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## Courses and Descriptions

### Undergraduate Courses

**2000 Introduction to Microcomputers (3) F,S,Su** 2 hrs. lecture; 2 hrs. lab. Credit will not be given for this course and CSC 1100, ISDS 1100, and LIS 2001. A user-oriented introduction to microcomputers and applications software; terminology; hardware; software: the operating system, word processing, spreadsheets, data management, graphics, communications.

**2201 Introduction to Statistical Analysis (4) F,S** 3 hrs. lecture; 2 hrs. lab. Prereq.: MATH 1021 or equivalent. Descriptive statistics; inferential statistical methods including confidence interval estimation and hypothesis testing for one and two population means and proportions; one-way analysis of variance; simple linear regression and correlation; analysis of categorical data. [*\*GENERAL EDUCATION COURSE*]

**3201 Statistical Analysis II (4) S** Prereq.: EXST 2201 or equivalent. 3 hrs. lecture; 2 hrs. lab. Applied statistical modeling: multiple regression, variable selection, serial correlation, repeated measures, multivariate tools, logistic regression, blocking and factorial design, categorical data analysis, and nonparametric techniques.

**3999 Supervised Independent Study and Research (1-4) V** Prereq.: consent of instructor. May be taken for a max. of 8 sem. hrs. of credit with consent of department head. Investigation of areas of interest not covered in other departmental courses, under the guidance of departmental faculty. **Senior and**

### Graduate Courses

**4012 Introduction to Sampling Techniques (3) Su** Prereq.: EXST 2201 or equivalent. Simple random, stratified random, cluster, systematic, multistage, multiphase, and unequal probability sampling procedures methods and applications; ratio and regression estimation; non-response and non-sampling errors.

**4025 SAS Programming (3) Su** Prereq.: EXST 2201 or equivalent. Reading, processing, manipulating, transforming, and outputting data in various formats; descriptive and summary statistics procedures; subsetting and combining data sets; DO loops and arrays; industry standard programming practices.

**4050 Principles and Theory of Statistics (4) F** Prereq.: EXST 2201 or equivalent and MATH 1550 or equivalent. 3 hrs. lecture; 2 hrs. lab. Probability distributions as models for real-world processes; sampling distributions and the central limit theorem; estimation and confidence region methods; principles of hypothesis testing; modeling; emphasis on links between theory, methodology, and application.

**4087 Special Topics in Applied Statistics (3) V** Prereq.: EXST 2201 or equivalent. May be taken for a max. of 6 sem. hrs. of credit when topics vary.

### Graduate Courses

**7003 Statistical Inference I (4) F,S** 3 hrs. lecture; 2 hrs. lab. Prereq.: MATH 1021 or equivalent. Credit will be given for only one of the following: EXST 7003, 7004, 7005, 7009. Basic concepts of statistical models and sampling; descriptive and inferential methods; normal, t, chi-square, and F distributions; tests of hypothesis and estimation, analysis of variance, correlation, regression, analysis of categorical data; emphasis on social and behavioral sciences research problems; computer software applications.

**7004 Experimental Statistics I (4) F,S** 3 hrs. lecture; 2 hrs. lab. Prereq.: MATH 1021 or equivalent. Credit will be given for only one of the following: EXST 7003, 7004, 7005, 7009. Basic concepts of statistical models and use of samples; measures of variation and central tendency; normal, t, chi-

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square, and F distributions; test of hypothesis, analysis of variance, regression, and correlation; emphasis on laboratory-oriented sciences research problems; computer software applications.

**7005 Statistical Techniques I (4) F,S** 3 hrs. lecture; 2 hrs. lab. Prereq.: MATH 1021 or equivalent. Credit will be given for only one of the following: EXST 7003, 7004, 7005, 7009. Basic concepts of statistical models and sampling methods, descriptive statistical measures, distributions, tests of significance, analysis of variance, regression, correlation, and chi-square; emphasis on field-oriented life sciences research problems; computer software applications.

