Syllabus template

Semester: 1 (MSC w.e.f. 2026)	
Course : Economics	
Paper Title: Quantitative Economic Analysis II	
Paper code: M2C4EC26014C	**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 advanced tools and methods of exploratory data analysis.
2. To study the techniques of cointegration and error correction and their applications in economic analysis.
3. To study the structure and estimation of simultaneous stochastic equation models.
4. To study the interaction between economic theory and empirical economic applications.
5. To study system estimation techniques used in econometric modeling.
6. To study and compare single-equation and system estimation methods.

Course Outcome:

Module 1:

1. Identify the objectives and underlying assumptions of Principal Component Analysis and Factor Analysis.
2. Explain the theoretical basis of the Principal Component method of estimation.
3. Apply Principal Component Analysis to reduce dimensionality and extract common factors from multivariate data.
4. Analyse factor loadings and eigenvalues to interpret the results of factor analysis.
5. Evaluate the suitability of Principal Component–based factor models for empirical economic data.
6. Construct and interpret factor-based representations of datasets for applied economic analysis.

Module 2:

1. Recognize the conditions under which cointegration arises among economic time series variables.
2. Describe the structure and functioning of error correction, Vector Auto Regression, and Vector Error Correction models.
3. Implement appropriate time series models to examine dynamic relationships among economic variables.
4. Examine short-run and long-run adjustments captured through cointegration and error correction mechanisms.
5. Assess the applicability of VAR and VEC models for empirical economic analysis.
6. Formulate empirical economic applications using advanced time series techniques to interpret real-world economic phenomena.

Module 3

1. Identify the rank and order conditions required for the identification of econometric models.
2. Explain linear homogeneous restrictions and zero restrictions as special cases in model identification.
3. Apply single-equation estimation techniques such as OLS, ILS, instrumental variables, and two-stage least squares.
4. Analyse the properties and limitations of alternative estimators including K-class and LIML.
5. Evaluate system estimation methods such as three-stage least squares and full information maximum likelihood.
6. Construct appropriate estimation strategies by selecting suitable single-equation or system methods for empirical economic models.

SYLLABUS

UNIT/Module	CONTENT	HOURS or NUMBER OF CLASSES	CO Mapping	COGNITIVE LEVEL
I.	Principal Components, Factor Analysis using Principal Component method of estimation.	01	CO1, CO2, CO3, CO4, CO5, CO6	K1,K2, K3, K4, K5, K6
II	Cointegration and error correction model; Vector Auto Regression Model; Vector Error Correction model; Applications of Time Series Techniques in Economics	01	CO1, CO2, CO3, CO4, CO5, CO6	K1,K2, K3, K4, K5, K6
III	Rank &Order Condition – Linear Homogeneous Restriction - Zero Restriction (Special case). Single Equation Modelling- OLS, ILS, Instrumental Variable Estimator, 2 SLS, K-class, LIML, System Estimation Method-3SLS, FIML	01	CO1, CO2, CO3, CO4, CO5, CO6	K1,K2, K3, K4, K5, K6
	Practicals	01	CO1, CO2, CO3, CO4, CO5, CO6	K1,K2, K3, K4, K5, K6

Text Books

1. Johnson, R. A, and Wichern, D. W (2013).: Applied Multivariate Statistical Analysis, Pearson Education, 6th Edition.
2. Johnston and Dinardo: Econometric Methods, 4th Edition, The McGraw Hill Companies Inc.
3. Judge. et.al. (1993) :Theory and Practice of Econometrics, Wiley

Suggested readings
1. Richard Harris and Robert Sollis, Wiley Student Edition
2. Bridge J.L.: Applied Econometrics, North Holland Publishing Company.
3. Theil (1971) : Principles of Econometrics. Wiley
4. Maddala, G.S (1988) : Econometrics, McGraw hill
5. G.C. Chow: Econometrics (1984)
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)	1	2	15×1=15
Module 2 (20 marks)	2	3	10×2=20
Module 3 (10 marks)	1	2	15×1=15
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 objectives and underlying assumptions of Principal Component Analysis and Factor Analysis.	K1
CO2	Explain the theoretical basis of the Principal Component method of estimation.	K2
CO3	Apply Principal Component Analysis to reduce dimensionality and extract common factors from multivariate data.	K3
CO4	Analyse factor loadings and eigenvalues to interpret the results of factor analysis.	K4
CO5	Evaluate the suitability of Principal Component–based factor models for empirical economic data.	K5
CO6	Construct and interpret factor-based representations of datasets for applied economic analysis.	K6
	Module 2	
CO1	Recognize the conditions under which cointegration arises among economic time series variables.	K1
CO2	Describe the structure and functioning of error correction, Vector Auto Regression, and Vector Error Correction models.	K2
CO3	Implement appropriate time series models to examine dynamic relationships among economic variables.	K3
CO4	Examine short-run and long-run adjustments captured	K4

	through cointegration and error correction mechanisms.	
CO5	Assess the applicability of VAR and VEC models for empirical economic analysis.	K5
CO6	Formulate empirical economic applications using advanced time series techniques to interpret real-world economic phenomena.	K6
	Module 3	
CO1	Identify the rank and order conditions required for the identification of econometric models.	K1
CO2	Explain linear homogeneous restrictions and zero restrictions as special cases in model identification.	K2
CO3	Apply single-equation estimation techniques such as OLS, ILS, instrumental variables, and two-stage least squares.	K3
CO4	Analyse the properties and limitations of alternative estimators including K-class and LIML.	K4
CO5	Evaluate system estimation methods such as three-stage least squares and full information maximum likelihood.	K5
CO6	Construct appropriate estimation strategies by selecting suitable single-equation or system methods for empirical economic models.	K6