2009

Statistics (STAT)

Montclair State University

Statistics

SPIN161	Title	Magic Realism in Spanish American Literature.
	Number and type of credits	3 hours lecture.
	Course Description	A study of magic realism as manifested in representative works of contemporary Spanish American fiction. Works to be read in English translation. Taught in English. Not for major credit. Meets World Cultures Requirement.
STAT330	Title	Fundamentals of Modern Statistics I.
	Prerequisites	MATH 221 with a grade of C- or better.
	Number and type of credits	3 hours lecture.
	Course Description	Displaying, describing and modeling data; arrangements for producing data; probability; methods for drawing conclusions from data: significance testing, confidence interval estimation, linear regression, analysis of variance. Examples from many disciplines including the social and natural sciences. Statistical software is used.
STAT401	Title	Applied Statistics for the Sciences.
	Prerequisites	MATH 111 or Math 112.
	Number and type of credits	3 hours lecture.
	Course Description	Organizing, displaying, and describing data; designing experiments; methods for drawing conclusions from data; significance testing, confidence intervals, linear regression, analysis of variance, chi-square tests of independence. Examples from disciplines in the natural and physical sciences. Statistical software is used. Not for Mathematics and Computer Science majors.
STAT403	Title	Techniques and Applications of Statistics.
	Prerequisites	MATH 112.
	Number and type of credits	3 hours lecture.
	Course Description	Statistical techniques for the social and behavioral sciences including estimation, tests of hypothesis, non-parametric statistics, regression and correlation. May not be taken for credit by mathematic majors.
STAT441	Title	Statistical Computing.
	Prerequisites	STAT 330 or STAT 401 with a grade of C- or better.
	Special Fee	Special fee.
	Number and type of credits	3 hours lecture.
	Course Description	This course is designed: (1) to acquaint students with the use of the computer in solving statistical problems, and (2) to develop intermediate level statistical methodology. Several statistical computing packages and the

		student's own programs will be utilized.
STAT442	Title	Fundamentals of Modern Statistics II.
	Prerequisites	STAT 330 with a grade of C- or better or STAT 401 with a grade of C- or better.
	Number and type of credits	3 hours lecture.
	Course Description	Continuation of STAT 440. Principles of statistical inference, categorical data analysis, one and two-way anova, multiple linear regression, nonparametric methods, bootstrap methods. Examples from a wide variety of disciplines. Statistical software is used.
STAT443	Title	Introduction to Mathematical Statistics.
	Prerequisites	MATH 340 with a grade of C- or better; and STAT 330 or STAT 401 with a grade of C- or better.
	Number and type of credits	3 hours lecture.
	Course Description	Develops statistical methods from probability theory. Topics discrete and continuous probability distributions, estimation, inference and hypothesis testing.
STAT481	Title	Introduction to Statistical Data Mining.
	Prerequisites	STAT 442 with a grade of C- or better.
	Number and type of credits	3 hours lecture.
STAT481	Course Description	Introduction to the concepts and applications of a variety of data-mining methods. Data mining is the process of selecting, exploring, and modeling large amounts of data to uncover previously unknown patterns in the data. Statistical techniques covered include classification and regression trees, predictive modeling, and unsupervised learning. Hands-on applications to data sets from diverse fields. Statistical software is used.
STAT487	Title	Statistical Genomics.
	Prerequisites	BIOL 380 and STAT 330 or STAT 401, or equivalent.
	Number and type of credits	3 hours lecture.
	Course Description	Analysis of discrete data illustrated with genetic data on morphological characters, allozymes, restriction fragment length polymorphisms and DNA sequences. Maximum likelihood and Bayesian estimation including iterative procedures. Numerical resampling and bootstrapping. Development of

