



University of Management and Technology

School of Business and Economics

Course title; **Advanced Quantitative Research Methods**
Course code **EC 718**

Resource Person:

Department: **Economics**

SBE Vision

SBE envisions its success in the sustainable contribution that it will make to the industry, academia and research in public and private sector. SBE will lead by providing professionally competent and ethically conscious human resources engaged in the global and local context to foster socio-economic growth and sustainability for the society. SBE envisages having faculty with high research potential and a deep desire for cutting edge research including collaboration with national and international partners.

SBE Mission

Being a research-oriented and student-centric business school, we emphasize research publications in impact factor journals as well as state-of-the-art learning methodologies. We will prepare our students to become the future ethical business leaders and the guiding post for the society, while equipping them with the knowledge and skills required by world-class professionals. We will be the leading choice for organizations seeking highly talented human resource. SBE will foster internationalization with key stakeholders and actively work to exchange best practices with business schools across Pakistan through collaborations, workshops, conferences and other means.

Program Objectives

The main objective of the program is to develop knowledge and skills of the participants. This program has been designed for students who, pursue advanced research degrees (MS and PhD), and would lead to lucrative careers. The program is a blend of theory, quantitative, research and applied areas in economics for preparing students to deal with the problems of the real world.

Course Objectives

The objectives of this course to develop the foundations of economic research methods and design. It has been designed for M.Phil/ PhD students, with the aim to provide the students with the required qualitative research methods having sound foundations in economics research methods.

Students will learn how to define a research question, explore the strengths and limitations of various research methods, and gain perspective into several methods and research writing. It is expected that, upon

successful completion of this course, students will study in greater depth those particular research methods that are most appropriate for their research.

Learning Objectives

The objectives of this course, students should be able to:

- a) Provide basic understanding of more advanced econometric techniques.
- b) Apprehend these econometric techniques for the context of substantive research topics
- c) Develop statistical programming skills in different software's, including graphical display of data.
- d) Present quantitative findings to varied types of audiences.
- e) Define a research question clearly, its elaboration and its significance.
- f) Choose an appropriate econometric technique to a research question for the targeted research question;
- g) specifying the independent and dependent Indicator for a research question,
- h) Draft a preliminary research proposal.

Course Requirement

Research Paper: Students are required to write a 15-20 page research paper. At the minimum, **paper should include at least six articles from academic journals (or two books and two academic articles).** This is a minimum requirement and by no means should be taken as a limit. Students may also cite materials or sources like newspaper articles and other non-academic journals to boost their arguments in the paper. This paper will count for 15% of the student's final grade. Students are encouraged to start working on the paper at their earliest, and consult teacher of the course along the way to make sure that they are on the right track. **Research papers should be submitted three weeks before the final term exams.**

Presentation (Research Paper): Students are required to present their research papers during allotted times. Presentation time is 15 minutes, followed by a question-answer session. Students will be graded based on content, organization, and manner of presentation, as well as their participation in question-answer sessions, both as presenters and audience. This assignment will be worth 5% of the final grade.

Assignments: Students are required to write a critical book report on a classical text and discuss it in the classroom. Total worth of this assignments is 20%.

Exams: There will be two exams in this class, a midterm and a final. These exams will be closed book and conducted in the class room. Exams will be based on assigned readings, class discussions, lectures and any other learning activities done in the class room by the exam date. Midterm exam will be worth 25% and final exam will be worth 30% of the final grade.

Attendance & Class Participation: Students are required to come to class regularly. Attendance will be taken in each class. University policy on attendance will be followed. Class participation is also a vital part of this class. Students are required to read the assigned material prior to the class meetings and come prepared to take part in the discussion and learning activities related to that material. Participation includes, but not limited, reading the assigned material for the class, asking questions about the day's readings, answering questions raised by the instructor, spontaneously responding to the on-going discussion in the class, and taking part in the in-class activities. Overall, combined grade for attendance and participation is 5% of the student's final grade.

Grade Evaluation Criteria

Following is the criteria for the distribution of marks to evaluate final grade in a semester.

