Probability & Statistics
Pla Docent (Syllabus)

1 Summary Information

Course Name: Probability & Statistics

Degree: IBE

Course: Second year

Terms: 1st and 2nd

Number of ECTS Credits: 5+5

Course Code: 21120

Hours: 24h Theory and 9h Practice per trimester

Professor: Christian Brownlees

2 Description

The Probability & Statistics is course sequence spanning two trimesters. The first trimester covers Probability while the second trimester covers Statistics.

Probability provides an introduction to probability and its applications. The list of topics covered in the course includes: basic probability concepts; rules and operations in probability; random variables; discrete and continuous distributions; bivariate distributions; conditional distributions and conditional expectation; limit theorems for sums of random variables; applications of limit theorems.

Statistics provides an introduction to statistical inference and its applications. The list of topics covered in the course includes: the notions of population & sample; distribution of sample statistics, point estimation, confidence intervals, hypothesis testing, simple liner regression model.

In each trimester there will be sixteen theory lectures devoted to developing concepts and applications, and six practical sessions that will focus on the application of the methods learned in class. The course emphasizes both clarity in understanding the concepts and the elementary mathematics involved, as well as the ability to apply the methods in practical settings. Though the mathematics will be kept simple, the student should be warned that thinking is required.

3 Competences to be Attained

Specific competences:

1. Acquisition of the basic concepts of probability and statistical inference.

2. Knowledge and understanding of basic statistical calculations and the software tools used for them.

3. The ability to identify the elements making up a univariate statistical model applied to real situations.

4. The ability to use standard statistical packages and to correctly interpret the lists produced.

General competences:

G4. The ability to satisfactorily use the English language for academic purposes (read, write and speak using a medium-high register).

G5. Proficiency in the use of computing tools and their main applications in ordinary academic work.

G9. Consolidated habits as regards self-discipline, personal standards and thoroughness in academic work and in organization and fulfilment of timescales.

G10. A proactive attitude to ascertaining the unknown, essential in all training processes and in all prestigious professional activities.

G11. The ability to apply the knowledge acquired and to adapt it to new situations flexibly and creatively.

G12. The ability to make progress autonomously and continuously in training and learning processes.

G16. Use of the right information in formulating proposals and problem-solving.

G19. Identification of the key factors in a problem.

4 Methodology

The course is divided in Theory and Practice sessions. Theory sessions will be used to introduce the material of the course. Practice sessions will be used to review problem sets that will be assigned in class.

5 Evaluation

5.1 Trimester Grade

Each trimester, the grade of the course is going to be based on:

1. Seminars session presentations. Seminar sessions will be used to practice the concepts explained in the theory classes. Students will solve problem sets during such classes. Seminar session have a weight of 15% on the overall trimester grade.

2. There will be up to three intermediate written exams that will be carried out during each trimester. Intermediate exams are written tests that have the same structure of the final exam. Intermediate exams have a weight of 25% on the overall trimester grade.

3. The final exam is a written test covering the entire program. The final exam has a weight of 60% on the overall trimester grade.

5.2 Probability & Statistics Final Grade

The final grade of Probability & Statistics is based on the simple average of the grades of the two trimesters. To pass students must obtain a grade higher than 4 in both trimesters and the average of the two trimester grades must be higher than 5.

5.3 Make-up Exam

Each trimesters there will be a make up exam for those students that got a grade smaller than 5. This option is only available for those that participated to seminar sessions. The Make-up exam is a written test based on the entire program of the trimester. To pass the exam, students need to get a grade higher than 4. The new trimester grade is going to be computed as an average of the Make-up exam (weight 0.7) and the seminar sessions (weight 0.30), if this average is higher than 4. Otherwise, the trimester grade is not going to be changed.

6 Contents

Probability

1. Probability: Basic concepts
2. Random Variables
3. Discrete Random variables. Special Discrete Univariate Random Variables.
4. Continuous Random Variables. Special Continuous Univariate Random Variables.
5. Bivariate Random Variables
6. Asymptotics

Statistics

1. Population & Samples.
2. Distribution of Sample Statistics.
3. Point Estimation
4. Confidence Intervals
5. Hypothesis Testing
6. 1-way Anova
7. Simple Regression Model

7 Textbook

"Statistics for Business and Economics" Paul Newbold, William L. Carlson and Betty Thorne, Upper Saddle River, N.J. : Prentice Hall, cop. 2007, 7th ed.