

QUANTITATIVE METHODS

- **Applied Statistics for the Agri-Food System**

[Prof. Daniele Moro](#)

COURSE AIMS

The course aims to provide the students with mathematical and statistical tools for the theoretical and applied analysis of the food sector.

COURSE CONTENT

	ECTS
<i>Linear Algebra</i> Definitions of vector and matrix; linear independence; matrix operations; rank and determinant; linear systems in matrix form	1.0
<i>Mathematical tools</i> Notion of derivative; partial derivatives and total derivative; unconstrained and constrained optimization; comparative statics	1.5
<i>Random variables and probability distribution</i> Notion of probability; random variables; main distributions (normal distribution); estimators and sampling distributions	1.0
<i>Inference</i> Confidence intervals and hypotheses testing; t , χ^2 and F distributions; one-sample and two-sample hypotheses; Chi-squared tests	1.0
<i>Simple linear regression analysis</i> Least squares estimates; tests for the regression coefficients and for the overall model	0.5
Tutorials.	1.0

READING LIST

Selected readings from the following textbook:

K. BLACK, *Business Statistics for Contemporary Decision Making*, 5e, John Wiley & Sons, USA, 2007.

A. Asano, *An Introduction to Mathematics for Economics*, Cambridge University Press, USA, 2013.

Slides and classnotes.

TEACHING METHODS

The course is organized with 5 credit units of class lectures (35 hours) and 1 credit unit of class/lab exercises (12 hours), in which further applications on lectures' notions will be presented. Solving problems is required for passing final examination.

COURSE ASSESSMENT

The assessment will be based on one final written exam and assignments/homeworks. The global assessment is intended to evaluate the student's skills in managing mathematical and statistical tools.

The final written exam will last 120 minutes. Questions mainly relate to the application of the analytical methodologies presented in class, but they may also refer to theoretical issues. The exam is intended to provide a sufficiently precise measure of the student's learning and to offer to the instructor a grasp of the student's reasoning skills and abilities to use the methodological instruments presented in class.

The assignments/homeworks will require to solve problems/exercises and to carry out statistical analysis using a specific software.



NOTES

Further information can be found on the instructor's webpage or on the Faculty notice board.

Professor Daniele Moro is available to meet students after classes or by appointment (phone: 0523/599292 - daniele.moro@unicatt.it).

• Mod. Applied Econometrics for the Agri-Food System

[Prof. Paolo SCKOKAI](#)

COURSE AIMS

The course aims to introduce students to some basic econometric tools applied to food and agricultural data. Special attention will be given to those models that can be applied in a business environment.

COURSE CONTENT

	ECTS
The multiple regression model. Review of the two-variable regression model. The multiple regression model. The use of dummy variables. F-tests on model specification.	1.0
Heteroscedasticity and serial correlation. Definition, test and correction for heteroscedasticity. Definition, test and correction for serial correlation.	1.0
Forecasting. Use of the regression model for forecasting. Forecast error, forecast error variance and confidence intervals. Forecasting with serially correlated errors.	0.5
Models of qualitative choice. Definitions: binary and multiple choice models. Binary Linear Probability Model, Probit Model and Logit Model.	1.0
Panel data models. OLS estimation on panel data. Fixed-effects models: definition and estimation problems.	0.5
Instrumental Variable estimation. Correlation between explanatory variables and error term. IV estimation, endogeneity and 2SLS estimation.	0.5
Estimation of systems of equations. Simultaneity, OLS estimation and the identification problem. Seemingly unrelated regressions (SUR) and Three-stage least squares (3SLS).	0.5
Tutorial computer sessions	1.0

READING LIST

Selected readings from the following textbooks:

WOOLDRIDGE J.M. - *Introductory Econometrics: A Modern Approach*, 5th ed., South-Western Cengage Learning, 2013.

R.S PINDYCK-D.L. RUBINFELD, *Econometric Models and Economic Forecasts*, 4th ed., McGraw-Hill, 1998.

Further readings on specific topics will be provided by the instructor.

TEACHING METHOD

The course consists of five credits of lectures and one credit of tutorial computer sessions.

ASSESSMENT METHOD

The exam is structured in two parts: one final written exam and two computer-based exams.

The final written exam lasts 120 minutes and it is structured with open questions and exercises concerning applications of econometric models to agricultural and food economic data. The score attached to each question may change depending on the test. The assessment is intended to provide a sufficiently precise measure of the student's learning and to offer to the instructor a grasp of the student's reasoning skills and abilities to use econometric tools.



The two computer-based exams will refer to the content of the tutorial computer sessions and will ask the students to carry out econometric analysis of agricultural and food economic data using a specific econometric software.

NOTES

Further information can be found on the instructor's webpage or on the Faculty notice board.

Prof. Paolo Scokai is available to meet with students after class in the SMEA offices or by appointment (tel. 0523-599290; email paolo.skokai@unicatt.it).