Marks Evaluation

Marks in percentage

Term Paper	15
Presentation (Term paper)	05
Assignments/Take home problems Set	20
Mid Term	25
Final exam	30
Attendance	05
Total	100

STUDENTS ARE REQUIRED TO READ AND UNDERSTAND ALL ITEMS OUTLINED IN THE PARTICIPANT HANDBOOK

Class Policy:-

- **Be On Time**
You need to be at class at the assigned time. After 10 minutes past the assigned time, you will be marked absent.
- **Mobile Policy**
TURN OFF YOUR MOBILE PHONE! It is unprofessional to be texting or otherwise.
- **Email Policy**
READ YOUR EMAILS! You are responsible if you miss a deadline because you did not read your email. Participants should regularly check their university emails accounts regularly and respond accordingly.
- **Class Attendance Policy**
A minimum of 80% attendance is required for a participant to be eligible to sit in the final examination. Being sick and going to weddings are absences and will not be counted as present. You have the opportunity to use 6 absences out of 30 classes. Participants with less than 80% of attendance in a course will be given grade 'F' (Fail) and will not be allowed to take end term exams. International students who will be leaving for visa during semester should not use any days off except for visa trip. Otherwise they could reach short attendance.
- **Withdraw Policy**
Students may withdraw from a course till the end of the 12th week of the semester. Consequently, grade W will be awarded to the student which shall have no impact on the calculation of the GPA of the student. A Student withdrawing after the 12th week shall be automatically awarded "F" grade which shall count in the GPA.
- **Moodle**
UMT –LMS (Moodle) is an Open Source Course Management System (CMS), also known as a learning Management System (LMS). Participants should regularly visit the course website on MOODLE Course Management system, and fully benefit from its capabilities. If you are facing any problem using moodle, visit <http://oit.umt.edu.pk/moodle>. For further query send your queries to lms@umt.edu.pk
- **Harassment Policy**
Sexual or any other harassment is prohibited and is constituted as punishable offence. Sexual or any other harassment of any participant will not be tolerated. All actions categorized as sexual or any other harassment when done physically or verbally would also be considered as sexual harassment when done using electronic media such as computers, mobiles, internet, emails etc.
- **Use of Unfair Means/Honesty Policy**
Any participant found using unfair means or assisting another participant during a class test/quiz, assignments or examination would be liable to disciplinary action.

- **Plagiarism Policy**

All students are required to attach a “Turnitin” report on every assignment, big or small. Any student who attempts to bypass “Turnitin” will receive “F” grade which will count towards the CGPA. The participants submit the plagiarism report to the resource person with every assignment, report, project, thesis etc. If student attempts to cheat “Turnitin”, he/she will receive a second “F” that will count towards the CGPA. There are special rules on plagiarism for final reports etc. all outlined in your handbook.

- **Communication of Results**

The results of quizzes, midterms and assignments are communicated to the participants during the semester and answer books are returned to them. It is the responsibility of the course instructor to keep the participants informed about his/her progress during the semester. The course instructor will inform a participant at least one week before the final examination related to his or her performance in the course.

Course Outline

Course code.....EC 111/225

Course title; Micro Economics/ Business Economics

Program	Cohort
Credit Hours	3
Duration	15 Weeks
Prerequisites (If any)	None
Resource Person Name and Email	
Counseling Timing (Room#)	
Contact no.	
Web Links:- (Face book, Linked In, Google Groups, Other platforms)	

Chairman/Director Programme signature.....Date.....

Dean's signature.....Date.....

Research Paper

Contents.

All of the following should be included: title, abstract, statement of problem/ research question, justification, review of the literature, formal statement of research question, dependent and independent variables, hypotheses, proposed research design and methods, measures for protection of human subjects, proposed research schedule, resource requirements, budget, possible funding sources, preliminary bibliography.

Deliverables.

