

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

Code	43024
Name	Applied biostatistics and computational methods for analysing and presenting data
Cycle	Master's degree
ECTS Credits	5.0
Academic year	2022 - 2023

Study (s)

Degree	Center	Acad. year	Period
2138 - M.D. in Research in and Rational Use of Medicines	Faculty of Pharmacy and Food Sciences	1	First term

Subject-matter

Degree	Subject-matter	Character
2138 - M.D. in Research in and Rational Use of Medicines	2 - Applied biostatistics and computational methods for analysing and presenting data	Obligatory

Coordination

Name	Department
PERIS RIBERA, JOSE ESTEBAN	134 - Pharmacy and Pharmaceutical Technology

SUMMARY

The course consists of two parts: 1-Applied Biostatistics, 2-computing methods for data analysis and presentation.

In the first part, theoretical and practical nature, the student must acquire the necessary theoretical basis to select and perform appropriate statistical treatments to different situations that you may encounter, both from a research aspect and from a professional perspective. In the research, prior knowledge of the characteristics of the various statistical tests entitle him to address proper experimental design. The practical part involves the application of a software tool for solving various problems raised as examples. The second part is eminently practical and aims to facilitate the acquisition of practical skills for data representation in the area of biomedical sciences, and process modeling using linear and nonlinear regression. After entering the basic concepts, learning is based on the resolution of practical cases by appropriate software tools. While learning is done on Excel, the objective is for students to understand the fundamental structure of these tools to enable self-learning with different programs.



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 is no registration restriction

OUTCOMES

2138 - M.D. in Research in and Rational Use of Medicines

- Utilizar adecuadamente las herramientas informáticas, métodos estadísticos y de simulación de datos, aplicando los programas informáticos y la estadística a los problemas biomédicos
- 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.
- Be able to make quick and effective decisions in professional or research practice.
- Be able to access the information required (databases, scientific articles, etc.) and to interpret and use it sensibly.
- Be able to access to information tools in other areas of knowledge and use them properly.
- To be able to assess the need to complete the scientific, historical, language, informatics, literature, ethics, social and human background in general, attending conferences, courses or doing complementary activities, self-assessing the contribution of these activities towards a comprehensive development.

LEARNING OUTCOMES

At the end of the teaching-learning process the student should be able to:

1. Design and plan an experimental study
2. Select the most appropriate statistical test for interpreting the results of a research work.
3. Make and unweighted regressions, transform data, obtain initial estimates and compare models.

DESCRIPTION OF CONTENTS

**1. Applied Biostatistics**

Descriptive methods. Probability and theoretical distributions. Inferential methods. Parameter estimation. Hypothesis Testing. Compliance testing. Comparison half half theoretical observed. Comparison of observed ratio to a theoretical ratio. Goodness of fit tests. Chi-square test. Kolmogorov-Smirnov. Tests independiència between two variables. Comparison of two proportions. Analysis of contingency tables. Comparison of two means. Comparison of more than 2/2 (ANOVA). Regression. Correlation. Experimental designs. Analysis of survival. Introduction to multivariate analysis. Principal component analysis. Logistic Regression. Discriminant analysis. Analysis of "clusters".

2. Computational methods for the analysis and presentation of data

Mathematical models. Optimization problems. Objective functions. Types of mathematical functions. Syntax of explicit functions in Excel. Linear Regression. Weighting. Comparing parameters. Nonlinear Regression. Simultaneous adjustment. Data Transformation. Obtaining initial estimates. Model comparison.

WORKLOAD

ACTIVITY	Hours	% To be attended
Computer classroom practice	40,00	100
Theory classes	10,00	100
Study and independent work	20,00	0
Readings supplementary material	10,00	0
Preparation of evaluation activities	20,00	0
Preparing lectures	15,00	0
Preparation of practical classes and problem	40,00	0
TOTAL	155,00	

TEACHING METHODOLOGY

During the activities, both theoretical and practical, the applications of the subject contents in relation to the Sustainable Development Goals (SDG) will be indicated. This is intended to provide knowledge, skills and motivation to understand and address these SDGs, while promoting reflection and criticism.

Lectures, participatory lecture
Resolution of case studies
Problems



To complete the classroom hours, the materials provided for face-to-face teaching will be adapted, so that the student can access them at any time. Use of the virtual classroom forum to answer questions. For the practical sessions of the theoretical content, the use of videoconferences and/or the realization of the proposed exercises would be combined using the "Task" option in the virtual classroom.

EVALUATION

Continuous assessment
Practical exam

Minimum rating: 5 points

Type(%)
Formative assessment:

Classroom Assistance 50
Problems and Issues 25

Final Evaluation:
Practical examination 25

REFERENCES

Basic

- ROBERT G.D. STEEL Y JAMES H. TORRIE. Bioestadística: Principios y procedimientos. 2ª Edición. McGraw-Hill, 1985.
- JOSEP Mª DOMENECH I MASSONS. Bioestadística. Métodos estadísticos para investigadores. Editorial Herder, 1982.
- GEORGE C. CANAVOS. Probabilidad y estadística. Aplicaciones y métodos. McGraw-Hill, 1987.
- Wagner, J.G. 1993. Pharmacokinetics for the Pharmaceutical Scientist. CRC Ed, London.
- Macheras, P. Iliadis A. 2005. Modeling in Biopharmaceutics, Pharmacokinetics and Pharmacodynamics: Homogeneous and Heterogeneous Approaches (Interdisciplinary Applied Mathematics), Springer.

Additional

- JOSÉ L. CARRASCO Y MIGUEL A. HERNÁN. Estadística multivariante en las ciencias de la vida. Editorial Ciencia 3, S.L. 1993.



- P. ARMITAGE, G. BERRY and J.N.S. MATTHEWS. Statistical Methods in Medical Research. 4 th ed. Blackwell Science Ltd, 2002.
- NIST/SEMATECH e-handbook of statistical methods,
<http://www.itl.nist.gov/div898/handbook/>
- Bourne, D.W.A. 1995 Mathematical modeling of pharmacokinetic data, Technomic Publishing co., Lancaster.
- Bourne, D.W.A. 2002 chapter 12. Classical modeling, section iv research applications in pharmacokinetics in drug discovery and development Schoenwald, R.D. Ed., Crc Press, Boca Raton.
- Graphical analysis of enzyme kinetics http://tutor.lscf.ucsb.edu/instdev/sears/biochemistry/twenz/enzymeinhibitionkinetics_intro.htm
Duane W. Sears revised: july 25, 2001