470 20th Century Spanish Literature
Fall of even years. 3(3-0) P:M: (SPN 411)
Principal literary movements of Spain through major works, generations, and authors.

475 Spanish American Literature through the 19th Century
Spring of odd years. 3(3-0) P:M: (SPN 415)
Development of Spanish American literature from its origins through the nineteenth Century.

480 Spanish American Literature of the 20th Century
Fall of odd years. 3(3-0) P:M: (SPN 416)
Major works of poetry, theatre, prose fiction, and essay.

485 Topics in Hispanic Literatures of the Americas
Spring of even years. 3(3-0) P:M: (SPN 415 or SPN 416)
A national literature or regional literature: Hispanic Caribbean, Mexico and Central America, Andean Countries, River Plate area, or Latino literature in the United States.

490 Independent Study
Fall, Spring. 1 to 4 credits. A student may earn a maximum of 9 credits in all enrollments for this course. R: Approval of department.
Special project arranged by an individual student and faculty member in an area supplementing regular course offerings.

491 Special Topics in Spanish
Fall, Spring. 3(3-0) R: Approval of department.
Special topics supplementing regular course offerings, proposed by faculty on a group study basis.

492 Senior Writing Project
Fall, Spring, Summer. 1(1-0) R: Open only to seniors in Spanish.
Research and preparation of a paper on an interdisciplinary subject that synthesizes at least three areas of a major's undergraduate education. Students work under the supervision of a faculty member.

800 Current Approaches to Spanish Instruction
Fall. 3(3-0)
Theoretical and applied study of methodologies of teaching Spanish.

805 Evolution of the Spanish Language
Spring of odd years. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course.
Phonology, morphology and syntax of Spanish from its origins to the present.

806 Topics in Hispanic Linguistics
Spring. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course.
Issues in Spanish language in relation to current linguistic inquiry. Topics vary.

807 Topics in Hispanic Culture
Spring of odd years. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course.
Topics such as the Enlightenment, Post-Francoist film, and pre-Columbian cultures.

810 Studies in Medieval Spanish Literature
Spring of even years. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course.
Works, genres, and writers of the Spanish Middle Ages. Topics vary.

815 Studies in Golden Age Literature
Fall of even years. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course.
Poetry, drama, and prose of 16th and 17th century Spain. Topics vary.

820 Cervantes
Fall of odd years. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course.
Critical study of "Don Quijote," "Novelas Ejemplares," or other works.

825 Studies in 18th and 19th Century Spanish Literature
Spring of odd years. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course.
Literature from post-Baroque Spain to the Generation of 1898. Topics vary.

830 Studies in 20th-Century Spanish Literature
Fall of odd years. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course.
Authors, generations, and tendencies that shape the directions of Spanish literature in the 20th Century. Topics vary.

835 Spanish-American Literature before Modernismo
Spring of even years. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course.
Major authors and movements from the colonial period to Modernismo. Topics vary.

840 Contemporary Spanish-American Literature
Fall of even years. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course.
Poetry, drama, prose, fiction, and essay from Modernismo to the present. Topics vary.

890 Independent Study
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 9 credits in all enrollments for this course. R: Approval of department.
Special projects, directed reading, and research arranged by an individual graduate student and a faculty member in areas supplementing regular course offerings.

891 Special Topics in Spanish
Fall, Spring, Summer. 3(3-0) A student may earn a maximum of 6 credits in all enrollments for this course. R: Approval of department.
Special topics supplementing regular course offerings proposed by faculty on a group study basis for graduate students.

999 Doctoral Dissertation Research
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 24 credits in all enrollments for this course. R: Approval of department.
Doctoral dissertation research.

STATISTICS AND PROBABILITY STT

Department of Statistics and Probability
College of Natural Science

200 Statistical Methods
Fall, Spring, Summer. 3(4-0) P:M: (MTH 103 or MTH 110 or MTH 116 or MTH 124 or concurrently or MTH 132 or concurrently or LBS 117 or LBS 118 or concurrently) or designated score on Mathematics placement test. Not open to students with credit in STT 201 or STT 315 or STT 421.
Data analysis, probability models, random variables, estimation, tests of hypotheses, confidence intervals, and simple linear regression.