Week 3:	Abstract and Research question
Week 4:	Initial bibliography
Week 5:	Elaboration of Research question
Week 6:	Table of contents for Research proposal
Week 9:	Review the theoretical and empirical Literature
Week 10:	Empirical Methodology and Tentative results
Week 11:	Submission of First Draft
Week 12:	Submission of Final Draft
Week 14:	Oral Presentation (10-15 minutes including Q/A)

Written Proposal. Students will use the APA format. The proposal will include cover sheet, abstract, spelling and grammar checked, citations and references. Maximum length, of the proposal will be 20 pp. double-spaced, bibliography included.

Recommended Text Books:

- Dimitrios, A. (2006). Applied Econometrics: a modern approach using EViews and Microfit.
- Pindyck, R. S. and D. L. Rubinfeld, *Econometric Models and Economic Forecasts*, Fourth Edition, McGraw-Hill, New York, 1998.
- Hill, R. C., Griffiths, W. E., & Lim, G. C. (2018). *Principles of econometrics*. John Wiley & Sons.
- Green, W. H. *Econometric Analysis*, Fourth Edition, New York: Macmillan, 2000.
- Fomby, T. B., R. C. Hill and S. R. Johnson, *Advanced Econometric Methods*, New York: Springer-Verlag, 1984.
- Kmenta, J., *Elements of Econometrics*, New York: Macmillan, 1986.
- Maddala, G. S., *Introduction to Econometrics*, 2nd ed., New York: Macmillan, 1992.

1. Estimation of Single Equation Regression Models

CPAM, tests of autocorrelation and heteroscedasticity

Assignment 1: (Based on the data file: *Monthly Company Prices*)

- 1a) Compute monthly returns for the 25 stocks and KSE index using logarithmic first difference formula. Plot your results in graphs and comment on your findings.
- 1b) Calculate excess returns for the 25 companies and KSE index.
- 1c) Applying OLS, estimate 25 regression equations with excess return on each of the 25 stocks as dependent variable and excess market return as independent variable. Test for autocorrelation in each equation and re-estimate the equations till autocorrelation is removed in all the equations. Comment on your findings.
- 1d) Compute means, standard deviations and half standard deviations of the excess rates of return for the 25 stocks using time series observations. This will yield four cross section variables 25 average returns and 25 standard deviations, 25 lower standard deviations and 25 upper standard deviations. Place these four variables against the cross section of 25 betas obtained in part 1c.
- 1e) Regress average returns on betas. Test for heteroscedasticity. Re-estimate the equation to tackle heteroscedasticity, if found. Interpret your results.
- 1f) Regress average returns on betas and standard deviations. Test for heteroscedasticity. Re-estimate the equation to tackle heteroscedasticity, if found. Interpret your results.
- 1g) Regress average return on betas, beta squares and standard deviations. Test for heteroscedasticity. Re-estimate the equation to tackle heteroscedasticity, if found. Interpret your results.
- 1h) Regress average return on betas, beta squares and half standard deviations. Test for heteroscedasticity. Re-estimate the equation to tackle heteroscedasticity, if found. Interpret your results.
- 1i) Estimate CAPM allowing asymmetry in the measurement of beta at thresholds: excess market return equal to zero.
- 1j) Estimate CAPM allowing asymmetry in the measurement of price of risk at threshold: $\beta = 0$.
- 1k) Estimate CAPM allowing asymmetry in the measurement of price of risk at threshold to be determined endogenously.

2. Univariate Time Series Models and Financial Econometrics

ARMA and ARCH models

Assignment 2: (Based on data file: *Country Stock Price Indices*)

- 2a) Apply appropriate unit root tests and determine the orders of integration of the all the variables. Draw and study Correlograms to ensure that that your tests are applicable.
- 2b) Perform all the steps from diagnostic to estimation of ARMA models for all the variables. Interpret and comment on your results.
- 2c) Estimate all the ARMA models for any five variables ignoring the last 12 observations.
- 2d) Make dynamic forecasts for the last 12 observations.
- 2e) Evaluate forecasting performance of your models.
- 2f) Decompose the forecasting errors and comment on your findings.
- 2g) Perform all the steps from diagnostic to estimation of GARCH models for any five variables. Interpret your results.
- 2h) Estimate ARCH-M models for any five variables. Interpret your results.
- 2i) Estimate TARARCH models for any five variables setting threshold equal to zero. Interpret your results.
- 2j) Estimate TAR model for any five variables with the threshold of US rate of return set equal to zero.
- 2k) Estimate TAR model for any two variables with the threshold of US rate of return determined endogenously.
- 2l) Estimate LSTAR model for any two variables with the threshold of US rate of return set equal to zero.

