

Guía docente de la asignatura

## Metodología en Neurociencia Cognitiva: Investigación Básica y Aplicada

Fecha última actualización: 09/07/2021  
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**Máster**

Máster Universitario en Neurociencia Cognitiva y del Comportamiento

**MÓDULO**

Metodológico

**RAMA**

Ciencias de la Salud

**CENTRO RESPONSABLE DEL TÍTULO**

Escuela Internacional de Posgrado

**Semestre**

Primero

**Créditos**

4

**Tipo**

Optativa

**Tipo de enseñanza**

Presencial

### PRERREQUISITOS Y/O RECOMENDACIONES

(a) It is recommended for the student to have English skills sufficient to follow lessons and actively participate in them.

(b) It is recommended for the student to have above-average general software use skills.

### BREVE DESCRIPCIÓN DE CONTENIDOS (Según memoria de verificación del Máster)

#### PHASE A. E- PROGRAMMING AN EXPERIMENT:

- (1) Introduction: Aim of the study, experimental design, formulation of hypotheses
- (2) Training in experiment programming
- (3) Individual programming of an experiment, and problem-solving throughout the process

#### PHASE B. STATISTICAL ANALYSIS:

- (4) The replicability crisis: good practices in Psychological and Neuroscience designs and analyses
- (5) Data pre-processing: Filtering, position and dispersion statistics



(6) Data Analyses I: Descriptive statistics using statistical software

(7) Data Analyses II: Hypothesis testing using statistical software

(8) Data and hypothesis management: Questionable and recommendable research practices

## COMPETENCIAS

### COMPETENCIAS BÁSICAS

- CB6 - Poseer y comprender conocimientos que aporten una base u oportunidad de ser originales en desarrollo y/o aplicación de ideas, a menudo en un contexto de investigación.
- CB7 - Que los estudiantes sepan aplicar los conocimientos adquiridos y su capacidad de resolución de problemas en entornos nuevos o poco conocidos dentro de contextos más amplios (o multidisciplinares) relacionados con su área de estudio.
- CB8 - Que los estudiantes sean capaces de integrar conocimientos y enfrentarse a la complejidad de formular juicios a partir de una información que, siendo incompleta o limitada, incluya reflexiones sobre las responsabilidades sociales y éticas vinculadas a la aplicación de sus conocimientos y juicios.
- CB9 - Que los estudiantes sepan comunicar sus conclusiones y los conocimientos y razones últimas que las sustentan a públicos especializados y no especializados de un modo claro y sin ambigüedades.
- CB10 - Que los estudiantes posean las habilidades de aprendizaje que les permitan continuar estudiando de un modo que habrá de ser en gran medida autodirigido o autónomo.

## RESULTADOS DE APRENDIZAJE (Objetivos)

- Students must learn to use specialized software for programming experiments and data analyses (E-prime, Open-sesame, Excel, JASP, R-Studio, Jamovi, etc.)
- Students must be able to:
  - Critically evaluate the quality of basic and applied research (experimental control, designs, questionable research practices, etc.)
  - Program experiments
  - Work with quantitative data: summarizing, classifying, plotting, and presenting these data to an audience.

## PROGRAMA DE CONTENIDOS TEÓRICOS Y PRÁCTICOS

### TEÓRICO

**Block 1. Programming an experiment with E-Prime or similar open-source software:**

**Unit 1. Introduction:** Aim of the study, experimental design, formulation of hypotheses

**Unit 2. Training in experiment programming**



**Unit 3.** Individual programming of an experiment, and problem-solving throughout the process

**Block 2. Statistical analysis:**

**Unit 4.** The replicability crisis, and how we can deal with it: Questionable and recommendable practices in Psychology and Neuroscience

**Unit 5.** Descriptive statistics and fundamentals of Null-Hypothesis Significance Testing with R and R-Studio

**Unit 6.** Factorial designs in open-source statistical software (JASP/Jamovi)

**Unit 7.** Introduction to Bayesian analysis using JASP

## PRÁCTICO

All units are simultaneously theoretical and practical, and include tasks to apply the acquired knowledge to simulated cases.

