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Educational Resources Biostatistics Courses

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The following are courses taught by Biostatistics faculty and/or related to Biostatistics. Course titles link to most recently available syllabi or homepages.

Courses in our Department

BMI 511 - [Introduction to Biostatistics](#) 3 credits. This course will provide a breadth in biostatistical methods for public health practitioners. Topics will include research design, data collection methods and database management, statistical computing and programming, descriptive statistics in tables and graphics, and biostatistical methods for summary measures, probability and distributions, sampling distributions, statistical inference, hypothesis testing and statistical comparison, nonparametrics, correlation, regression analysis and survey sampling.

BMI 541 - [Introduction to Biostatistics](#) 3 credits. Course designed for the biomedical researcher. Topics include: descriptive statistics, hypothesis testing, estimation, confidence intervals, t-tests, chi-squared tests, analysis of variance, linear regression, correlation, nonparametric tests, survival analysis and odds ratio. Biomedical applications used for each topic. Prerequisite: Math 221 or equivalent or instructor's consent.

BMI 542 - [Introduction to Clinical Trials I](#) 3 credits. Intended for biomedical researchers interested in the design and analysis of clinical trials. Topics include definition of hypotheses, measures of effectiveness, sample size, randomization, data collection and monitoring, and issues in statistical analysis. Statistics graduate students should take Stat 641. Prerequisite: Stat 541 or equivalent or instructor's consent.

BMI 544 - [Introduction to Clinical Trials II](#)- This course will provide practical experience and training in clinical trial research. The course will focus on the design, implementation, and conduct of clinical trials. Topics include: regulatory requirements for clinical trials; data collection strategies, data quality and management; budget development and justification; federal, institutional, and sponsor-defined requirements; establishment of research infrastructures for safety and success; preparation of investigator-INDs; investigator responsibilities in Phase I-IV trials. Development of data collection and data management systems and a budget for the protocol developed in 541 are required components of this course.

BMI 546 - [Practicum in Clinical Trial Data Analysis and Interpretation](#). 3 credits. This course will provide

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practice in analysis and interpretation of existing datasets from national and international clinical trials in a variety of diseases. Students will develop a research question, review clinical protocols, and analyze available data to prepare a report. Prerequisites: Stat 541 or Stat 572 and Stat 542 or Stat 641.

Courses in the Statistics Department (some are also cross-listed)

Stat 571 - Statistical Methods for Bioscience I. 4 credits. Design course aimed at CALS graduate students, but the principles are quite applicable to molecular biology. Topics include: descriptive statistics, distributions, one- and two-sample normal inference, one-way ANOVA, simple linear regression, categorical data, non-parametric methods, underlying assumptions, and diagnostic work. Prerequisites: College algebra: Graduate standing or instructor's consent.

Stat 572 - Statistical Methods for Bioscience II. 4 credits. Continuation of Stat 571. Polynomial regression, multiple regression, two-way Anova with and without interaction, split-plot design, subsampling, analysis of covariance, elementary sampling, introduction to bioassay. Prerequisites: Statistics 571.

Stat 609 - [Mathematical Statistics I](#). 3 credits. Review of probability, random variables and vectors and their distributions, moments and inequalities, generating functions, transformations of random variables, sampling and distribution theory, convergence concepts for sequences of random variables, laws of large numbers, central limit and other limit theorems. Prerequisite: Stat 309 or 431, Math 340, Math 521, or equivalent or instructor's consent.

Stat 610 - [Introduction to Statistical Inference](#) (Mathematical Statistics II). 4 credits. Conditioning, distribution theory, approximation to distributions, modes of convergence, limit theorems, statistical models, parameter estimation, comparison of estimators, confidence sets, theory of hypothesis tests, introduction to Bayesian inference and nonparametric estimation. Prerequisite: Stat 309 or Stat 431, Math 521, Math 340 or equivalent or instructor's consent.

Stat 641 - [Statistical Methods for Clinical Trials](#) 3 credits. Statistical issues in the design of clinical trials, basic survival analysis, data collection and sequential monitoring. Intended for statistics graduate students; those with medical backgrounds should take Stat 542. Prerequisite: Math/Stat 310 or equivalent or instructor's consent.

[Stat 642 - Statistical Methods for Epidemiology](#). 3 credits. Methods for analysis of case-control, cross sectional, and cohort studies. Covers epidemiologic study design, measures of association, rates, classical contingency table methods, and logistic and Poisson regression. Prerequisite: Stat 310 or equivalent or instructor's consent.

Stat 643 - [Practicum in Coordinating Center Methods](#). 3 credits. Practicum in the operation of a coordinating center in a clinical trial or epidemiologic study. Covers organization, randomization, forms design and collection, quality control and other operational responsibilities of coordinating centers. Prerequisite: Stat 641 or 642 or instructor's consent.

Stat 741 - Survival Analysis Theory and Methods. 3 credits. Theory and practice of analytic methods for censored survival data, including nonparametric and parametric methods, the proportional hazards regression model, and a review of current topics in survival analysis. Prerequisite: Stat 610 or 710 or equivalent or instructor's consent.

Stat 751 - Sequential Analysis. 3 credits. Sequential tests of simple hypotheses and their optimal properties;

composite hypotheses including derivation of the sequential t-test; sequential estimation; stochastic approximation, topics in sequential analysis. Prerequisite: Stat 310 or equivalent.

