

SYLLABUS DEL CORSO

Piano degli Esperimenti

2627-3-E4102B043

Learning objectives

The course aims to provide the conceptual basis and tools for the construction of basic sample designs in finite populations. The student must know how to plan, analyze and interpret data of an experimental design.

At the end of the course the student must be able to basically apply a survey sampling plan and must also be able to conduct an experimental design.

Knowledge and understanding

This course will provide knowledge and understanding to:

- Main sampling plans from finite populations (case of continuous and dichotomous variables)
- Construction of the total/average/fraction estimator for the different sampling plans
- Main experimental designs
- Analysis of variance (ANOVA) in the context of the design of the experiments

Ability to apply knowledge and understanding

At the end of the course the students will be able to:

- Knowing how to apply the correct sampling plan based on population structure and the type of variable
- Knowing how to build a correct estimator and recognize its properties
- Knowing how to build a correct experimental plan
- Knowing how to perform analysis of variance

The course allows the student to acquire a solid foundation in the application of statistics to the biostatistics/statistical/demographic work context.

Contents

Definition of a sample plan in the presence of finite populations. Analysis of data deriving from experimentation.

Detailed program

- Sampling from finite populations
- Simple random sample
- Introduction to proportion estimate
- Stratified sampling
- Cluster sampling
- Introduction to panel sampling
- Fully randomized design (one factor)
- One way ANOVA; two or more ways ANOVA
- 2² factorial design
- Randomized complete block design.

Prerequisites

No formal prerequisites required.

However, knowledge of basic concepts of statistics, probability calculus and inference is strongly recommended.

Teaching methods

Lectures of theory and examples in the classroom.

Classroom lectures: 42 hours

Assessment methods

The examination comprises a written paper comprising exercises and open-ended theoretical questions covering both sampling theory and experimental design.

It should be noted that an optional oral examination may be requested by the lecturer. It is important to note that students are permitted to request an oral examination only if they have achieved a pass mark in the written paper (18/30).

The written examination comprises open-ended theoretical questions and numerical exercises (to be completed using a calculator). The theoretical questions assess knowledge of the main sampling plans and experimental designs, along with their characteristics and properties. The exercises evaluate the capacity to select, calculate and interpret suitable sampling plans (and their estimators), experimental designs and ANOVA in the context of elementary practical problems. Moreover, the theoretical questions and exercises (accompanied by their respective comments) serve to evaluate the capacity to articulate oneself using the appropriate technical language.

The oral examination is comprised of a presentation of theoretical topics. It is imperative that the student be able to present and discuss theoretical concepts, whilst also demonstrating an ability to make connections between different topics.

Textbooks and Reading Materials

For sampling techniques:

Frosini B.V., Montinaro M., Nicolini G., Il campionamento da popolazioni finite, UTET, 1999 ;

Cochran W.G., Sampling Techniques, J. Wiley, New York, 1977.

For design of experiments:

Cochran W.G., Cox M.G., Experimental Designs, II ed. Wiley, New York, 1992

Montgomery, D.C., Progettazione e analisi degli esperimenti, McGraw-Hill, Milano, 2005

Semester

I Semester, II period

Teaching language

Italian

Sustainable Development Goals

QUALITY EDUCATION
