UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Research Methods

2425-2-I0201D139-I0201D218M

Aims

Basic knowledge of typical sampling schemes, methodological tools of descriptive statistics and inferential statistics to set up studies and to analyse data, with attention to the features of rehabilitation data.

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

1) read and discuss scientific literature with descriptive and inferential statistical analyses
2) have a solid knowledge to be involved in the the design and implementation of studies in rehabilitation

Contents

Basics of probability calculation
Confidence interval on the parameter p probability of an event (proportion)
Frequency tables and graphs
Order of magnitude and dispersion indicators
Gaussian Distribution (to approximate the trend of a histogram)
Confidence interval on the mu parameter
Use of the Gaussian distribution to construct confidence intervals

Detailed program

- UNITA' A : Calcolo delle probabilità (Capitolo 5)
  Definizione di esperimento
  Spazio campionario, eventi semplici e composti

Probabilità con approccio classico e frequentista
Eventi incompatibili, dipendenti e indipendenti
Probabilità dell’unione e dell’intersezione
Probabilità condizionata

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- UNITA' B : Intervallo di confidenza sulla proporzione p (Capitolo 9)
  Calcolo della stima puntuale di una probabilità
  Intervallo di confidenza: calcolo della stima intervallare di una probabilità, interpretazione, simulazione
  Pianificazione della stima intervallare di una probabilità

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- UNITA' C : Organizzare e sintetizzare i dati (Capitolo 2 e Capitolo 3)
  Costruzione di una tabella di frequenza per una caratteristica qualitativa: frequenze assolute, relative, relative %
  Rappresentazione grafica con grafici a barre, a torta
  Costruzione di una tabella di frequenza per una caratteristica quantitativa: aggregazione in classi, frequenze assolute, relative, relative %
  Rappresentazione grafica con istogramma
  Indicatori sintetici dell’ordine di grandezza e della variabilità del fenomeno quantitiativo: media aritmentica (e/o mediana) e deviazione standard

- UNIT A: Calculation of probabilities (Chapter 5)
  Definition of experiment
  Sample space, simple and compound events
  Probability with classical and Frequentist approach
  Incompatible, dependent and independent events
  Probability of union and intersection
  Conditional probability

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- UNIT B: Confidence interval on the proportion p (Chapter 9)
  Calculation of the point estimate of a probability
  Confidence interval: calculation of the interval estimate of a probability, interpretation, simulation
  Planning the interval estimate of a probability

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- UNIT C: Organizing and summarizing data (Chapter 2 and Chapter 3)
  Construction of a frequency table for a qualitative characteristic: absolute, relative, relative frequencies %
  Graphic representation with bar and pie charts
  Construction of a frequency table for a quantitative characteristic: aggregation into classes, absolute, relative, relative % frequencies
  Graphic representation with histogram
  Synthetic indicators of the order of magnitude and variability of the quantitative phenomenon: arithmetic mean (and/or median) and standard deviation

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- UNIT D : Gaussian Distribution and its use as a histogram approximation method (Chapter 7)
  Gaussian distribution: genesis and area calculation method

- UNIT E : Confidence interval on mu (Chapter 9)
  Confidence interval: calculation of the interval estimate of a mu parameter, interpretation, simulation
  Planning the interval estimation of a mu parameter

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- UNIT F: Use of the Gaussian distribution to construct the confidence intervals in UNITS B and E
  sample distributions of the proportion and the mean

Prerequisites

None.

Teaching form

Synchronous frontal lessons, asynchronous contents (clips and quizzes).

Textbook and teaching resource

- Book: Fondamenti di statistica Micheal Sullivan III, traduzione a cura di Emma Zavarrone, Pearson 2020, diponibile anche come e-book https://www.pearson.it/opera/pearson/0-7264-fondamenti_di_statistica
- Slides
- Video clip

Semester

First semester.

Assessment method

Written exam.

Office hours

Under request, via email contact with the instructor.

Sustainable Development Goals

QUALITY EDUCATION | GENDER EQUALITY