Biostatistics Courses (BIOS)

BIOS Courses

This is a list of courses with the subject code BIOS. For more information, see Biostatistics (College of Public Health) in the catalog.

BIOS:4110 General Biostatistics 3 s.h.
Biostatistics and biostatistical computation; biostatistical aspects of health-related problems; clinical trials; statistical issues in big data problems; disease modeling; disease mapping; genetics and epidemiology; brief introduction to survival and longitudinal analyses.

BIOS:4120 Introduction to Biostatistics 3 s.h.
Application of statistical techniques to biological data including descriptive statistics, probability and distributions, sampling distributions, nonparametric methods, hypothesis tests, confidence intervals, analysis of categorical data, and simple linear regression; designed for non-biostatistics majors and MPH students. Requirements: college algebra or ALEKS score of 65% or higher.

BIOS:4510 Data Science Foundations in R 2 s.h.
Introduction to use of R tools for data wrangling and communication tasks commonly encountered in biostatistics; topics include preparation and manipulation of analytic datasets, data visualization, tabular summaries, and reporting. Offered spring semesters.

BIOS:5120 Regression Modeling and ANOVA in the Health Sciences 3 s.h.
Continuation of BIOS:4120; correlation, simple and multiple linear regression, confounding, interactions, model selection, single and multiple factor ANOVA (analysis of variance) models, contrasts, multiple comparisons, nested and block designs; introduction to mixed models; for non-biostatistics majors. Offered spring semesters. Prerequisites: BIOS:4120. Same as IGPI:5120, STAT:5610.

BIOS:5130 Applied Categorical Data Analysis 3 s.h.
Analysis of proportions, risk measures, and measures of association; Mantel-Haenszel method; logistic regression for binary responses and for matched data; logistic regression for multi-category responses; analysis of count data (Poisson regression and negative binomial regression); analysis of clustered data (generalized estimating equations and generalized linear mixed models); special topics include the application of propensity score methods; designed for non-biostatistics majors. Offered fall semesters. Prerequisites: BIOS:5120. Same as IGPI:5130.

BIOS:5310 Research Data Management 3 s.h.
Introduction to data management techniques and problems encountered in gathering and processing data from biomedical investigations; introduction to SAS, techniques taught in SAS; designed for non-biostatistics majors. Offered fall and spring semesters. Recommendations: prior programming experience with C, C++, Python, Java, or other. Same as IGPI:5310, STAT:5810.

BIOS:5510 Biostatistical Computing 2 s.h.
Introduction to computer programming using SAS and R statistical software packages; programming language syntax, constructs, procedures, and techniques for data management, data analysis, and statistical programming commonly encountered in biostatistics; designed for first-year biostatistics majors. Offered fall semesters. Corequisites: BIOS:5710. Same as IGPI:5510.

BIOS:5710 Biostatistical Methods I 4 s.h.
Probability distributions, moments, estimation, parametric and nonparametric inference for one-sample and two-sample problems, analysis of frequency data; emphasis on use of computers; designed for first-year biostatistics majors. Offered fall semesters. Requirements: two semesters of calculus. Same as IGPI:5710.

BIOS:5720 Biostatistical Methods II 4 s.h.
Continuation of BIOS:5710; multi-factor ANOVA (analysis of variance), multiple comparisons, orthogonal contrasts, linear regression and correlation, regression diagnostics and remedial measures, model selection, and mixed models; designed for first-year biostatistics majors. Offered spring semesters. Prerequisites: BIOS:5710. Requirements: one semester of linear algebra. Same as IGPI:5720.

BIOS:5730 Biostatistical Methods in Categorical Data 3 s.h.
Estimation of proportions, rates, risks, relative risks, and odds ratios; Mantel-Haenszel method; logistic regression (including ordinal logistic regression and multi-category nominal logistic regression); Poisson regression and negative binomial regression; methods for correlated or clustered data (conditional logistic regression, generalized estimating equations, and mixed effects models); special topics include an introduction to generalized linear models and likelihood-based inferential techniques in this framework; designed for first-year biostatistics majors. Offered spring semesters. Prerequisites: BIOS:5510 and BIOS:5710. Corequisites: BIOS:5720. Same as IGPI:5730.

BIOS:6210 Applied Survival Analysis 3 s.h.
Nonparametric, parametric, and semi-parametric methods for time-to-event data; types of censoring; Kaplan-Meier estimation; Cox proportional hazards models, including methods for assessing adequacy of the proportional hazards assumption; time varying covariates; sample size calculations for comparison of two or more groups; focus on analysis of real data sets and examples using statistical software. Offered spring semesters. Prerequisites: BIOS:5120 or BIOS:5720. Same as IGPI:6210.

BIOS:6234 Basic Biostatistical Methods with Genetics Applications 1 s.h.
Introduction to terminology, fundamental concepts, and methods of biostatistics as applied to genetic research; genetic investigation examples used to illustrate statistical approaches. Same as GENE:6234.

BIOS:6310 Introductory Longitudinal Data Analysis 3 s.h.
Introduction to statistical models and estimation methods for outcome variables (normal and non-normal) clustered or measured repeatedly in time or space; focus on applications and computer software methods for ANOVA based methods, hierarchical linear models, linear mixed models, correlated regression models, generalized estimating equations, and generalized linear mixed models. Offered fall semesters. Prerequisites: BIOS:5120 or STAT:3200. Same as IGPI:6310, STAT:6550.
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<td>BIOS:6610</td>
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<td>BIOS:6650</td>
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<td>BIOS:6720</td>
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<td>BIOS:7310</td>
<td>Longitudinal Data Analysis</td>
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<td>BIOS:7410</td>
<td>Analysis of Categorical Data</td>
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**Prerequisites:**
- BIOS:5720 and ((STAT:4100 and STAT:4101) or STAT:5100 and BIOS:5120. Same as EPID:6420.
- BIOS:5720 and BIOS:5730 and BIOS:5510. Requirements: BIOS:5510 with section subtitle of programming with R.
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- BIOS:5510 and STAT:5101 or STAT:5101. Same as IGPI:7310.
BIOS:7500 Preceptorship in Biostatistics  
Work experience using knowledge and skill acquired in classroom; arranged in conjunction with ongoing departmental or collegiate activities or with governmental agencies or private industry; preparation of prospectus and presentation of research results in a department seminar.

BIOS:7600 Advanced Biostatistics Seminar  
0-3 s.h. 
Current topics; supervised experience in reading and interpreting biostatistical literature. Same as IGPI:7600.

BIOS:7604 Scholarly Integrity in Biostatistics for Postdocs  
0 s.h. 
Responsible conduct of research training; emphasis on issues of particular relevance to biostatisticians and statisticians including authorship, communication, student/mentor relationships, plagiarism, fabrication and falsification of data, bias, Type I/II errors, reproducible research, data confidentiality and security, conflicts of interest, human/animal subjects. Requirements: postdoctoral research scholar/fellow standing in biostatistics or statistics.

BIOS:7700 Problems/Special Topics in Biostatistics  
arr. 
Didactic material in biostatistics; may include tutorials, seminars, faculty-directed independent work (e.g. literature search, project, short research project).

BIOS:7800 Independent Study in Biostatistics  
arr. 
In-depth pursuit of an area of special interest in biostatistics requiring substantial creativity and independence.

BIOS:7850 Research in Biostatistics  
arr. 
Research that may lead to a dissertation.

BIOS:7900 Thesis/Dissertation  
arr.