201 Statistical Methods
Fall, Spring, Summer. 4(3-2) P:M: (MTH 103 or MTH 110 or MTH 116 or MTH 124 or concurrently or MTH 132 or concurrently or LBS 117 or LBS 118 or concurrently) or designated score on Mathematics placement test. Not open to students with credit in STT 200 or STT 315 or STT 421.
Probability and statistics with computer applications. Data analysis, probability models, random variables, tests of hypotheses, confidence intervals, simple linear regression. Weekly lab using statistical software.

231 Statistics for Scientists
Fall, Spring. 3(3-0) P:M: (MTH 124 or MTH 132 or MTH 152H or LBS 118) R: Open only to students in College of Natural Science. SA: STT 331
Calculus based course in probability and statistics. Probability models, random variables. Estimation, confidence intervals, tests of hypotheses, simple linear regression with applications in sciences.

290 Topics in Statistics and Probability
Fall, Spring, Summer. 1 to 3 credits. P:NM: (MTH 103) R: Approval of department.
Individualized study of selected topics.

315 Introduction to Probability and Statistics for Business
Fall, Spring, Summer. 3(4-0) P:M: (MTH 124 or MTH 132 or MTH 152H or LBS 118) Not open to students with credit in STT 200 or STT 201 or STT 421.
A first course in probability and statistics primarily for business majors. Data analysis, probability models, random variables, confidence intervals, and tests of hypotheses with business applications.

317 Quantitative Business Research Methods
Fall, Spring, Summer. 3(3-1) Interdepartmental with Marketing and Supply Chain Management. Administered by Department of Marketing and Supply Chain Management. P:M: (STT 315) R: Open only to juniors or seniors. SA: ML 317, MTA 317
Application of statistical techniques, including forecasting, to business decision making. Includes applications of linear regression and correlation, analysis of variance, selected non-parametric tests, time series, and index numbers.

351 Probability and Statistics for Engineering
Fall, Spring, Summer. 3(3-0) P:M: (MTH 234 or concurrently or MTH 254H or concurrently or LBS 220 or concurrently) R: Open only to juniors or seniors. Not open to students with credit in STT 430.
A calculus based course in probability and statistics for engineering majors. Probability models and random variables. Estimation, confidence intervals, tests of hypotheses, simple linear regression. Other topics with applications to engineering.

421 Statistics I
Fall, Spring, Summer. 3(3-0) P:NM: (MTH 103 or MTH 110 or MTH 116 or LBS 117) Not open to students with credit in STT 200 or STT 201 or STT 315.
Basic probability, random variables, and common distributions. Estimation and tests for one-, two-, and paired sample problems. Introduction to simple linear regression and correlation, 1-way ANOVA.

422 Statistics II
Fall, Spring, Summer. 3(3-0) P:NM: (STT 421) Not open to students with credit in STT 464.
Goodness of fit and other non-parametric methods. Linear models including multiple regression and ANOVA for simple experimental designs.

430 Introduction to Probability and Statistics
Fall. 3(3-0) P:NM: (MTH 126 or MTH 133 or MTH 153H or LBS 119) R: Open only to majors in the Department of Economics or Department of Agricultural Economics. Not open to students with credit in STT 351.
Calculus based probability and statistics with applications. Discrete and continuous random variables and their expectations. Point and interval estimation, tests of hypotheses, simple linear regression.

441 Probability and Statistics I: Probability
Fall, Spring, Summer. 3(3-0) P:NM: (MTH 234 or MTH 254H or LBS 220)
Probability models and basic statistics at an intermediate mathematical level. Discrete, continuous, univariate, and multivariate distributions. Random variables. Normal approximation. Sampling distributions, parameter estimation, and elementary tests of hypotheses.

442 Probability and Statistics II: Statistics
Spring. 3(3-0) P:NM: (STT 441 and MTH 314)
Estimation, tests of hypotheses, confidence intervals. Goodness of fit, non-parametric methods. Linear models, multiple regression, ANOVA.

