

2009-11 Cal Poly Catalog

Statistics Department

STAT–STATISTICS

STAT 130 Introduction to Statistical Reasoning (4) GE B1

Survey of statistical ideas and philosophy. Emphasis on concepts rather than in-depth coverage of statistical methods. Topics include sampling, experimentation, data exploration, chance phenomena, and methods of statistical inference. Credit not allowed for students with a previous statistics course. 4 lectures. Prerequisite: Passing score on the ELM examination, or an ELM exemption, or credit in MATH 104. Fulfills GE B1.

STAT 150 Introduction to Statistical Investigations (4)

Orientation to the statistics program. Introduction to the discipline of statistics and the nature of statistical reasoning. Design of surveys and experiments, graphical and numerical summaries, statistical models, and interpretation of results. Development of discussion, writing, presentation, and evaluation skills. 4 lectures. Prerequisite: Freshman Statistics major, or permission of instructor.

STAT 200 Special Problems for Undergraduates (1–2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department chair.

STAT 217 Introduction to Statistical Concepts and Methods (4) GE B1

Sampling and experimentation, descriptive statistics, confidence intervals, two-sample hypothesis tests for means and proportions, Chi-square tests, linear and multiple regression, analysis of variance. Substantial use of statistical software. Not open to students with credit in STAT 218 or STAT 221 or STAT 251. 4 lectures. Prerequisite: Passing score on the ELM examination, or an ELM exemption, or credit in MATH 104. Fulfills GE B1.

STAT 218 Applied Statistics for the Life Sciences (4) GE B1

Data collection and experimental design, descriptive statistics, confidence intervals, parametric and non parametric one and two-sample hypothesis tests, analysis of variance, correlation, simple linear regression, chi-square tests, relative risk and odds. Applications of statistics to the life sciences. Substantial use of statistical software. Not open to students with credit in STAT 217 or STAT 221 or STAT 251. 4 lectures. Prerequisite: Passing score on the ELM examination, or an ELM exemption, or credit in MATH 104. Fulfills GE B1.

STAT 221 Introduction to Probability and Statistics (5) GE B1

Data classification, descriptive statistics, elementary probability. Binomial and normal distributions. Random sampling, confidence intervals and hypothesis testing on common parameters. Introduction to regression and correlation, analysis of variance, contingency table analysis. Substantial use of statistical software. Not open to students with credit in STAT 217, STAT 218, STAT 252, STAT 302, or STAT 312. 5 lectures. Prerequisite: Passing score on the ELM examination, or an ELM exemption, or credit in MATH 104. Fulfills GE B1. *Changed effective Winter 2010.*

STAT 251 Statistical Inference for Management I (4) GE B1

Descriptive statistics. Probability and counting rules. Random variables and probability distributions. Sampling distributions and point estimation. Confidence intervals and tests of hypotheses for a single mean and proportion. 4 lectures. Prerequisite: Completion of the ELM requirement and a passing score on appropriate Mathematics Placement Examination for MATH 221 eligibility, or MATH 118 or equivalent. Fulfills GE B1.

STAT 252 Statistical Inference for Management II (5) GE B1

Confidence intervals and tests of hypotheses for two means and two proportions. Introduction to ANOVA, regression, correlation, multiple regression, time series, and forecasting. Statistical quality control. Enumerative data analysis. Substantial use of statistical software. 5 lectures. Prerequisite: STAT 221 or STAT 251 with a minimum grade of C-. Fulfills GE B1.

STAT 270 Selected Topics (1–4)

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

STAT 301 Statistics I (4)

Introduction to statistics for mathematically inclined students, focused on process of statistical investigations. Observational studies, controlled

experiments, randomization, confounding, randomization tests, hypergeometric distribution, descriptive statistics, sampling, bias, binomial distribution, significance tests, confidence intervals, normal model, *t*-procedures, two-sample procedures. Substantial use of statistical software. 4 lectures. Prerequisite or concurrent: MATH 142.

STAT 302 Statistics II (4)

Continued study of the process, concepts, and methods of statistical investigations. Association, chi-square procedures, one-way ANOVA, multiple comparisons, two-way ANOVA interaction, simple linear regression, correlation, prediction, logistic regression, multiple regression, time series, forecasting, quality control. Substantial use of statistical software. Not open to students with credit in STAT 322. 4 lectures. Prerequisite: STAT 301.

STAT 312 Statistical Methods for Engineers (4) GE B6

Descriptive and graphical methods. Discrete and continuous probability distributions. One and two sample confidence intervals and hypothesis testing. Single factor analysis of variance. Quality control. Introduction to regression and to experimental design. Substantial use of statistical software. 4 lectures. Prerequisite: MATH 142. Fulfills GE B6.

