

Syllabus template

Semester: 5	
Course : Economics	
Paper Title: INTRODUCTORY ECONOMETRICS	
Paper code: C3EC230521T	Credits: 4
Hours/week : 4	
Category: Core/MDC/SEC/VAC : Core	
Theory / Practical / Composite : Theory	
No of Modules : 2	
Course Overview:	
<ol style="list-style-type: none"> 1. To study fundamental concepts of probability distributions and their applications. 2. To study statistical concepts of estimation and hypothesis testing. 3. To study basic econometric concepts and techniques for analyzing economic data. 4. To study the properties of Ordinary Least Squares (OLS) and Maximum Likelihood estimates. 5. To study diagnostic testing methods for simple and multiple regression models. 6. To study the consequences of multicollinearity and explore possible remedies. 	
Course Outcome:	
Module 1:	
<ol style="list-style-type: none"> 1. Identify key statistical distributions, including Normal, Chi-square, t-, and F-distributions, and their roles in data analysis. 2. Explain the concepts of parameter estimation, properties of estimators, and the logic behind hypothesis testing. 3. Apply estimation techniques and statistical tests to compute and interpret parameters in sample data. 4. Analyze Type I and Type II errors, the power of a test, and implications for decision-making in hypothesis testing. 5. Evaluate methods for comparing parameters from two samples and judge the appropriateness of different statistical tests. 6. Construct statistical hypotheses and design tests to draw conclusions about population parameters based on sample evidence. 	
Module 2:	
<ol style="list-style-type: none"> 1. Recognize the nature, scope, and objectives of econometrics and its role in economic analysis. 2. Summarize the assumptions and derivation of the simple linear regression model, including models without an intercept, and interpret regression coefficients. 3. Implement the Ordinary Least Squares (OLS) and Maximum Likelihood estimation methods to estimate regression parameters and evaluate model fit. 4. Differentiate among key properties of regression coefficients, such as BLUE properties, and analyze goodness-of-fit measures including R^2 and alternative interpretations. 5. Assess the validity of regression results using hypothesis tests, including the F-test, and diagnose issues like multicollinearity in multiple regression models. 6. Design multiple regression models, interpret multiple regression coefficients, apply the Gauss-Markov theorem, and make predictions using the fitted model. 	
Prerequisites: <i>cumulative knowledge of previous semesters needed</i>	

SYLLABUS				
UNIT/Module	CONTENT	HOURS or NUMBER OF CLASSES	CO Mapping	COGNITIVE LEVEL
I.	<ul style="list-style-type: none"> Statistical Concepts Normal distribution; chi-sq, t- and F-distributions; estimation of parameters; properties of estimators; testing of hypotheses: defining statistical hypotheses related to population parameters; Type I and Type II errors; power of a test; tests for comparing parameters from two samples. 	2 classes per week	CO1, CO2, CO3, CO4, CO5, CO6	K1, K2, K3, K4, K5, K6
II.	<ul style="list-style-type: none"> Nature and Scope of Econometrics Simple Linear Regression Model: Two Variable Case Assumptions, Derivation of the regression coefficient, regression models without an intercept, interpretation of a regression equation, important results relating to OLS regression, goodness of fit – R², alternative interpretation of R², properties of regression coefficients and hypothesis testing, the F-test of goodness of fit, BLUE properties, Maximum Likelihood method of estimation . Multiple Linear Regression Model : Assumptions of the CLRM, Derivation and interpretation of the multiple regression coefficients; properties of the multiple regression coefficients; Multicollinearity, goodness of fit – R², F-test, analysis of variance and adjusted R², Gauss-Markov Theorem, Prediction 	2 classes per week	CO1, CO2, CO3, CO4, CO5, CO6	K1, K2, K3, K4, K5, K6
Text Books				
1. Jay L. Devore, Probability and Statistics for Engineers, Cengage Learning, 2010.				
2. John E. Freund, Mathematical Statistics, Prentice Hall, 1992.				
3. Richard J. Larsen and Morris L. Marx, An Introduction to Mathematical Statistics and its Applications, Prentice Hall, 2011.				
4. Maddala, Introduction to Econometrics, Wiley				

Suggested readings			
1. Jan Kmenta, Elements of Econometrics, Indian Reprint, Khosla Publishing House, 2nd ed. 2008			
2. Jack Johnston and John Dinardo, Econometric Methods, McGraw Hill Higher Education; 4th edition (July 16, 1997)			
Web Resources			
NA			
Evaluation :CIA: 30 (20+5+5)+ End Semester:70			
Paper Structure for Theory Semester Exam:			
Module	No. of questions to be answered	No. of alternatives given	Marks
Module 1 (35 marks)	3	4	3×5=15
	2	3	2×10=20
Module 2 (35 marks)	3	4	3×5=15
	2	3	2×10=20
		Total	70

Course outcomes (COs) and Cognitive Level Mapping

COs	CO Description	Cognitive levels
	Module 1	
CO1	Identify key statistical distributions, including Normal, Chi-square, t-, and F-distributions, and their roles in data analysis.	K1
CO2	Explain the concepts of parameter estimation, properties of estimators, and the logic behind hypothesis testing.	K2
CO3	Apply estimation techniques and statistical tests to compute and interpret parameters in sample data.	K3
CO4	Analyze Type I and Type II errors, the power of a test, and implications for decision-making in hypothesis testing.	K4
CO5	Evaluate methods for comparing parameters from two samples and judge the appropriateness of different statistical tests.	K5
CO6	Construct statistical hypotheses and design tests to draw conclusions about population parameters based on sample evidence.	K6
	Module 2	
CO1	Recognize the nature, scope, and objectives of econometrics and its role in economic analysis.	K1
CO2	Summarize the assumptions and derivation of the simple linear regression model, including models without an intercept, and interpret regression coefficients.	K2
CO3	Implement the Ordinary Least Squares (OLS) and Maximum Likelihood estimation methods to estimate regression parameters and evaluate model fit.	K3
CO4	Differentiate among key properties of regression coefficients, such as BLUE properties, and analyze goodness-of-fit measures including R^2 and alternative interpretations.	K4

CO5	Assess the validity of regression results using hypothesis tests, including the F-test, and diagnose issues like multicollinearity in multiple regression models.	K5
CO6	Design multiple regression models, interpret multiple regression coefficients, apply the Gauss-Markov theorem, and make predictions using the fitted model.	K6