UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Quantitative Methods

2223-1-F5602M002

Learning objectives

Students will obtain the ability to carry out empirical research in microeconomics and macroeconomics. Further details are provided in the dedicated sections of each module.

Contents

The course provides the basic elements of inferential statistics and econometrics for the development and the estimation of models to analyze complex phenomena in economics. Further details are provided in the dedicated sections of each module.

Detailed program

INFERENTIAL STATISTICS

Samples and sampling distributions. Convergences of sequences of random variables. Law of large numbers. Central limit theorem and its applications. Monte Carlo approximations. Sampling from the Normal distribution. Statistical models. Bernoulli model, location Normal model, location-scale Normal model. Likelihood function. Sufficient statistics. Maximum likelihood estimates. Mean squared error. Bias, standard error, consistency. Confidence intervals. Confidence intervals in the Bernoulli model, the location Normal model, the location-scale Normal model. Testing hypotheses. P-values, statistical significance, practical significance, critical values. One-sided and two-sided tests. Hypothesis assessment via confidence intervals. Testing hypotheses in the Bernoulli model, the location Normal model, the location-scale Normal model. Sample size determination. Inference on a variance. Distribution-free (non parametric) methods. Method of moments. Bootstrap method. Inference about quantiles. Least squares method. Ordinary least squares estimates in the simple linear regression model. ANOVA

decomposition in the simple linear regression model. Hypotheses testing about the parameters of the simple linear model.

ECONOMETRICS

The simple regression model. Multiple regression analysis: estimation. Multiple regression analysis: inference. Multiple regression analysis: OLS asymptotics. Multiple regression analysis: further issues. Multiple regression analysis with qualitative information. Heteroskedasticity. More on specification and data problems. Basic regression analysis with time series data. Panel data. Instrumental variables estimation. Simultaneous equations models. Limited dependent variable models. Advanced time series topics.

Prerequisites

Basic statistics. Descriptive statistics. Probability. Probability distributions.

Teaching methods

Frontal lessons. Tutorials in the lab.

During the Covid-19 emergency, lectures will be online.

Assessment methods

Students can undertake written midterms or a final oral test for each module. The final mark is obtained as a weighted average of the two modules, according to the credits (CFU) of each module.

Textbooks and Reading Materials

INFERENTIAL STATISTICS

Evans, M.J., *Probability and Statistics: The Science of Uncertainty (2nd edition)*, Freeman, 2010.

ECONOMETRICS

"Introductory econometrics: a modern approach", by J.M. Wooldridge, Thompson South Western, Belmond, 2015 (5?? edition).

Semester

First and second semester.

Teaching language

English.

Sustainable Development Goals

NO POVERTY | GENDER EQUALITY