

SYLLABUS FOR PRELIMINARY EXAMINATION IN PROBABILITY

Revised: June, 2005

Topics: random variables, expectations, probability inequalities, laws of large numbers, Borel-Cantelli Lemmas, zero-one laws, weak convergence, characteristic functions, central limit theorem, conditional probability, conditional expectation, martingales and applications.

Theorems: Examinees may be asked to state and be familiar with the proofs of the following theorems:

- Borel-Cantelli Lemmas [1, Thms 4.3, 4.4]
- Kolmogorov's Zero-One law [1, Thms 4.5, 22.3]
- Kolmogorov's maximal inequality for sums of independent random variables [1, Thm 22.4]
- Central Limit Theorem for the sums of iid random variables [1, Thm 27.1]
- Lindeberg's Central Limit Theorem for the sums of independent random variables [1, Thm 27.2]
- Law of large numbers for independent random variables [1, Thm 22.1]
- Optional sampling theorem for submartingales [1, Thm 35.2]
- Martingale convergence theorem [1, Thm 35.5]

Examinees may also be asked for exact statements of other theorems.

REFERENCES

- [1] P. Billingsley, Probability and Measure IIIrd edition
- [2] P. Billingsley, Probability and Measure IInd edition