

STATISTICS APPLIED TO PSYCHOLOGY I – Code 800146

Academic Year 2022-23

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

Mail: ralcala@psi.ucm.es

Office number: 2121-O

Office hours (fall semester): Tuesdays and Thursdays, from 15.00 to 16.00
Wednesdays, from 13.00 to 15.00.

SYNOPSIS

COMPETENCIES

General competencies

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

Transversal competencies

TC1: Analysis and synthesis.

TC2: Preparation and defense 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 analyze 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

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

OBJECTIVES

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

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

Grading will be based on two components:

- **Final exam** (70% of the final mark). An in-person 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 assignments, 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 2 din-a4 pages, two sided), (ii) a non-programmable scientific calculator (not that on your cellphone), and (iii) the set of statistical tables available on *Virtual Campus*. At least 40% of the maximum score on the exam is required (but not sufficient) to pass this course. Students who fail Statistics-I in January will have the opportunity to take a resit exam at the end of the academic year, in June/July. Please, notice that final exams will be held in-person both, in January and in June/July.
- **Assignments** (30% of the final mark). This component consists of two items:
 - **Submissions** (20% of the final mark). Two or three assignments will be posted on *Virtual Campus* during the semester and submission deadlines will be agreed upon with the class. All assignments must be submitted as a pre-requisite to pass the course, but only assignments submitted on time will be graded. Late submissions will receive 0 points, which will contribute to the final mark. Students who fail in January will be allowed to submit any missing assignments in June/July to meet the requirement to pass, but these will be considered late submissions in all respects.
 - **In-class activities** (10% of the final mark). Students are expected to engage actively in lectures. You should prepare in advance (e.g., by doing homework, readings, etc.) and answer questions posed during the session. Only those who contribute consistently during the semester will be credited on this item.

No passing mark is required on any of the two assignment items. Students who fail the course in January will keep the mark earned during the semester on this component 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 each component. 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

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

Most of the following books are either available from the library (either as e-book or in hardcover) or freely downloadable from the Internet.

Cohen, B. H. (2008). *Explaining Psychological Statistics*, 3rd Edition. Hoboken, NJ: John Wiley & Sons Inc.

Daniel, J. (2012). *Sampling Essentials: Practical Guidelines for Making Sampling Choices*. Thousand Oaks, CA: SAGE.

Edge, M.D. (2019). *Statistical Thinking from Scratch. A Primer for Scientists*. New York, NY: Oxford University Press.

Freund, J. E. (2014). *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 (☛ includes detailed explanations for students with poor mathematical background).

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: John Wiley & Sons.

Thompson, B. (2006). *Foundations of Behavioral Statistics. An Insight-Based Approach*. New York, NY: Guilford Press.

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

✦ Vokey, J.R. & Allen, S.W. (2018). *Thinking with data*, 7th Edition. Lethbridge, Alberta: Psuence™ Publishing Society. Available at <http://people.uleth.ca/~vokey/pdf/thinking.pdf> (☛ covers most of the contents of descriptive statistics included in the program without requiring a strong mathematical background).

✦ Ward, M. & Gundlach, E. (2015). *Introduction to Probability*. New York, NY: W. H. Freeman & Company.

✦ Witte, R.S. & Witte, J.S. (2017). *Statistics*. Hoboken, NJ: John Wiley & Sons (☛ includes detailed explanations for students with poor mathematical background).

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., & 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.

Heiman, G. W. (2011). *Basic Statistics for the Behavioral Sciences*. 6th Edition. Belmont, CA: Thomson-Wadsworth.

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

Moore, D. S. (2006). *The Basic Practice of Statistics*, 4th Edition. New York, NY: W.H. Freeman & Company.

Mosteller, F., Fienberg, S. E., & Rourke, R. E. K. (1983). *Beginning Statistics with Data Analysis*. Reading, MA: Addison-Wesley.

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.