

Course guide

230808 - STAT - Statistics

Last modified: 27/10/2016

Unit in charge: Barcelona School of Telecommunications Engineering
Teaching unit: 749 - MAT - Department of Mathematics.

Degree: **Academic year:** 2016 **ECTS Credits:** 6.0
Languages: English

LECTURER

Coordinating lecturer: JOSEP M. AROCA FARRERONS

Others: JOSEP M. AROCA FARRERONS

PRIOR SKILLS

Probability, random variables.

REQUIREMENTS

PPEE.

TEACHING METHODOLOGY

- Lectures.
- Application classes.
- Laboratory classes.
- Exercises.
- Short answer test (Control).
- Short answer test (Test).
- Extended answer test (Final Exam).

LEARNING OBJECTIVES OF THE SUBJECT

Basic concepts and methods of statistics. Data analysis, hypothesis testing, estimation.

STUDY LOAD

Type	Hours	Percentage
Self study	98,0	65.33
Hours large group	26,0	17.33
Hours small group	26,0	17.33

Total learning time: 150 h

CONTENTS

1. Random variables

Description:

Basic concepts of random variables. Parameters. Important variables in statistics: Gaussian, chi-squared, Student's t, Fisher's F.

Full-or-part-time: 19h

Theory classes: 3h

Practical classes: 2h

Self study : 14h

2. Descriptive statistics. Theory of sampling

Description:

Populations and samples. Distribution of sample statistics. Sample mean value and variance. Distribution of proportions, differences and sums, ratio of variances.

Full-or-part-time: 21h

Theory classes: 3h

Practical classes: 2h

Laboratory classes: 2h

Self study : 14h

3. Estimation Theory. Confidence Intervals

Description:

Unbiased estimators. Point and interval estimation. Confidence intervals for the mean value and variance. Confidence intervals for proportions. Confidence intervals for differences and sums. Maximum likelihood estimators.

Full-or-part-time: 21h

Theory classes: 3h

Practical classes: 2h

Laboratory classes: 2h

Self study : 14h

4. Statistical hypothesis testing

Description:

Statistical hypotheses. Errors of type I and type II. Tests with one and two tails. Significance level. Tests of significance for small and large samples. Power of a test. Adjusting theoretical distributions to sample frequency distributions. Chi-squared test.

Full-or-part-time: 22h

Theory classes: 3h

Practical classes: 3h

Laboratory classes: 2h

Self study : 14h

5. Regression

Description:

Adjustment curves. Linear regression. The method of the least squares. Multiple regression. Correlation coefficients.

Full-or-part-time: 22h

Theory classes: 3h

Practical classes: 3h

Laboratory classes: 2h

Self study : 14h

6. Analysis of variance

Description:

Techniques of analysis of variance (ANOVA). One factor experiments. Fisher test. Block treatment. Two factor experiments.

Full-or-part-time: 22h

Theory classes: 3h

Practical classes: 3h

Laboratory classes: 2h

Self study : 14h

7. Non-parametric tests

Description:

Signed rank test. Kruskal-Wallis test. Runs test. Rank correlation.

Full-or-part-time: 23h

Theory classes: 4h

Practical classes: 2h

Laboratory classes: 3h

Self study : 14h

GRADING SYSTEM

The final grade is obtained from the works proposed by the professor (each one 10% to 35% of the total grade)

BIBLIOGRAPHY

Basic:

- Walpole, R.E. [et al.]. Probabilidad y estadística para ingeniería y ciencias. 9a ed. México: Pearson Educación, 2012. ISBN 9786073214179.
- Ríos, S. Métodos estadísticos. 6a ed. Madrid: Ediciones del Castillo, 1967. ISBN 8421901982.
- Spiegel, M.R. [et al.]. Probabilidad y estadística. 3a ed. México: McGraw-Hill, 2010. ISBN 968-451-102-7.

Complementary:

- Mendenhall, W.; Sincich, T. Statistics for engineering and the sciences. 6th. Upper Saddle River, NJ: Pearson Prentice-Hall, 2017. ISBN 9781498731829.
- Devore, J.L. Probability and statistics for engineering and science. 8th int. ed. Cengage Learning, 2011. ISBN 9780840068279.
- Feller, W. An Introduction to probability theory and its applications (vol 1). 3rd ed. New York: John Wiley, 1968. ISBN 978-0471257080.
- Feller, W. An Introduction to probability theory and its applications (vol 2). New York: John Wiley, 1968. ISBN 0471257117.