461 Computations in Probability and Statistics
Spring. 3(3-0) P:NM: (CSE 131 or CSE 230) and (MTH 314 and STT 441)
Computer algorithms for evaluation, simulation and visualization. Sampling and prescribed distributions. Robustness and error analysis of procedures used by statistical packages. Graphics for data display, computation of probabilities and percentiles.

464 Statistical Methods for Biologists I
Fall. 3(3-0) Interdepartmental with Animal Science; Crop and Soil Sciences. P:NM: (STT 421)
Biological random variables. Estimation of population parameters. Testing hypotheses. Linear correlation and regression (prediction). Analyses of counted and measured data to compare several biological groups (contingency tables and analysis of variance).

465 Statistical Methods for Biologists II
Spring. 3(3-0) Interdepartmental with Animal Science; Crop and Soil Sciences. P:NM: (STT 464)
Concepts of reducing experimental error: covariance, complete and incomplete block designs, latin squares, split plots, repeated-measures designs, regression applications, and response surface designs.

471 Statistics for Quality and Productivity
Fall of even years. 3(3-0) P:NM: (STT 351 or STT 422 or STT 442)
Scientific context of quality: Box, Deming, Taguchi. Graphical techniques, control charts. Design of experiments: factorials and fractional factorials, confounding and aliasing. Engineering parameter design through experimentation.

481 Issues in Statistical Practice
Spring. 1(1-0) P:M: Completion of Tier I writing requirement. R: Open only to seniors in the Department of Statistics.
Selected readings and projects illustrating special problems encountered by professional statisticians in their roles as consultants, educators, and analysts.

490 Directed Study of Statistical Problems
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 9 credits in all enrollments for this course. R: Open only to juniors or seniors in the Department of Mathematics or Department of Statistics and Probability. Approval of department.
Individualized study of selected topics.

801 Design of Experiments
Fall of odd years. 3(3-0) P:NM: (STT 422 or STT 442 or STT 465 or STT 471)
Blocking and randomization. Split-plot, latin square and factorial designs. Fractional factorial designs, aliasing and confounding of effects. Mixture and central composite designs and response surface exploration. Clinical trials.

820 Econometrics I
Spring. 3(3-0) Interdepartmental with Economics; Agricultural Economics. Administered by Department of Economics. P:NM: (EC 801 and STT 430)
The single equation regression model. Properties of least-squares estimators under various specifications. Multicollinearity, generalized least-squares, errors in variables, seemingly unrelated regressions. Identification and estimation in simultaneous equations models.

821 Econometrics II
Fall. 3(3-0) Interdepartmental with Economics; Agricultural Economics. Administered by Department of Economics. P:NM: (EC 820 and STT 442)
Estimation and hypothesis testing. Asymptotic properties of optimization estimators. Analysis of cross-sectional economic data. Qualitative and limited dependent variables. Probit, logit, tobit, and sample selectivity. Duration models. Count data.

822 Econometrics III
Spring. 3(3-0) Interdepartmental with Economics; Agricultural Economics. Administered by Department of Economics. P:NM: (EC 820 and STT 442)
Dynamic models and time series data. ARMA models. ARCH models. Unit roots, cointegration and error correction. Rational expectations models.

825 Sample Surveys
Fall. 3(3-0) P:NM: (STT 422 or STT 442 or STT 862)
Application of statistical sampling theory to survey designs. Simple random, stratified, and systematic samples. Sub-sampling, double sampling. Ratio and regression estimators.

826 Nonparametric Statistics
Fall. 3(3-0) P:NM: (STT 442 or STT 862)
Statistical methods based on counts, ranks, order statistics and permutations of observations. Point and interval estimates, tolerance sets, and tests valid under broad distributional assumptions. Applications to social and natural sciences.

841 Linear Statistical Models
Fall. 3(3-0) P:NM: (STT 442 or STT 862)
Theory and applications of statistical models with linear parameters. Curve fitting, simple and multiple regression, multiple and partial correlation. Analysis of variance, simultaneous inference, experimental design.

842 Categorical Data Analysis
Spring of odd years. 3(3-0) P:NM: (STT 442 or STT 862)
Analysis of categorical and ordinal data: contingency tables; chi square tests; exact tests; log-linear models; measures of association; logistic regression; generalized linear models.