		statistical techniques for characterizing genetic disequilibrium and diversity. Locating genes with markers. Cross listed with Biology and Molecular Biology BIOL 487.
STAT495	Title	Topics in Statistical Science.
	Prerequisites	STAT 330 with a grade of C- or better or STAT 401 with a grade of C- or better.
	Course Description	Guided study of selected topics in statistical science such as exploratory data analysis, applied multivariate methods, statistical quality control, design of experiment. May be repeated once for a maximum of 6.0 credits.
STAT497	Title	Undergraduate Research in Statistical Science.
	Prerequisites	STAT 442 with a grade of C- or better and departmental approval.
	Course Description	Individual research in an area of statistical science agreed upon by the student and instructor. The results of the research will be the basis of a seminar or colloquium to be given by the student. May be repeated five times for a total of six credits. Students must not accumulate more than six credits total in courses MATH 497, MATH 498, STAT 495, STAT 497.
STAT500	Title	Biostatistical Methods for Research Workers I.
	Prerequisites	Permission of graduate program coordinator.
	Number and type of credits	3 hours lecture.
	Course Description	Planning effective observational and experimental research, data collection and summarization, significance testing and p-values, t-test, chi-square, regression and correlation, use of statistical software, reading statistical results in the literature. Required course for the MPH degree.
STAT541	Title	Applied Statistics.
	Prerequisites	STAT 330 or STAT 443 and permission of graduate program coordinator.
	Number and type of credits	3 hours lecture.
	Course Description	Review of estimation and hypothesis testing for one sample and two sample problems; introduction to non-parametric statistics and linear regression; fundamental principles of design, completely randomized design, randomized block design, latin square, and 2 factor design.
STAT542	Title	Statistical Theory I.
	Prerequisites	STAT 541 and permission of graduate program coordinator.
	Number and type of credits	3 hours lecture.
	Course Description	Discrete and continuous probability distributions, multivariate distributions,

		sampling theory, transformations, Chi-squared, 'F' and 't' distributions. Point estimation, properties of estimators, sufficiency, exponential families, interval estimation, hypothesis testing, power, Neyman-Pearson Lemma, likelihood ratio tests. The impact of the above theory on areas such as regression analysis, analysis of variance and analysis of discrete data.
STAT543	Title	Statistical Theory II.
	Prerequisites	STAT 542 and permission of graduate program coordinator.
	Number and type of credits	3 hours lecture.
STAT543	Course Description	Discrete and continuous probability distributions, multivariate distributions, sampling theory, transformations, Chi-squared, 'F' and 't' distributions. Point estimation, properties of estimators, sufficiency, exponential families, interval estimation, hypothesis testing, power, Neyman-Pearson Lemma, likelihood ratio tests. The impact of the above theory on areas such as regression analysis, analysis of variance and analysis of discrete data.
STAT544	Title	Statistical Computing.
	Prerequisites	STAT 541 or STAT 548, and CMPT 183, and permission of graduate program coordinator.
	Special Fee	Special fee.
	Number and type of credits	3 hours lecture.
	Course Description	Computer systems for data analysis and data graphics, and intermediate level statistical methodology are investigated. Several statistical computing packages are utilized and evaluated.
STAT545	Title	Practicum in Statistics I.
	Prerequisites	STAT 541, STAT 544, and STAT 547 or STAT 548, and permission of graduate program coordinator.
	Course Description	An applied experience in which students work with practitioners in industry, government or research organizations utilizing statistical techniques in a research setting. Students will work with statisticians on projects involving experimental design and data collection as well as the analysis and interpretation of the data. May be repeated once.
STAT546	Title	Non-Parametric Statistics.
	Prerequisites	STAT 330 and permission of graduate program coordinator.

	Number and type of credits	3 hours lecture.
	Course Description	Selected distribution-free tests and estimation techniques including sign, Kolmogorov-Smirnov, Wilcoxon signed rank, Mann-Whitney, Chi-square, rank correlation, Kendall's Tau, Kruskal-Wallace, Friedman, McNemar, and others.
STAT547	Title	Design and Analysis of Experiments.
	Prerequisites	STAT 541 or STAT 548, and permission of graduate program coordinator.
	Number and type of credits	3 hours lecture.
	Course Description	Fundamental principles of design; fixed, random and mixed models; factorial designs; designs with restricted randomization; split-plot design; confounding; fractional replication; experimental and sampling errors.
STAT548	Title	Applied Regression Analysis.
	Prerequisites	STAT 330 or STAT 443, and permission of graduate program coordinator.
	Number and type of credits	3 hours lecture.
	Course Description	Fitting equations to data; matrices, linear regression; correlation; analysis of residuals; multiple regression; polynomial regression; partial correlation; stepwise regression; regression and model building; regression applied to analysis of variance problems; introduction to nonlinear regression.
STAT549	Title	Sampling Techniques.
	Prerequisites	STAT 330 or STAT 443, and permission of graduate program coordinator.
	Number and type of credits	3 hours lecture.
	Course Description	Sampling and survey methodology; basic sampling theory; simple, stratified, random, cluster, systematic and area sampling. Sampling errors and estimation procedures.
STAT552	Title	Intermediate Statistics Methods.
	Prerequisites	STAT 330, permission of graduate program coordinator.
	Number and type of credits	3 hours lecture.
	Course Description	Follow up to introductory statistical methods course. Principles of statistical inference; categorical data analysis; one and two-way anova; multiple linear regression; nonparametric methods; bootstrap methods. Examples from a wide variety of disciplines. Statistical software is used.
STAT561	Title	Statistical Data Mining I.
STAT561	Prerequisites	STAT 541 or STAT 548 or equivalent, permission of graduate program

