Biostatistics Courses

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 M.P.H. students. Requirements: college algebra or ALEKS score of 65% or higher.

BIOS:4710 Biostatistical Methods Laboratory 1 s.h.
Computational aspects of one-sample and two-sample problems; analysis of frequency data, linear regression, and correlation analysis; examples using these computational methods in public health. Offered fall semesters. Prerequisites: STAT:3200 and STAT:2010.

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, and an introduction to mixed models; designed for non-biostatistics majors. Offered spring semesters and summer sessions. Prerequisites: BIOS:4120. Same as IGPI:5120, STAT:5610.

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:6110 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 effects model); special topics include the application of propensity score methods; designed for non-biostatistics majors. Offered fall semesters. Prerequisites: BIOS:5120. Same as IGPI:6110.

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: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.

BIOS:6420 Survey Design and Analysis 3 s.h.
Methodological issues regarding design, sampling approach, implementation, analysis, and interpretation of surveys and questionnaires in public health research. Offered spring semesters of even years. Prerequisites: EPID:4400 and BIOS:5120. Same as EPID:6420.
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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BIOS:6610</td>
<td>Statistical Methods in Clinical Trials</td>
<td>3 s.h.</td>
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<tr>
<td>BIOS:6650</td>
<td>Causal Inference</td>
<td>3 s.h.</td>
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<tr>
<td>BIOS:6720</td>
<td>Statistical Machine Learning for Biomedical and Public Health Data</td>
<td>3 s.h.</td>
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<tr>
<td>BIOS:6810</td>
<td>Bayesian Methods and Design</td>
<td>3 s.h.</td>
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<tr>
<td>BIOS:7110 I</td>
<td>Theory of Biostatistics</td>
<td>4 s.h.</td>
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<tr>
<td>BIOS:7120 II</td>
<td>Theory of Biostatistics</td>
<td>4 s.h.</td>
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<td>BIOS:7210</td>
<td>Survival Data Analysis</td>
<td>3 s.h.</td>
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<td>BIOS:7230</td>
<td>Advanced Clinical Trials</td>
<td>3 s.h.</td>
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<td>BIOS:7240</td>
<td>High-Dimensional Data Analysis</td>
<td>3 s.h.</td>
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<tr>
<td>BIOS:7270</td>
<td>Scholarly Integrity in Biostatistics</td>
<td>1 s.h.</td>
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<tr>
<td>BIOS:7310</td>
<td>Longitudinal Data Analysis</td>
<td>3 s.h.</td>
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<tr>
<td>BIOS:7330</td>
<td>Advanced Biostatistical Computing</td>
<td>3 s.h.</td>
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<tr>
<td>BIOS:7410</td>
<td>Analysis of Categorical Data</td>
<td>3 s.h.</td>
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BIOS:7500 Preceptorship in Biostatistics arr.
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.