New York University  
Department of Economics

Applied Statistics and Econometrics – G31.1102  
Spring 2013


### Course Outline

<table>
<thead>
<tr>
<th>Topic</th>
<th>Chapter(s):</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Multiple Regression Analysis and Least Squares Estimation</strong></td>
<td>1 – 5 (W: 3 – 6; 10; V: 1-2)</td>
</tr>
<tr>
<td>Non-matrix solution for two explanatory variables</td>
<td></td>
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<tr>
<td>Matrix Structure of the General Linear Model</td>
<td></td>
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<tr>
<td>Estimation of Unknown Parameters</td>
<td></td>
</tr>
<tr>
<td>Statistical Inference and Forecasting</td>
<td></td>
</tr>
<tr>
<td><strong>Binary Explanatory Variable Models</strong></td>
<td>6: Secs. 6.2, 6.3; (W: 7; )</td>
</tr>
<tr>
<td>Intercept, Slope, and Interaction Effects</td>
<td></td>
</tr>
<tr>
<td>Structural Changes and Seasonality</td>
<td></td>
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<tr>
<td><strong>Special Aspects of the Linear Model</strong></td>
<td>9; (W: 8; V: 4)</td>
</tr>
<tr>
<td>Heteroskedasticity</td>
<td>20; (W: 12; V: 4)</td>
</tr>
<tr>
<td>Autocorrelation</td>
<td>4.7; (W:3.4; V: 2.8)</td>
</tr>
<tr>
<td>Multicollinearity</td>
<td></td>
</tr>
<tr>
<td><strong>Non-linear Least Squares and Maximum Likelihood</strong></td>
<td>7, 14; (V: 6)</td>
</tr>
<tr>
<td><strong>Qualitative Dependent Variable Models</strong></td>
<td>17; (W: 17; V: 7)</td>
</tr>
<tr>
<td>Linear Probability Model</td>
<td></td>
</tr>
<tr>
<td>Logit and Probit Models</td>
<td></td>
</tr>
<tr>
<td><strong>Instrumental Variables and Basic Simultaneous System</strong></td>
<td>8, 10; (W: 15 – 16; V: 5)</td>
</tr>
<tr>
<td>The Identification Problem</td>
<td></td>
</tr>
<tr>
<td>Estimation Techniques for Simultaneous Systems</td>
<td></td>
</tr>
<tr>
<td>Forecasting Using a Simultaneous System</td>
<td></td>
</tr>
<tr>
<td><strong>Distributed Lags, Nonstationary Data and Time Series Analysis</strong></td>
<td>21; (W: 11, 18; V: 8 - 9)</td>
</tr>
<tr>
<td>Distributed Lags and ARDL Models</td>
<td></td>
</tr>
<tr>
<td>ARIMA Models</td>
<td></td>
</tr>
<tr>
<td>Basic Cointegration Analysis</td>
<td></td>
</tr>
<tr>
<td><strong>Panel Data Methods</strong></td>
<td>11; (W: 13 – 14; V: 10)</td>
</tr>
<tr>
<td>Fixed Effects and Random Effects Models</td>
<td></td>
</tr>
<tr>
<td><strong>Specification Analysis, Model Selection and Data Issues</strong></td>
<td>6, 4.7; (W: 9; V: 3, 6)</td>
</tr>
<tr>
<td>Specification Errors</td>
<td></td>
</tr>
<tr>
<td>Model Selection</td>
<td></td>
</tr>
</tbody>
</table>
**Office Information**
Office Hours: Tuesdays, 5:15 – 6:15 p.m.
Office Location: Economics Dept., Room 503
Email: as44@nyu.edu

**Course Requirements**
1. Mid-term Examination 40%
2. Final Examination 50%
3. Applied Projects 10%

Please note that there will be **no make up** of the mid-term examination.

**Computer Requirement**

The statistical package EVIEWS will be used throughout the course. You are encouraged to become familiar with this package.

**Lab Session**

The course consists of lectures and lab sessions. You should use the lab sessions to go over materials and homework assignments. Also, all computer-related and data issues should be resolved in the lab sessions.
**Applied Statistics and Econometrics – A Detailed Look**

**Estimators; Properties of Estimators**
- Unbiasedness
- Minimum Variance
- Consistency
- Best Linear Unbiased Estimator
- Least Squares Estimators
- The Maximum Likelihood Estimator
- Non-linear Estimator

**Multiple Regression**
- Specification of the Population Model
- The Regression Model
- Estimation of Parameters
- Unadjusted $R^2$, Adjusted $R^2$, F statistic
- Estimated Variance, Standard Error of Regression
- Hypothesis Testing of Individual and Several Coefficients
- Confidence Intervals for Coefficients
- Correlation Analysis
- Standardized Variables
- Forecasting using a Structural Econometric Model

**Binary Explanatory Variable Models**
- Intercept and Slope Effects Using Binary Independent Variables
- Using Binary Variables to Test for Structural Changes
- Piece-wise Linear Regression

**Multicollinearity**
- Effects of Multicollinearity on Estimation and Statistical Inference
- Detecting Multicollinearity; Methods for Reducing Multicollinearity

**Autocorrelation and Heteroskedasticity**
- Effects of Heteroskedasticity on Ordinary Least Squares
- Tests for Detecting Heteroskedasticity
- Effects of Serial Correlation on Ordinary Least Squares
- Tests for Detecting Serial Correlation
- Using Generalized Least Squares to Correct for Serial Correlation and Heteroskedasticity

**Specification Analysis**
- Effects of Including Irrelevant Variables
- Effects of Excluding Relevant Variables
- Test for Irrelevant Variables
- Test for Excluding Relevant Variables
- Structural Changes
- Test for Parameter Constancy
- Ramsey Reset Test for Specification Error
Special Models
The Linear Probability Model
The Logit Model
The Probit Model
Panel Data Method -- The Fixed Effects Model
Panel Data Method -- The Random Effects Model

Simultaneous Systems
Structural Form of the Simultaneous System
Reduced Form of the Simultaneous System
Estimation Problem Caused by Simultaneity
Testing for Simultaneity
The Identification Problem
Indirect Least Squares
Two Stage Least Squares

Time Series Analysis
The Adaptive Expectations Model
The Partial Adjustment Model
Estimating Econometrics Models involving Distributed Lags
Stochastic Processes
Stationarity
Unit Roots
Testing for Stationarity
ARIMA Models
Estimating ARIMA Models
Forecasting using Time Series Models
Basic Cointegration Analysis