

Course Schedule for GPP program

Sample Plan 1: Statistics major or strong background

Fall: STAT130 (Sampling Surveys)

STAT170A (Regression Analysis)

STAT201A (Theory of Probability and Statistics)

Alternative: STAT146 (Statistical Forecasting Techniques), STAT147 (Introduction to Statistical Computing), STAT202A (Regression, ANOVA, and Design), Statistics 231A (Statistics for Biological Sciences)

Winter: STAT140 (Nonparametric Techniques)

STAT147 (Introduction to Statistical Computing),

STAT201B (Theory of Probability and Statistics)

Alternative: STAT110 (Biostatistical Methods in Life Science), STAT 157 (Statistical Computer Packages), STAT170B (Design of Experiments), STAT202B (Regression, ANOVA, and Design)

Spring: STAT167 (Introduction to Data Science)

STAT171 (General Statistical Models)

STAT201C (Theory of Probability and Statistics)

Alternative: STAT127 (Introduction to Quality Improvements), STAT157 (Statistical Computer Packages), STAT161 (Introduction to Probability Models)

Sample Course Plan 2: Non-statistics major or weak background

Fall: STAT146 (Statistical Forecasting Techniques)

STAT147 (Introduction to Statistical Computing)

STAT156A (Mathematical Statistics for Data Science)

Alternative: STAT130 (Sampling Surveys), STAT160A (Elements of Probability and Statistical Theory)

Winter: STAT140 (Nonparametric Techniques)

STAT156B (Mathematical Statistics for Data Science)

STAT157 (Statistical Computer Packages)

Alternative: STAT110 (Biostatistical Methods in Life Science), STAT160B (Elements of Probability and Statistical Theory),

Spring: STAT127 (Introduction to Quality Improvements)

STAT161 (Introduction to Probability Models)

STAT167 (Introduction to Data Science)

Alternative: STAT160C (Elements of Probability and Statistical Theory), STAT171 (General Statistical Models)

Courses for GPP: STAT110 (Biostatistical Methods in Life Science, W), STAT127 (Introduction to Quality Improvements, S), STAT130 (Sampling Surveys, F), STAT140 (Nonparametric Techniques, W), STAT146 (Statistical Forecasting Techniques, F), STAT147 (Introduction to Statistical Computing, FW), STAT156AB (Mathematical Statistics for Data Science), STAT170AB (Regression Analysis, Design), STAT 157 (Statistical Computer Packages, WS), STAT160ABC (Elements of Probability and Statistical Theory), STAT161 (Introduction to Probability Models, S), STAT167 (Introduction to Data Science, S), STAT171 (General Statistical Models, S), STAT201ABC (Theory of Probability and Statistics), Statistics 202ABC (Regression, ANOVA, and Design), Statistics 231A (Statistics for Biological Sciences, F)

Course description

- *Statistics 110 - Biostatistical Methods in Life Science*
Provides undergraduate students majoring or interested in life sciences with statistical tools for analyzing different types of data frequently encountered in life sciences. Emphasizes applications of methodology, including contingency table analysis, linear regression and ANOVA, maximum likelihood method and the estimation-maximization algorithm, logistic regression, Poisson regression, and survival analysis.
- *Statistics 127 - Introduction to Quality Improvements*
Explores Deming's 14 points for management, graphical methods, fishbone diagram, Pareto analysis, control charts for attributes and variables, custom and moving average charts, process capability, economic design, acceptance sampling, Taguchi method, parameter design, tolerance design, reliability, hazard rate, censoring, and accelerated life testing.
- *Statistics 130 - Sampling Surveys*
Covers simple random sampling, addresses stratified sampling, cluster sampling, and ratio and regression estimates. Explores random response, capture-recapture, and jackknife techniques.
- *Statistics 140 - Nonparametric Techniques*
Randomization tests. Rank tests. Methods of association. Distribution-free tests.
- *Statistics 146 - Statistical Forecasting Techniques*
Topics include exponential smoothing, simple and multiple regression analysis, time series, trend analysis, and seasonal analysis.
- *Statistics 147 - Introduction to Statistical Computing*
Introduction to computer-assisted data analysis and statistical inference using both the R and SAS packages. Topics include input, output, and editing of data; graphical procedures; descriptive statistics; cross-tabulation; inferential statistical techniques including estimation and testing; and analysis of variance.