		coordinator.
	Number and type of credits	3 hours lecture.
	Course Description	Introduction to the concepts and applications of a variety of data mining methods. Data mining is the process of selecting, exploring, and modeling large amounts of data to uncover previously unknown patterns in the data. Statistical methods covered include classification and regression trees, predictive modeling, and unsupervised learning. Hands-on applications to data sets from diverse fields. Statistical software is used.
STAT562	Title	Statistical Data Mining II.
	Prerequisites	STAT 548 and STAT 561, permission of graduate program coordinator.
	Number and type of credits	3 hours lecture.
	Course Description	Continuation of STAT 561. An in-depth approach to the topics of STAT 561 including logistic regression, decision trees, classifier theory, predictive modeling and unsupervised learning methods. Mathematical details of these techniques as well as the computational methods for their implementation. Hands-on applications to data sets from diverse fields. Statistical software is used.
STAT570	Title	Statistical Consulting.
	Prerequisites	STAT 541 or equivalent, permission of graduate program coordinator.
	Number and type of credits	3 hours lecture.
	Course Description	An introduction to the statistical and interpersonal issues that arise in statistical consulting. Topics include communicating with scientists in other disciplines, technical writing and presentation, and statistical tools for consulting. Lectures center around real case studies presented by the instructor and invited speakers. Statistical software is used. Emphasis of the course is on the scientific, statistical, computational, and communication skills that a statistical consultant needs for interacting effectively with researchers from a wide range of disciplines.
STAT583	Title	Fundamentals of Data Analysis.
	Prerequisites	STAT 330 and permission of the Graduate Program Coordinator.
	Number and type of credits	3 hours lecture.
	Course Description	Theory and application of statistical methods for data analysis in professional industrial areas such as business, manufacturing, biomedical and marketing. Exploratory data analysis; principles of statistical inference;

		design and analysis of observational studies and experiments; linear regression. Additional topics based on real examples from other disciplines would include biostatistical methods, multivariate analysis, time series analysis, and data mining. Statistical software is used.
STAT595	Title	Topics in Statistics.
	Prerequisites	Permission of graduate program coordinator.
	Number and type of credits	3 hours lecture.
	Course Description	Topics such as exploratory data analysis, statistical graphics, statistical quality control and statistical quality assurance, Bayesian methods and Markov chain Monte Carlo studies. May be repeated twice for a total of 9.0 credits.
STAT597	Title	Research Methods in Statistical Science.
	Prerequisites	STAT 552 or equivalent and departmental approval.
	Number and type of credits	3 hours lecture.
	Course Description	Preparation for research in statistical science. Application of mathematics and computing science to the development, modeling, validation and evaluation of statistical research methods. Identification of statistical issues in real world problems and novel applications of statistical methods to these problems. Development of research proposals in statistical science.
STAT600	Title	Statistical Methods for Research Workers I.
	Prerequisites	Doctoral status, permission of graduate program coordinator.
STAT600	Number and type of credits	3 hours lecture.
	Course Description	Planning effective observational and experimental research, data collection and summarization, significance testing and p-values, t-test, chi-square, regression and correlation, use of statistical software, reading statistical results in the literature.
STAT601	Title	Statistical Methods for Research Workers II.
	Prerequisites	STAT 600 or equivalent, permission of graduate program coordinator.
	Number and type of credits	3 hours lecture.
	Course Description	Principles and practices of experimental design. Randomized comparative designs, randomized block designs, factorial designs, dealing with concomitant variables, repeated measurements. Predictive modeling and analysis of designed studies. Topics from multivariate analysis, time series analysis,

