UNIVERSITY OF SAHIWAL

Course Specification File*

*Extend the space where required

A. Course Identification and General Information

Faculty: Economics and Management Sciences	Department: Business Administration
Degree Program: MS	Course Name: Econometric Analysis
Course Code:	Course Category:
Credit Value: 3	Course Level/Semester: Level 7 /Semester 2
Nature of Course (Theory/Lab):	Course Specific Requirement (If any):
Contact Hour: 3 Hour per week	Additional Information (If any):

B. Faculty Member Information

Name of Faculty Member: Dr. Muhammad Husnain	Designation: Assistant Professor
Contact Details: 0333-4525954	Email: m.husnain@uosahiwal.edu.pk
Office No:	Office Visiting Hour: 11:00 to 13:00 (Tuesday & Thursday)
Course Level/Semester:	Additional Information (If any):

C. Course Description and Objectives

The course "Econometric Analysis" is meticulously designed for MS-level students to build a solid foundation in econometrics and its applications in business research. With students from diverse backgrounds such as marketing, finance, and human resource management, this course blends theoretical concepts with practical applications. By exploring techniques for cross-sectional, time series, and panel data, students will master statistical tools and software, including SPSS, Smart PLS, EViews, Stata, and Microsoft Excel. Through this course, students will learn to interpret data, diagnose model assumptions, and apply econometric techniques to solve complex business problems, equipping them for academic and professional success.

Course objective:

- Provide a comprehensive understanding of econometric principles and their role in business research.
- Equip students with the skills to manage, analyze, and interpret cross-sectional, time series, and panel data.
- Teach students how to use statistical software like SPSS, SmartPLS, EViews, Stata, and Excel effectively.
- Develop the ability to assess and diagnose econometric model assumptions critically.
- Train students to apply advanced econometric methods to real-world business scenarios.

- Foster analytical thinking and independent research through weekly assignments and practical exercises.

D. Course Learning Outcomes

By the end of this course, students will be able to:

- Understand and explain the fundamental concepts of econometrics and their business applications.
- Conduct descriptive and inferential statistical analyses using advanced statistical software.
- Build and evaluate econometric models tailored for cross-sectional, time series, and panel data.
- Diagnose and resolve econometric issues such as heteroscedasticity, autocorrelation, and multicollinearity.
- Apply specialized techniques like logistic regression, SEM, moderation, mediation, and meta-analysis in business contexts.
- Interpret, report, and communicate econometric results effectively to guide decision-making

E. Course Contents / Topics to be Covered.

1. Introduction to Econometrics, Data Structure, and the Role of Graphs in Analysis
2. Descriptive Statistics and Correlation Analysis
3. Fundamentals of Simple Regression Analysis and Underlying Assumptions
4. Addressing Heteroscedasticity: Detection and Remedies
5. Understanding and Managing Autocorrelation in Regression Models
6. Diagnosing and Resolving Multicollinearity in Data Analysis
7. Econometric Modeling: Specification and Diagnostic Testing
8. Working with Dummy Variables and Exploring Interaction Effects
9. Logistic Regression and Analysis of Limited Dependent Variables
10. Modeling Variance Using ARCH and GARCH Models
11. Exploring Long-Term Relationships with Cointegration and Error Correction Models
12. Panel Data Analysis: Fixed Effects, Random Effects, and Model Selection
13. Structural Equation Modeling (SEM): Theory and Practice
14. Conducting Moderation Analysis with Multiple Moderators
15. Mediation Analysis: Concepts, Techniques, and Applications
16. Aggregating Research Findings through Meta-Analysis

F. Course Schedule / Weekly Course Outline

Topic Description	Week
Introduction to Econometrics, Data Structure, and the Role of Graphs • Definition and scope of econometrics in business research • Types of data: Cross-sectional, time series, panel data • Importance of graphical representation in econometric analysis • Practical: Data handling, visualization, and summary statistics in MS Excel	1
Descriptive Statistics and Correlation Analysis • Central tendency, dispersion, and data distribution • Correlation coefficients: Types and interpretations • Graphical tools for data exploration • Practical: Descriptive statistics and correlation analysis in SPSS	2
Fundamentals of Simple Regression Analysis and Underlying Assumptions • Overview of regression models and their applications • Assumptions of the classical linear regression model • Interpretation of regression coefficients and hypothesis testing • Practical: Simple regression analysis in SPSS and residual diagnostics	3
Addressing Heteroscedasticity: Detection and Remedies • Concept of heteroscedasticity and its implications • Detection techniques: Breusch-Pagan and White tests • Remedies: Weighted least squares and robust standard errors • Practical: Testing and correcting heteroscedasticity in SPSS	4
Understanding and Managing Autocorrelation in Regression Models • Definition and consequences of autocorrelation • Detection methods: Durbin-Watson and Ljung-Box tests • Remedies: Generalized least squares and Cochrane-Orcutt method • Practical: Addressing autocorrelation in EViews	5
Diagnosing and Resolving Multicollinearity in Data Analysis • Causes and consequences of multicollinearity • Detection techniques: Variance Inflation Factor (VIF) and tolerance values • Remedies: Principal component analysis and variable selection • Practical: Detecting and addressing multicollinearity in SPSS	6
Advanced Econometric Modeling: Specification and Diagnostic Testing • Model specification errors and their implications • Diagnostic tests for model adequacy • Importance of residual analysis and goodness-of-fit • Practical: Model specification and diagnostics in Stata	7
Working with Dummy Variables and Exploring Interaction Effects • Creating and interpreting dummy variables • Interaction effects and their applications • Practical: Incorporating dummy variables in regression analysis using SPSS	8