3. Multivariate Time Series Models

VAR Models, Causality, Impulse Response Analysis and Co-integration

Assignment 3: (Based on data file: *Quarterly Macro Data*)

- 3a) Apply causality tests between the following.
 - i. Money supply and price level
 - ii. Price level and exchange rate
 - iii. Exchange rate and foreign exchange reserves
- 3b) Propose a VAR model involving at least four variables in the data file. Diagnose and estimate the proposed VAR models.
- 3c) Perform and interpret causality analysis.
- 3d) Draw and interpret *Impulse Response Functions*.
- 3e) Also perform variance decomposition and interpret your results.
- 3f) Using the same set of variables as in part 3b apply Engle Granger co-integration analysis. Interpret your results.
- 3g) Using the same set of variables apply Johansen co-integration analysis. Interpret your results.

3h) Using the same set of variables apply ARDL co-integration analysis. Interpret your results.

4. Production Analysis

Production, cost and profit functions and testing of hypotheses

Assignment 4: (Based on data files: *Panel Macro and Production*)

- 4a) Using the file *Panel Macro*, construct series of capital stocks for any five countries.
- 4b) Estimate production functions for the five countries using capital and labor as the inputs and derive series of TFP.
- 4c) For each of the five countries analyze how TFP is affected by the size of government and trade openness.
- 4d) Using the file *Production*, construct appropriate price and quantity indices of the aggregate energy input.
- 4e) Estimate Cobb-Douglas production function using capital, labor and energy as the three inputs and test the following hypotheses, one at a time.
 - i. Energy is a redundant input
 - ii. Technology is subject to constant returns to scale
- 4f) Estimate Cobb-Douglas cost system using capital, labor and energy as the three inputs and test the following hypotheses, one at a time.
 - i. Energy is a redundant input
 - ii. Technology is subject to constant returns to scale
- 4g) Estimate all the Hicks and Allen elasticities at the sample means.
- 4h) Estimate Cobb-Douglas profit system using capital, labor and energy as the three inputs. Is it possible to test the following hypotheses, one at a time, how or why not?
 - i. Energy is a redundant input
 - ii. Technology is subject to constant returns to scale
- 4i) Estimate all the own and cross price elasticities of output supply and input demand functions at the sample means.
- 4j) Estimate Translog cost system using capital, labor and energy as the three inputs and test the following hypotheses, one at a time.
 - i. Technology is homothetic
 - ii. The underlying production function is homogeneous
 - iii. The underlying production function is homogeneous of degree one
 - iv. The underlying production function is Cobb-Douglas
- 4k) Estimate all the Hicks and Allen elasticities the sample means.

5. Household Budget Analyses

Engle equation, Spline functions, demand systems and testing of hypotheses

Assignment 5: (Based on data file: *Household Budget*)

- 6a) Estimate linear Engle equations and test for heteroscedasticity. Re-estimate linear Engle equations in expenditure share form and identify necessities and luxuries by inspection of the results.
- 6b) Estimate quadratic Engle equations in expenditure share form. Test that the system of linear Engle equations is valid. Estimate expenditure elasticities at sample means.
- 6c) Estimate Working-Leser Engle equations. Identify necessities and luxuries by inspection of the results. Estimate expenditure elasticities at sample means.
- 6d) Using tests of nested and non-nested models as required compare the Engle curves under the three systems. Apart from results of the tests, which of the three systems appears more appealing? Explain why/how.
- 6e) Choosing appropriate knots, estimate the system of Linear Spline Engle equations and plot the Engle curves.
- 6f) Choosing the same knots as in part 'g', estimate the system of quadratic Spline Engle equations and plot the Engle curves.
- 6g) Choosing the same knots as in part 'g', estimate the system of Working-Leser Spline Engle equations and plot the Engle curves.
- 6h) Using tests of nested and non-nested models as required compare the Engle curves under the three Spline systems. Apart from results of the tests, which of the three systems appears more appealing? Explain why/how?

