



## Lahore University of Management Sciences

### ECON 334– Time Series Econometrics Spring 2011-12

Instructor	Tareena Musaddiq
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Course URL (if any)	-

Course Basics				
Credit Hours				
Lecture(s)	Nbr of Lec(s) Per Week	2	Duration	1 hour 30 minutes
Recitation/Lab (per week)	Nbr of Lec(s) Per Week	-1	Duration	- 40 minutes
Tutorial (per week)	Nbr of Lec(s) Per Week	-	Duration	-

Course Distribution	
Core	
Elective	✓
Open for Student Category	Junior/Senior
Close for Student Category	

COURSE DESCRIPTION
<p>This course provides an in depth discussion of some of the most frequently used time- series techniques in economics (monetary/macroeconomics) as well as finance. It provides an introduction to time series econometrics which is frequently used in modelling macroeconomic behaviour, advanced asset pricing, and studying of capital markets. The course is intended for undergraduate students looking to gain a sound understanding of technical economic analysis with regards to time series data. The core contents of the course include time series modeling, AR/MA/ARMA/ARIMA models, autocorrelation functions, unit root tests, VAR analysis, cointegration, error-correction models, volatility models, regime switching models etc. and their related applications.</p>

COURSE PREREQUISITE(S)	
<ul style="list-style-type: none"><li>•</li><li>•</li><li>•</li></ul>	Econ 330 Econometrics Econ 230 Statistics and Data Analysis

COURSE OBJECTIVES
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<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> </ul>	<p>Understand in depth the models for time series data</p> <p>Application of time series data by using real world data</p>
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### Learning Outcomes

<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> </ul>	<p>Be able to develop and understanding of how to model time series data</p> <p>Grasp of interpreting the models applied and their use in understanding macroeconomic data and application to policy</p> <p>Strong understanding of using Stata to implement the models studied using real world data</p>
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### Grading Breakup and Policy

<p>Assignment(s): 20%</p> <p>Home Work:</p> <p>Quiz(s): 20%</p> <p>Class Participation:</p> <p>Attendance:</p> <p>Midterm Examination: 30%</p> <p>Project:</p> <p>Final Examination: 30%</p>
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### Examination Detail

Midterm Exam	<p>Yes/No: Yes</p> <p>Combine Separate: Separate</p> <p>Duration: 1 hour 40 minutes</p> <p>Preferred Date:</p> <p>Exam Specifications: Closed books/closed notes, calculator allowed</p>
Final Exam	<p>Yes/No: Yes</p> <p>Combine Separate: Separate</p> <p>Duration: 2 hours</p> <p>Exam Specifications: Closed books/closed notes, calculator allowed</p>

### COURSE OVERVIEW

Week/ Lecture/ Module	Topics	Recommended Readings	Objectives/ Application
<b>Lecture 1 &amp; 2</b> <b>Lab session 1</b>	Difference Equations	<b>Chapter 1 : Enders</b>	Time series models, difference equations and their solutions, lag operators Lab : Intro to Stata
<b>Lecture 3,4,5,6</b> <b>Quiz 1</b> <b>Lab session 2 and 3</b>	Stationary time series models	<b>Chapter 2 : Enders</b>	<ul style="list-style-type: none"> <li>- Autoregressive processes</li> <li>- Moving Average processes</li> <li>- Autocorrelation functions.</li> <li>- Properties of the correlogram</li> </ul> <p>ARMA models.</p> <ul style="list-style-type: none"> <li>- Infinite Moving Average representation</li> <li>- Unobserved components</li> </ul>



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			<ul style="list-style-type: none"> <li>- Prediction and MSE</li> <li>-Box Jenkins</li> <li>-Seasonality</li> <li>Lab session : AC, PAC in stata</li> </ul>
<b>Lecture 7,8 Quiz 3 Lab session 7</b>	Testing for trends and units roots	<b>Chapter 4: Enders</b>	<ul style="list-style-type: none"> <li>Dicky Fuller tests, Extensions of DF test, Phillips Perron Test, Structural Changes, Problems in testing unit roots</li> <li>Lab session : testing through DF test</li> </ul>
<b>Lecture 9 , 10,11 and 12 Quiz 2 Lab session 4 and 5</b>	Modelling Economic Time Series : Trends and volatility	<b>Chapter 3</b>	<ul style="list-style-type: none"> <li>ARCH processes, GARCH, ARCH M, Maximum Likelihood</li> <li>Lab sessions : Applying the ARCH models</li> </ul>
<b>Lecture 13 and 14 Quiz 3 Lab session 6</b>	Asymmetric models of volatility		<ul style="list-style-type: none"> <li>EGARCH, TARCH, T GARCH, GJR models</li> <li>Lab session : Applying the asymmetric models</li> </ul>
	MID TERM		
<b>Lecture 15, 16, 17, 18 Lab session 8 and 9</b>	Multi equation Time Series Model	<b>Chapter 5: Enders</b>	<ul style="list-style-type: none"> <li>Dynamic models</li> <li>- Distributed lag models, Multipliers</li> <li>- Vector Autoregressions and Granger Causality</li> <li>-Impulse Response Functions</li> <li>- Error correction models.</li> <li>Lab sessions : Applying VaR, generating impulse response functions</li> </ul>
<b>Lecture 19, 20, 21, 22 Quiz 4 Lab session 10 and 11</b>	Co integration and Error Correction Models	<b>Chapter 6 : Enders</b>	<ul style="list-style-type: none"> <li>Cointegration and common trends, Engle Granger methodology, Characteristic roots, rank and co integration, Johansen methodology, hypothesis testing in co integration</li> <li>Lab sessions : Testing for co integration and applying the co integration model</li> </ul>
<b>Lecture 23 , 24, 25</b>	Regime switching models	<b>Chapter 7 : Enders</b>	<ul style="list-style-type: none"> <li>Lab session 12 : Applying the regime switching models</li> </ul>
<b>Lecture 26 and 27</b>	Application of the models	<b>Journal articles related to the material covered in the course</b>	
<b>Lecture 28</b>	Review and Quiz 5		

### Textbook(s)/Supplementary Readings

Main Reading :

Walter Enders, *Applied Econometrics Time Series*, 2<sup>nd</sup> ed. 2004, Wiley

Optional Text :

Andrew C Harvey, *The Econometric Analysis of Time Series*, Second Edition.