Statistics and Psychometric Models

Code: 104881
ECTS Credits: 6

2025/2026

Degree	Type	Year
Applied Statistics	OP	4

Contact

Name: Albert Espelt Hernàndez

Email: albert.espelt@uab.cat

Teachers

Eduardo Doval Diéguez

Juan Martín Aliaga Ugarte

Jose Blas Navarro Pastor

Clara-Helena Pretus Gomez

Marina Bosque Prous

Eva Penelo Werner

Alfredo Pardo Garrido

Teaching groups languages

You can view this information at the end of this document.

Prerequisites

This course uses the statistical software JAMOVI, and attending classes requires a laptop computer.

Objectives and Contextualisation

"Statistical and psychometric models" is taught in the second semester of the second year, after having completed the two previous subjects on methodology, through which the students must have acquired the foundations of research methodology and data analysis.

On the basis of these previous subjects, in the current subject students will now move on to more complex statistical models, of a multivariable nature, introducing analytical solutions to three common phenomena in psychological research: interaction between variables; statistical control of confusing variables; and reduction in the dimensionality of data.

The training objectives of this subject are:

1. To learn the concept of a statistical model as an approach to the multidimensionality of research in psychology.

2. To understand the relationship between the research design used and the corresponding data analysis.

3. To know when and how to apply data-reduction techniques.

At the end of the course, students must be able to:

1. Specify the statistical model appropriate to the objectives and hypotheses of psychological research when research design allows this.

2. Distinguish between models that respond to a predictive hypothesis and those that respond to an explanatory hypothesis.

3. If necessary, include interaction variables and/or adjustment variables in the model.

4. Decide on the need to keep terms of interaction and/or adjustment variables in the model.

5. Correctly estimate and interpret the coefficients of a regression model.

6. Delimit the main aspects to be diagnosed when validating the model.

7. Know how to apply a principal-components analysis to reduce data dimensionality; correctly determine the number of components retained; optimal rotation of the said components; and perform an adequate interpretation of their meaning.

8. Understand the statistical analysis carried out in research papers that use predictive or explanatory statistical models, or data-reduction models.

9. Know the basic statistical vocabulary in Catalan, Spanish and English.

10. Know the basic elements of statistical analysis software.

Learning Outcomes

1. CM14 (Competence) Propose the statistical model needed to analyse data sets belonging to real studies.
2. KM17 (Knowledge) Recognise the statistical models for the analysis of data with different structures and complexities that frequently appear in different fields of application.
3. SM16 (Skill) Select appropriate sources of information for the statistical work.
4. SM18 (Skill) Refine the information available for subsequent statistical processing.

Content

U1. Unifactorial Confirmatory Factor Analysis (CFA)
U2. Multifactorial Confirmatory Factor Analysis (CFA)
U3. Unidimensional Exploratory Factor Analysis (EFA)
U4. Multidimensional Exploratory Factor Analysis (EFA)
U5. Internal Consistency
U6. Consistency or Agreement
U7. Models for continuous quantitative responses
U8. Categorical predictors
U9. Predictive models
U10. Explanatory models

U11. Model diagnosis and results publication
U12. Analysis of variance

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Practical classes (small groups): approach and resolution of different practical problems of investigation analysis	26	1.04	
Theoretical classes: master class with multimedia support	19.5	0.78	
Type: Supervised			
Supervision of the resolution of the practices carried out autonomously	7.5	0.3	
Type: Autonomous			
Bibliographic and documentary consultations	7	0.28	
Monitoring and participation in discussion forums through the virtual campus	7.5	0.3	
Practical review of the main analytical procedures of the course through the resolution of the practices	10	0.4	
Reading the "Theory Schemes" for the preparation of theoretical classes	30	1.2	
Self-study: Completion of summaries, diagrams and conceptual maps	37.5	1.5	

This course provides different activities based on active-learning methodologies that are centred on the student. This involves a "hybrid" approach in which we combine traditional teaching resources with other resources aimed at encouraging meaningful and cooperative learning.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Evidence 1. Individual submission, during the practical session with the assigned group, of the analysis results of a practical case related to topics 1 to 6 (approximately during weeks 4 to 7); Written feedback will be provided within two weeks after	15	0	0	CM14, KM17, SM18
Evidence 2: Written evidence consisting of a set of multiple choice	40	2.5	0.1	CM14,

questions related to units 1-6, as well as to the Jamovi tables that make the previous analysys (1st assessment period); Written feedback provided in two weeks				KM17, SM16, SM18
Evidence 3. Individual submission in the practical group session of the analysis results of a practical problem related to topics 712 (approx. weeks 1317); Written feedback provided in two weeks	15	0	0	CM14, KM17, SM18
Evidence 4: Writted evidence consisting of a set of multiple choice questions related to units 7-12, as well as tables witth Jamovi (2nd assessment period); Written feedback provided in two weeks	40	2.5	0.1	CM14, KM17, SM16, SM18

EV1 and EV3 are submitted individually during the practical sessions. The writing must be totally original and not copied from other sources or groups. In order for an evidence to be evaluated, it will be necessary to have attended 2/3 of its practices in person. The weight of each of these evidences is 15%.

The EV2 and EV4 (individual exams) consist of a set of approximately 25 multiple choice questions (three answer options, penalty for errors; two errors discount one correct, according to the usual criteria *k*-1). Students will be allowed to bring printed the material prepared by the teaching team as well as notes of the student's own elaboration. Electronic devices will not be available except for a calculator (not a mobile phone). At demand of the teaching staff, the students could have the statement and some Jamovi results tables a few hours before.

