MSO 201A/ESO 209: Probability and Statistics  
2014-2015-II Semester

Instructor: Dr. Neeraj Misra  
FB 515, Department of Mathematics & Statistics  
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Lectures: Venue: L7; Days: M,Th,F; Time: 08:00-08:50 Hrs

Tutorials:

Section R1: Roll numbers 11009 – 13111; Tutor: Dr. A K Chaturvedi; Venue: L-3; Day: W; Time: 08:00 to 08:50 Hrs.

Section R2: Roll numbers 13112 – 13290; Tutor: Dr. Sumit Ganguly; Venue: L-4; Day: W; Time: 08:00 to 08:50 Hrs.

Section R3: Roll numbers 13291 – 13477; Tutor: Dr. Joydeep Dutta and Dr. Somesh K Mathur; Venue: L-5; Day: W; Time: 08:00 to 08:50 Hrs.

Section R4: Roll numbers 13478 – 13650; Tutor: Dr. Faiz Hamid; Venue: L-14; Day: W; Time: 08:00 to 08:50 Hrs.

Section R5: Roll numbers Y9053–10600, 12881, 12882, 12915 and 13651–13819; Tutor: Dr. Sudib Kumar Mishra; Venue: L-15; Day: W; Time: 08:00 to 08:50 Hrs.

Office Hours: To be announced by respective tutors, if any.

Weightages

There will be one mid-semester examination (on one of the days during 16-02-15 to 21-02-15, to be announced by DOAA), carrying 30% weightage; an end-semester examination (on one of the days during 20-04-15 to 29-04-15, to be announced by DOAA) carrying 50% weightage; and two quizzes (on 31-01-15 (Saturday) and 21-03-15 (Saturday)), each carrying a weightage of 10%.
Academic Performance Evaluation Scheme

Although the policy of relative grading will be followed for awarding the final grades, there is a minimum performance requirement for each grade. These minimum performance requirements are given below:

- **A* Grade:** 85% Marks
- **A Grade:** 70% Marks
- **B Grade:** 55% Marks
- **C Grade:** 40% Marks
- **D Grade:** 30% Marks
- **E Grade:** 20% Marks

Attendance Policy & Code of Conduct

Except for reasons beyond student’s control, every student is expected to attend all sessions (lectures, tutorials, examinations, quizzes) of the course. Students are also expected to maintain proper decorum during lectures, tutorials and examinations. Any act of indiscipline will be sternly dealt with and severely penalized.

Makeup Examination Policy

Except for serious exigencies (such as hospitalization during the examination), there will be no makeup examination for mid-semester examination and quizzes. Makeup examination for end-semester examination will be as per the policy of the institute.

Text Book:


Course Content:

**Probability:** Axiomatic definition, Properties, Conditional probability, Bayes rule and independence of events, Random Variables, Distribution function, Probability mass and density functions, Expectation, Moments, Moment generating function, Chebyshev’s inequality, Special distributions: Bernoulli, Binomial, Geometric, Negative binomial, Hypergeometric, Poisson, Uniform, Exponential, gamma; Joint distributions, Marginal and conditional distributions, Moments, Independence of random variables, Covariance, Correlation, Functions of random variables, Weak law of large numbers, P.Levy’s Central limit theorem (i.i.d. finite variance case), Normal and Poisson approximations to Binomial.

**Statistics:** Introduction: Population, sample, parameters; Point Estimation: Method of moments, MLE, Unbiasedness, Consistency, Comparing two estimators (Relative MSE), Confidence interval estimation for mean, difference of means, variance, proportions, Sample size problem; Tests of Hypotheses: N-P lemma, examples of MP and UMP tests, p-value, Likelihood ratio test, Tests for mean, variance, two sample problems, Tests for
proportions, Relation between confidence interval and tests of hypotheses, Chi-square goodness of fit tests, Contingency tables, SPRT; Regression Problem: Scatter diagram, Simple linear regression, Least square estimation, Tests for slope and correlation, prediction problem, Graphical residual analysis, Q-Q plot to test for normality of residuals, Multiple regression; Analysis of Variance: Completely randomized design and Randomized block design; Quality Control, Shewhart control charts and cusum charts.