

**COURSE DATA****Data Subject**

Code	43080
Name	Data processing methods in physiology
Cycle	Master's degree
ECTS Credits	6.0
Academic year	2021 - 2022

Study (s)

Degree	Center	Acad. year	Period
2141 - Master's Degree in Physiology	Faculty of Medicine and Odontology	1	First term
3127 - Doctoral Programme in Physiology	Doctoral School	0	First term

Subject-matter

Degree	Subject-matter	Character
2141 - Master's Degree in Physiology	1 - Methodology for research in physiology	Obligatory

Coordination

Name	Department
CIBRIAN ORTIZ DE ANDA, ROSA MARIA	190 - Physiology

SUMMARY

The realization of any investigation, such as those included in the field of Physiology, requires a series of steps, from the setting of the objectives to the verification of their achievement. Among them is the management and treatment of experimental data, which are those that, among others, are developed in this subject, for the correct obtaining of the results.

Therefore, the objectives of the subject are:

-Know the different steps to follow to carry out a scientific investigation and to present it as a scientific result.

-Acquire sufficient knowledge to allow the student, in their future research work, to carry out an adequate treatment of experimental data.



-Know the field of application and the proper use of the different statistical tests for a correct extrapolation from the sample information to that of the population.

-Fluently manage one of the most widely used statistical programs today, the SPSS v.17.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

There are no prerequisites for taking the subject.

COMPETENCES (RD 1393/2007) // LEARNING OUTCOMES (RD 822/2021)

2141 - Master's Degree in Physiology

- Students should apply acquired knowledge to solve problems in unfamiliar contexts within their field of study, including multidisciplinary scenarios.
- Students should be able to integrate knowledge and address the complexity of making informed judgments based on incomplete or limited information, including reflections on the social and ethical responsibilities associated with the application of their knowledge and judgments.
- Students should communicate conclusions and underlying knowledge clearly and unambiguously to both specialized and non-specialized audiences.
- Students should demonstrate self-directed learning skills for continued academic growth.
- Students should possess and understand foundational knowledge that enables original thinking and research in the field.
- Be able to integrate new technologies in their professional and/or research work.
- Be able to access to information tools in other areas of knowledge and use them properly.
- To acquire a critical attitude that allows you to make reasoned judgments and defend them with rigor and tolerance.
- Assess the need to complete the scientific training, in languages, computer science, ethics, etc., attending conferences or courses and/or carrying out complementary activities, self-evaluating the contribution that the performance of these activities implies for their comprehensive training.
- Employ the basic tools for the treatment of experimental data in biomedical research.
- Differentiate between the statistical methods to carry out the correct data analysis and handle them in a practical context of an investigation, as well as adequately present the results.



LEARNING OUTCOMES (RD 1393/2007) // NO CONTENT (RD 822/2021)

- Apply the scientific method in solving experimental work.
- Work with information sources, both traditional and through new Internet technologies.
- Synthesize and communicate scientific information.
- Acquire sufficient knowledge to allow the student, in his future research work in the field of Physiology, to carry out an adequate treatment of experimental data, both with the limitation of errors associated with direct and indirect measurements.
- Know the field of application and the proper use of the different statistical tests for a correct extrapolation of the information from the sample to that of the population.-Fluently manage the SPSS Program, once the statistical test or tests to be used are known, given the importance of adequate statistical analysis in research work.

DESCRIPTION OF CONTENTS

1. Scheme of conducting an investigation

The steps for conducting an investigation are described:

- Statement of objectives.
- Choice of a material and method to carry out the experiences.
- Data collection.
- Orientative assessment of the data.
- Data processing.
- Verification of the achievement of the stated objectives.

2. Scheme of presentation of a scientific work

- Title.
- Authors.
- Summary.
- Keywords.
- Introduction.
- Material and method.
- Results.
- Discussion.
- Conclusions.
- Thanks.
- Bibliography.
- Supplementary material.



3. Bibliographic reference manager

- Definition.
- Examples of bibliographic managers.
- Reference manager Zotero.

4. Calculation of errors in direct and indirect measurements

- Fundamental concepts.
- Error writing criteria.
- Classification of measures.
- Calculation of errors in direct measurements.
- Calculation of errors in indirect measures.

5. Graphic representations

- General criteria.
- Choice of axes and scales.
- Representation of errors.
- Representative curve drawing.
- Special scales.
- Linear regression.
- Estimation of the regression parameters: Comparison of slopes and ordinates.

6. Systematic reviews and meta-analysis. Publication of research studies

- Definitions.
- Sections.
- Methodology.
- Results presentation.
- Types of studies.
- How to publish a research study in an impact journal.

