

BIOSTATISTICS (BIST)

BIST 5091. Biostatistics Internship. (1-3 Credits)

Internship course for Biostatistics graduate students.
May be repeated for a total of 3 credits

BIST 5092. Biostatistics Practicum. (1 Credit)

Participation in two-week Biopharmaceutical Summer Academy. May be repeated for a maximum of three credits with a change of topic.
May be repeated for a total of 3 credits

BIST 5099. Independent Study. (1-6 Credits)

Independent study on biostatistics and its applications under the supervision of a faculty instructor.

Enrollment Requirements: Instructor consent.
May be repeated for credit

BIST 5215. Statistical Consulting. (3 Credits)

(Also offered as STAT 5215.) Applied inference for academia, government, and industry: ethical guidelines, observational studies, surveys, clinical trials, designed experiments, data management, aspects of verbal and written communication, case studies.

Enrollment Requirements: BIST/STAT 5315, 5505, and 5605; or instructor consent.

BIST 5225. Data Management. (3 Credits)

(Also offered as STAT 5225.) Creation and management of datasets for statistical analysis: software tools and databases, user-defined functions, importing/exporting/manipulation of data, conditional and iterative processing, generation of reports.

BIST 5505. Applied Statistics I. (3 Credits)

(Also offered as STAT 5505.) Exploratory data analysis: stem-and leaf plots, Box-plots, symmetry plots, quantile plots, transformations, discrete and continuous distributions, goodness of fit tests, parametric and non-parametric inference for one sample and two sample problems, robust estimation, Monte Carlo inference, bootstrapping.

Enrollment Requirements: Open to graduate students in Statistics and Biostatistics; others with permission.

BIST 5515. Design of Experiments. (3 Credits)

(Also offered as STAT 5515.) One way analysis of variance, multiple comparison of means, randomized block designs, Latin and Graeco-Latin square designs, factorial designs, two-level factorial and fractional factorial designs, nested and hierarchical designs, split-plot designs.

Enrollment Requirements: STAT 5005 or graduate student in Biostatistics. Not open for credit to students who have passed STAT 3515Q.

BIST 5545. Mathematical Statistics I. (3 Credits)

(Also offered as STAT 5545.) Introduction to probability theory, transformations and expectations, moment generating function, discrete and continuous distributions, joint and marginal distributions of random vectors, conditional distributions and independence, sums of random variables, order statistics, convergence of a sequence of random variables, the central limit theorem. Formerly offered as BIST/STAT 5585.

Enrollment Requirements: Open to graduate students in Biostatistics, others with permission.

BIST 5555. Mathematical Statistics II. (3 Credits)

(Also offered as STAT 5555.) The sufficiency principle, the likelihood principle, the invariance principle, point estimation, methods of evaluating point estimators, hypotheses testing, methods of evaluating tests, interval estimation, methods of evaluating interval estimators. Formerly offered as BIST/STAT 5685.

Enrollment Requirements: BIST/STAT 5545.

BIST 5605. Applied Statistics II. (3 Credits)

(Also offered as STAT 5605.) Analysis of variance, regression and correlation, analysis of covariance, general linear models, robust regression procedures, and regression diagnostics.

Enrollment Requirements: BIST/STAT 5505.

BIST 5615. Categorical Data Analysis. (3 Credits)

Statistical analysis of data on a nominal scale: discrete distributions, contingency tables, odds ratios, interval estimates, goodness of fit tests, logistic/probit/complementary log-log regression, Poisson-related regression.

Enrollment Requirements: BIST 5505 and 5605; or instructor consent.

BIST 5625. Introduction to Biostatistics. (3 Credits)

Rates and proportions, sensitivity, specificity, two-way tables, odds ratios, relative risk, ordered and non-ordered classifications, trends, case-control studies, elements of regression including logistic and Poisson, additivity and interaction, combination of studies and meta-analysis.

Enrollment Requirements: Open to graduate students in Biostatistics, others with permission.

BIST 5635. Clinical Trials. (3 Credits)

Basic concepts of clinical trial analysis; controls, randomization, blinding, surrogate endpoints, sample size calculations, sequential monitoring, side-effect evaluation and intention-to-treat analyses. Also, experimental designs including dose response study, multicenter trials, clinical trials for drug development, stratification, and cross-over trials.

Enrollment Requirements: Open to graduate students in Biostatistics, others with permission.

BIST 5645. Concepts and Analysis of Survival Data. (3 Credits)

Survival models, censoring and truncation, nonparametric estimation of survival functions, comparison of treatment groups, mathematical and graphical methods for assessing goodness of fit, parametric and nonparametric regression models.

Enrollment Requirements: Open to graduate students in Biostatistics, others with permission.

BIST 5655. Epidemiology. (3 Credits)

The statistical study of health and illness in human and veterinary populations: epidemiological study designs, measures of disease frequency/effect/potential impact, selection and information biases, confounding, stratified analysis.

Enrollment Requirements: Open to graduate students in Biostatistics, others with permission.

BIST 5705. Statistical Methods in Bioinformatics. (3 Credits)

Statistical methods and software tools for the analysis of biological data: sequencing methods; gene alignment methods; expression analysis; evolutionary models; analysis of proteomics, metabolomics, and methylation data; pathway analysis: gene network analysis.

Enrollment Requirements: BIST 5505 and 5585; or instructor consent.

BIST 5815. Longitudinal Data Analysis. (3 Credits)

Statistical theory and methodology for data collected over time in a clustered manner: design of experiments, exploratory data analysis, linear models for continuous data, general linear models for discrete data, marginal and mixed models, treatment of missing data.

Enrollment Requirements: BIST 5505 and 5605; or instructor consent.

BIST 6615. Statistical Learning and Optimization. (3 Credits)

(Also offered as STAT 6615.) Computationally intensive statistical learning methods with optimization techniques: classification, discriminant analysis, (generalized) additive models, boosting, regression trees, regularized regression, principal components, support vector machines, and (deep) neural networks.

Enrollment Requirements: Instructor consent and intermediate courses in mathematical and applied statistics.