

# STATISTICS APPLIED TO PSYCHOLOGY I – Code 800146

## COURSE INFORMATION

**Undergraduate Studies:** 0812 – Bachelor's degree in Psychology (Studies Plan 2009-10)

**Type:** Basic (compulsory)

**ECTS:** 6.0

**Module:** Basic training

**Area:** Statistics

**Year:** First

**Semester:** 1

## LECTURER INFORMATION

**Name:** Rocío Alcalá Quintana, PhD

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## SYNOPSIS

### COMPETENCIES

#### General competencies

GC6: Know and understand research methods and data analysis techniques.

#### Transversal competencies

TC1: Analysis and synthesis.

TC2: Preparation and defence of properly reasoned arguments.

TC3: Problem solving and decision making in Psychology.

TC5: Looking for information and data interpretation on social, scientific and ethical topics related to the field of Psychology.

TC6: Team work and collaboration with other professionals

TC7: Critical thinking and self- analysis.

TC8: Learning how to learn, skills for life-long learning.

#### Specific competencies

SC17: Be able to measure and obtain relevant data for the evaluation of interventions.

SC18: Know how to analyse and interpret results of evaluations.

SC19: Know how to appropriately and accurately provide feedback to recipients.

### TEACHING ACTIVITIES

TEACHING ACTIVITIES	Hours	% of total credits	Attendance
Theory classes	45	30 %	100%
Practical sessions	15	10 %	100%
Students' work	82.5	55 %	0%
Assessment	7.5	5 %	100%

### BRIEF DESCRIPTION:

Basic concepts of measurement and types of variables. Introduction to Statistics. Data summarization and visualization. Measures of central tendency, variability, and skewness. Measures of association. Introduction to probability theory. Probability distributions of some continuous and discrete random variables. Sampling.

## PRE-REQUISITES

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Basic proficiency in secondary school maths is required to follow the course adequately.

## OBJECTIVES

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This course aims at providing students with the necessary background to study the most widely used quantitative data analysis techniques in the various areas of Psychology. This background focus on descriptive statistics and on the basics of probability theory required to prepare students for the subsequent course on statistical inference.

## TOPICS

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Part I: Descriptive statistics

1. Introduction
2. Summarizing data: Frequency distributions and graphical representations
3. Measures of location and central tendency
4. Measures of variability
5. Measures of shape: skewness and kurtosis
6. Standard scores
7. Bivariate frequency distributions
8. Measures of association and linear correlation

Part II: Probability

9. Introduction to Probability Theory
10. Random variables
11. Probability distributions of discrete random variables
12. Probability distributions of continuous random variables
13. Sampling essentials

## ASSESSMENT

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Grading will be based on three components:

- **Final exam** (70% of the final mark). The final exam will take place at the end of the semester. It will be based on all material covered during the course and it will consist of exercises and problems similar to those in your homework, and examples shown in class. The exam will be closed book, but students will be allowed to bring (i) a hand-written formulae sheet (up to 3 DIN-A4 pages, two sided), (ii) a non-programmable scientific calculator, and (iii) the set of statistical tables available on Virtual Campus.

At least 40% of the maximum score in the exam is required to pass this course. Students who fail Statistics-I in February will have the opportunity to take a re-exam in July.

- **Project** (20% of the final mark). Students are required to work on an individual project based on the main topics covered in the course. Detailed instructions and items to be included in the project will be posted on the "Stat-I project site" at Virtual Campus on a regular basis. Also, students must attend regular follow-up meetings with their lecturer to check up their progress during the semester (at least once a month). Meetings will take place in groups of 4 students during my office hours and must be booked in advance through Virtual Campus. At the end of the semester, an individual project report must be submitted through Virtual Campus as a pre-requisite to pass, but grading will be mostly based on the outcome of our follow-up meetings. No passing mark is required for this component and students who fail to attend the follow-ups or who come underprepared only qualify to receive at most 50% of the maximum possible score on this component. Project marks earned during the course will be valid in July since there will not be project re-submission in July.

- **In-class activities** (10% of the final mark). Class attendance is recommended but not mandatory. Students who attend classes are expected to prepare for them (including homework) and to participate actively.