		categorical data analysis. Students analyze data from research projects.
STAT610	Title	Statistical Methods For Scientivic Research.
	Prerequisites	Departmental approval.
	Number and type of credits	3 hours lecture.
	Course Description	This course aims to provide an introduction to the types of statistical analyses used in scientific research. Topics include EDA analysis, inference procedures, modeling and estimation, generalized linear models, multivariate analysis, time series and design of experiments. The course focuses on applications in areas including ecology, environmental health and environmental sciences and public health.
STAT640	Title	Biostatistics I.
	Prerequisites	STAT 544, STAT 547, STAT 548, and permission of graduate program coordinator.
	Number and type of credits	3 hours lecture.
	Course Description	Fundamental statistical concepts and methods used by statistical scientists in the health, biological, medical and pharmaceutical industries. Categorical data analysis, logistic regression, generalized linear models, nonparametric regression techniques.
STAT641	Title	Biostatistics II.
	Prerequisites	STAT 544, STAT 547, STAT 548, and permission of graduate program coordinator.
	Number and type of credits	3 hours lecture.
	Course Description	Fundamental statistical concepts and methods used by statistical scientists in the health, biological, medical and pharmaceutical industries. Survival analysis and designs for clinical trials.
STAT642	Title	Introduction to Stochastic Processes.
	Prerequisites	MATH 540 and permission of graduate program coordinator.
	Number and type of credits	3 hours lecture.
	Course Description	Generating functions, convolutions, recurrent events, random walk models, gambler's ruin problems, Markov chains and processes, time dependent stochastic processes, queuing theory and epidemic models.
STAT645	Title	Advanced Topics in Statistics.
	Prerequisites	Permission of graduate program coordinator.
	Number and type of credits	3 hours lecture.
	Course Description	Recent developments in statistical science. Topics such as data mining, statistical genomics, computationally intensive data-analytic methods,

		statistical consulting, dynamic statistical graphics and visualization, applied time series analysis. May be repeated with no limit as long as the topic is different.
STAT646	Title	Multivariate Analysis.
	Prerequisites	STAT 541, STAT 548 and permission of graduate program coordinator.
	Number and type of credits	3 hours lecture.
	Course Description	Analysis of multiple response variables simultaneously; covariance and the multivariate normal distribution; manova, discriminant functions; principle components and canonical correlations.
STAT647	Title	Practicum in Statistics II.
	Prerequisites	STAT 542, STAT 545, at least one 600-level course, and permission of graduate program coordinator.
	Course Description	An applied experience in which students work with practitioners in industry, government or research organizations utilizing advanced statistical techniques in a research setting. Students will be expected to exhibit the ability to work independently on projects involving advanced techniques in experimental design, analysis and interpretation of data. May be repeated once.
STAT648	Title	Advanced Statistical Methods.
	Prerequisites	STAT 544, STAT 547, STAT 548, and permission of graduate program coordinator.
	Number and type of credits	3 hours lecture.
	Course Description	Advanced statistical concepts and methods used by statistical scientists in the analysis of designed experiments and observational studies. Response surface methodology, analysis of covariance, the general linear model, the cell means model and the analysis of variance of unbalanced or messy data.
STAT649	Title	Independent Study in Statistics.
	Prerequisites	Permission of graduate program coordinator and departmental approval.
	Course Description	Independent study under the direction of a faculty member, offering the opportunity to pursue topics in statistics which may be outside the scope of regular curricular offerings or may be an extension of an existing course or courses. Approval must be obtained from the graduate coordinator and faculty advisor. May be repeated once for a maximum of 6.0 credits during the graduate program.

STAT698	Title	Master's Thesis.
	Prerequisites	Permission of graduate program coordinator.
	Course Description	Independent study under faculty advisement. Students must follow the MSU Thesis Guidelines, which may be obtained from the Graduate School. Students should take STAT 699 if they do not complete STAT 698 within the semester.
STAT699	Title	Master's Thesis Extension.
	Prerequisites	STAT 698, permission of graduate program coordinator.
	Course Description	Continuation of Master's Thesis project. Thesis extension will be graded IP (In Progress) until thesis is completed, at which time a grade of Pass or Fail will be given. Course may be repeated.
TELL370	Title	Sociocultural Foundations for Working with English Language Learners in Early Childhood and Elementary Settings.
	Prerequisites	ECEL 200.
	Number and type of credits	3 hours lecture.
	Course Description	This course examines the schooling of English learners from a sociocultural and historical perspective. Students learn about the nature of the immigration experience, the cultural psychology of bilingual-bicultural development during early and middle childhood, additive approaches to language and culture in school settings, and building successful home-school partnerships with culturally and linguistically diverse families.
TELL371	Title	Language Development and Bilingualism in Early Childhood and Elementary Education.
	Prerequisites	LNGN 220.
	Number and type of credits	3 hours lecture.
	Course Description	In this course, students examine first and second language acquisition during the preschool and elementary years, the theory and practice of supporting English language development across the curriculum, strategies to maintain the home language in English immersion settings, and language proficiency and dialectal variation in the classroom. Students also learn about the nature of language and linguistic subsystems (phonology, morphology, vocabulary, grammar, pragmatics).
TELL472	Title	Literacy and the Bilingual Learner in Early Childhood and Elementary