Sylla us of PhD Preliminary Examination in Pro a ility and Stati tic

Probability and Statistics Prelim Committee
Department of Mathematics
New Mexico Institute of Mining and Technology

Probability and Statistics Prelim Committee Members:
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The PhD Preliminary Examination in Probability and Statistics is intended to determine whether a student has adequate knowledge at the undergraduate level in statistics and probability (including stochastic processes) to begin a Ph.D. thesis research in applied mathematics. The exam is written and graded by a committee of professors in the Department of Mathematics with expertise in probability and statistics.

The written exam consists of approximately 6 to 8 questions. The students are given four hours to take the exam. Students are not allowed use of notes or books, but allowed use of a calculator. A passing score is 70% or higher. Students who fail the exam can take the exam one more time.

Students interested in taking the exam should have taken the courses, Math 483 (Mathematical Statistics) and Math 486 (Stochastic Processes), or their equivalents. A student should prepare for the exam by studying the relevant material from several books listed at the end of this syllabus, and by reviewing problems of the practice test and of previously given exams.

Statistics

Families of distributions: location and scale families

Populations, samples, statistics, order statistics

Sampling distributions in the normal case (t, chi-squared, F)

Parametric point estimation: maximum likelihood, method of moments, Bayes estimation

MLE and Fisher information, univariate and multivariate, Delta method

Hypothesis testing: likelihood ratio tests, size, level, power, chi-square tests

Interval estimation, bootstrap (?)

Bayesian inference

Simple linear regression mo

4. H. Taylor and S. arlin, *An Intro uction to Stochastic Mo eling*, Academic Press, 2014.

Supplementary

1. (?) R. Walpole et al *robability an Statistics for Engineers an Scientists*, Pearson, 2016.

2. L. Bain and M. Engelhardt, *Intro uction to robability an Mathematical Statistics* , Cengage, 2000.