

Statistics and Probability—STT

- 844 Time Series Analysis**
Spring of odd years. 3(3-0) RB: (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) RB: (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) RB: (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) RB: (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) RB: (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) RB: (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) RB: (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) RB: (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) RB: (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) RB: (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) RB: (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 36 credits in all enrollments for this course. R: Approval of department.
Master's thesis research.

- 915 Advanced Survival Analysis**
Spring of odd years. 3(3-0)
Interdepartmental with Epidemiology. Administered by Department of Epidemiology. RB: (EPI 810 and EPI 826 and EPI 852)
Methods of analysis of time to event data parametric and nonparametric models, frailty models.

- 920 Advanced Methods in Epidemiology and Applied Statistics**
Spring of even years. 3(3-0)
Interdepartmental with Epidemiology. Administered by Department of Epidemiology. P:M: (EPI 826)
Pattern recognition and cluster analysis, longitudinal data analysis, path analysis, repeated measures and time-series analysis.

- 951 Sequential Analysis and Renewal Theory**
Fall of even years. 3(3-0) RB: (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) RB: (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) RB: (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) RB: (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) RB: (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) RB: (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) RB: (STT 882)
Discrete and continuous time martingales, convergence theorems, Doob-Meyer decomposition. Applications.

- 964 Stochastic Analysis**
Spring of even years. 3(3-0) RB: (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. RB: (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. 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 120 credits in all enrollments for this course. R: Approval of department.
Doctoral dissertation research.

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.
- 468 Computer Graphics**
Spring. 4(0-8) P:M: (STA 360)
The computer as a medium for visual communication design. Experimentation with drawing, painting and solid modeling applications.
- 470 Still Photography**
Fall, Spring. 4(2-4) P:M: (STA 370)
Control of black and white photographic materials through advanced camera and darkroom techniques. View camera principles and use. Print hand-coloring and archival processing. Contemporary form and content issues.
- 472 Color Photography**
Spring. 4(2-4) P:M: (STA 370)
Principles of color photography. Vision, perception, and photographic science and art. Effect of color on content. Color negative process and printing.
- 474 Photography Studio Lighting**
Fall. 4(2-4) P:M: (STA 370)
The photographer's balance of still life and portrait composition and controlled lighting with personal interpretation of subject matter. Lighting theory, technique, and equipment.
- 475 Photography Workshop**
Spring. 4(1-6) P:M: (STA 370)
Non-traditional photographic processes and concepts. Non-silver printmaking, electronic still imaging, computer manipulation, video production, and slide-sound productions.

