

## 66853 - Quantitative epidemiology and advanced statistics

### Syllabus Information

**Academic year:** 2023/24

**Subject:** 66853 - Quantitative epidemiology and advanced statistics

**Faculty / School:** 105 - Facultad de Veterinaria

**Degree:** 617 - Master's in Global Health: Integration of Environmental, Human and Animal Health

**ECTS:** 6.0

**Year:** 1

**Semester:** First semester

**Subject type:** Compulsory

**Module:**

### 1. General information

This subject is compulsory and is part of a two-subject block, together with "Qualitative tools applied to health". The objective is to train students in the use of tools that, along with those acquired in the "Qualitative tools" subject, will provide them with the necessary competences for the design and analysis of epidemiological and statistical studies, the graphic and spatial representation of the health situation of populations and the performance of risk analysis for decision making.

The competencies acquired in this subject will serve as a basis for the rest. They will also complement the "Animal experimentation" subject in terms of design and analysis of work protocols, field tests and clinical trials.

These approaches and objectives are aligned with the following Sustainable Development Goals (SDGs) of the United Nations Agenda 2030 (<https://www.un.org/sustainabledevelopment/es/>), so that the acquisition of the learning results of the subject provides training and competence to contribute to some extent to the achievement of SDG3, 4, 5, 6 and 8.

### 2. Learning results

Upon completion of this subject, the student will be able to:

1. Use statistical analysis and its interpretation in global health.
2. Use the tools of quantitative epidemiology in observational studies as a basis for health care decision making.
3. Apply a risk analysis at population level and make decisions based on it. -Manage and interpret spatial health information.
4. Describe both numerically and graphically the results from a set of sample data. -Pose and contrast statistical hypotheses and interpret them correctly.
5. Design and implement a qualitative risk analysis for decision making.
6. Design a multistage sampling to know the presence of a disease in a population and estimate its prevalence.
7. Assess the reliability of diagnostic tests.
8. Calculate the prevalence and incidence of a disease.
9. Estimate risk factors by ruling out confounding factors and identifying interaction variables.
10. Perform a spatial representation of health information.

### 3. Syllabus

#### *Module 1. Advanced statistics*

- 1.1 Probability.
- 1.2 Descriptive statistics.
- 1.3 Statistical inference.
- 1.4 Linear models.

#### *Module 2. Risk analysis*

- 2.1. Principles of risk analysis for decision making.
- 2.2. Qualitative risk analysis, approach to a disease model.

#### *Module 3. Advanced epidemiology*

- 3.1 Sampling.
- 3.2. Reliability assessment of diagnostic tests.
- 3.3. Design and analysis of observational studies.
- 3.4. Multivariate epidemiologic studies. 3.5 Logistic regression models.

#### *Module 4. Geographic Information system: use of maps and spatial analysis.*

4.1. Introduction to geographic information systems.

4.2. Geographic data management.

Spatial analysis and visualization.

#### 4. Academic activities

1. Theoretical lectures by teachers, supported by audiovisual media. Summaries and supplementary material will also be published in the ADD (Anillo Digital Docente) to encourage prior study and class participation by students.
2. Practical classes in the computer classroom that include the use of database design and management programs (Microsoft Access 2016) and programming languages for statistical and graphical analysis (R) as well as geographic information systems.
3. Presentation of examples of application of the tools presented.
4. Problem solving and case studies, to help students acquire practical skills.

#### 5. Assessment system

1. Solving of exercises and problems at the end of the practical sessions of statistics.
2. Solving of risk analysis issues.
3. Solving of exercises and problems at the end of the epidemiology practical sessions.
4. Solving of GIS issues.
5. Presentation of a paper on spatial representation of epidemiological results.

The activities will be done in the classroom and will be delivered at the end of each session, by e-mail or through the ADD (Anillo Digital Docente) of the subject. They will be part of the student's portfolio.

The assessment of each activity is shown in the following table:

<b>Assessment System</b>	<b>% in the assessment</b>
Solving statistical exercises and problems	33,5%
Solving of risk analysis issues.	8%
Solving statistical exercises and problems	33,5%
Solving of GIS issues.	17%
Presentation of a paper on spatial representation of epidemiological results.	8%

Students who have not passed a minimum of 80% of the proposed activities, must prove that they have acquired the practical competences corresponding to the teaching not received by means of a specific exam that will consist of a written test of the theoretical contents (40% of the final grade) and the realization of practical exercises similar to those developed in the classroom (60% of the final grade) that will be part of their portfolio.