**7009 Statistical Methods I—Web-Based (3) V** Prereq.: MATH 1021 or equivalent and knowledge of SAS statistical analysis software. Credit will be given for only one of the following: EXST 7003, 7004, 7005, 7009. Basic concepts of statistical models and use of samples; measures of variation and central tendency, normal, t, chisquare, and F distributions; tests of hypothesis; analysis of variance, regression, and correlation; emphasis on field oriented life science research problems.

**7011 Nonparametric Statistics (3) Su** Prereq.: EXST 7003 or 7004 or 7005 or equivalent. Nonparametric one and two-sample location and distribution tests, including binomial, chi-square, Kolmogorov-Smirnov, Mann-Whitney U, Wilcoxon; analyses of variance, including Cochran's Q, Kruskal-Wallis, Friedman; correlation and regression, including Kendall's tau, Spearman's rho, and point biserial.

**7012 Fundamental Sampling Techniques (3) S** Prereq.: EXST 7003 or 7004 or 7005 or equivalent. Simple and stratified random sampling; ratio and regression estimation; cluster, multistage and multiphase sampling procedures; systematic sampling; nonresponse and nonsampling errors; links between methodology and application emphasized.

**7013 Statistical Inference II (4) S** Prereq.: EXST 7003 or equivalent. 3 hrs. lecture; 2 hrs. lab. Credit will be given for only one of the following: EXST 7013, 7014, 7015, 7019. Analyses of variance and experimental designs; completely randomized and complete block designs; latin square designs; split plot; arrangements of treatments; multiple comparisons; covariance analysis; multiple and curvilinear regression techniques; emphasis on social and behavioral sciences research problems.

**7014 Experimental Statistics II (4) F** Prereq.: EXST 7004 or equivalent. 3 hrs. lecture; 2 hrs. lab. Credit will be given for only one of the following: EXST 7013, 7014, 7015, 7019. Multiple classification analysis of variance and covariance, individual degrees of freedom, factorial arrangement of treatments, and multiple regression; emphasis on science/laboratory research problems.

**7015 Statistical Techniques II (4) F,S** Prereq.: EXST 7005 or equivalent. 3 hrs. lecture; 2 hrs. lab. Credit will be given for only one of the following: EXST 7013, 7014, 7015, 7019. Multiple classification analyses of variance and covariance, sampling designs, parameter estimation, multiple regression and correlation, tests of specific hypothesis, and factorial experiments; emphasis on field-oriented life sciences research problems.

**7019 Statistical Methods II—Web-Based (3) V** Prereq.: EXST 7003 or 7004 or 7005 or 7009 or equivalent and knowledge of SAS statistical analysis software, Credit will be given for only one of the following: EXST 7013, 7014, 7015, 7019. Multiple classification analyses of variance and covariance; sampling designs, parameter estimation, multiple regression and correlation, tests of specific hypotheses, and factorial experiments; emphasis on field-oriented life science research problems.

**7025 Biological Population Statistics II (3) V** Prereq.: EXST 7015 or equivalent. Extensive development and application of statistical techniques to parameter estimation in population dynamics; principles of model building and role of model building in population management.

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**7031 Experimental Design (3) S** Prereq.: *EXST 7013 or 7014 or 7015 or equivalent*. Comparison of designs, models, and analyses; emphasis on factorial experiments, complete and incomplete block designs, and confounding.

**7034 Regression Analysis (3) F** Prereq.: *EXST 7013 or 7014 or 7015 or equivalent; and knowledge of matrix algebra*. Fundamentals of regression analysis, stressing an understanding of underlying principles; response surfaces, variable selection techniques, and nonlinear regression.

**7036 Categorical Data Analysis (3) S** Prereq.: *EXST 7013 or 7014 or 7015 or equivalent*. Statistical techniques used in analyzing data from discrete distributions; contingency tables, loglinear and logit models, logistic regression, and repeated measures for nominal and ordinal data; emphasis on computer analysis and interpretation.

