Aims
The course aims to endow students with knowledge and important skills for the quantitative and empirical analysis of economic phenomena. Such skills are essential to complete the profile of the economics graduate and are expected to prove useful for a career. In particular, these skills will be deepened with the study of some applications concerning the localization of productive activities and innovation phenomena across European regions.

More specifically, the course aims to equip students with the following knowledge and competencies:

a) Knowledge and understanding
   - knowledge and ability to analyze the main phenomena related to the localization of economic activity, innovative activity and technological progress on applied economic studies, with a specific focus with respect to the Italian and European context
b) Applying knowledge and understanding
   - ability to understand and interpret quantitative and statistical analysis, in particular those related to use of georeferenced data
   - ability to carry out analyses of economic data by applying basic econometric methods
   - familiarity with the access to main data economic sources
c) Making judgements
   - thanks to the awareness of the empirical approach to the study of real world economic issues and of the problems and pitfalls likely to occur in applied analysis, students develop the ability to make judgements on empirical analysis reported in published studies
d) Communications skills
   - by means of applied studies to be carried out in groups, students develop their communication skills, both in written and oral form, with particular reference to the use of the technical language, specific of the quantitative disciplines
e) Learning skills
   - by means of applied studies to be carried out in lab and groups and the study of scientific articles, students acquire the tools to independently carry out analysis and studies related to economic phenomena.

The knowledge and skills acquired in the course of Applied Economics complements those that students acquire in the course of Innovation and creativity, Market analysis, and Entrepreneurship and firm creation, and provide students with the background knowledge necessary to conduct empirical analyses within a possible PhD program.

Prerequisites
As the main object of the Econometrics course is the study of the quantitative methodologies used to assess economic phenomena, students are supposed to have already acquired the
basic knowledge of economics (this prerequisite is very important) during their undergraduate degree course. Other prerequisites relates to basic knowledge in statistics (essential), mathematics (essential), informatics (useful) and English language (very important). In particular, it is highly recommended that students are already familiar with the following knowledge:

- **Statistics**: probability theory (random variables and their probability distributions), properties of the probability distribution functions (expected value, mean, variance, covariance), main sample distributions, how to draw inference on population from sample evidence, point estimation, confidence intervals, hypothesis testing;
- **Mathematics**: set theory (relations, functions, numerical sets, natural, rational and real numbers), one variable function (properties, graphic representation, elementary functions such as linear, logarithmic, exponential, polynomial) limits, derivatives, integrals, functions of two or more independent variables (properties, graphic representation, necessary and sufficient conditions for maxima and minima of two variables functions);
- **Informatics**: ability in the use of text (Word) and spreadsheets (Excel) software;
- **English**: good knowledge of the English language is required because some reading material is provided in English.

**Syllabus**
During the first part of the course the following topics will be addressed:
- Review of probability theory, hypothesis testing, confidence intervals, regression model with one explanatory variable
- Linear regression model with k explanatory variables
- Ordinary Least Squares estimation method
- Functional form and non-linear models
- Dummy variables and structural change
- Internal and external validity of empirical models
- Endogeneity and instrumental variables estimation method

During the second part of the course, through the discussion of analytical and empirical contributions, the following topics will be addressed:
- distribution of productive activities
- innovation activity and its main drivers
- knowledge flows among European regions.

**Teaching methods**
Lectures: 36 hours
Tutorials: 10 hours

Tutorials will take place in the computer lab so that students will acquire the basic skills necessary to run the econometric software STATA, which will be used for elementary empirical analyses.

This course adopts a gradual learning process following a building-block approach, in presenting each new topic it is assumed that students have already learned the previous ones, for this reason they are strongly recommended to attend all the lectures, those of the second part will help to understand the application of the techniques learned in the first part of course. During lectures, students will be involved in discussions that allow them to develop critical thinking and improve communication skills.

Students are also encouraged to prepare assigned exercises as this is essential for a complete understanding of the course and for acquiring the applied skills. The homework can be done in groups of up to 4 students who are expected to hand in a written paper in which the results of
the exercises are reported and discussed. These activities are expected to enhance independent judgment and communication skills.

**Assessment**

Assessment method: written examination.

The examination questions are intended to assess whether students have acquired the main knowledge of the methods to carry out applied analysis and are able to use such knowledge to critically discuss empirical studies on the economics of innovation and localization of productive activities. Therefore, in answering the exam questions, students are required to:
- present and discuss theoretical content
- discuss in a rigorous, logical and consequential way the empirical analysis results by comparing, if appropriate, alternative economic approaches.

To pass the exam (mark 18/30) students have to demonstrate a good understanding of the first part of the course topics, a basic knowledge of the second part and to be able to use the tools learned in the first part of the course for interpreting the results of the analyses presented in the second part. The maximum mark of 30/30 (possibly cum laude) will be awarded to students who demonstrate that they have acquired an excellent mastery of the topics of the course, both from a theoretical and applied perspective, and they are able to answer the exam questions by using a rigorous language.

**Reading list**

**First part**


**Second part**


**Other information**
Lecture-by-lecture covered topics are reported in the on-line course register. The course register and the teaching material can be found at the course webpage at the link,

- old UNICA website:  

- new UNICA website (you have to login first):  
  [https://www.unica.it/unica/it/ateneo_s07_ss01_sss03.page?contentId=SHD30574](https://www.unica.it/unica/it/ateneo_s07_ss01_sss03.page?contentId=SHD30574)