STAT 313 Applied Experimental Design and Regression Models (4) GE B1

Analysis of variance and regression analysis for students not majoring in statistics or mathematics. Includes one-way classification, randomized blocks, Latin squares, factorial designs, multiple regression, diagnostics, and model comparison. 4 lectures. Prerequisite: STAT 217 or STAT 218 or STAT 221 or STAT 312. Fulfills GE B1.

STAT 321 Probability and Statistics for Engineers and Scientists (4) GE B6

Tabular and graphical methods for data summary, numerical summary measures, probability concepts and properties, discrete and continuous probability distributions, expected values, statistics and their sampling distributions, point estimation, confidence intervals for a mean and proportion. Use of statistical software. 4 lectures. Prerequisite: MATH 142. Fulfills GE B6.

STAT 323 Design and Analysis of Experiments I (4)

Principles, construction and analysis of experimental designs. Completely randomized, randomized complete block, Latin squares, Graeco Latin squares, factorial, and nested designs. Fixed and random effects, expected mean squares, multiple comparisons, and analysis of covariance. 4 lectures. Prerequisite: STAT 302 or STAT 312.

STAT 324 Applied Regression Analysis (4)

Simple linear regression and associated special topics, multiple linear regression, indicator variables, influence diagnostics, assumption analysis, selection of "best subset", nonstandard regression models, logistic regression, nonlinear regression models. 4 lectures. Prerequisite: STAT 252 or STAT 302 or STAT 312 or STAT 313.

STAT 325 Introduction to Probability Models (4)

Introduction to probability and applied probability models. Topics include basic probability rules, counting rules, conditional probability, discrete and continuous random variables, and expectation. Applied models include Poisson processes, Markov chains, and reliability models. Not open to students with credit in STAT 321 or STAT 425. 4 lectures. Prerequisite: MATH 206 and CSC/CPE 101 or CSC 232 or CSC/CPE 235. *Changed effective Winter 2010.*

STAT 330 Statistical Computing I: SAS (4)

Techniques available to the statistician for efficient use of computers to perform statistical computations and to analyze large amounts of data. Use of SAS throughout the course. Includes data preparation, report writing, and basic statistical methods. 4 lectures. Prerequisite: STAT 252 or STAT 302 or STAT 312 or STAT 313 or STAT 322.

STAT 350 Probability and Random Processes for Engineers (4) GE B6

Random events, random variables, and random processes, with emphasis on probabilistic treatment of signals and noise. Specific topics include: sample spaces, probability, distributions, independence, moments, covariance, time/ensemble averages, stationarity, common processes, correlation and spectral functions, physical noise sources. 4 lectures. Prerequisite: MATH 241, EE 228. Fulfills GE B6.

STAT 400 Special Problems for Advanced Undergraduates (1–2)

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department head.

STAT 416 Statistical Analysis of Time Series (4)

Time series components, descriptive smoothing methods, regression models for time series data, forecasting via exponential smoothing, evaluation of forecasts, autocorrelation, ARIMA models and Box-Jenkins methods, combining forecasts, frequency domain analysis, filtering. 4 lectures. Prerequisite: **STAT 252 or STAT 302 or STAT 312**. STAT 324 or STAT 524 or consent of instructor. *Changed effective Winter 2010.*

STAT 417 Survival Analysis Methods (4)

Parametric and nonparametric methods for analyzing survival data. Topics include Kaplan-Meier and Nelson-Aalen estimates, Cox regression models, accelerated failure time models. Use of statistical software to implement methods throughout course. 4 lectures. Prerequisite: STAT 302 or consent of instructor.

STAT 418 Analysis of Cross-Classified Data (4)

Discrete multivariate statistics, including analysis of cross-classified data, log-linear models for multidimensional contingency tables, goodness of fit statistics, measures of association, model selection, and hypothesis testing. 4 lectures. Prerequisite: STAT 324 or STAT 524 or consent of instructor. *Changed effective Winter 2010.*

STAT 419 Applied Multivariate Statistics (4)

Continuous multivariate statistics. Multivariate linear model, principal components and factor analysis, discriminant analysis, clustering, and canonical correlation. Use of Minitab and SAS throughout the course. 4 lectures. Prerequisite: Two courses in statistics, or consent of instructor. Recommended: MATH 206.

STAT 421 Survey Sampling and Methodology (4)

Survey planning, execution, and analysis. Principles of survey research, including non-sampling and sampling error topics. Survey sample designs, including simple random, systematic, stratified, cluster, and multi-stage. Estimation procedures and sample size calculations. 4 lectures. Prerequisite: One of the following: STAT 217, STAT 218, STAT 221, STAT 252, STAT 302, STAT 312, or STAT 512.

STAT 423 Design and Analysis of Experiments II (4)

Continuation of STAT 323. 2^k factorial designs, 3^k factorial designs, balanced and partially balanced incomplete block designs, nested designs, split-plot designs, response surface methodology, confounding, repeated measures, and other design approaches. 4 lectures. Prerequisite: STAT 323.

