

Statistics Graduate Programme

COURSE DESCRIPTIONS

ST5198 Graduate Seminar Module

The Graduate Seminar Module is introduced as a compulsory module for research students matriculated from August 04 onwards.

The objectives are to encourage research students to participate in seminars and help to improve their presentation skills. It is made up of 2 components:

- (1) Attend departmental seminars (Year 1, Sem 1)
- (2) Deliver a 20-30 mins talk followed by 5-10 mins Question and Answer session (Year 1, Sem 2)

Student must obtain a "Satisfactory" grade for the module as part of the graduation requirements.

ST5204 Experimental Design 2

Prerequisite: ST3232 or ST5203 or Departmental approval

General linear model approach to the analysis of experimental designs, means model and effects model, unbalanced designs and missing values, split-plot, strip-plot, repeated measures, nested and crossover designs, response surface methodology.

ST5205 Probability Theory 2

Prerequisite: MA4241 or ST4237

Overlap: MA5260

Conditional expectation given a sigma-algebra, Martingale, stopping time, Martingale convergence theorems, Doob's Stopping Theorem and applications, Brownian motion, construction and sample path properties.

ST5206 Generalized Linear Models

Prerequisite: ST4233 or Departmental approval

Model fitting and selection, models for continuous and discrete data, models for polytomous data, log-linear models, conditional and quasi-likelihoods, diagnostics.

ST5207 Nonparametric Regression

Prerequisite: ST3131 or Departmental approval

Various smoothing methods, including kernel, spline, nearest neighbour, orthogonal series and penalized likelihood.

ST5208 Statistics for Quality and Productivity Improvement

Prerequisite: ST3235 or Departmental approval

Statistical process and quality control, response surface, reliability analysis, design of experiments, Taguchi method.

ST5209 Analysis of Time Series Data

Prerequisite: ST3233 or Departmental approval

Stationary processes, ARIMA processes, forecasting, parameter estimation, spectral analysis, non-stationary and seasonal models.

ST5210 Multivariate Data Analysis

Prerequisite: ST4236 or Departmental approval

Dimension reduction, cluster analysis, classification, multivariate dependencies and multivariate statistical model assessment with emphasis on non-normal theory, computer-intensive data-dependent methods.

ST5211 Sampling From Finite Populations

Prerequisite: ST2132 or Departmental approval

Survey data, basic sampling, stratified sampling, cluster sampling, double sampling, systematic sampling, non-response and missing values, multiple imputations, bootstrap of sampling error.

ST5212 Survival Analysis

Prerequisite: ST2132 or Departmental approval

Censoring, probability models for survival times, graphical procedures, Inference procedures. Parametric and nonparametric models, Cox proportional hazards model, regression models for grouped data, Bayesian predictive distributions.

ST5213 Categorical Data Analysis

Prerequisite: ST3131 or Departmental approval

Categorical response data and contingency tables, loglinear models, building and applying loglinear models, loglinear and logit models for ordinal variables, multinomial response models.

ST5214 Advanced Probability Theory

Prerequisite: ST2131 or Departmental approval

Compulsory to MSc by Research and AMP students

Overlap: MA5259

Probability measures and their distribution functions. Random variable: properties of mathematical expectation, independence, conditional probability and expectation. Convergence concepts: various modes of convergence of sequence of random variables; almost sure convergence, Borel-Cantelli Lemma, uniform integrability, convergence of moments. Weak and strong law of large numbers. Convergence in distribution, characteristic function: general properties, convolution, uniqueness and inversion., Lindeberg conditions and central limit theorem.

ST5215 Advanced Statistical Theory

Prerequisite: ST2131 and ST2132 or Departmental approval
Compulsory to MSc by Research and AMP students

Review: Weak Law of large numbers, central limit theorem, Slutsky theorem, delta method and variance stabilizing transformation. Statistical models. Sufficiency and Neyman's Factorization criterion. Scores. Exponential families. Estimation methods: moment, maximum likelihood, least squares. Optimality of estimates. Unbiasedness, minimum variance, completeness, UMVU estimates. Theorems of Rao-Blackwell, Cramer-Rao, Lehmann-Scheffe. Consistency. Large sample theory of MLE's, Bayes, minimax. Confidence intervals, P-values, classical (Neyman-Pearson) tests, UMP tests, Likelihood ratio test, Power, Wald's test, Rao's Score test, Application of likelihood ratio tests to regression.

ST5217 Statistical Methods for Genetic Analysis

Pre-requisite: Departmental approval

This is a level 5000 course on genetic data analysis focusing on human and population genetics. The emphasis will be in understanding the role of statistics and data analysis in modern genetics research and its applications. Numerical and computational methods will be discussed with applications to real data sets. To equip the students with the tools to conduct genetic data analysis. Topics include introduction to genetics, gene mapping, sequence data, population genetics and coalescent theory, phylogeny reconstruction, pedigree analysis, genetic epidemiology, role of genetic factors in human diseases, familial aggregation, segregation and linkage analysis, analysis of complex and quantitative traits. This module is targeted at students who are interested in Statistics and are able to meet the pre-requisites.

ST5241 Special Topics

Prerequisite: Departmental approval

This module consists of selected topics which may vary from year to year depending on the interests and availability of staff.

ST5242 Special Topics

Prerequisite: Departmental approval

This module consists of selected topics which may vary from year to year depending on the interests and availability of staff.