**7037 Multivariate Statistics (3) F** Prereq.: *EXST 7013 or 7014 or 7015 or equivalent; and knowledge of matrix algebra*. Comparison of multivariate techniques and analyses; emphasis on discriminant analysis, factor analysis and principal component analysis, canonical correlation, cluster analysis, and multivariate analysis of variance.

**7039 Statistical Methods for Reliability and Survival Data (3) S** Prereq.: *EXST 7013 or 7014 or 7015*. Characteristics of lifetime data; non-parametric methods including Kaplan Meier estimation; lifetime parametric models, parametric methods for single distribution data; planning life test; system reliability concepts; failure time regression; accelerated testing.

**7060 Probability and Statistics (3) F** Prereq.: *MATH 2057 or equivalent*. Probability, random variables, discrete and continuous distribution functions; expected values, moment generating functions; functions of random variables.

**7061 Statistical Theory (3) S** Prereq.: *EXST 7060 or equivalent*. Point estimation; hypothesis testing; interval estimation; large sample theory; new developments in statistical inference.

**7083 Practicum in Statistical Consulting I (2) V** Prereq.: *EXST 7013 or 7014 or 7015, and permission of instructor*. 4 hrs. independent study. Pass-fail grading. Supervised application of statistical techniques to research problems; readings, oral presentations, and discussions on statistical consulting; problem-solving; mock-consulting sessions; participation in real-life statistical consulting sessions under faculty supervision.

**7084 Practicum in Statistical Consulting II (2) F,S,Su** Prereq.: *EXST 7083 and permission of instructor*. 4 hrs. independent study. Pass-fail grading. May be taken for a max. of 6 sem. hrs. credit. Primary responsibility for statistical consulting projects under the supervision of graduate faculty.

**7085 Special Problem in Statistics (1-3) F,S,Su** Prereq.: *permission of department*. Pass-fail grading. A technical paper on an advanced topic in statistics is required. Development of a topic in advanced statistics under faculty supervision.

**7086 Advanced Seminar in Statistics (1) F,S,Su** Prereq.: *consent of instructor*. May be repeated for credit when topics vary. Pass-fail grading. Develop and present a 50-minute seminar on an advanced topic in statistics as a part of the department's seminar series.

**7087 Advanced Topics in Statistics (1-3) V** Prereq.: *consent of instructor*. May be repeated for credit when topics vary. Lectures on advanced topics in statistics not covered in other experimental statistics courses.

**7142 Statistical Data Mining (3) F** Prereq.: *EXST 7013, 7014, 7015, 7019, or equivalent*. Data preparation tools; model prediction; objects grouping; and variables classification.

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**EXST 7151 Bayesian Data Analysis (3)** *Prereq.: EXST 7013 or EXST 7014 or EXST 7015 and EXST 7060 or consent of department head.* Introduction to Bayesian statistical methods and their application in fields such as agriculture, biology, engineering and medicine; topics include non-informative, conjugate and elicited priors; posterior development; common single and multiple parameter models such as binomial, normal, Poisson, and exponential; hierarchical models; hypothesis testing and credible sets; posterior simulation via Markov Chain Monte Carlo; and performance of Bayesian procedures.

**7152 Advanced Topics in Statistical Modeling (3)** *Prereq.: EXST 7013 or 7014 or 7015 and EXST 7034 or equivalent or consent of department head.* Regularized linear regression and classification methods; penalized spline fitting to normal and non-normal data; tree-based methods; ensemble methods including boosting; support vector machine and kernel-based methods.

**7999 Independent Study (1-3) F,S,Su** *Prereq.: Permission of instructor. May be taken for a max. of 9 sem. hrs. of credit when topics vary.* Independent study under the guidance of graduate faculty.

**8000 Thesis Research (1-12 per sem.)** "S"/"U" grading.