STAT 425 Probability Theory (4)

Basic probability theory, combinatorial methods, independence, conditional and marginal probability, probability models for random phenomena, random variables, probability distributions, distributions of functions of random variables, mathematical expectation, covariance and correlation, conditional expectation. 4 lectures. Prerequisite: STAT 301 or STAT 321, MATH 241, and MATH 248. Recommended: STAT 325.

STAT 426 Estimation and Sampling Theory (4)

Continuation of STAT 425. Properties of statistics obtained from samples. Sample mean properties, convergence in probability, law of large numbers, and central limit theorem. Selected probability distributions. Theory of estimation. Sampling distribution of estimators. 4 lectures. Prerequisite: STAT 425.

STAT 427 Mathematical Statistics (4)

Continuation of STAT 426. The theory of hypothesis testing and its applications. Power and uniformly most powerful tests. Categorical data and nonparametric methods. Other selected topics. 4 lectures. Prerequisite: STAT 426.

STAT 430 Statistical Computing II: S-Plus (4)

Design and use of statistical software in programming statistical applications; object oriented statistical languages; random number generation; Monte Carlo methods including resampling (bootstrap and jack-knife), randomization tests, and simulation; exploratory data analysis using linked, Trellis, and dynamic graphics; smoothing algorithms; and regression trees. 4 lectures. Prerequisite: STAT 302, STAT 330, and STAT 323 or STAT 324.

STAT 440 SAS Certification Preparation (2)

Preparation and discussion of programming, data management, and data analysis topics related to the Certified Base Programmer Exam offered by the Statistical Analysis Systems (SAS) Institute. 2 lectures. Prerequisite: STAT 330 or equivalent.

STAT 461, 462 Senior Project I, II (1) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 90 hours total time.

STAT 465 Statistical Communication and Consulting (4)

Blending of the theoretical and practical aspects of statistical consulting. Development of tools necessary to conduct effective consulting sessions, present oral arguments and written reports, work collaboratively to solve problems, and utilize professional publications in statistics. 4 lectures.

Prerequisite: **Successful completion of at least one STAT 400-level course and senior standing. Open only to statistics majors with senior standing.** *Changed effective Winter 2010.*

STAT 470 Selected Advanced Topics (1-4)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 lectures. Prerequisite: Consent of instructor.

STAT 485 Cooperative Education Experience (6) (CR/NC)

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Major credit limited to 6 units; total credit limited to 12 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

STAT 495 Cooperative Education Experience (12) (CR/NC)

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Major credit limited to 12 units; total credit limited to 24 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

STAT 512 Statistical Methods (4)

Statistical methods in research for graduate students not majoring in mathematical sciences. Probability distributions, confidence intervals, hypothesis testing, contingency tables, linear regression and correlation, multiple regression, analysis of variance. Substantial use of statistical software. 4 seminars. Prerequisite: Graduate standing and intermediate algebra or equivalent.

STAT 513 Applied Experimental Design and Regression Models (4)

Applications of statistics for graduate students not majoring in mathematics. Analysis of variance including the one-way classification, randomized blocks, Latin squares, and factorial designs. Introduction to multiple regression and to analysis of covariance. Substantial use of statistical software. 4 lectures. Not open to students with credit in STAT 313. Prerequisite: One of the following: STAT 512, STAT 217, STAT 218, STAT 221, STAT 252, STAT 312, or equivalent.

STAT 523 Design and Analysis of Experiments I (4)

Principles, construction and analysis of experimental designs. Completely randomized, randomized complete block, Latin squares, Graeco-Latin squares, factorial, and nested designs. Fixed and random effects, expected mean squares, multiple comparisons, and analysis of covariance. Not open to students with credit in STAT 323. 4 lectures. Prerequisite: STAT 513 or STAT 542 or consent of instructor.

STAT 524 Applied Regression Analysis (4)

Simple linear regression and associated special topics, multiple linear regression, indicator variables, influence diagnostics, assumption analysis, selection of best subset, nonstandard regression models, logistic regression, nonlinear regression models. Not open to students with credit in STAT 324. 4 lectures. Prerequisite: STAT 513 or STAT 542 or consent of instructor.

STAT 530 Statistical Computing I: SAS (4)

Techniques available to the statistician for efficient use of computers to perform statistical computations and to analyze large amounts of data. Use of the SAS software system. Includes data preparation, report writing, basic statistical methods, and a research project. Not open to students with credit in STAT 330. 4 lectures. Prerequisite: STAT 512 or STAT 513 or STAT 542 or equivalent.

STAT 542 Statistical Methods for Engineers (4)

Descriptive and graphical methods. Discrete and continuous probability distributions. One and two sample confidence intervals and hypothesis testing.

Single factor analysis of variance. Quality control. Introduction to regression and to experimental design. Substantial use of statistical software. 4 lectures. Not open to students with credit in STAT 312. Prerequisite: MATH 142 and graduate standing.