

Introduction to Data Processing and to the Communication of Scientific Information

Code: 44710

Credits: 9

2026/2027

Degree programme	Type	Course
Neurosciences	OB	1

Contact lecturer

Name : Roser Masgrau Juanola

Email : roser.masgrau@uab.cat

Teaching staff

Esther Dalfo Capella

Arnaldo Javier Parra Damas

Carlos Barcia Gonzalez

Roser Masgrau Juanola

Ferran Torres Benitez

Group languages

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

Prerequisites

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

Objectives

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

Learning outcomes

- CA07 (Formulate a hypothesis in the context of neuroscience and propose a work plan to disprove or accept it.) Formulate a hypothesis in the context of neuroscience and propose a work plan to disprove or accept it.
- CA08 (Interpret the experimental results obtained from an experiment involving the study of the central and peripheral nervous systems.) Interpret the experimental results obtained from an experiment

involving the study of the central and peripheral nervous systems.

- CA09 (Draft scientific articles and summaries using scientific databases and illustrate your text with photographs or drawings to report a finding in the field of neuroscience.) Draft scientific articles and summaries using scientific databases and illustrate your text with photographs or drawings to report a finding in the field of neuroscience.
- CA10 (Apply the knowledge acquired about a specific aspect of neuroscience to reach conclusions and generate new working hypotheses that can be understood by a wide audience, including both specialists and non-specialists.) Apply the knowledge acquired about a specific aspect of neuroscience to reach conclusions and generate new working hypotheses that can be understood by a wide audience, including both specialists and non-specialists.
- KA07 (Work as a team in data processing and in the communication of scientific information, assessing the social, economic, and environmental impact of the data obtained.) Work as a team in data processing and in the communication of scientific information, assessing the social, economic, and environmental impact of the data obtained.
- KA08 (Identify the most appropriate probabilistic model for the analysis and interpretation of experimental data obtained during research in any field of neuroscience.) Identify the most appropriate probabilistic model for the analysis and interpretation of experimental data obtained during research in any field of neuroscience.
- SA07 (Perform accurate statistical analyses in the field of neuroscience, to reach reliable and reproducible conclusions.) Perform accurate statistical analyses in the field of neuroscience, to reach reliable and reproducible conclusions.
- SA08 (Disseminate the results obtained from neuroscience research through scientific articles, posters, and conferences.) Disseminate the results obtained from neuroscience research through scientific articles, posters, and conferences.
- SA09 (Develop an experimental design to statistically analyse data obtained from experiments involving the nervous system.) Develop an experimental design to statistically analyse data obtained from experiments involving the nervous system.

Contents

Scientific Communication. Science generates products that must be properly delivered. This part of the course helps students realize that developing skills to effectively communicate scientific results is as important as generating them. Since English is the official language of science, all activities in this part of the module will be conducted in English. Essentially, this part of the module consists of:

- Presentations: speaking to an audience about your research is an obligation, but also a privilege and a great opportunity to meet and be known. Making slides as simple as possible, using body language to your advantage, making eye contact with the audience, and respecting time limits are some of the strategies that will be discussed and practiced.
- Poster presentations: an effective scientific poster presentation is much more than simply designing a poster, and a design is much more than just combining figures and fitting text in between. It is also very important to know how to present the poster in 2-3 minutes, paying attention to non-verbal language and considering the audience.
- Paper writing: what to publish, where, and how. We will emphasize writing an abstract since abstracts are one of the most challenging parts of scientific writing. Moreover, most potential readers will only spend a few seconds reading your abstract in scientific databases. If it doesn't catch their attention, you have failed.
- Other topics of interest: discussions will cover the ethics of science, the publication process, and science communication to a general audience.
- Artificial intelligence: students will be introduced to AI tools for scientific communication and will discuss the advantages and disadvantages of using them.

Statistical Analysis of Experimental Data. Statistics is essential in experimental sciences throughout the entire process: in design, to ensure experiments adequately address the questions posed; in data collection, to ensure quality and avoid biases; and in analysis, to obtain impartial and reproducible conclusions. It is key to modeling the inherent variability in biology and identifying significant relationships. The theoretical classes in this part of the module will be conducted in English and Catalan. The fundamental objective of this part of the module is to train students in the analysis and interpretation of experimental data. Therefore, basic

competencies will be provided to design, execute, and analyze research projects, apply appropriate statistical techniques, interpret results, and draw appropriate conclusions. Thus, the content will be:

- Introduction to statistics: utilities and limits.
- Population, sample, sampling, and hypothesis formulation.
- Types of variables and effect measurement.
- Descriptive statistics and probability.
- Diagnostic tests and bivariate statistical significance.
- Effect estimation, confidence intervals, concordance, correlation, and regression.
- ANOVA and introduction to multivariate analysis.
- Common designs, sample size calculation, and experimental planning.
- Interpretation of results: statistical significance versus practical relevance.

The first hour of this part will be dedicated to data processing considering gender.

Learning activities and methodology

Title	Hours	ECTS	Learning outcomes
Preparation and elaboration of works	145	5.8	
Lectures and class seminars	56	2.24	
Work tutoring	17	0.68	

The so called "guided activities" include:

Lectures.

