ECONOMETRICS THEORY AND PRACTICE
COURSE OUTLINE
(Revised July, 2020)

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1. OBJECTIVE

This course aims to provide a sound foundation in the theory and practice of econometrics for economists. A distinctive feature of the course is its integration of the theoretical developments and practical data analysis. Economic examples with emphasis on African context are consistently used throughout the course to motivate and illustrate the subject matter. Extensive practical work using econometric software packages is an important aspect of the course.

2. PREREQUISITES

The student should be fully familiar with the material covered in the Quantitative Methods course of the Core programme.

3. TEACHING ARRANGEMENTS

The course has two parts, each comprising 60 contact hours, including lectures and labs. At the end of each topic students are guided in estimating the relevant models preferably using data from African countries.

4. GRADING

There will be at least one in class test. Home assignments will include some empirical applications

<table>
<thead>
<tr>
<th>Course Assessment</th>
<th>Percent</th>
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<tbody>
<tr>
<td>Home assignments/practicals</td>
<td>40</td>
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<tr>
<td>Final Examination</td>
<td>60</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
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5. SOFTWARE PACKAGES

There are several software–packages that could be used for econometric analysis. These include: E-Views, STATA, GRETL, and R. The students should become acquainted with at least one menu-driven econometric software package (good to analyze empirical data) and at least command driven software package (good for simulations).

COURSE OUTLINE

PART I - ECON 561: ECONOMETRICS I (MACRO-ECONOMETRICS)

1.1 Overview of Classical Regression
Readings: Greene (2018) Chs. 1-4

1.2 Estimation Principles
   1.2.1 Least Squares Principle
   1.2.2 The Maximum Likelihood Principle

(3 Hours)
(10 Hours)
1.2.3 Method of Moments (MM)
1.2.4 Instrumental Variables Method
1.2.5 Generalized Method of Moments (GMM) Principles
1.2.6 Nonlinear Least Squares

Empirical applications
Readings: Greene (2018) Chs. 9, 12, 13, 14

1.3 Model Specification, Selection and Evaluation (4 Hours)
1.3.1 Model Specification
1.3.2 Model Selection
1.3.3 Model Evaluation

Readings: Greene (2018) Ch. 6

Empirical applications
1.4 Time Series Analysis (19 Hours)
1.4.1 Concepts of Stationarity and Non-stationarity (2 Hours)
1.4.2 Univariate Time Series Models (13 Hours)
   • Stationary Stochastic Processes: World Decomposition Theorem
   • Univariate Time Series Analysis: AR, MA and ARMA
   • ARIMA Modelling and Forecasting
     • Lag Length Selection & Testing Model Accuracy
     • Modeling Seasonality
     • Forecasting Univariate Time Series

Empirical Applications

Readings:

1.4.3 Multivariate Time Series Models (19 Hours)
   • Stationary VAR (Specification, Estimation and Variance-Covariance Decomposition)
   • Integrated Variables and Unit Root Testing
   • Structural Break and Unit Root Testing
   • Cointegration and Error-Correction Models
   • Co-integration test approaches: Engle-Granger; Engle-Yoo; Dynamic OLS (DOLS) and Fully Modified OLS (FMOLS); ARDL.
   • Non-stationary multivariate linear models: VAR models with unit roots-cointegration and impulse response functions; Testing and estimation of the cointegrating vector and the VECM

Empirical Applications,

Readings:

1.5 Financial Econometrics (9 Hours)

- Autoregressive Conditional Heteroscedastic (ARCH) Models
- Generalized Autoregressive Conditional Heteroscedastic (GARCH) Models
- Extensions to the Original GARCH Model – Asymmetric GARCH Models
- Multivariate GARCH Models

Empirical Application

Readings:

Enders (2014) Ch. 3, Greene (2018) Ch. 16

Main Textbooks


Required Textbooks


Supplementary readings


**Journal Articles**


**PART II - ECON 562: ECONOMETRICS II (MICRO-ECONOMETRICS)**

**2.1 Linear Panel Data Models** (16 Hours)

- 2.1.1 Regression with Pooled Time Series/Cross-Section Data
- 2.1.2 Static Panel Models – FE & RE Models
- 2.1.3 Dynamic Panel Models - GMM
- 2.1.4 Nonstationarity, Unit Roots and Cointegration in Panels

*Empirical Applications*

*Readings: Cameron and Trivedi (2005) Ch. 21 & 22, Greene (2018), Ch. 11; Verbeek, (2013), Ch. 10; Baltagi (2013), Chaps. 1-4, 8, and 12.*

**2.2 Discrete Choice Models** (12 Hours)

- 2.2.1. Binary Choice Models (LPM, Logit, and Probit)
- 2.2.2. Multi-Response Models
  - Multinomial Logit & Probit Models
  - Ordered Logit & Probit Models
  - Conditional and Nested Logit Models
  - Multivariate Probit Models

*Empirical Applications*

*Readings: Cameron and Trivedi (2005) Ch. 14, 15; Greene (2018) Ch. 17*
2.3 Limited Dependent Variable Models (8 Hours)
   2.3.1 Tobit Models
   2.3.2 Sample Selection Models

Empirical Applications

2.4 Treatment Effect Models (14 Hours)
   2.4.1 The Evaluation Problem
   2.4.2 Randomization
   2.4.3 Regression Discontinuity Design
   2.4.4 The Method of Matching
   2.4.5 Difference-in-Differences Estimator

Readings:
Cameron and Trivedi (2010), “Microeconometrics Using Stata”, Stata Press

Journal Articles & Chapters:

2.5 Introduction to Further Topics (10 Hours)
   2.5.1 Duration Models
   2.5.2 Count Data Models
   2.5.3 Quantile Regression

Empirical Applications.
Readings: Cameron and Trivedi (2005), Ch. 20, 23, & 25, Greene (2018), Ch. 18; Baltagi (2008), Ch.10; Blundell and Dias (2000)

Main Textbooks

Required Textbooks

Econometrics Theory and Practice Course Outline

Supplementary Texts

Baum, Christopher (2006), Introduction to Modern Econometrics Using Stata, Stata Press.
Collins and Trivedi (2009), Microeconometrics: Using Stata, Stata Press.
Edward Leamer, (eds.), Handbook of Econometrics, 5, 3160-3228, Amsterdam, North Holland
Horowitz, J.L. (2001), “Bootstrap in Econometrics”, in James Heckman and Edward Leamer,
(eds.): Handbook of Econometrics, 5, 3160-3228, Amsterdam, North-Holland.
(USA).
Shao, U. and D. Tu (1995), The Jackknife and Bootstrap, New York: Springer

Journal Articles


Selected Journal Articles on Empirical Studies in the African Context


**Relevant AERC Research Papers**
**Available at:**