- Statistics 157 - Statistical Computer Packages*
 A study of major statistical packages, including SAS with the emphasis on advanced SAS programming. Topics include advanced graphical procedures, linear models (regression and analysis of variance), multivariate techniques, and SAS macros.
- Statistics 155 - Probability and Statistics for Science and Engineering*
 Covers sample spaces and probability; random variables and probability distributions; elements of statistical inference; and testing and estimation. Also addresses selected topics in multivariate distributions and introduces stochastic processes.
- STAT156A-B (Mathematical Statistics for Data Science)*
 (A) Introduction to frequentist probability concepts, random variables, and their distributions. Discussion of key theorems and inequalities in probability theory. Introduction to frequentist methods of point and interval estimation.
 (B) Introduction to Bayesian probability concepts, illustrative application of Frequentist theory to linear regression, logistic regression and ANOVA, analysis of contingency tables, applications of sequential statistics, methods for observational studies and for missing data analyses.
- Statistics 157 - Statistical Computer Packages*
 A study of major statistical packages, including SAS with the emphasis on advanced SAS programming. Topics include advanced graphical procedures, linear models (regression and analysis of variance), multivariate techniques, and SAS macros.
- Statistics 160A-B-C - Elements of Probability and Statistical Theory*
 (A) Topics included statistical regularity, probability spaces, fundamental theorems in discrete probability, Bayes' theorem, random variables, densities and distribution functions, and continuous distributions. Credit is awarded for only one of MATH 149A or STAT 160A.
 (B) Topics include transformations of random variables and central limit theorem, distributions of sample statistics, statistical inference, and estimation. Prerequisite: STAT 160A with a grade of "C-" or better. Credit is awarded for only one of MATH 149B or STAT 160B.
 (C) Topics include hypothesis testing, chi-square tests, and nonparametric methods. Prerequisite: STAT 160B with a grade of "C-" or better. Credit is awarded for only one of MATH 149C or STAT 160C.
- Statistics 161 - Introduction to Probability Models*

Covers compound distributions, branching processes and random walk. Explores continuous time models such as Poisson processes and queuing models. Examines the Markov property and introduces Markov chains. Also covers simple time series models.

- *Statistics 167 - Introduction to Data Science (4 units)*
Introduction to data science using the R programming language. Topics include big data management, visualization and analytical skills, unsupervised and supervised statistical learning methods, and real-world data science application examples.
- *Statistics 170A - Regression Analysis*
Topics include simple and multiple linear regression, scatter-plots, and point and interval estimation. Addresses prediction, testing, calibration, interpretation, and practical applications of multiple regression. Explores simple, partial, and multiple correlation; variable selection methods; diagnostic procedures; and regression for longitudinal data.
- *STAT170B (Design of Experiments)*
Topics include principles of design; completely randomized designs; and one-way analysis of variance. Covers complete block designs and two-way analysis of variance; multiple comparisons; complete factorial experiments. Explores fixed, random, and mixed models; split-plot designs; nested designs; analysis of covariance; sample size determination; and power analysis.
- *Statistics 171 - General Statistical Models (4 units)*

Generalized linear models and least squares. Analysis of covariance, nonlinear regression and nonlinear least squares. Regression methods for discrete data; loglinear models, logistic regression, discriminant analysis. Regression methods for life data. Cox survival model, Kaplan-Meier estimation, Mantel-Haenszel test.
- *Statistics 201A-B-C - Theory of Probability and Statistics (4 units)*

(A) Topics include probability and conditional probability; random variables: univariate and multivariate; distributions; independence; moments; generating functions; transformations, and standard distributions. Also addresses multivariate normal distribution; order statistics; inequalities; convergence concepts; law of large numbers, and the central limit theorem. Credit is not awarded for STAT201A, if it has already been awarded to STAT210A if STAT210A was taken prior to Fall 2013.

(B) Topics include exponential families; delta method; inference concepts; sufficiency; point estimation; unbiasedness; completeness; and consistency. Also explores relative efficiency; maximum likelihood; method of moments; interval estimation; pivots; and approximate intervals and regions. Credit is not awarded for STAT201B, if it has already been awarded to STAT210B if STAT210B was taken prior to Fall 2013.

(C) Topics include Bayesian estimation; prior selection; loss functions; admissibility; hypothesis testing; Neyman-Pearson lemma; size; power; UMP tests; likelihood ratio tests; sequential tests; non-parametric tests; and bootstrap. Credit is not awarded for STAT201C, if it has already been awarded to STAT210C if STAT210C was taken prior to Fall 2013.

- Statistics 202A-B - Regression, ANOVA, and Design (4 units)

(A) Topics include Linear Regression Models, Correlations, Fitting and Prediction, Diagnostics, Transformations, Collinearity, and Influential.

(B) Topics include Fixed Effects Models with or without Interactions, Types 1 - 4 ANOVA, Multiple Testing, ANCOVA, Mixed Effects Models, ML and REML Estimation Methods, BLUP, Multiple Crossed and Nested Factors, Analysis of Longitudinal Data, General Linear Mixed Models, Parametric Models for Covariance Structure, Bayesian ANOVA.

- Statistics 231A - Statistics for Biological Sciences (4 units)

Covers one- and two-sample tests, one- and two-way analysis of variance, multiple comparisons, simple and multiple linear regression, nonparametric statistics, and categorical data.