## BIBLIOGRAFÍA

### BIBLIOGRAFÍA FUNDAMENTAL

#### Block 1

- Schneider, W., Eschman, A., y Zuccolotto, A. (2002). E-Prime user's guide (Version 1.1). Pittsburg: Psychology Software Tools.
- Mathôt, S., Schreij, D., & Theeuwes, J. (2012). OpenSesame: An open-source, graphical experiment builder for the social sciences. *Behavior Research Methods*, 44(2), 314-324

#### Block 2

- Goss-Sampson, M. (2019). Statistical analysis in JASP: A guide for students. Recovered from: [https://gala.gre.ac.uk/id/eprint/25585/7/25585%20GOSS-SAMPSON\\_Statistical\\_Analysis\\_In\\_JASP\\_A\\_Guide\\_For\\_Students\\_%28Pub%29\\_2019.pdf](https://gala.gre.ac.uk/id/eprint/25585/7/25585%20GOSS-SAMPSON_Statistical_Analysis_In_JASP_A_Guide_For_Students_%28Pub%29_2019.pdf)
- Greenland, S. et al. (2016). Statistical tests, P values, confidence intervals, and power: A guide to misinterpretations. *European Journal of Epidemiology*, 31, 337.
- Cumming, G. (2014). The new statistics: Why and how. *Psychological Science*, 25(1), 7.
- Open Science Collaboration(2015). Estimating the reproducibility of psychological science. *Science*, 349(6251), aac4716.

### BIBLIOGRAFÍA COMPLEMENTARIA

- Dienes, Z. (2008). *Understanding psychology as a science: An introduction to scientific and statistical inference*. Macmillan International Higher Education.
- Field, A. (2016). *An adventure in statistics* London: Sage.
- Field, A., Miles, J., & Field, Z. (2012). *Discovering statistics using R*. London: Sage.



**ENLACES RECOMENDADOS**

All necessary links will be provided via PRADO2

**EVALUACIÓN (instrumentos de evaluación, criterios de evaluación y porcentaje sobre la calificación final)****EVALUACIÓN ORDINARIA**

[Article 17 of the UGR Assessment Policy and Regulations establishes that the ordinary assessment session (convocatoria ordinaria) will preferably be based on the continuous assessment of students, except for those who have been granted the right to a single final assessment (evaluación única final), which is an assessment method that only takes a final exam into account.]

PHASE A: 50% of the total score

- Participation/attendance: 15%
- Individual assignments (35%):
  - Assignment about the book “Getting Started” (5%).
  - Experiments programmed in class (4%).
  - Programming of your own experiments (26%) (a minimum of 15% in this task is required to pass the [course](#)).

PHASE B. 50% of the total score

- Participation/attendance: 15%
- Individual assignments (35%):
  - Loading data and computing basics statistics using R and R-Studio. Simulated sampling. Distributions of t, p, and Cohen’s d using Monte-Carlo simulation. (7.5%)
  - Factorial designs in JASP: Marginal effects and interactions (10%)
  - Factorial designs in JASP: Planned and non-planned comparisons. Understanding alpha-error growth control. (10%)
  - Bayesian t-tests and Bayesian ANOVA/ANCOVA (7.5%)

Individual assignments must be handed before the due date. Late work will be accepted with a 20% penalty.

A minimum of 25% in each phase is required to pass the course.

If students do not reach the minimum required in each part of the course, their maximum score will be 49% (4,9) of the total score.

**EVALUACIÓN EXTRAORDINARIA**

[Article 19 of the UGR Assessment Policy and Regulations establishes that students who have not passed a course in the ordinary assessment session (convocatoria ordinaria) will have access to an extraordinary assessment session (convocatoria extraordinaria). All students may take part in this extraordinary assessment session, regardless of whether or not they have followed continuous assessment activities. In this way, students who have not carried out continuous



assessment activities will have the opportunity to obtain 100% of their mark by means of an exam and/or assignment].

For the extraordinary assessment, the student must submit all the previously described individual assignments. The qualification percentages will be kept up to a maximum of 10 (100%), once participation/attendance is disregarded.

### EVALUACIÓN ÚNICA FINAL

[Article 8 of the UGR Assessment Policy and Regulations establishes that students who are unable to follow continuous assessment methods due to justifiable reasons shall have recourse to a single final assessment (evaluación única final), which is an assessment method that only takes a final exam into account. In order to opt for a single final assessment (evaluación única final), students must send a request, using the corresponding online procedure, to the coordinator of the master's programme, in the first two weeks of the course or in the two weeks following their enrollment (if the enrollment has taken place after the classes have already begun). The coordinator will communicate this information to the relevant teaching staff members, citing and verifying the reasons why the student is unable to follow the continuous assessment system.]

For the single final assessment, the student must submit all the previously described individual assignments. The qualification percentages add up to a maximum of 10 (100%), once participation/attendance is disregarded.

### INFORMACIÓN ADICIONAL

Teaching methodologies include:

- In-class and student individual work (25 hours, 1 credit)
- Teacher presentations
- Student/teacher interactions with statistical and programming software
- Autonomous learning (75 hours, 3 credits)
- Collecting and data analysis in an experimental work
- Group presentations

The teaching methodology and assessment will be adapted to students with specific needs (SEN), in accordance with Article 11 of the Regulations on assessment and grading of students at the University of Granada, published in the Official Bulletin of the University of Granada, no. 112, 9 November 2016.