Although all assessment activities in this course are carried out in person, the teaching staff reserves the right to require an individual oral defense of any submitted evidence. This measure may be applied when there are reasonable indications that cast doubt on the authenticity, authorship, or integrity of the evidence. This includes, among other cases, possible inconsistencies in content or writing style, results that are incoherent with the student's other work, suspicion of non-original content, or signs of unauthorized copying or collaboration during the assessment. Such an oral defense may be required even when the evidence constitutes the sole assessment instrument for the student, as a mechanism to ensure the validity, reliability, and fairness of the evaluation process. If the oral defense is not successfully passed, the teaching staff may review the initial grade and, if deemed appropriate, annul the corresponding evidence.

The responses to all the evaluation evidence must be original (writings detected from other sources or copied or plagiarized responses will not be accepted). A breach of this condition implies the nullification of the evidence. More than one non-compliance will suppose a final qualification of 0 in the subject (in application to the regulations on evaluation of the UAB and of the Psychology degree. These measures will be applied to all the people involved in the evaluation irregularity.

In order to pass the subject through continuous assessment, the following criteria must be meet: 1) The weighted sum of all the evidence must be equal to or greater than 5 points. 2) The average of EV2 and EV4 should be 4.5 or higher (onascale of 0 to 10); otherwise the maximum grade in the course will be 4.5.

In accordance with the UAB regulations, students who have not passed the course and who meet: 1) have carried out evidence with a weight ofat least 2/3 of the total and 2) have a continuous assessment mark 3.5 or higher, may be eligible for resit. The EV2 and/or EV4 can be recovered. The qualification of the recovered evidence will replace the previously obtained and the total qualification will be recalculated with the criteria aforementioned.

A student who has submitted evidence of learning with a weight equal to or greater than 4 points (40%) will be recorded as 'evaluable'.

No unique final synthesis test for students who enroll for the second time or more is anticipated.

The presentation of the translation of the of the statements of the in-person assessment tests will be carried out if the requirements established in Article 263 of the academic regulations are met and the request is made in week 4 online (e-form) (more information on the faculty website).

The single assessment(AU) will take place on the same day and at the same location as the exam for the second assessment period of the students. All course content will be assessed.The same evidence will be used, and the final grade for the students will be calculated as described for continuous assessment, with the same weightings as indicated in the Continuous assessment. The total duration will be 3-4 hours. The single assessment must be requested online (e-form) during the specific period (more information on the faculty website).

Use of Artificial Intelligence: In accordance with the model established by the faculty regarding the use of artificial intelligence, it is considered permitted solely as a tool to support study and self-directed learning, but not allowed during the completion of any assessment evidence. All evaluations are conducted in person, and the use of any software other than JAMOVI is not authorized. Therefore, the use of AI-based technologies is restricted to the context of personal study, under the responsibility of the student, and it must be understood that such tools cannot be considered sources whose content has been validated by the teaching staff. If the use of any unauthorized software, including artificial intelligence tools, is detected during the completion of an assessment, that evidence will be graded with a 0.

Link to the assessment guidelines of the Faculty of Psychology and Speech Therapy:
https://www.uab.cat/doc/DOC_Pautes_Avaluacio_2025-2026

Bibliography

Reference manuals:

Abad, F.J., Olea, J., Ponsoda, V. & García, C. (2011). *Medición en ciencias sociales y de la salud*. Madrid: Síntesis.

Kleinbaum, D.G., Kupper, L.L., Nizam, A., Muller, K. & Rosenberg, E.S. (2012). *Applied Regression Analysis and other Multivariable Methods*. (5ª ed.). Boston (MA): Cengage Learning, Inc.

Ajenjo, C., Miguel, F.J., Griera, O. (2021). Manual d'ús de Jamovi per anàlisi de dades en estudis socials. Bellaterra: Universitat Autònoma de Barcelona.

Losilla, J.M., Vives, J. (2023). MaAnálisis de Datos con jamovi. Bellaterra: Universitat Autònoma de Barcelona.

Other references:

Domènech, J.M. & Granero, R. (2004). *Anàlisi de dades en Psicologia* (Vols. 1 i 2) (2ª Ed.). Barcelona: Signo.

Martínez Arias, R. (1995). *Psicometría: Teoría de los tests psicológicos y educativos*. Madrid: Síntesis.

Meltzoff, J. (2000). *Crítica a la investigación. Psicología y campos afines*. Madrid: Alianza Editorial. (Traducción del original de 1998).

Viladrich, M.C. & Doval, E. (Eds.) (2008). *Psicometria*. Barcelona: Edicions UOC.

Software

Jamovi

Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this link. To consult the language you will need to enter the CODE of the subject.

Name	Group	Language	Semester	Turn
(PLAB) Practical laboratories	111	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	112	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	113	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	114	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	211	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	212	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	213	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	214	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	311	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	312	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	313	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	314	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	411	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	412	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	413	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	414	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	511	Catalan/Spanish	second semester	morning-mixed
(PLAB) Practical laboratories	512	Catalan/Spanish	second semester	morning-mixed
(PLAB) Practical laboratories	513	Catalan	second semester	morning-mixed
(TE) Theory	1	Catalan	second semester	morning-mixed
(TE) Theory	2	Catalan	second semester	morning-mixed
(TE) Theory	3	Catalan/Spanish	second semester	morning-mixed
(TE) Theory	4	Catalan/Spanish	second semester	morning-mixed
(TE) Theory	5	Catalan	second semester	morning-mixed