843 Multivariate Analysis
Spring of even years. 3(3-0) P:NM: (STT 442 or STT 862)
Multivariate normal distribution, tests of hypotheses on means, multivariate analysis of variance. Discriminant analysis. Principal components. Factor analysis. Analysis of frequency data.

844 Time Series Analysis
Spring of odd years. 3(3-0) P:NM: (STT 442 or STT 862)
Stationary time series. Autocorrelation and spectrum. ARMA and ARIMA processes: estimation and forecasting. Seasonal ARIMA models. Identification and diagnostic techniques. Multivariate time series. Time series software.

852 Stochastic Methods in Operations Research
Spring of even years. 3(3-0) P:NM: (STT 441 or STT 861)
Optimization techniques related to queuing, inventory, and Markov decision models. Simulation, reliability, and decision analysis.

861 Theory of Probability and Statistics I
Fall. 3(3-0) P:NM: (MTH 320 or concurrently)
Discrete and continuous random variables and vectors. Important probability models. Inequalities and limit laws. Sampling distributions and functions of random vectors. Statistical inference.

862 Theory of Probability and Statistics II
Spring. 3(3-0) P:NM: (MTH 314 and MTH 421 or concurrently and STT 861)
Statistical inference: sufficiency, likelihood, estimation, and tests of hypotheses in parametric and nonparametric cases. Linear models, goodness of fit, and other topics.

865 Modern Statistical Methods
Spring. 3(3-0) P:NM: (STT 862)
Modern statistical methods. Applicability and computer implementation. Resampling methods, including the bootstrap. Markov chain Monte Carlo. Survival analysis. Nonparametric curve estimation.

871 Theory of Statistics I
Fall. 3(3-0) P:NM: (MTH 828 or concurrently and STT 881 or concurrently)
Empirical distributions, quantiles, Glivenko-Cantelli Theorem. Important distributions and families. Convergences, Slutsky Theorem, asymptotics of differentiable functions. Basic concepts of decision theory. Confidence sets. Some basic statistical methods.

872 Theory of Statistics II
Spring. 3(3-0) P:NM: (STT 871 and STT 882 or concurrently)
Theory of Neyman Pearson tests and extensions. Convex loss estimation, best unbiased estimates, sufficient statistics, information lower bounds. Extensive application to linear models. LAN families and applications to estimation and tests.

881 Theory of Probability I
Fall. 3(3-0) P:NM: (MTH 828 or concurrently)
Measures and their extensions, integration, and convergence theorems. Product measures, Lebesgue decomposition, transition probabilities, Kolmogorov consistency theorem. Independence. Classical limit theorems for partial sums.

882 Theory of Probability II
Spring. 3(3-0) P:NM: (STT 881)
Conditional expectation, martingales, stationary processes. Brownian motion, convergence in distribution, and the invariance principle.

886 Stochastic Processes and Applications
Fall. 3(3-0) P:NM: (STT 441 or STT 861)
Markov chains and their applications in both discrete and continuous time, including classification of states, recurrence, limiting probabilities. Queuing theory, Poisson process and renewal theory.

888 Stochastic Models in Finance
Spring. 3(3-0) P:NM: (STT 441 or STT 861) SA: STT 887
Stochastic models used in pricing financial derivatives. Discrete-time models, Brownian motion, stochastic integrals and Ito's formula, the basic Black-Scholes model, risk neutral distribution, European and American options, exotic options, the interest rate market, futures and interest rate options.

890 Statistical Problems
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 24 credits in all enrollments for this course. R: Approval of department.
Individualized study on selected problems.

899 Master's Thesis Research
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 24 credits in all enrollments for this course. R: Approval of department.
Master's thesis research.

951 Sequential Analysis and Renewal Theory
Fall of even years. 3(3-0) P:NM: (STT 872)
Sequential estimation, testing and design. Optimal stopping. Linear and nonlinear renewal theory.

952 Topics in Advanced Inference
Spring of odd years. 3(3-0) P:NM: (STT 872)
Topics selected from: decision theory; James-Stein, shrinkage, Bayes, and empirical Bayes estimation; invariance; bootstrap methodology; inference on stochastic processes; stochastic approximation; survival analysis and reliability.

