

Introduction to Statistical Methods, 2017 - 2018

Probabilities & Statistics, M1 International, Université Paris-Saclay

General Course Information

INSTRUCTOR Theophanis Tsandilas (fanis at lri.fr)
LECTURES Thursdays 2 - 5 pm at PUIO (Bld. 640) in E213
WEB SITE <https://www.lri.fr/~fanis/courses/Stats2017>

Overview

The course is the second part of the module *Probabilities and Statistics* of the international Computer-Science Master (M1 IIT) program. The course mainly targets students and researchers who are interested in experimental research methods and often have to deal with relatively small samples and messy data. Previous knowledge of statistics or probability theory is not required, but some understanding of basic notions of probabilities might help.

The course will introduce fundamental concepts of descriptive and inferential statistics. The goal of the course is NOT to provide a set of statistical recipes or step-by-step instructions. Particular focus will be given on understanding key principles, thinking about the underlying model assumptions, and recognizing the limitations of each statistical method.

The students will learn how to use the R software to analyze real datasets and how to apply computational methods to estimate parameters and evaluate statistical procedures.

Assessment

Course Component	Weight
Assignment	50%
Exam	50%
Total	100%

Course Material

Part of the course content has been based on Thom Baguley's book:

Serious Stats: A Guide to Advanced Statistics for the Behavioral Sciences,
Palgrave Mcmillan, 2012.

However, no textbook will be required. Course material is based on proposed readings and other material presented in the class or posted online.

Course Coordination and Communication

During the term, we will use the Slack software (slack.com) to facilitate the communication between the instructor and the students

Slack workspace: statistics-saclay.slack.com

Course Calendar

The following is a tentative schedule. Topics may change during the term. Please, check the course's website for updates.

	Date	Description
1	Nov 23	Basic concepts: data, populations, and samples. Why learning statistics? Types of data and descriptive statistics. Starting with R.
2	Nov 30	Probability distributions. The central limit theorem. Statistical inference. Introduction to confidence intervals.
3	Dec 7	Continuing on confidence intervals. Monte Carlo methods. Bootstrapping. Introduction to the null hypothesis testing.
4	Dec 14	Significance tests. Good practices and pitfalls. Assignment handout.
5	Dec 21	Correlation. Regression models and prediction.
Holidays		
6	Jan 11	Effect size and statistical power. Analyzing messy data. Dealing with violations of model assumptions.
7	Jan 18	Advanced statistical procedures. Alternatives to classical statistical inference. Exam preparation. Deadline for handing in the assignment.
	Jan 25	Final exam (2 hours)