Syllabus template

Semester: 1 (MSC w.e.f. 2026)	
Course : Economics	
Paper Title: Quantitative Economic Analysis I	
Paper code: M2C4EC26013C	**Credits: 6**
Hours/week : 4 CLASSESS/WEEK + 2 HOURS OF SELF-DIRECTED STUDY	
Category: Core/MDC/SEC/VAC : Core	
Theory / Practical / Composite : Composite	
No of Modules : 3	

Course Overview:

1. To study the consequences arising from violations of classical regression assumptions.
2. To study methods for testing and estimating linear regression models in the presence of heteroscedasticity.
3. To study techniques for testing and estimating linear regression models affected by serial correlation.
4. To study analytical tools and methods for examining time series data in economics.
5. To study the structure and applications of simultaneous equation models.
6. To study the use of computer-based techniques for analyzing time series and cross-sectional economic data.

Course Outcome:

Module 1:

1. Identify the key classical linear regression assumptions and recognize the nature of heteroscedasticity and autocorrelation.
2. Explain the causes and consequences of heteroscedasticity and autocorrelation in regression models.
3. Apply appropriate diagnostic tests to detect heteroscedasticity and autocorrelation in empirical data.
4. Analyze the impact of assumption violations on parameter estimates, standard errors, and inference.
5. Implement corrective estimation techniques to address heteroscedasticity and autocorrelation in linear regression models.
6. Evaluate the suitability of Logit and Probit models for analyzing qualitative dependent variables in applied economic research.

Module 2:

1. Describe the concept of autocorrelation and outline the roles of ACF and PACF in time series analysis.
2. Distinguish among key stochastic processes including white noise, random walks, MA, AR, ARMA, and ARIMA processes.
3. Interpret the behavior and properties of different time series processes using correlograms and model characteristics.
4. Examine the conditions under which unit roots arise and explain their implications for time series modeling.

5. Assess the presence and impact of structural breaks in economic time series data.
6. Construct appropriate time series models by selecting suitable processes based on empirical patterns and diagnostic tools.

Module 3

1. Recognize the role of economic theories to specify single-equation models for empirical analysis.
2. Implement identification rules to verify the estimability of simple economic equations.
3. Apply appropriate techniques to specify and identify econometric models correctly.
4. Demonstrate the estimation of single-equation models using standard econometric methods.
5. Execute estimation procedures and obtain interpretable parameter estimates for simple economic relationships.
6. Solve basic empirical problems by applying specification and identification principles in single-equation models.

SYLLABUS

UNIT/Module	CONTENT	HOURS or NUMBER OF CLASSES	CO Mapping	COGNITIVE LEVEL
I.	Violation of Classical Assumptions: Heteroscedasticity, Autocorrelation Logit and Probit models	01	CO1, CO2, CO3, CO4, CO5, CO6	K1,K2, K3, K4, K5, K6
II	Autocorrelation - ACF and PACF - Some Useful Processes (White Noise, Random Walks, MA Processes, AR Processes, ARMA Processes and ARIMA Processes) –Unit root and structural break.	01	CO1, CO2, CO3, CO4, CO5, CO6	K1,K2, K3, K4, K5, K6
III	Specification, Identification, single equation estimation in simple economic models	01	CO1, CO2, CO3, CO4, CO5, CO6	K1,K2, K3, K4, K5, K6
	Practical	01	CO1, CO2, CO3, CO4, CO5, CO6	K1,K2, K3, K4, K5, K6

Text Books

1. Jeffrey M. Wooldridge: Introductory Econometrics – A Modern Approach, 5th Edition, South-Western Cengage Learning
2. Maddala, G.S: Introduction to Econometrics, 3rd Edition, John Wiley and son
3. Johnston and Dinardo: Econometric Methods,4th Edition, The McGraw Hill Companies Inc.

Suggested readings

1. James H Stock and Mark W. Watson: Introduction to Econometrics, Pearson Education
2. G. C. Chow: Econometrics (1984)
3. Kmenta, J.: Elements of Econometrics

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 (20 marks)	2	3	10×2=20
Module 2 (20 marks)	2	3	10×2=20
Module 3 (10 marks)	1	2	1×10=10
Total marks (Theory)			50
Total marks (Practical)			20
		Total	**70**

Course outcomes (COs) and Cognitive Level Mapping

COs	**CO Description**	**Cognitive levels**
	Module 1	
CO1	Identify the key classical linear regression assumptions and recognize the nature of heteroscedasticity and autocorrelation.	K1
CO2	Explain the causes and consequences of heteroscedasticity and autocorrelation in regression models.	K2
CO3	Apply appropriate diagnostic tests to detect heteroscedasticity and autocorrelation in empirical data.	K3
CO4	Analyze the impact of assumption violations on parameter estimates, standard errors, and inference.	K4
CO5	Implement corrective estimation techniques to address heteroscedasticity and autocorrelation in linear regression models.	K5
CO6	Evaluate the suitability of Logit and Probit models for analyzing qualitative dependent variables in applied economic research.	K6
	Module 2	
CO1	Describe the concept of autocorrelation and outline the roles of ACF and PACF in time series analysis.	K1
CO2	Distinguish among key stochastic processes including white noise, random walks, MA, AR, ARMA, and ARIMA processes.	K2
CO3	Interpret the behavior and properties of different time series processes using correlograms and model characteristics.	K3
CO4	Examine the conditions under which unit roots arise and explain their implications for time series modeling.	K4
CO5	Assess the presence and impact of structural breaks in economic time series data.	K5
CO6	Construct appropriate time series models by selecting	K6

	suitable processes based on empirical patterns and diagnostic tools.	
	Module 3	
CO1	Recognize the role of economic theories to specify single-equation models for empirical analysis.	K1
CO2	Implement identification rules to verify the estimability of simple economic equations.	K2
CO3	Apply appropriate techniques to specify and identify econometric models correctly.	K3
CO4	Demonstrate the estimation of single-equation models using standard econometric methods.	K4
CO5	Execute estimation procedures and obtain interpretable parameter estimates for simple economic relationships.	K5
CO6	Solve basic empirical problems by applying specification and identification principles in single-equation models.	K6