physical scientists. Intro to sample spaces, random variables, statistical distributions, hypothesis testing, basic experimental design, regression, and correlation.
Prereq: MATH 175.

STAT 404 (s) Special Topics
Credit arranged

STAT 407 Experimental Design
3 credits
Joint-listed with STAT 507
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.
Prereq: STAT 431

STAT 419 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.
Prereq: STAT 251 or STAT 301

STAT 422 Sample Survey 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. Cooperative: open to WSU degree-seeking students.
Prereq: STAT 251 or STAT 301

STAT 426 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.
Prereq: STAT 251 or STAT 301

STAT 427 R Programming
3 credits
Credit not awarded for STAT 427 after STAT 419. 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.
Prereq: STAT 251 or STAT 301

STAT 431 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. Cooperative: open to WSU degree-seeking students.
Prereq: STAT 251 or STAT 301

STAT 433 Econometrics
3 Credits
Cross-listed with ECON 453
Application of statistical methods to economics and business studies; emphasis on regression analysis methods.
Prereq: STAT 251 or STAT 301

STAT 436 Applied Regression Modeling
3 credits
Joint-listed with STAT 516
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 500-level.
Prereq: STAT 431
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 451</td>
<td>Probability Theory</td>
<td>3</td>
<td>Cross-listed with MATH 451. Random variables, expectation, special distributions (normal, binomial, exponential, etc.), moment generating functions, law of large numbers, central limit theorem. Cooperative: open to WSU degree-seeking students. (Fall only)</td>
</tr>
<tr>
<td>STAT 452</td>
<td>Mathematical Statistics</td>
<td>3</td>
<td>Cross-listed with MATH 452. Estimation of parameters, confidence intervals, hypothesis testing, likelihood ratio test, sufficient statistics. Cooperative: open to WSU degree-seeking students. (Spring only)</td>
</tr>
<tr>
<td>STAT 453</td>
<td>Stochastic Models</td>
<td>3</td>
<td>Cross-listed with MATH 453. Markov chains, stochastic processes, and other stochastic models; applications. Additional projects/assignments required for graduate credit. Cooperative: open to WSU degree-seeking students.</td>
</tr>
<tr>
<td>STAT 456</td>
<td>Quality Management</td>
<td>3</td>
<td>Cross-listed with OM 456. Principles of total quality management, with emphasis on problem solving techniques to continually improve processes; customer-driven quality, management and employee participation, statistical process control, product/process design, and process capability. May include evening exams. May involve field trips.</td>
</tr>
<tr>
<td>STAT 498</td>
<td>Internship</td>
<td>credit</td>
<td>Permission</td>
</tr>
<tr>
<td>STAT 499</td>
<td>Directed Study</td>
<td>credit</td>
<td>Permission</td>
</tr>
<tr>
<td>STAT 500</td>
<td>Master's Research and Thesis</td>
<td>credit</td>
<td>Permission</td>
</tr>
<tr>
<td>STAT 501</td>
<td>Seminar</td>
<td>credit</td>
<td>Permission</td>
</tr>
<tr>
<td>STAT 502</td>
<td>Directed Study</td>
<td>credit</td>
<td>Permission</td>
</tr>
<tr>
<td>STAT 503</td>
<td>Workshop</td>
<td>credit</td>
<td>Permission</td>
</tr>
<tr>
<td>STAT 504</td>
<td>Special Topics</td>
<td>credit</td>
<td>Permission</td>
</tr>
<tr>
<td>STAT 507</td>
<td>Experimental Design</td>
<td>3</td>
<td>Joint-listed with STAT 407. 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.</td>
</tr>
<tr>
<td>STAT 514</td>
<td>Nonparametric Statistics</td>
<td>3</td>
<td>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. Cooperative: open to WSU degree-seeking students.</td>
</tr>
<tr>
<td>STAT 516</td>
<td>Applied Regression Modeling</td>
<td>3</td>
<td>Joint-listed with STAT 436. Statistical modeling and analysis of scientific date 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 required for graduate credit.</td>
</tr>
<tr>
<td>STAT 517</td>
<td>Statistical Learning and Predictive Modeling</td>
<td>3</td>
<td>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.</td>
</tr>
<tr>
<td>STAT 519</td>
<td>Multivariate Analysis</td>
<td>3</td>
<td>The multivariate normal, Hotelling's T2, multivariate general linear model, discriminant analysis, covariance matrix tests, canonical correlation, and principle component analysis. Cooperative: open to WSU degree-seeking students.</td>
</tr>
<tr>
<td>STAT 535</td>
<td>Introduction to Bayesian Statistics</td>
<td>3</td>
<td>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.</td>
</tr>
</tbody>
</table>

Prereq: STAT 431
STAT 550 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. Cooperative: open to WSU degree-seeking students.
Prereq: MATH 330 and STAT 451
Coreq: STAT 452

STAT 555 Statistical Ecology
3 credits
Cross-listed with WLF 555
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. Cooperative: open to WSU degree-seeking students. (Spring, alt/years)
Prereq: MATH 451 or Permission

STAT 565 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. Cooperative: open to WSU degree-seeking students. (Alt/years)
Prereq: STAT 451, STAT 452, MATH 330, and computer programming experience or Permission

STAT 597 (s) Consulting Practicum
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 598 (s) Internship
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 599 (s) Research
Credit arranged
Research not directly related to a thesis or dissertation.
Prereq: Permission