



Subject: Probability and Statistics
Code: 18472
Institution: Escuela Politécnica Superior
Degree: Telecommunication Technologies and Services Engineering
Level: Graduate
Type: Compulsory
ECTS: 6

1. COURSE TITLE

Probability and Statistics

1.1. Course number

18472

1.2. Course area

Mathematics

1.3. Course type

Compulsory

1.4. Course level

Graduate

1.5. Year

Second

1.6. Semester

First

1.7. Credit allotment

6 ECTS Credits

1.8. Prerequisites

None, although it could be helpful to have some knowledge of Calculus and Linear Algebra

1.9. Minimum attendance requirement

It is not mandatory to attend classes, but some activities that contribute to the final grade are done there.



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1.10. Faculty data

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1.11. Course objectives

FB1 Competencies: Combinatorics. Probability. Scalar random variables and vector random variables, distributions with application in Telecommunication Technologies and Services Engineering (Gaussian, Poisson, exponential, Bernoulli, etc.). Elements and basic techniques of statistical inference and their applications in engineering.

At the end of the course the student should be able to

- model and analyze random phenomena
- think probabilistically
- understand gambling
- predict long time behaviour for random phenomena
- design experiments involving chance
- infer the right conclusions from a given experiment
- use probabilistic and statistical tools to solve real problems

1.12. Course contents

Lectures:

1. Introduction.
2. Intuitive probability.



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3. Conditioning.
4. Independence.
5. Counting.
6. Random variables.
7. Expectation and Standard Deviation.
8. Strategies in gambling.
9. Law of Large Numbers.
10. Working with random variables.
11. Variables, boxes and populations.
12. Ergodic Markov Chains.
13. Gainings in gambling.
14. Central Limit Theorem.
15. Controlled experiments.
16. Observational studies.
17. Descriptive Statistics.
18. Chance errors in sampling.
19. Confidence intervals.
20. Tests of significance.
21. Tests of significance for one population.
22. Tests of significance for two populations.
23. Randomization and blocking.
24. When does it make sense to perform a test?
25. Random models.
26. Tests of significance for more than two populations.

1.13. Course bibliography

1. A. Adhikari, D. Freedman, R. Pisani y R. Purves, *Statistics*, Norton & Company.
2. D. Bertsekas y J. Tsitsiklis, *Introduction to Probability*. Athena Scientific Press.
3. G. Box , W.G. Hunter and J.S. Hunter. *Statistics for experimenters*. John Wiley & Sons.
4. G. Grimmett y D. Welsh, *Probability, an introduction*. Clarendon Press, Oxford.
5. J. De la Horra. *Estadística Aplicada*, Ediciones Díaz de Santos.
6. D.S. Moore. *The active practice of statistics*, W. H. Freeman and Company.
7. S. Ross, *Probability and Statistics for Engineers and Scientists*. Elsevier Academic Press.
8. E.O. Thorp, *Beat the Dealer: A Winning Strategy for the Game of Twenty-One*, Vintage Books.