Classroom practices.

Presentations in class.

The hours are divided into 30 hours of Biostatistics theory and 26 hours of Communication, which consists of 12 lecture hours and 14 seminar hours. For the seminars, students are split into two groups, each containing half of the total class

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	Weight	Hours	ECTS	Learning outcomes
Scientific communication: Presentation and defense of works	46%	3	0.12	CA07, CA09, SA08, SA09
Data processing: practical exercises and selflearning	24%	2	0.08	CA07, CA08, CA10, KA07, KA08, SA07, SA09
Data processing: Examination	30%	2	0.08	CA08, KA08, SA07, SA09

The Scientific Communication component will be assessed through continuous evaluation, which will take into account attendance and attitude, punctual submission of assignments, and the presentation and defense of works.

The Data Processing component will also be assessed through continuous evaluation via practical exercises and self-learning activities. Additionally, there will be an exam where students must answer questions on theoretical and applied concepts. The minimum grade of the exam required to average with the continuous evaluation of this part is 3.5 out of 10. There will be a second exam for the Data Processing exam for students who do not pass this assessment.

A minimum score of 3.5 out of 10 is required in each part (Scientific Communication and Data Processing) to pass the module.

Students will receive a grade of "Not Assessed" if the assessment activities they have completed account for less than one-third of the final course grade.

The commission of any irregularity in an assessment act (academic fraud, plagiarism or improper use of AI, unless this use is expressly authorized in the teaching guide), which may lead to a significant variation in the grade, means that this act will be graded with a 0. In the event that the teaching guide provides that in order to pass the subject it is an essential requirement to have obtained a minimum grade in this assessment act or that several irregularities occur in the assessment acts of the same subject, the final grade for this subject is 0. Apart from this, a disciplinary process may be initiated against the student who incurs any of these irregularities.

Bibliography

Scientific communication

George M. Hall: How to write a paper. BMJ Books, 2008
(https://bibcercador.uab.cat/permalink/34CSUC_UAB/1c3utr0/cdi_proquest_ebookcentral_EBC1120469)

Jenny Freeman: How to display data. BMJ Books, 2008
(https://bibcercador.uab.cat/permalink/34CSUC_UAB/1c3utr0/cdi_globaltitleindex_catalog_213523389)

George M. Hall: How to present at meetings. BMJ Books, 2007
(https://bibcercador.uab.cat/permalink/34CSUC_UAB/1c3utr0/cdi_ciando_primary_ciando488781)

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

50 Essentials on Science Communication. Jean Paul Bertemes , Serge Haan and Dirk Hans. 2024. De Gruyter Mounter. <https://www.degruyter.com/document/doi/10.1515/9783110763577/html#contents>

<https://www.nature.com/articles/d41586-025-04166-2>

Data processing

Milton JS. *Estadística para biología y ciencias de la salud*. 3a. Edición. Madrid: Interamericana. McGraw-Hill, 2001.

Daniel WW. *Bioestadística. Base para el análisis de las ciencias de la salud*. 4a Edición. Limusa Wiley, 2002.

Cuadras CM. *Fundamentos de estadística: aplicación a las ciencias humanas*. Barcelona: EUB, 1996.

Sentís J, Pardell H, Cobo E, Canela J. *Manual de Bioestadística*. 3a. Edición. Barcelona: Masson, 2003.

Armitage PG, Berry G, Matthews JNS. 2002. *Statistical methods in medical research*. Oxford: Blackwell Science Limited.

webs:

<http://www.bioestadistica.uma.es/libro/>

http://www.hrc.es/bioest/M_docente.html

<http://davidmlane.com/hyperstat/index.html>

<https://www.equator-network.org>

Simulators:

<http://web.udl.es/usuaris/q3695988/wenessim/Pagines/index.htm>

http://www.uco.es/simulaciones_estadisticas/index.php?menu=simula

Software:

The jamovi project (2023). jamovi (Version 2.3) [Computer Software]. Retrieved from <https://www.jamovi.org> , accessed 2024-07-04

Program of the Girona Heart Registry (REGICOR), IMIM, Barcelona. GranMo. <https://www.datarus.eu/en/applications/granmo/> , accessed 2024-07-04

Bulus, M. (2023). pwrss: Statistical Power and Sample Size Calculation Tools. R package version 0.3.1. <https://CRAN.R-project.org/package=pwrss>

Bulus, M., & Polat, C. (2023). pwrss R paketi ile istatistiksel güç analizi [Statistical power analysis with pwrss R package]. Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi, 24(3), 2207-2328. <https://doi.org/10.29299/kefad.1209913> , accessed 2024-07-04

Software

For the data processing section, it will be used jamovi (Version 2.6) , GranMo, pwrss

Course groups and languages

The information provided is provisional until November 30. After this date, you will be able to consult the language of each group through this [link](#). To access the information, you will need to enter the course CODE

Type of teaching	Group	Language	Semester	Shift
(TEm) Theory (master)	1	English	first semester	morning-mixed
(SEMm) Seminars (master)	1	English	first semester	morning-mixed
(SEMm) Seminars (master)	2	English	first semester	morning-mixed