Only those who meet these requirements will earn credit for this component. No passing mark is required here and students who fail in February will keep the mark earned during the semester for July.

**FINAL GRADES.** Provided that you earned at least 40% of the maximum score in the exam, your final mark will be a weighted mean of the marks earned on the three components. Final grades will be assigned according to your final mark (ranging from 0 to 10) on the following scale:

[0, 5): Suspenso (SS) [7, 9): Notable (NT)

[5, 7): Aprobado (AP) [9, 10]: Sobresaliente (SB)

## RESOURCES

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### Textbook

There is no required textbook for this course. One or two chapters from different textbooks will be recommended on Virtual Campus as "further reading" for each topic and a list of useful books for reference is provided in next section.

Lecture notes will be made available on Virtual Campus before the corresponding topic is covered in class. It is strongly recommended that you print those lecture notes and bring them to class.

Homework exercises and problems will also be regularly posted on Virtual Campus. Further exercises can be found in the books listed next.

### Course website

The course website is accessible through Universidad Complutense's Virtual Campus, (<http://www.ucm.es//campusvirtual>). The website is an essential element of the course and relevant information (including lecture notes, assignments, exercises, supplemental materials, announcements, etc.) will be posted there on a regular basis. Students are responsible for checking it frequently for news and updates.

### Basic references in English

The following books are either available in the library or freely downloadable from the Internet.

Freund, J. E. (2007). *Modern Elementary Statistics*, 12th Edition. Englewood Cliffs, NJ: Prentice-Hall.

Gravetter, F.J. & Wallnau, L.B. (2010). *Statistics for the Behavioral Sciences*, 8th Edition. Belmont, CA: Thomson-Wadsworth (L includes detailed explanations for students with poor mathematical background).

Howell, D. C. (2016). *Fundamental Statistics for the Behavioral Sciences*, 9th Edition. Belmont, CA: Cengage Learning.

Kroese, D.P. (2009). *A short Introduction to Probability*. University of Queensland. Available at <http://www.maths.uq.edu.au/~kroese/asitp.pdf>

Minium, E. W. & Clarke, R. B., (1982). *Elements of Statistical Reasoning*. Hoboken, NJ: J Wiley & Sons.

Spiegel, M.R., Schiller, J., & Srinivasan, R.A. (2008). *Schaum's Outline of Probability and Statistics*, 3rd. Edition. McGraw-Hill (L good source of probability exercises and problems).

Vokey, J.R. & Allen, S.W. (2013). *Thinking with data*, 7th Edition. Lethbridge, Alberta: PswenceTM Publishing Society. Available at <http://people.uleth.ca/~vokey/pdf/thinking.pdf>

Witte, R.S. & Witte, J.S. (2009). *Statistics*. Hoboken, NJ: John Wiley & Sons.

### Basic references in Spanish (also available in the library)

Amón, J. (1996). *Estadística para Psicólogos 1. Estadística Descriptiva*. Madrid: Pirámide.

Amón, J. (1996). *Estadística para Psicólogos 2. Probabilidad y Estadística Inferencial*. Madrid: Pirámide.

Martínez Arias, R., Chacón Gómez, J. C., Castellanos López, M. A. (2014). *Análisis de Datos en Psicología y Ciencias de la Salud. Vol. 1*. Madrid: EOS.

### Further references (some of them, but not all, available in the library)

Blitzstein, J. K, y Hwang, J. (2015). *Introduction to Probability*. Boca Raton, FL: CRC Press/Taylor & Francis Group.

Botella, J., León, O.G. y San Martín, R (2001). *Análisis de datos en Psicología I. Teoría y ejercicios*. Madrid: Pirámide.

Hays, W. L. (1988). *Statistics*. New York, NY: Holt, Rinehart & Winston.

- Moore, D. S. (2006). *The Basic Practice of Statistics*, 4th Edition. New York, NY: W.H. Freeman & Company.
- Peña, D. (1995). *Introducción a la Estadística para las Ciencias Sociales*. Madrid: McGraw-Hill Interamericana.
- Stephens, L.J. (2008). *Schaum's Outline of Statistics in Psychology*. McGraw-Hill.