Stat 851 - Generalized Linear Models. 3 credits. Methods for developing, fitting and checking models beyond the classical linear model framework. Binary, ordinal and categorical models will be examined, as well as the non-Gaussian continuous case and more advanced topics. Prerequisite: Stat 850 (or concurrent registration in Stat 850) or instructor's consent.

Stat 860 - Topics in Time Series and Approximation Theory. 3 credits. Topics in statistical and approximation theoretic methods of estimating functions and values of functionals from experimental data. Experimental design and data analysis problems that also arise as problems in approximation theory. Convergence theorems. Prerequisites: Statistics 710 or instructor's consent.

Stat 992 - Topics in Statistics Seminar . 1-3 credits. Content varies ([Spring 2003: Statistical Methods for the Analysis of Microarray Data](#), some other recent topics include Statistical Genetics, Longitudinal Data Analysis, Advanced Survival Analysis, Empirical Processes and Semiparametric Inference, Functional Data Analysis) Prerequisite: instructor's consent.

Stat 998 - [Statistical Consulting](#). 3 credits. Consulting apprenticeship. Prerequisite: 9 credits in statistics and instructor's consent.

Courses in other Departments

ActSci 650 - [Actuarial Mathematics 1](#). 3 credits. Advanced problems in the mathematical theory of life contingencies; force of mortality, laws of mortality; premiums and reserves for insurance and annuities based on a single life. Prerequisites: Act Sci 303 and either Math 431 or Stat 313.

ActSci 651 - [Actuarial Mathematics II](#). 3 credits. Continuation of Actuarial Mathematics I. Joint life probabilities, annuities and insurances, multiple-decrement theory; pension fund mathematics. Prerequisites: Act Sci 650.

Math 303 - Theory of Interest and Life Insurance 3 credits. Application of calculus to compound interest and insurance functions; interest compounded discretely and continuously; force of interest function; annuities payable discretely and continuously; bonds and yield rates; life tables, life annuities, single and annual premiums for insurance and annuities; reserves. Prerequisites: Math 234 or concurrent registration, or instructor's consent.

Pop Hlth 794 -Biological Basis of Population Health. Fall; 1cr. This course covers the physiology, biology and biochemistry of selected disease processes deemed to be important to students of Population Health Sciences by virtue of their clinical significance including incidence, mortality and morbidity.

Pop Hlth 795 - Principles of Population Health Science. Fall; 3 cr. Introduces students to the multiple determinants of health including medical care, socioeconomic status, the physical environment and individual behavior, and their interactions. Also covered will be the definition and measurement of population health, economic concepts in population health, and ethical and managerial issues in population health improvement. Prerequisites: Grad st in Population Health or cons inst.

Pop Hlth 796 - Introduction to Health Services Research. Spring; 3 cr. Introduces students to a variety of

perspectives, substantive areas and methodological approaches to health services research that provide the foundation for understanding the structure, process and outcomes of the U.S. health care system.

Prerequisites: Grad stdt in population health & Pop Hlth 795; or cons inst. .

Pop Hlth 797 - Introduction to Epidemiology. Fall; 2-3 cr. Lectures and discussions on design, implementation and interpretation of epidemiologic studies; emphasis on methodologic problems in the measurement of disease frequency, natural history and risk factors. Prerequisites: Grad st in clinical/life science or cons inst.

Pop Hlth 798 - Epidemiologic Methodology. Spring; 3 cr. Design and implementation of epidemiologic research, including sample selection, recruitment, data collection and management. Strategies to address methodologic limitations are emphasized. Prerequisites: Grad stdt in population health & Pop Hlth 797; or cons inst.

Pop Hlth 800 - Quantitative Methods in Population Health I. Spring; 3 cr. Topics include: Rates and risks, classical analysis techniques for epidemiologic studies, ordinary and logistic regression. Prerequisites: Grad stdt in population health and Stat 541 or equiv; or cons inst.

Pop Hlth 875 - Assessment of Medical Technologies. (Crosslisted with Ind Engr) Fall; 2-3 cr. Basic ideas and tools of cost effectiveness analysis as applied in evaluating medical technologies. Addresses special problems and methods in assessing diagnostic technologies, including ROC analysis, and in measuring health for technology assessment. Uses "classical" and current journal literature. Prerequisites: Grad stdt in population health & Pop Hlth 797 & 800; or cons inst.

Pop Hlth 876 - Measuring Health Outcomes. Spring; 3 cr. Provides a comprehensive understanding of health outcome measures, including generic health status measures, disease-specific measures, and consumer reports of the quality of care. Prerequisites: Grad stdt in population health & Pop Hlth 795, 797 & 800; or cons inst.

Pop Hlth 900 - Quantitative Methods in Population Health II. Fall; 3 cr. Principles and applications of regression analysis of observational data with unequal variance, unequal sampling weights, missing observations, correlation between observations and non-normally distributed outcomes, and related statistical methods in population health. Examples use data sets from ongoing population health research. Prerequisites: Grad stdt in population health & Pop Hlth 795,797, 798, & 800; or cons inst.

Pop Hlth 904 - Special Topics in Epidemiology. Fall and Spring; 2 cr. In-depth focus on current areas of epidemiologic investigation. Each semester multiple modules (e.g., cardiovascular, cancer, infectious diseases, womens health, international, etc.) will be offered.



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