

## ECO341A: Econometrics I / Instructor: Dr. Deep Mukherjee

**Objective of the Course:** This is the first level undergraduate course in Econometrics. This course provides the foundations for undertaking econometric research. The objective of the course is to teach statistical tools needed to basic linear regression analysis, use of software to conduct empirical economic research.

### Course outline:

Topic	Number of lectures
<b>Statistical distribution theory:</b> Probability density function and cumulative distribution functions; Joint, marginal and conditional distributions; Distribution of a function of a random variable; Moments; Chi-square, t and F distributions	6
<b>Statistical inference:</b> Estimation (Unbiasedness, consistency and efficiency of estimators, Least squares principle, method of moments, method of maximum likelihood); Hypothesis testing (Type I and II error, Power of a test)	6
<b>Classical Linear Regression Model (CLRM):</b> Sampling distribution of regression estimates; Gauss-Markov theorem; Asymptotic distribution of regression coefficient, Residuals, Goodness of fit, Properties of estimators	8
<b>Statistical inference in the context of CLRM:</b> t test and F test; Jarque-Bera test; Asymptotic tests (LR test, Wald test, LM test); Model specification test	6
<b>Problems associated with CLRM:</b> Multicollinearity; Heteroskedasticity; Autocorrelation; Diagnosis of such problems (VIF, Theil's measure, Breusch-Pagan test, White's test, Durbin-Watson test, Ljung-Box test); Remedies to heteroskedasticity and autocorrelation (Heteroskedasticity robust inference, Generalized Least Squares estimator, Prais-Winsten procedure, Cochrane-Orcutt procedure); Omitted variables and Instrumental Variable estimator	8
<b>Time-series regression:</b> Trend and seasonality; Assumption; Models with lagged explanatory variables; Models with lagged dependent variable	3
<b>Regression with qualitative information:</b> Dummy variable; Interactions of dummy variables; Seasonal dummy model; Structural change and Chow test	3
<b>Total number of lectures (Class time: 50 minutes)</b>	<b>40</b>

### Suggested Textbooks:

1. Dougherty, C. *Introduction to Econometrics*, 5<sup>th</sup> Edition, Oxford University Press
2. Stock, J. H. & Watson, M. W. *Introduction to Econometrics*, 3<sup>rd</sup> Edition, Pearson
3. Wooldridge, J. M. *Introductory Econometrics: A Modern Approach*, 5<sup>th</sup> Edition, Cengage