Universitat Autònoma de Barcelona

2023/2024

Introduction to Data Processing and to the Communication of Scientific Information

Code: 44710
ECTS Credits: 9

Degree	Type	Year	Semester
4313792 Neurosciences	OB	0	1

Contact

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Teaching groups languages

You can check it through this link. To consult the language you will need to enter the CODE of the subject. Please note that this information is provisional until 30 November 2023.

Teachers

Enrique Claro Izaguirre

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Roser Masgrau Juanola

Prerequisites

There is no special requirement for this module, other than those that apply to the master program.

Objectives and Contextualisation

The primary objectives of this course are i) provide with transversal abilities to communicate science efficiently, and ii) acquire some fundamental competences in statistical analysis of experimental results.

Competences

- Communicate and justify conclusions clearly and unambiguously to both specialised and non-specialised audiences.
- Conceive, design, develop and synthesise scientific projects in the field of neurosciences.
- Integrate knowledge and use it to make judgements in complex situations, with incomplete information, while keeping in mind social and ethical responsibilities.
- Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.

Learning Outcomes

1. Communicate and justify conclusions clearly and unambiguously to both specialised and non-specialised audiences.
2. Devise an alternative work plan in case the hypothesis is not supported by the experiments.
3. Efficiently present research work and findings in neurosciences, orally and in writing, using English.
4. Formulate a hypothesis that will further knowledge of a particular problem, design a series of experiments to test it and propose a specific, realistic work plan.
5. Formulate the current state of a major problem in neurosciences in writing.
6. Integrate knowledge and use it to make judgements in complex situations, with incomplete information, while keeping in mind social and ethical responsibilities.
7. Know the structure of an application for research funding and the procedure used for evaluating it.
8. Recognise the need for statistical analysis and use it with ease in real contexts.
9. Seek out information in the scientific literature using appropriate channels, and use this information to formulate and contextualise a research topic.
10. Show responsibility in information and knowledge management.
11. Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.

Content

1. Communication in Science.

A scientist generates products that need to be marketed conveniently. This part of the subject leads the student to realize that the development of skills to communicate scientific results in an effective manner is, at least, as
important as generating them. Being English the lingua franca among scientists, all activities will be conducted in this language. Continued evaluation will emphasize the progress of each student throughout the teaching period. The final mark in this submodule will combine class attendance and timely completion of assignments.

In essence, the course consists of:

Paper writing: What to publish, where, and how. We will emphasize abstract (summary) writing. Abstracts, unlike most beginners may think, is one of the trickiest parts of scientific writing. Most potential readers of your paper will only devote a few seconds to read your abstract from scientific databases. If you don't catch their attention, you have failed. Within this paper writing part, we will get into the peer-review system.

Poster design: Effective poster design is much more than merely putting your figures together and fitting some text in between. Consider yourself in the middle of a 400-poster session, competing with every one to attract the attention of that important scientist coming down the hall, with whom you want to talk. Just passing by, the big guy may ask you, "hum, what have you done here?" Unless you say something captivating within 15 seconds, his eyes might be already on the next poster.

Lecturing: Speaking to an audience about your research is a privilege and a great occasion to know and be known. However your product (your science) may not reach the customer (the audience). Beware of Power Point-induced sleep, make the simplest possible slides, use body language wisely, make eye contact with the audience, respect your time limits, and much more. Additionally, depending on the enrollment number, we will discusssome science ethics and the science and art of fundraising.

2. Statistical Analysis of Experimental Data.

Introduction. Statistics is a central issue for experimentalists, both before and after the experiments are performed. In the former case because careful experimental design is needed if we want the experiment yields right answers to the questions we are asking for and in the latter case because data sets resulting from experiments need systematic and accurate analyses in order to produce unbiased and reproducible conclusions. Variability is inherently linked to biology and statistics is responsible for variability modeling, that

is, for separating the diverse sources of error to identify trends, associations, correlations helpful for exploring the intricate jungle of life sciences.

Objectives. The subject comprises a basic course on statistics. The fundamental objective is to qualify the students for accurate analysis and interpretation of experimental data.

Contents. 1. An introduction to the statistical package. 2. Working with data in a project. 3. Monovariate and bivariate descriptive statistics. 4. Random variables and probability distributions. 5. Statistical inference: Estimation and hypothesis testing. 6. Analysis of the differences between two groups or conditions: two independent samples and paired data. 7. Analysis of the differences between two or more groups: Analysis of variance (ANOVA). 8. Two-way ANOVA. 9. Linear regression.

Methodology

The so called "activitats dirigides" include:

Lectures.

Classroom practices.

Presentations in class.

They are distributed in 30 hours of Biostatistics theory and 26 hours of Communication. Communication hours are in turn divided into 12 hours of theory and 14 hours of seminars. The seminars are held in two class groups with half of the total number of students each.

Note: 15 minutes of a class will be reserved, within the calendar established by the center / degree, for the complementation by the students of the surveys of evaluation of the performance of the teaching staff and of evaluation of the subject / module.

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.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Lectures and class seminars	56	2.24	9, 3, 7, 10, 4, 2, 6, 11, 1, 8, 5
Type: Supervised			
Work tutoring	17	0.68	9, 3, 7, 10, 4, 2, 6, 11, 8, 5
Type: Autonomous			
Preparation and elaboration of works	150	6	9, 3, 7, 10, 4, 2, 6, 11, 1, 8, 5

Assessment

There is a continuous assessment based on class atendance and attitude, timely completion of assignments, performance in oral presentations, a practical exercise and an exam on statistics.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Data processing: Examination	49%	2	0.08	10, 4, 2, 6, 11, 8
Data processing: practical exercise	5%	0	0	10, 4, 2, 6, 11, 8
Scientific communication: Presentation and defense of works	46%	0	0	9, 3, 7, 10, 4, 2, 6, 11, 1, 5

Bibliography

Scientific communication

George M. Hall: How to write a paper. BMJ Books, 2008 (https://onlinelibrary-wiley-com.are.uab.cat/doi/pdf/10.1002/9781118488713)

Jenny Freeman: How to display data. BMJ Books, 2008 (https://ebookcentral-proquest-com.are.uab.cat/lib/uab/reader.action?docID=428140)

George M. Hall: How to present at meetings. BMJ Books, 2007 (https://onlinelibrary-wiley-com.are.uab.cat/doi/pdf/10.1002/9781119962120)

Elizabeth Wager: How to survive peer review. BMJ Books, 2002

Ivan Valiela: Doing Science. Design, Analysis, and Communication of Scientific Research. Oxforf U.P., 2001

Data processing

Julien I.E. Hoffman: Basic Biostatistics for Medical and Biomedical Practitioners, Second Edition. Academic Press - Elsevier, 2019. ISBN 978-0-12-817084-7 (DOI https://doi.org/10.1016/C2018-0-02190-8)

Babak Shahbaba: Biostatistics with R - An Introduction to Statistics Through Biological Data. Springer, 2012. ISBN 978-1-4614-1301-1 e-ISBN 978-1-4614-1302-8. (DOI https://doi.org/10.1007/978-1-4614-1302-8)

Software

For the data processing section, it will be used the R-Commander software, a free program publically accessible.