

BIOMATHEMATICS, COMPUTING and DOCUMENTATION

Study Programme: MIMV **Curricular Year:** 1st **Semester:** 1st **Compulsory** **Credits:** 5.0 ECTS

Lecturer(s): M.Isabel F.Neto C.Fonseca (CCP/R)

1. Contact hours:

Lectures - 28 Practicals - 28 Total - 56

2. Objectives:

At the end of course the students should be able to: use statistics for summarizing data and perform exploratory data analysis; be aware of the conditions underlying the applicability of the theoretical models used for statistical analysis; discuss the validity and the limits of each model; analyze and interpret the statistical results; be aware of the difference between cause-effect relationships and statistical associations between variables; have the basic skills to search and critically read technical and scientific papers; use the computer to perform: (a) word-processing, build tables and graphs; (b) data storage, retrieval, processing and analysis using spreadsheets and a statistical package; (c) search the internet and online library databases for scientific and technical documents.

3. Programme:

Theoretical: Descriptive statistics and exploratory data analysis. Probability. Bayes' Theorem - application to diagnostic tests. Probability distributions. Central limit theorem. Sampling distributions. Hypothesis testing: estimation of confidence intervals for a sample mean and for a proportion; Errors type I and II; Power of a test; T-tests for comparison of means; One-way ANOVA; F-test for comparison of two variances; Nonparametric tests; Comparison of proportions. Chi-squared distribution. Goodness of fit, independence and homogeneity tests. Methods for bivariate quantitative data: Scatter plots; Q-Q plots; Covariance; Correlation coefficient: Spearman and Pearson; Regression: simple linear model; Confidence limits for the estimation of predicted values and associated errors.

Introduction to sampling methods and experimental design.

Practical: Use of hardware and software to solve problems applying the concepts approached during theoretical lessons, using WORD, EXCEL and SPSS. Use of the internet and online library databases to search for technical and scientific documents.

4. Bibliography:

- Fligner, M.A., Moore, D. & Notz, W.I. (2014). *A Estatística Básica e Sua Prática*. 6ª edição. Editora LTC, Brasil.
- Oliveira, A. G. (2014). *Bioestatística Descodificada*. 2ªed. Lisboa-Porto: LIDEL.
- Pereira, A. & Poupá, C. (2018). *Como Escrever uma Tese, Monografia ou Livro Científico Usando o Word*. 7ª Edição. Edições Sílabo, Lda.
- Pestana, M.H. & Gageiro, J.N. (2014). *Análise de Dados para Ciências Sociais - a complementaridade do SPSS*. 6ª Edição. Edições Sílabo, Lda.
- Petrie, A. & Watson, P. (2013). *Statistics for Veterinary and Animal Science*. 3rd ed. Wiley-Blackwell.
- Lang, T.A. and Secic, M. (2006). *How to report statistics in medicine: annotated guidelines for authors, editors, and reviewers*. 2nd ed. Philadelphia: American College of Physicians.

4. Assessment: The students will be evaluated at the end of the term by a written examination having a worth of 55% of the final grade. The remaining 45% of the final grade will result from the sum of the grades obtained on the following continuous assessment activities: (i) Bibliographical research exercise; (ii) Data collection (iii) A written report of an exploratory data analysis exercise; (iv) 6 mini-tests online via Moodle; (v) Presentation of statistical results from an exercise of data analysis.