

Introduction to Statistics - Course Syllabus

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Course Description

This course aims at introducing the basic concepts of applied statistics including probability, common distributions, descriptive statistics, statistical inference, and data analysis. This course is designed for master students of Entrepreneurship Innovation and Business Administration at University of Padua.

This course is cohort-based, which means that there is an established start and end date, and that you will interact with other students throughout the course. In particular, students will be grouped such that one student having statistical background will study with three or four students who have no background on statistics.

Required Materials

- Book: *OpenIntro Statistics*, Diez, Barr and Cetinkaya-Rundel, third edition, 2015. The book is free to download from: <https://www.openintro.org/download.php?file=os3&redirect=/stat/textbook/os3.php>.
- Course notes available on Moodle.

Prerequisites

Students are encouraged to read the following documents in advance:

- OpenIntro Statistics, chapters: 1, 2, 3, (section 3.1), 4, 5 (sections 5.1, 5.2, 5.3), 6 (sections 6.1, 6.2, 6.3, 6.4), 7, 8.
- Online course: STAT 500-Applied Statistics, <https://onlinecourses.science.psu.edu/stat500/>

Course Objectives

At the completion of this course, students will be able to:

1. Understand the role of statistics in doing the research.
2. Read and understand the statistical concepts from reports and papers.
3. Master the statistical methods to summarize and analyze data: *descriptive statistics, confidence interval for population mean and proportion, hypothesis testing, Chi-square test for independence, linear regression model.*
4. Interpret results from various computer packages (R, SPSS, SAS) and be able to perform appropriate statistical techniques.

Schedule and daily learning goals

The schedule is tentative and subject to change. The learning goals below should be viewed as the key concepts you should grasp after each week, and also as a study guide before each homework and final exam.

All the lectures will be held at Department of Economics and Management “Marco Fanno”, University of Padua, Via Ugo Bassi 1, 35131, Padua, Italy.

Lecture 01, 01/10, from 08.30 to 10.30 at room 44: Overview, Collecting Data and Descriptive Statistics

- Introduction the role of statistics
- How to collect data
- Determine the quantitative and qualitative data
- Summarizing a data set by using statistical measure of central tendency and variability, and using graphical presentation.
- Homework

Lecture 02, 03/10, from 08.30 to 10.30 at room 44: Introduction to Probability

- Definition of probability
- Random variable
- Some common probability distribution (normal, t -student, Chi-square)
- Homework

Lecture 03, 04/10, from 08.30 to 10.30 at room 44: Correct Exercises I and II

Lecture 04, 08/10, from 08.30 to 10.30 at room 44: Introduction to Statistical Inference: Confidence Interval

- Sampling distribution
- Statistical estimation
- Two-sided confidence interval for population mean
- Two-sided confidence interval for population proportion
- Homework

Lecture 04-05, 10/10 and 11/10, from 08.30 to 10.30 at room 44: Hypothesis Testing

- t -test for mean of one sample
- t -test for mean of paired data
- t -test for comparing two population means of independence data (equal variances and unequal variances)
- Homework

Lecture 07, 15/10, from 08.30 to 10.30 at room 44: Correct Exercises III and IV

Lecture 08, 17/10, from 08.30 to 10.30 at room 44: Testing for Categorical Data and Normality

- Testing for normality of data
- Goodness-of-fit test
- Chi-square test for independence
- Homework

Lecture 09-10, 18/10 and 22/10, from 08.30 to 10.30 at room 44: Linear regression model

- Set-up a regression model
- Fitting model
- Model checking (the significant of coefficients, model assumptions)
- Model predicting
- Homework