6. Household Demand Analyses

Engle equation, Spline functions, demand systems and testing of hypotheses

Assignment 6: (Based on data file: *Household Demand*)

- 6a) Estimate linear expenditure system.
- 6b) Estimate all the income and price elasticities of demand at the sample means.
- 6c) Estimate linear AIDS.
- 6d) Estimate all the income and price elasticities of demand at the sample means.
- 6e) Estimate non-linear AIDS.
- 6f) Estimate all the income and price elasticities of demand at the sample means.

7. Estimation Based on Pooled and Panel data

Estimation with pooled time series and cross section data

Assignment 7: (Based on data file: *Panel Macro*)

- 7a) Estimate a consumption function in which the dependent variable is consumption and the independent variables are GDP and lagged consumption using the following methods.
 - i. Common Effects Model

- ii. Fixed Effects Model
 - iii. Random Effects Model
 - iv. Dynamic panel GMM
- 7b) Estimate a production function in which the dependent variable is log GDP and the independent variables are log capital, log labor, trade openness (exports plus imports divided by GDP) and lagged log GDP using the following provisions.
- i. Common intercept
 - ii. Fixed cross effects
 - iii. Fixed time effects
 - iv. Fixed time and cross sectional effect
 - v. Fixed time effects and cross sectional random effects
 - vi. Dynamic panel GMM

8. Estimation of Simultaneous Equations

Estimation of macroeconomic models

Assignment 8: (Based on data file: *Annual Macro*)

- 8a) Specify and estimate a simultaneous equations model by 2SLS, Iterative 3SIS and GMM to determine the inter-linkages across trade, investment and output.
- 8b) Estimate aggregate demand and aggregate supply functions using 2SLS, Iterative 3SIS and GMM methods. Interpret your results.

Mid Terms (for cohort classes exam week is announced by Cohort Office)						
10	Perfect competition: Short run & Long run	Learning the survival behavior of the competitive firms in short run.	<ol style="list-style-type: none"> 1. Basic market models and how firms produce 2. Characteristics of perfectly competitive markets and their relation to present market system 3. The difference between long run and short run. 4. How profit/loss define the entry and exit of new firms and profit of existing firms? 	Graphical Presentations	Assignment	Within a Week
11	Monopoly& other allied concepts	The working of a monopolist and its differences from a competitive market.	<ol style="list-style-type: none"> 1. What is a pure monopoly? 2. What are its major assumptions? 3. How prices and output are determined? 4. Mechanism of price discrimination 	Comparative Case Study	Assignment (Perfect competition and Monopoly, similarities and differences)	Within a Week
12 & 13	Monopolistic competition and oligopoly	Firm type describes the behavior of revenue, hence student will be able to decide the how much to produce	<ol style="list-style-type: none"> 1. Characteristics of the market and its differences with previous markets. 2. Strategic production decisions of firms 3. Positive and negative effects of advertising 4. Incentives and obstacles of collusion among firms 5. Comparison of markets in terms of their R&D expenditures on green production 	Case study	Activity	Within a Week

14 & 15	Sustainable development Goals ¹	Familiarization with the concept of environment and social sustainable.	<ol style="list-style-type: none"> 1. What are the efforts done by the United Nations in this regard? 2. Efforts done by Government of Pakistan 3. Role of education sector in achieving SDGs 4. How we as businessmen can play our role in make a sustainable future? 	Guest Speaker & Documentary	Industrial Visit	Within 1 week
Final Terms						

¹ This session may be shifted to any other week based on the availability of the guest speaker and time constraints of industrial visit