SHORT DESCRIPTION AND JUSTIFICATION
Applied Statistics consists of the use of methods to collect, analyze and interpret data. This implies the quantification of biotechnological phenomena that present a certain experimental variability; to understand, control, model and predict this variability it is useful to have practical knowledge of Statistics.

The subject is organized around three parts: data description, probability distribution models and statistical inference techniques. These parts constitute the basic foundations that the student must acquire and then apply them, when necessary, in other subjects of the degree.

The concepts and techniques presented in the classroom are worked with the help of real practical examples adapted for their resolution, both individually and in groups. Some commonly used statistical programs are used to process the data.

COMPETENCES
- That students have the ability to gather and interpret relevant data (normally within their area of study) to think over and make judgments on relevant social, scientific or ethical issues (CB3)
- Be able to work in a multidisciplinary environment (T2)
- Be able to use tools, systems or processes to carry out the activities in the field of Biotechnology according to the established requirements (E4)
- Be able to analyse, integrate and interpret data and information in the field of Biosciences (E7)

PREVIOUS REQUIREMENTS
The competences of the previous educational stages; and in particular, the use of office tools.

CONTENTS
1. Introduction to statistics.
   Scientific method, data and Statistics.
2. Exploratory data analysis.
   Construction and interpretation of statistics, tables and charts.
3. Probability. 
   Definitions and models of frequent use.
4. Inference from a sample. 
   Inference for a population (proportion, mean, variance and distribution model).
5. Inference from two or more samples. 
   Comparison of two populations (variances, means). 
   Comparison of more than two populations (variances, means).
6. Correlation and Regression 
   Correlation coefficient. Regression lines. Hypothesis tests.

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**LEARNING ACTIVITIES**

<table>
<thead>
<tr>
<th>Learning Activities</th>
<th>ECTS Credits</th>
<th>Competences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>0.8</td>
<td>E7</td>
</tr>
<tr>
<td>Case and Problem-Solving Sessions</td>
<td>0.8</td>
<td>B3, T2, E4, E7</td>
</tr>
<tr>
<td>Seminars</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Practical and Lab Work</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Presentations</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Personal Study</td>
<td>3.3</td>
<td>-</td>
</tr>
<tr>
<td>Assessment Tasks (Exams, Continuous Assessment...)</td>
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<td>B3, E7</td>
</tr>
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<td><strong>TOTAL</strong></td>
<td><strong>5.0</strong></td>
<td><strong>B3, T2, E4, E7</strong></td>
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</tbody>
</table>

**TEACHING METHODOLOGY**

The lectures combine theoretical exposition of concepts with exercises, problems and cases, where students must apply the concepts explained. Some of the exercises are corrected immediately in the classroom, while others are proposed as personal study activities; in this case, students can consult the doubts generated in the following classes or in the hours of consultation that the teacher has planned in his office.

Evaluation activities are carried out periodically so that students can become aware of their progress in acquiring the knowledge and skills of the subject. Some of these evaluations are carried out without prior notice, in order that the students have the subject up to date (class activities), but those that have more weight in the final grade are done by notifying it in advance (partial and final exams), according to the schedule foreseen and announced at the beginning of the course.

For personal study, the student must rely on the notes obtained in class and supplement them with the consultation of one of the recommended books that are available in the IQS library. Students are encouraged to practice solving a selection of proposed activities and problems.
ASSESSMENT

ASSESSMENT METHODS

<table>
<thead>
<tr>
<th>Assessment methods</th>
<th>Weight</th>
<th>Competences</th>
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</thead>
<tbody>
<tr>
<td>Final Exam (A)</td>
<td>40%</td>
<td>B3, E7</td>
</tr>
<tr>
<td>Midterm Exam/s (B)</td>
<td>30%</td>
<td>B3, E7</td>
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<tr>
<td>Continuous Assessment Activities (C)</td>
<td>30%</td>
<td>B3, T2, E4, E7</td>
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<tr>
<td>Reports and Presentations</td>
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<td>Lab or Field Work</td>
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<tr>
<td>Projects</td>
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<tr>
<td>Host Student Evaluation</td>
<td></td>
<td></td>
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<tr>
<td>Participation</td>
<td></td>
<td></td>
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</tbody>
</table>

LEARNING OUTCOMES
The student must demonstrate that he / she understands the concepts and knows how to use the basic techniques of Statistics that constitute the contents of the subject. This will evaluate the E7 and B3 competences, through the activities carried out in class (C), the partial exam (B) and the final exam (A). The student must demonstrate that he / she knows how to apply the appropriate statistical techniques for the resolution of concrete problems in the field of Biotechnology and that he / she knows how to interpret the results in a practical way, making justified decisions (with this the competencies E7 and B3 will be evaluated). In the follow-up activities, the development of the T2 and E4 competences will be promoted, through the resolution of cases and problems.

QUALIFICATION
- Ordinary calls. The qualification of the subject will be calculated using three evaluation methods: Final Exam (A), Partial Exam (B) and Activities carried out in class (C) and weighting their grades according to the assigned weights (see table of assessment methods).
  - May call: by calling A1 to the final exam grade in May, the final grade (FG) will be obtained by applying the formula: \( CG = (0.3C + 0.3B + 0.4A1) \) followed by the condition: IF \( A1 \geq 3.5 \) THEN \( FG = CG \); OTHERWISE \( FG = CG / 2 \).
  - July call: by calling A2 to the exam grade of July, the final grade (FG) will be obtained according to the formula \( FG = 0.3C + 0.7A2 \).
- Extraordinary calls: the grade of the call is the one obtained in the corresponding examination.

ASSESSMENT OF THE COMPETENCES
Each one of the competences will be evaluated using the answers to certain questions of the evaluation methods. For this, three basic types of questions will be established: 1) Concepts and exercises of application of formulas, 2) problems such as those made in class, to evaluate the competence and 3) problems whose solution can be deduced from those made in class, but that imply a new or different situation. The indicator used in each case will be the average grade obtained in the corresponding question type.
BIBLIOGRAPHY

Reference books:

DOCUMENT HISTORY

PREVIOUS REVISIONS
July 14th 2014, Dr. Lucinio González Sabaté
May 28th 2015, Dr. Lucinio González Sabaté
July 26th 2016, Dr. Lucinio González Sabaté
July 3rd 2017, Dra. Vanessa Serrano Molinero

CURRENT REVISION
July 18th de 2018, Dra. Vanessa Serrano Molinero