School of Mathematics

Course 251 - Probability and Theoretical Statistics 2001–02
(SF MSISS, SF Mathematics, JS TSM)

Lecturer: Dr. K. Mosurski

Requirements/prerequisites: 151

Duration: 24 weeks

Number of lectures per week: 3

Assessment: assignments taken into accountin final result.

End-of-year Examination: One 3-hour examination

Description: The objectives of the course are:

1. To demonstrate a methodology for handling random outcomes.

2. To teach the rules and methods of probability manipulation.

3. To teach the methods of distribution theory.

4. To present the methods and philosophy of statistical modelling.

5. To introduce the use of computers in statistical modelling.

Course Content

Probability Theory. Definition via axioms, basic manipulation rules, set measure Conditional Probability, Independence of events, Bayes' rule. Random Variables, Distribution and Density Functions, Multivariate Densities. Expectation operator, Moments, conditional moments. (objectives 1 and 2) Introduction to simulation (5)

Probability and Moment Generating Functions, Characteristic Functions.

Sums of Random Variables, The Law of Large Numbers , i.i.d Central Limit Theorem and extensions, and other limits. Standard Distributions. Interrelationships, Bernoulli, Binomial, Geometric, Negative Binomial, Hypergeometric, Poisson Characterisations of the Normal distribution..Multivariate Normal, Multivariate Bernoulli. Samples, likelihood, sampling distributions of means, sample variances. Discrete and continuous mixture distributions. (objectives 3 and 4).

Assessment

Exercise sheets may be handed out during the course. These will be marked and returned to the students. During the Easter vacation the students are expected to carry out team projects based on the course to date. These will involve the use of the computer package MINITAB. Teams will present the results of the projects to the class.

Students may opt out of the above assessments although they are strongly advised not to do so.

A standard College exam will be held in June with a supplemental (if required) in September.

Marking

June Mark = max (f1,f2) where: f1 = 0.8 exam + 0.2 (cts. assessment), f2 = exam.
Note this formula maybe adjusted to take account of extra/fewer exercises given to students.
Supplemental mark = exam

Textbooks:

1. Mood, A.M., Graybill, F.A. and Boes, D.C., *"Introduction to the Theory of Statistics,"* Mc Graw-Hill (paper-back).

2. Lindgren, B.W., *"Statistical Theory",* 3rd edition.

3. Hogg, R.V. and Craig, A.T., *"Introduction to Mathematical Statistics"*, MacMillan, 3rd edition.

4. Hoel, P.G., Port, S.C. and Stone, C.J., *"Introduction to Probability Theory",* Houghton Miffin.

5. Thompson, W.A. Jr., *"Applied Probability".*

October 11, 2001