7. Analysis of data

- Checking the normality of a population. Kolmogorov-Smirnov method.
- Estimation of population parameters. Robust estimators.
- Comparison of means and proportions.
- Use of statistics: Z, t-Student.
- Acceptance and rejection of hypotheses.
- Analysis of categorizable data. Contingency tables, Chi-square.
- Comparison of 3 or more means. ANOVA.



8. Use of the SPSS statistical package

Practical resolution of exercises.

9. Carrying out an experience and presentation as scientific work

A laboratory experience will be carried out showing the different sections of a research work and the presentation of it as a scientific work will be prepared.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	33,00	100
Tutorials	4,00	100
Laboratory practices	3,00	100
Other activities	2,00	100
Development of group work	24,00	0
Study and independent work	22,00	0
Readings supplementary material	10,00	0
Preparation of evaluation activities	22,00	0
Preparing lectures	5,00	0
Preparation of practical classes and problem	5,00	0
Resolution of case studies	20,00	0
TOTAL	150,00	

TEACHING METHODOLOGY

- Theoretical classes with active alumni participation.
- Classes of problems related to the subjects.
- Classes in the computer room to handle the necessary computer tools for solving problems.
- Practical laboratory classes, including introductory seminars, conducting internships with the teacher follow-up and support, and redaction of a written memory or written test.
- Debated and directed discussion on the work and practices carried out.
- Face-to-face and electronic tutoring with teachers.



EVALUATION

Evaluation system:

- Written exam consisting of exercises similar to those carried out in the classes: evaluation up to 7 points.
- Memory of experience in scientific article format: evaluation up to 3 points.

Attendance at the laboratory experience session is compulsory.

Minimum passing grade: 5 points.

REFERENCES

Basic

- Armitage P, Berry G. Estadística para la investigación biomédica. Ed. Doyma. Tercera ed. (1997) ISBN: 84-8174-158-2
- Viedma JA. Métodos estadísticos: fundamentos y aplicaciones. Ed. del Castillo (1972). ISBN 10: 8421900021
- Liberati A, Altman DG, Tetzlaff J, Mulrow C, Gøtzsche PC, Ioannidis JP, Clarke M, Devereaux PJ, Kleijnen J, Moher D. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. PLoS medicine. (2009), 6, e1000100
- Higgins JPT, Thomas J, Chandler J, Cumpston M, Li T, Page MJ, Welch VA (editors). Cochrane Handbook for Systematic Reviews of Interventions version 6.2 (updated February 2021). Cochrane (2021). Available from www.training.cochrane.org/handbook
- Reis LO. Quick beginners guide and tips on how to write a manuscript. Int Braz J Urol. (2020), 46:822-824
- Balch CM, McMasters KM, Klimberg VS, Pawlik TM, Posner MC, Roh M, Tanabe KK, Whippen D, Ikoma N. Steps to Getting Your Manuscript Published in a High-Quality Medical Journal. Ann Surg Oncol. (2018), 25:850-855

Additional

- Colton T. Estadística en medicina. Ed. Salvat. (1990) ISBN: 978-84-345-1476-8
- Ferran M. SPSS para Windows. Programación y análisis estadístico. McGraw-Hill (2001). ISBN: 978-84-481-301-2.34
- Pérez López C. Técnicas Estadísticas Multivariantes con SPSS. Gaceta grupo editorial (2009). ISBN 978-84-92812-00-4



- Wells GA, Shea B, Connell DO, et al. The Newcastle-Ottawa Scale (NOS) for assessing the quality of non randomised studies in meta-analyses. http://www.ohri.ca/programs/clinical_epidemiology/oxford.asp
- Shea BJ, Reeves BC, Wells G, Thuku M, Hamel C, Moran J, Moher D, Tugwell P, Welch V, Kristjansson E, Henry DA. AMSTAR 2: a critical appraisal tool for systematic reviews that include randomised or non-randomised studies of healthcare interventions, or both. *BMJ*. (2017), 21, 358:j4008.
- Di Girolamo N, Reynders RM. Health care articles with simple and declarative titles were more likely to be in the Altmetric Top 100. *J Clin Epidemiol*. (2017), 85:32-36
- DeJesus JM, Callanan MA, Solis G, Gelman SA. Generic language in scientific communication. *Proc Natl Acad Sci USA*. (2019), 116:18370-18377

ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

ONLY IF FACE-TO-FACE TEACHING IS NOT POSSIBLE

1. Contents

The contents collected in the teaching guide are maintained.

2. Vorkload and temporary planning of teaching

The weight of the various activities that add up the hours of dedication in ECTS credits marked in the teaching guide is maintained.

Scheduled teaching dates and times are maintained.

3. Teaching methodology

Both theoretical and practical topics and tutorials will take place virtually.

4. Evaluation

The evaluation system of the teaching guide is maintained. The exam will be made online on the day and time provided for in the exam schedule approved in the degree.

5. Bibliography

The bibliography recommended in the teaching guide is maintained.