953 Asymptotic Theory
Fall of odd years. 3(3-0) P:NM: (STT 872)
Large sample behavior of likelihood function. Local Asymptotic Normality models. Contiguity. Bahadur and Pitman efficiency of statistical procedures.

954 Semi-Nonparametric Inference
Spring of even years. 3(3-0) P:NM: (STT 872)
Small and large sample properties of distribution-free tests. Adaptive and robust procedures. Nonparametric ANOVA. Estimation of regression and density functions.

961 Convergence of Measures and Stochastic Processes
Fall of even years. 3(3-0) P:NM: (STT 882)
Convergence of measures on metric spaces. Prohorov's theorem. Function spaces with the uniform and Skorohod metric. Empirical processes. Applications.

962 Stationary and Second Order Processes
Spring of odd years. 3(3-0) P:NM: (STT 882)
Stationary, second order, and Gaussian processes. Sample path properties. Linear and nonlinear prediction and estimation. Applications.

963 Martingales
Fall of odd years. 3(3-0) P:NM: (STT 882)
Discrete and continuous time martingales, convergence theorems, Doob-Meyer decomposition. Applications.

964 Stochastic Analysis
Spring of even years. 3(3-0) P:NM: (STT 882)
Stochastic integrals and semi-martingales, Ito formula, stochastic differential equations. Applications.

990 Problems in Statistics and Probability
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. P:NM: (STT 872) R: Approval of department.
Individual study on an advanced topic in statistics or probability.

995 Topics in Statistics and Probability
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 24 credits in all enrollments for this course. P:NM: (STT 882) RB: (STT 882) R: Approval of department.
Nonparametric statistics, multivariate analysis, time series analysis, Bayesian statistics, reliability theory, stochastic approximation, design of experiments, sets of decision problems, stochastic processes, or sequential analysis.

999 Doctoral Dissertation Research
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 48 credits in all enrollments for this course. R: Approval of department.
Doctoral dissertation research.

STUDIO ART STA

Department of Art
College of Arts and Letters

110 Drawing I
Fall, Spring. 3(0-6)
Fundamental concepts of drawing. Emphasis on observational, descriptive and analytical drawing. Practice of drawing skills using common drawing media.

111 Drawing II
Fall, Spring. 3(0-6) P:M: (STA 110)
Development of imagery and expression; abstraction and the use of the human figure as subject matter.

113 Color and Design
Fall, Spring. 3(0-6)
Basic elements of two-dimensional design. Principles of organization and the theory and practice of color as a basis for creative solutions for the problems of the artist and designer.

114 Three-Dimensional Form
Fall, Spring. 3(0-6)
Formal elements of three-dimensional form. Application of the principles of organization as a means for producing creative solutions for the artist and designer. Related practical experience with a variety of materials and processes.

300 Intermediate Drawing
Fall, Spring. 3(0-6) P:M: (STA 111 and STA 113 and STA 114)
Observational and imaginative drawing including the human figure. Non-representational drawing. Contemporary drawing systems, concepts, and processes.

320 Painting I
Fall, Spring. 3(0-6) P:M: (STA 111 and STA 113 and STA 114)
Representational painting of landscape, figure, and still life imagery. Painting concepts, materials, and techniques.

325 Painting II
Fall, Spring. 3(0-6) P:M: (STA 320)
Continuation of representational painting, and introduction to non-representational painting and concepts.

340 Ceramics I
Fall, Spring. 3(0-6) P:M: (STA 111 and STA 113 and STA 114)
Ceramic processes including handbuilding, glaze formulation, and kiln firing as a means of cultural expression.

345 Ceramics II
Fall, Spring. 3(0-6) P:M: (STA 340)
Continued development of ceramic forming and kiln firing techniques including handbuilding, glaze formulation, mold making, casting, and wheel throwing for cultural and artistic expression.

350 Figure Modeling
Fall, Spring. 3(0-6) P:M: (STA 111 and STA 113 and STA 114)
Modeling human and natural forms. The figure as a means of artistic and cultural expression.