



Course No. MSO 201a

Probability and Statistics

2016-17-II Semester

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Module 1

COURSE DETAILS

Course Details

- This course will be conducted in Flipped Classroom mode.
- Release of Video Lectures: Every Friday evening between three to seven videos will be released.
- Total duration (per week) of these videos will be between 90-100 minutes (each video will be of about 10 to 35 minutes duration).
- You are expected to watch these videos at your convenience and come for discussions in flipped classrooms.
- Flipped classroom: Venue: L7; Days: Mondays; Time 08:00-08:50 Hrs
- Discussion Hour: Venue: L7; Days: Fridays; Time 08:00-08:50 Hrs

Tutorials

- On Wednesdays; Time: 08:00-08:50 Hrs.
- Whole class is divided into five sections. Each section will be handled by a different tutor.
- Section 1: Roll numbers 10001-150119; Section 2: Roll Numbers 150120-150368;
- Section 3: Roll Numbers 150369-150596; Section 4: Roll Numbers 150597-151100;
- Venue of tutorials and names of tutors will be announced in course portal.
- Office Hours (if any): To be announced by respective tutors.

Weightages

- Mid-Semester Examination of 2 Hour Duration (pen and paper): On 27-02-17 (Mon), carrying 24% weightage;
- End-Semester Examination of 3 Hour Duration (pen and paper): On 24-04-17 (Mon), carrying 40% weightage;
- Two classroom quizzes of 30 minutes each (pen and paper): On 04-02-17 (Sat) and 08-04-17 (Sat), each carrying a weightage of 10%;
- Four online quizzes of 20 minutes each: On 21-01-17 (Sat), 18-02-17 (Sat), 25-03-17 (Sat) and 15-04-17 (Sat)), each carrying a weightage of 4%.

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

You are expected to:

- watch the video lectures on regular basis;
- attend all sessions (flipped classrooms, tutorials, examinations, quizzes) of the course;
- maintain proper decorum and discipline during flipped classrooms, tutorials and examinations. Any act of misconduct will be dealt severely.

Makeup Examination Policy

- Mid-semester examination and quizzes:
Except for serious exigencies (such as hospitalization during the examination), there will be no makeup examination.
- End-semester examination:
As per the policy of the institute.

Text Book

- Introduction to Mathematical Statistics, Seventh Edition, by Robert V. Hogg, J. W. McKean, and Allen T. Craig, Pearson Education, Asia.

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 (IID, finite variance cast), 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 table; 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.

Abstract of Next Module

- Introduction to probability and Statistics and their interrelations.

Thank you for your patience