Studio Art—STA

- 481 Art Experiences with Children and Youth: Elementary**
Fall, 5(1-8) P:M: Completion of Tier I writing requirement. R: Open only to juniors or seniors in the Department of Art with a teacher certification option.
Art teaching in the Saturday Art Program. Emphasis on elementary experiences. Planning and writing art curriculum.
- 482 Art Experiences with Children and Youth: Secondary**
Spring, 6(2-8) P:M: Completion of Tier I writing requirement. R: Open only to juniors or seniors in the Department of Art with a teacher certification option.
Art teaching in the Saturday Art Program. Emphasis on secondary experiences. Planning and writing art curriculum.
- 490 Independent Study**
Fall, Spring, 1 to 3 credits. A student may earn a maximum of 3 credits in all enrollments for this course. R: Approval of department.
Special projects arranged by an individual student and a faculty member in areas supplementing regular course offerings.
- 491A Selected Topics - Painting**
Spring, 2 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. P:M: (STA 320) R: Approval of department.
Issues of technique, style, and content in painting.
- 491B Selected Topics - Printmaking**
Spring, 2 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. P:M: (STA 430 or STA 431 or STA 432 or STA 433 or STA 435) R: Approval of department.
Issues of technique, style, and content in printmaking.
- 491C Selected Topics - Ceramics**
Spring, 2 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. P:M: (STA 345)
Issues of technique, style, and content in ceramics.
- 491D Selected Topics - Sculpture**
Spring, 2 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. P:M: (STA 350 or STA 351 or STA 354 or STA 355) R: Approval of department.
Issues of technique, style, and content in sculpture.
- 491E Selected Topics - Graphic Design**
Spring, 2 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. P:M: (STA 360) R: Approval of department.
Issues of technique, style, and content in graphic design.
- 491F Selected Topics - Photography**
Fall of odd years, 2 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. P:M: (STA 370) R: Approval of department.
Issues of technique, style, and content in photography.
- 492 Senior Seminar and Professional Practice (W)**
Fall, Spring, 2(2-0) P:M: Completion of Tier I writing requirement. R: Open only to seniors in the Studio Art major. C: STA 492A concurrently.
Capstone course for artists and designers. Writing as a mode of issue delineation and definition.
- 492A Exhibition Practicum**
Fall, Spring, 1(1-1) P:M: Completion of Tier I writing requirement. C: STA 492 concurrently.
Exhibition experience in studio art. Audience delineation. Conceptualization. Use of space. Evaluation.
- 493 Design Internship**
Fall, Spring, 1 to 4 credits. A student may earn a maximum of 4 credits in all enrollments for this course. P:M: (STA 460 or 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. R: Approval of department, contract required prior to registration.
Field experience in a working design environment under supervision of a design professional: art director, graphic designer, or photographer.
- 494 Design Center**
Fall, Spring, 4(0-8) P:M: (STA 460 or 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. R: Approval of department, contract required prior to registration.
Practicum in design problem solving, including extensive contact with selected clients at a professional level.
- 495 Workshop in Studio Art Practice**
Fall, Spring, Summer, 1 to 3 credits. A student may earn a maximum of 4 credits in all enrollments for this course. RB: Upper level studio art major. R: Open only to juniors or seniors or graduate students in the Studio Art major or approval of department. Written contract required.
In-depth study of a specific technique or theoretical artistic practice.
- 820 Painting**
Fall, Spring, 2 to 8 credits. A student may earn a maximum of 40 credits in all enrollments for this course. R: Open only to Master of Fine Arts students in Studio Art. Approval of department.
Advanced study in a variety of painting media to foster independent development.
- 830 Relief Printing**
Fall, Spring, 2 to 8 credits. A student may earn a maximum of 40 credits in all enrollments for this course. R: Open only to Master of Fine Arts students in Studio Art. Approval of department.
Theory and practice of relief prints as a means to create expressive imagery.
- 831 Screen Printing**
Fall, Spring, 2 to 8 credits. A student may earn a maximum of 40 credits in all enrollments for this course. R: Open only to Master of Fine Arts students in Studio Art. Approval of department.
Theory and practice of screen printing as a means to create expressive imagery.
- 832 Lithography**
Fall, Spring, 2 to 8 credits. A student may earn a maximum of 40 credits in all enrollments for this course. R: Open only to Master of Fine Arts students in Studio Art. Approval of department.
Theory and practice of lithography as a means to create expressive imagery.
- 833 Intaglio Printing**
Fall, Spring, 2 to 8 credits. A student may earn a maximum of 40 credits in all enrollments for this course. R: Open only to Master of Fine Arts students in Studio Art. Approval of department.
Theory and practice of intaglio printing as a means to create expressive imagery.
- 840 Ceramics**
Fall, Spring, 2 to 8 credits. A student may earn a maximum of 40 credits in all enrollments for this course. R: Open only to Master of Fine Arts students in Studio Art. Approval of department.
Advanced study in ceramics to foster independent development.
- 850 Sculpture**
Fall, Spring, 2 to 8 credits. A student may earn a maximum of 40 credits in all enrollments for this course. R: Open only to Master of Fine Arts students in Studio Art. Approval of department.
Advanced study in a variety of three-dimensional media to foster individual development.
- 860 Graphic Design**
Fall, Spring, 2 to 8 credits. A student may earn a maximum of 40 credits in all enrollments for this course. R: Open only to graduate students in Studio Art. Approval of department.
Planning and conceptualizing ideas for visual communication problems that are to be expressed in words and/or pictures. Design of research that will expose a mastery of visual aesthetics and concepts in information design.
- 891 Special Topics in Art Education**
Fall, Spring, Summer, 1 to 3 credits. A student may earn a maximum of 3 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.
- 892 Master of Fine Arts Seminar**
Fall, 3(3-0) A student may earn a maximum of 12 credits in all enrollments for this course. R: Open only to Master of Fine Arts students in Studio Art. Approval of department.
Contemporary intellectual issues related to practice in the visual arts. Group critiques of individual scholarly and applied research.
- 898 Master of Fine Arts Research**
Fall, Spring, 1 to 8 credits. A student may earn a maximum of 16 credits in all enrollments for this course. RB: 12 graduate credits in student's studio art discipline. R: Open only to Master of Fine Arts students in Studio Art.
Individual research project in the student's studio art discipline directed by major professor.