

Spanish—SPN

482 Topics in Spanish Linguistics
Fall of odd years. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course. P:M: (SPN 440) SA: SPN 480
Advanced study of the structure and usage of Spanish.

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 at the advanced level arranged by an individual student and supervised by a faculty member in an area supplementing, but not replacing, regular course offerings.

491 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.

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.

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 MTH 132 or LBS 117 or LBS 118) 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 MTH 132 or LBS 117 or LBS 118) 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. RB: (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 in The Eli Broad College of Business. Not open to students in The School of Hospitality Business. 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 MTH 254H or LBS 220) R: Open only to juniors or seniors. Not open to students with credit in STT 430.

Probability and statistics for engineering majors. Probability models and random variables. Estimation, confidence intervals, tests of hypotheses, simple linear regression. Applications to engineering.

421 Statistics I
Fall, Spring, Summer. 3(3-0) RB: (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) RB: (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) RB: (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) RB: (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) RB: (STT 441 and MTH 314)
Estimation, tests of hypotheses, confidence intervals. Goodness of fit, non-parametric methods. Linear models, multiple regression, ANOVA.

455 Actuarial Models
Spring. 3(3-0) Interdepartmental with Mathematics. RB: (STT 441)
Stochastic models used in insurance. Survival distributions, life insurance, life annuities, benefit premiums, benefit reserves, analysis of benefit reserves.

461 Computations in Probability and Statistics
Spring. 3(3-0) RB: (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. RB: (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. RB: (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.

466 Spatial Data Analysis
Spring. 4(3-2) Interdepartmental with Geography. Administered by Department of Geography. P:M: (GEO 463 or STT 200 or STT 201 or STT 231 or STT 315 or STT 351) RB: Basic computer skills, basic mathematics, basic statistics, geographic information science.

Theory and techniques for statistical analysis of point patterns, spatially continuous data, and data in spatial zones.

471 Statistics for Quality and Productivity
Fall of even years. 3(3-0) RB: (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.

STUDIO ART STA

Department of Art and Art History 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.

351 Mixed Media and Installation
 Fall, Spring. 3(0-6) P:M: (STA 111 and STA 113 and STA 114)
 Exploration of artistic expression using mixed media and assemblage techniques. Installation techniques.

354 Casting
 Fall, Spring. 3(0-6) P:M: (STA 111 and STA 113 and STA 114)
 Casting concepts and techniques as a means of artistic and cultural expression.

355 Construction and Fabrication
 Fall, Spring. 3(0-6) P:M: (STA 111 and STA 113 and STA 114)
 Sculptural concepts using methods of construction and fabrication as an approach to artistic and cultural expression.

360 Graphic Design
 Fall, Spring. 3(0-6) P:M: (STA 111 and STA 113 and STA 114)
 Graphic signs and symbols used in visual communication. Application of design principles to experimental and practical problem solving.

370 Photography
 Fall, Spring. 4(2-4) P:M: (STA 111 and STA 113 and STA 114)
 History and basic technology of black and white photography, integrative camerawork, and darkroom processing. Issues in photographic aesthetics. Students furnish camera and all materials.

400 Advanced Drawing
 Fall, Spring. 4(0-8) P:M: (STA 300)
 Drawing with an emphasis on a wide range of current drawing concepts, materials, and techniques. Advanced non-representational drawing. Application to individual thematic development.

420 Painting
 Fall, Spring. 4(0-8) A student may earn a maximum of 20 credits in all enrollments for this course. P:M: (STA 325)
 Advanced applications of painting concepts, styles and techniques. Consideration of the language of contemporary painting.

430 Relief Printing
 Fall, Spring. 4(0-8) A student may earn a maximum of 20 credits in all enrollments for this course. P:M: (STA 300 or STA 320)
 Theory and practice of relief prints including additive methods, linocut and woodcut for artistic and cultural expression.

431 Screen Printing
 Fall, Spring. 4(0-8) A student may earn a maximum of 20 credits in all enrollments for this course. P:M: (STA 300 or STA 320)
 Screen printing as a fine art print medium. Theory and techniques as a means to creative and expressive imagery.

432 Lithography
 Fall, Spring. 4(0-8) A student may earn a maximum of 20 credits in all enrollments for this course. P:M: (STA 300 or STA 320)
 Lithographic process as an artistic medium. Techniques of the medium. Preparing the plate or stone, printing, and using tusche, wash and rubbing as a means to creative imagery.

433 Intaglio
 Fall, Spring. 4(0-8) A student may earn a maximum of 20 credits in all enrollments for this course. P:M: (STA 300 or STA 320)
 Aesthetic principles and techniques such as line etching, soft ground, aquatint, dry point, wax resist, collograph, and monoprints.

435 Handmade Paper
 Spring of odd years. 4(0-8) A student may earn a maximum of 20 credits in all enrollments for this course. P:M: (STA 300 or STA 320)
 Handmade paper as an art form. Basic techniques including lamination, layering, folding and vacuum forming.

440 Ceramics
 Fall, Spring. 4(0-8) A student may earn a maximum of 20 credits in all enrollments for this course. P:M: (STA 345)
 Development of aesthetic and technical skills with particular focus on contemporary issues of content and concept. Includes opportunity for supervised individual study.

450 Advanced Sculpture
 Fall, Spring. 4(0-8) A student may earn a maximum of 20 credits in all enrollments for this course. P:M: (STA 350 or STA 351 or STA 354 or STA 355) RB: and one other 300-level sculpture course
 Advanced applications of sculpture concepts, styles and techniques. Consideration of the language of contemporary sculpture, with emphasis on individual direction.

460 Graphic Communication
 Fall, Spring. 4(0-8) P:M: (STA 462 or STA 463 or STA 464 or STA 465 or STA 466 or STA 467 or STA 468) RB: and one other 400 level graphic design course.
 Graphic design for visual communication based on typographic problem solving. Selected experimental and practical projects.

462 Three-Dimensional Design
 Spring. 4(0-8) P:M: (STA 360)
 Development and application of visual communication elements for three-dimensional structures and compound surfaces within a broad range of scale.

463 Book Design
 Fall. 4(0-8) P:M: (STA 360)
 Principles of typography and graphic design as applied to the book form.

464 Design Process and Concepts
 Fall. 4(0-8) P:M: (STA 360)
 Problem solving methods, strategies, and procedures. Exploration of problem definition, analysis, concept development, and evaluation.

465 The Poster
 Spring. 4(0-8) P:M: (STA 360)
 Poster design as a combined verbal and non-verbal communication device. Visual elements used to persuade and inform.

466 Corporate Imagery
 Fall. 4(0-8) P:M: (STA 360)
 Design development, hierarchical unification, and application strategies for the graphic identification of organizations and sub-units of organizations.

467 Motion Graphics and Electronic Media
 Fall. 4(0-8) P:M: (STA 360)
 Non-print methods of visual communication. Computer- and video-based two-dimensional animation design.