Logistic Regression and Analysis of Limited Dependent Variables • Overview of logistic regression and its business applications • Interpretation of odds ratios and marginal effects • Practical: Conducting logistic regression in SPSS	9
Modeling Variance Using ARCH and GARCH Models • Basics of time series variance modeling • Applications of ARCH and GARCH in financial data analysis • Practical: Implementing ARCH-GARCH models in EViews	10
Exploring Long-Term Relationships with Cointegration and Error Correction Models • Concept of cointegration and error correction mechanisms • Johansen and Engle-Granger methods • Practical: Cointegration analysis in EViews	11
Panel Data Analysis: Fixed Effects, Random Effects, and Model Selection • Introduction to panel data and its advantages • Fixed vs. random effects models • Hausman test for model selection • Practical: Panel data analysis in Stata	12
Structural Equation Modeling (SEM): Theory and Practice • Basics of SEM and its role in business research • Path analysis and model fit indices • Practical: SEM modeling in SmartPLS	13
Conducting Moderation Analysis with Multiple Moderators • Concept and application of moderation analysis • Handling multiple moderators and interaction terms • Practical: Moderation analysis in SmartPLS	14
Mediation Analysis: Concepts, Techniques, and Applications • Distinguishing mediation from moderation • Direct, indirect, and total effects • Practical: Mediation analysis in SmartPLS	15
Aggregating Research Findings through Meta-Analysis • Purpose and process of meta-analysis • Combining effect sizes from multiple studies • Practical: Conducting meta-analysis in Excel and SPSS	16

G. Schedule of Assignments/ Quiz / Academic/Reserach Activity

Sr. No	Description of Activity	Nature of Activity	Week
1	Create visual representations of a given dataset and discuss their importance	Individual Assignment	01
2	Perform descriptive statistics and correlation analysis on provided data	Individual Assignment	02

3	Conduct a simple regression analysis and interpret the results.	Individual Assignment	03
4	Detect heteroscedasticity in a dataset and apply corrective measures	Individual Assignment	04
5	Identify and resolve autocorrelation issues using appropriate methods.	Individual Assignment	05
6	Analyze multicollinearity in a dataset and propose solutions.	Individual Assignment	06
7	Specify an econometric model and perform diagnostic tests.	Individual Assignment	07
8	Use dummy variables in regression and interpret their effects.	Individual Assignment	08
9	Conduct logistic regression analysis and explain the outcomes.	Individual Assignment	9
10	Model time series variance using ARCH-GARCH and interpret results.	Individual Assignment	10
11	Perform cointegration analysis and interpret its significance.	Individual Assignment	11
12	Analyze panel data with fixed and random effects models.	Individual Assignment	12
13	Conduct SEM analysis and explain the path coefficients.	Individual Assignment	13
14	Perform moderation analysis with multiple moderators.	Individual Assignment	14
15	Conduct mediation analysis and interpret the findings.	Individual Assignment	15
16	Perform a meta-analysis using a collection of provided studies.	Individual Assignment	16

H. Course Components (Total contact hours and credits per semester)

	Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	3					3
Credit	3					3

I. Teaching-Learning Strategies

This course will utilize a variety of teaching methods to cater to different learning styles and promote active engagement:

- **Lectures:** Interactive lectures will introduce key concepts and theories.
- **In-class Activities:** Exercises, discussions, and case studies will enhance understanding and practical application.
- **Computer Labs:** Hands-on sessions using econometric software (EViews/Stata) to analyze real financial data.

Group Projects: Students will work in groups to apply econometric techniques to a specific financial problem and present their findings

J. Learning Resources / Recommended Books / Research Papers /Web-Links / Software

1. Gujarati, D. N., & Porter, D. C. (2013). Basic econometrics. McGraw-Hill Irwin.
2. Wooldridge, J. M. (2021). Introductory econometrics: A modern approach (7th ed.). Cengage Learning.
3. Asteriou, D., & Hall, S. G. (2015). Applied econometrics (2nd ed.). Palgrave Macmillan.
4. Greene, W. H. (2018). Econometric analysis (8th ed.). Pearson Education.
5. Hayashi, F. (2000). Econometrics. Princeton University Press.

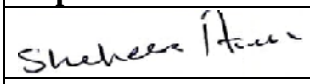
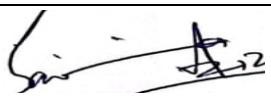
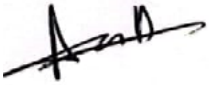
K. Facilities Required (If any)

Computer Lab for Practical Learning of Software

L. Additional Information (If any)

- **Software:**
  - EViews (https://www.eviews.com/)
  - Stata (https://www.stata.com/)

UNIVERSITY OF SAHIWAL

Name of Course Instructor		**Dr. Muhammad Husnain**	
Signature:		Date:	**10-01-2024**
Cluster Head (Name):		**Dr. Muhammad Husnain**	
Signature:		Date:	**20-01-2024**
Departmental Committee Review:			
			
Dr. Shaheera Amin	Dr. Muhammad Husnain	Dr. Waris Ali	
			
Dr. Saira Aziz	Dr. Atif Ali Gill	Dr. Ammara Saleem	
Program Coordinator (Signature and Stamp):		**Dr. Muhammad Husnain**	
Signature:		Date:	**23-01-2024**
Chairperson/ Teacher In charge (Signature and Stamp):		**Dr. Waris Ali**	
Signature:		Date:	**24-01-2024**