Course name: Introduction to Statistics and Econometrics

Monsoon 2015

Course No.: IE 408

Instructor: Mandira Sarma

Course credit: 4

1. **Probability and Random Variables**: Definitions and axioms of probability, probability set functions; probability density functions, distribution and characteristic functions; conditional probability.
2. **Some Well-known Distributions:** Binomial, Poisson, Uniform, exponential, Normal, Gamma, Chi-square, t-, F distributions and Bivariate/Multivariate Normal Distribution. Distribution of functions of random variables. Concept of sampling distribution.
3. **Asymptotic Theory:** Convergence in Probability, Convergence in Distribution, Central Limit Theorem.
4. **Statistical Inference:** Point and interval estimation. Unbiasedness, asymptotic unbiasedness, consistency, and efficiency of estimators. Method of maximum likelihood and properties of MLE estimators. Testing of hypotheses, errors of first and second kind, power of the test, and likelihood ratio test.
5. **Simple Linear Regression**: Method of least squares, properties of OLS estimators and goodness of fit. Gauss Markov Theorem.
6. **Multiple Linear Regression Analysis:** General case (k-explanatory variables); examples with k=2 & 3. Relationship between simple correlation, partial regression and multiple regression coefficients. Misspecification of models, omitted variable bias and properties of OLS estimates. Problem of multicollinearity.
7. **Inference in the Regression Model:** Hypothesis testing for significance of a subset of coefficients; and overall significance.
8. **Generalized Least Squares and Feasible Least Squares:** Violation of assumption on spherical errors (problems of autocorrelation and heteroscedasticity), GLS and FGLS. Tests to detect autocorrelation and heteroskedasticity. Problem of autocorrelation in lagged dependent variable models.

References:

Robert Hogg, Joseph W. McKean and Allen T. Craig: Introduction to Mathematical Statistics (6th edition, 2005)

Robert Hogg and Eliot Tanis: Probability and Statistical Inference (7th edition, 2006)

James Stock and R.W. Watson: Introduction to Econometrics (International edition 2007)

Jeffrey Wooldridge: Introductory Econometrics: A Modern Approach (2006).

Additional reading list will be provided in class as and when required.