

Statistical and Psychometric Models

Code: 102570
ECTS Credits: 6

2025/2026

| Degree | Type | Year |
|------------|------|------|
| Psychology | OB | 2 |

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Teaching groups languages

You can view this information at the [end](#) of this document.

Prerequisites

It is highly recommended to have acquired the competences worked on in the two previous methodological subjects: "Research Methods, Design and Techniques" and "Data Analysis". Therefore, students have to be able to understand and apply the methodology used for research in psychology, as well as basic descriptive and inferential data analysis techniques.

This course uses the statistical software JAMOV, 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.

Competences

- Distinguish between the design of research, procedures and techniques to evaluate hypotheses, contrast them and interpret the results.
- Maintain a favourable attitude towards the permanent updating through critical evaluation of scientific documentation, taking into account its origin, situating it in an epistemological framework and identifying and contrasting its contributions in relation to the available disciplinary knowledge.
- Recognise and evaluate the procedures and techniques applied to the construction and adaptation of the instruments of evaluation in psychology.
- Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
- Use computer programmes for data management and analysis.
- Use different ICTs for different purposes.

Learning Outcomes

1. Adequately interpret the results obtained from the application of the linear model and the techniques for reduction of dimensionality.

2. Assess and contrast models, tools and techniques and decide which are best suited to psychometric analysis.
3. Assess and contrast models, tools and techniques and decide which are most suitable for statistical analysis.
4. Correctly interpret the results obtained from the application of psychometric evidence presented.
5. Describe statistical indicators of reliability and validity based on test theory.
6. Describe the main features of the probability of statistical inference, estimation and hypothesis testing in the development of psychometric tests.
7. Draw reasoned conclusions from the results obtained after applying psychometric methods and techniques to respond to a research hypothesis.
8. Draw reasoned conclusions from the results obtained after applying statistical methods and technique which can respond to a research hypothesis.
9. Identify key models and psychometric analysis techniques and interpret the results obtained adequately.
10. Identify the general linear models and some techniques for multivariable statistical analysis and interpret the results obtained adequately.
11. Maintain a favourable attitude towards the permanent updating through critical evaluation of scientific documentation, taking into account its origin, situating it in an epistemological framework and identifying and contrasting its contributions in relation to the available disciplinary knowledge.
12. Make adequate use of data analysis tools in the development of psychometric tests.
13. Relate the results obtained by applying data analysis techniques to the theoretical approaches that originated the research hypothesis/es.
14. Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
15. Use computer programmes for data management and analysis.
16. Use different ICTs for different purposes.
17. Use the scoring criteria and interpretation of scores to draw conclusions about the characteristics of the people tested.

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 | 5, 6, 8, 7, 15, 9, 4, 11, 14, 13, 12, 17, 16, 3, 2 |
| Theoretical classes: master class with multimedia support | 18 | 0.72 | 5, 6, 15, 10, 9, 1, 11, |

| | | | |
|--|-----|------|--|
| Type: Supervised | | | |
| Supervision of the resolution of the practices carried out autonomously | 7.5 | 0.3 | 5, 6, 9, 13, 3, 2 |
| Type: Autonomous | | | |
| Bibliographic and documentary consultations | 7 | 0.28 | 5, 6, 8, 7, 9, 4, 11, 12, 16 |
| Monitoring and participation in discussion forums through the virtual campus | 7.5 | 0.3 | 11, 16 |
| Practical review of the main analytical procedures of the course through the resolution of the practices | 10 | 0.4 | 6, 9, 4, 11, 13 |
| Reading the "Theory Schemes" for the preparation of theoretical classes | 30 | 1.2 | 5, 6, 9, 11, 13 |
| Self-study: Completion of summaries, diagrams and conceptual maps | 40 | 1.6 | 5, 6, 8, 7, 15, 9, 4, 11, 13, 12, 17, 16, 3, 2 |

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

Continuous 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 | 5, 7, 15, 10, 9, 1, 4, 11, 14, 13, 12, 17, 16, 2 |
| Evidence 2: Written evidence consisting of a set of multiple choice questions related to units 1-6, as well as to the Jamovi tables that make the previous analysis (1st assessment period); Written feedback provided in two weeks | 40 | 2 | 0.08 | 5, 6, 15, 9, 1, 4, 11, 13, 12, 17, 16, 2 |
| Evidence 3. Individual submission in the practical group session of the analysis results of a practical problem related to topics 7-12 (approx. weeks 13-17); Written feedback provided in two weeks | 15 | 0 | 0 | 6, 8, 15, 10, 11, 14, 13, 16, 3 |
| Evidence 4: Written evidence consisting of a set of multiple choice | 40 | 2 | 0.08 | 15, 10, |

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 met: 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 (on a scale 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 of at 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.

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 JAMOVl 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. The single assessment must be requested online (e-form) during the specific period (more information on the faculty website).

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., Grier, 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). Anàlisi de Dades 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 | second semester | morning-mixed |
| (PLAB) Practical laboratories | 512 | Catalan | 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 |