

**CBN COLLABORATIVE POSTGRADUATE PROGRAMME
DEPARTMENT OF ECONOMICS, UNIVERSITY OF NIGERIA NSUKKA
QUANTITATIVE METHODS
MODULE SPECIFICATION**

1. **Module Title:** Quantitative Methods

2. **Module Code:** ECO 505

3. **Number of credits:** 3

4. **Level:** M. Sc.

5. **Semester:** First

6. **Pre-requisites for admission to the module (if any)**

The pre-requisite is that the student has a satisfactory knowledge of intermediate quantitative techniques.

7. **Module Coordinator**

Professor E. O. Ogunkola

8. **Aims**

Upon completion of the course, students are expected to:

1. read and understand arguments in textbooks and journal articles using mathematical techniques commonly used in modern economic analysis;
2. grasp the relevance and use of modern mathematical techniques in their applications in theoretical and applied economics;
3. apply standard quantitative techniques to the analysis of economic phenomena and to conduct empirical research;
4. develop models in theoretical or applied work; and
5. understand the theoretical foundations of quantitative techniques.

9. **Summary of Content**

This course aims to provide a sound training in mathematics and econometrics which masters student in economics would be expected to cover. The structure of the course takes into account past experience in offering the course within the collaborating universities as well as recent developments. The structure also conforms to the prevailing trends in reputable Universities across the globe. It covers topics on (1) Matrix Algebra; (2) Economic application of calculus and static optimization; (3) Dynamic Analysis and Optimization; (4) Introduction to set theory and real analysis; and (5) Review of probability and statistics; (6) Classical linear regression; (7) Simultaneous equation models; (8) Time series analysis; (9) Limited dependent variable models; (10) Panel data analysis, (11) Applied general equilibrium model, (12) Dynamic Stochastic General Equilibrium

10. **Module Intended Learning Outcomes (MILOs)**

Upon successful completion of this module, students will be able to:

No.	Milos	Weighting (%)
1	Use matrix algebra to solve system of linear equations with economic applications including input and output model	Refer to no.15
2	Apply calculus and static optimization, especially multivariate calculus, extreme values of multivariate function and constrained optimization, to issues in economics	
3	Apply dynamic analysis and optimization especially the knowledge of difference and differential equations and dynamic optimization to economics	
4	Apply set theory and real analysis to economic problems	
5	Apply statistics and probability in economic analysis	
6	Use some econometric softwares to perform classical regression analysis and interpret results	
7	Identify and solve common problems with simultaneous equation models such as endogeneity and simultaneity bias. Application of relevant estimation techniques such as ILS, 2SLS etc.	
8	Familiar with the basic concepts in time series and the empirical analysis of time series data including specification and estimation of univariate time series models, ARDL models, unit roots and spurious regression, co-integration and error correction modeling, VAR, ARCH, GARCH models.	
9	Set up, estimate and evaluate models with qualitative and limited dependent variables (including linear probability models, logit, probit, and tobit models)	
10	Apply data analysis (pooled, fixed effects and random effects regression and specification tests) to economics	
11	Apply applied general equilibrium modeling to economic analysis	
12	Identify economic issues that require the application of dynamic stochastic general equilibrium modeling framework and apply it economic analysis	

11. Teaching and Learning Activities (TLAs)

MILO No.	TLAs	Functions	Hours/Week
1,2,3,4,5,6,7,8,9,10, 11,12	Lectures and materials	Course instructors will introduce, with appropriate audio-visual materials, the critical concepts of quantitative methods through lectures.	3hours
1,2,3,4,5,6,7,8,9,10, 11, 12	Tutorials (Case study, Group Discussion, Quizzes, presentations, peer review, role play)	Tutorial sessions will introduce experiential forms of learning activities such as case studies, group discussion, presentations, peer review, quizzes and role play. Emphasis placed on more in-depth learning of the processes, tools, and techniques in Quantitative Methods	1 hour

MILO No.	TLAs	Functions	Hours/Week
6,7,8,9,10,11,12	Computer assisted laboratory sessions	Computer assisted laboratory sessions with real data and hands on training	2 hours

12. Assessments Tasks/Activities

MILO No.	Type of assessment tasks/activities	Weighting (if applicable)	Remarks
1,2,3,4,5,6,7,8,9,10,11,12	Examination Students are required to participate in a three-hour examination to test their acquisitions of concepts and knowledge.	60%	
1,2,3,4,5,6,7,8,9,10,11,12	Written Test/Quizzes 1-hour written test/Pop Quizzes	20%	Week 7/On Going basis
1,2,3,4,5,6,7,8,9,10,11,12	Assignments Assessment comprising group work assignment and individual assignment.	20%	Case study analysis and computer-based Report on Quantitative Methods

13. Attendance Requirements

Students are required to attend 75% of lectures, tutorials and laboratory sessions.

14. Contribution to Programme Learning Outcomes

No	PILOs	MILO No
1	develop in the students a thorough knowledge and applied competence in the fundamentals of Economics.	1,2,3,4,5,6,7,8,9,10,11,12
2	develop in the students an ability to critically appraise alternative systems of Economics.	1,2,3,4,5,6,7,8,9,10,11,12
3	equip students with economic theories that will lead to expertise in Economics	1,2,3,4,5,6,7,8,9,10,11,12
4	provide training to qualified graduates of economics and to other individuals whose prior training or experience has made them capable of playing a leadership role in the economics profession	1,2,3,4,5,6,7,8,9,10,11,12
5	equip students with the ability to analyze and undertake course of action to improve organisational performance using financial, operational and strategic perspectives and frameworks learned in the coursework and experience	1,2,3,4,5,6,7,8,9,10,11,12
6	prepare students for managerial positions in the industries, as well as other related organizations	1,2,3,4,5,6,7,8,9,10,11,12
7	prepare participants for positions as consultants, advocates, analysts, or directly as policy makers in the public and private	1,2,3,4,5,6,7,8,9,10,11,12

	sector	
8	Inculcate the requisite intellectual/conceptual foundations that will permit meaningful participation in the discussion or resolution of the problems which confront the Economics discipline in the contemporary word;	1,2,3,4,5,6,7,8,9,10,11,12
9	encourage research into problems which impede the maximum contribution of Economics to national development and well-being of the people	1,2,3,4,5,6,7,8,9,10,11,12
10	develop skill in logical reasoning and critical analysis and improve the capacity students in formulating sound economic policies and strategies	1,2,3,4,5,6,7,8,9,10,11,12

15. Grading of Student Achievement

Letter Grade	% Mark	Grade Definitions	Remarks
A	70-100	Excellent	Demonstrate excellent understanding of the subject matters.
B	60-69	Good	Demonstrate a good understanding of the subject matters, though missing some of the points.
C	50-59	Adequate	Demonstrate an adequate understanding of the core of the subject matters.
F	>50	Fail	Demonstrate a wrong understanding of the subject matter.

16. Resources

Suggested primary texts

No	Name of Author(s)	Year of Publication	Title of Book	Edition	Publisher's Name	ISBN
1	M.W. Klein,	1997	Mathematical Methods for Economists	Latest Edition	Addison-Wesley: Reading-Massachusetts	0-20-185-5720
2	A.C. Chiang and K. Wainwright	2005	Fundamental Methods of Mathematical Economics	4th Edition	McGraw-Hill.	978-007-0-10910-0
3.	K. Sydsaéter and P. Hammond	2006	Essential Mathematics for Economic Analysis	Latest Edition	Prentice Hall	9781292074610
4.	K. Sydsaéter, P. Hammond, Atle Seierstad and Arne Strøm	2005	Further Mathematics for Economic Analysis	Latest Edition	Prentice Hall.	9780273713289
5.	Simon, C.P., and L. Blume,	1994	Mathematics for Economists	Latest Edition	W.W. Norton	9780393957334

No	Name of Author(s)	Year of Publication	Title of Book	Edition	Publisher's Name	ISBN
6.	Hill R. C., W.E. Griffiths and G.C. Lim	2011	Principles of Econometrics	4th Edition	Wiley Publishers	9780470626733
7.	Wooldridge, J. M.	2013	Introductory Econometrics: A Modern Approach	5th Edition	Cengage Learning	978-0-324- 58162-1

Suggested secondary texts

No	Name of Author(s)	Year of Publication	Title of Book	Edition	Publisher's Name	ISBN
1	Adkins, L. C.	2013	Using GRETL for Principles of Econometrics	4th Edition	Free online textbook	978-0-470-62673-3
2	Adkins, L. C. and Hill	2008	Using Stata for Principles of Econometrics		Stata Press	978-111-803208-4
3	Baltagi, B.,	2011	Econometrics	5th Edition	Springer	978-3-540-76515-8
4	Gujarati D. N. and D. C. Porter	2009	Basic Econometrics	5th Edition	McGraw Hill	978-0-07-337577-9
5	Harris, R. and R. Sollis	2003	Applied Time Series Modelling and Forecasting	Latest Edition	Wiley	0-470-84443-4
6	Johnston, J. and J. DiNardo	1997	Econometric Methods	4 th Edition	McGraw-Hill	0-070-32720-3
7	Maddala, G. S., and K. Lahiri	2010	Introduction to Econometrics	4 th Edition	Wiley	978-0-470-01512-4
8	Maddala, G.S.	1985	Limited Dependent and Qualitative Variables in Econometrics	Latest Edition	Cambridge University Press, New York.	978-0-511-81017-6
9	Mukherjee, C., H. White and M. Wuyts	1998	Econometrics and Data Analysis for Developing Countries	Latest Edition	Routledge: London (with data diskette).	978-1-315-00358-0
10	Verbeek, M.	2013	A Guide to Modern Econometrics	4th Edition	Wiley	0-470-85773-0
11	Woodward, W. A, H. L. Grey and A. C. Elliott	2011	Applied Time Series Analysis,	Latest Edition	CBC Press	978-1-498-73422-6
12	Wooldridge J.M	2010	Econometric Analysis of Cross Section and Panel Data	Latest Edition	MIT Press	978-0-262-23258-6
Additional econometrics resources are available at http://econometricslinks.com . And http://www.economicsnetwork.ac.uk/						

Software requirements

STATA and Eviews are highly recommended statistical packages which are excellent for modern data analysis as well as for standard econometric applications (including time series analysis).

Open source alternatives are

GRETL: (<http://gretl.sourceforge.net/>), R (<http://www.r-project.org/>) and OCTAVE: (<https://www.gnu.org/software/octave/>).

Other recommended commercial statistical packages include

RATS,
LIMDEP,
MICROFIT,
MATLAB,
GAUSS and
SHAZAM.

Note that, at the start of the course, students need to be given an introduction to the appropriate software package.

Suggested Journals

Journal of Quantitative Methods

Journal *of Applied* Quantitative Methods

Quantitative Methods and Statistics

CBN Journal of Applied Statistics

Journal of Applied Quantitative Methods

Research Methods – Clute Journals

Facilities Requirements

A lecture room with appropriate teaching and computer laboratory facilities

