

Disciplina **MCP5887** 
Advances in the management of data in scientific studies

Concentration area: 5131

Creation: 14/03/2019

Activation: 14/03/2019

Credits: 2

Workload:

Theory (weekly)	Practice (weekly)	Study (weekly)	Duration	Total
5	20	5	1 week	30 hours

Professor:

Antônio Augusto Barbosa Lopes

OBJECTIVE:

“Advances in the management of data in scientific studies” is the advanced version of the discipline MCP-5871 – “Management of data in scientific studies” which constitutes a highly recommended although not mandatory prerequisite. Students applying to attend the present course are assumed to have previous familiarization with basic tools offered in the SPSS Statistical Software, including data base construction and organization, variable definition, selection, structuring and transformation, principal distribution functions and commonly used parameters. Familiarization with basic parametric and non-parametric procedures is also required. The present course is aimed at discussing models (regression and other liner models) that are potentially useful in the analysis of multiple variables, and examining how these models fit to experimental data in practice.

RATIONALE:

Students attending the original discipline MCP5871 – “Management of data in scientific studies” suggested the creation of a new discipline that should constitute a step ahead, and include tools that are commonly used to solve problems involving multiple variables. In this sense, the original course MCP5871 should figure out as a highly recommended but not mandatory prerequisite. Keeping the same methodology of the original discipline, the present one was designed to be essentially (hands on).

CONTENT:

- Day 1. Moving from simple to more complex experimental designs. How do linear models fit to experimental data, and what kind of information can be obtained in return?
- Day 2. Regression analysis in strict sense. Prediction and precision. Models used for analysis of multiple variables: parameter obtainment and selection of predictors. The analysis of residuals and its importance in validating the regression. How to deal with...
- Day 3. Regression in a broad sense. Moving from classical models of analysis of variance (ANOVA) to the general and generalized linear models. Practical problems and possible solutions.
- Day 4. Analysis of events (survival and other outcomes). Commonly used models. Predictors and potential confounders. Extended versus restricted strategies for selection of predictors.
- Day 5. Old and new challenger and paradigms. Sample size in simple and complex experimental designs. What are Bayesian methods of data analysis? The "R" revolution.

EVALUATION:

Students will be subjected to practical (written) examination at the end of the course. Individual notebooks with the statistical software used throughout the course is required for the evaluation.

BIBLIOGRAFIA:

1. Hazra A, Gogtay N. Biostatistics Series Module 10: Brief Overview of Multivariate Methods. *Indian J Dermatol*. 2017;62(4):358-366. doi: 10.4103/ijd.IJD_296_17.
2. Schwemer G. General Linear Models for Multicenter Clinical Trials. *Control Clin Trials*. 2000;21(1):21-9.
3. Lewis-Beck MS, Bryman A, Liao TF. Editors. *The SAGE Encyclopedia of Social Science Research Methods*. 1st ed. Los Angeles, CA, USA: SAGE Publications, Inc. 2004. 1528p. <https://doi.org/10.4135/9781412950589>.
4. Vach W. *Regression Models as a Tool in Medical Research*. 1st ed. Boca Raton, FL, USA: CRC Press Taylor & Francis Group. 2013. 496p.
5. Madsen H, Thyregod P. Introduction to General and Generalized Linear Models. In: Chapman & Hall. *CRC Texts in Statistical Science Series*. 1st ed. Boca Raton, FL, USA: CRC Press Taylor & Francis Group. 2010. 316p.
6. Konoshi S. Introduction to Multivariate Analysis. In: Chapman & Hall. *CRC Texts in Statistical Science Series*. 1st ed. Boca Raton, FL, USA: CRC Press Taylor & Francis Group. 2014. 338p.

7. Manly BFL, Alberto JAN. *Multivariate Statistical Methods: A Primer*. 4th ed. Boca Raton, FL, USA: CRC Press Taylor & Francis Group. 2017. 253.
8. Gelman A, Carlin JB, Stern HS, Dunson DB, Vehtari A, Rubin DB. *Bayesian Data Analysis*. In: Chapman & Hall. *CRC Texts in Statistical Science Series*. 3rd ed. Boca Raton, FL, USA: CRC Press Taylor & Francis Group. 2013. 675p.
9. Field A, Miles J, Field Z. *Discovering Statistics Using R*. 1st ed. London, UK: SAGE Publications, Ltd. 2012. 992p.
10. Motulsky, Christopoulos A. *Fitting Models to Biological Data Using Linear and Nonlinear Regression: A Practical Guide to Curve Fitting*. 1st ed. New York, USA: Oxford University Press. 2004. 352p.

Idiomas ministrados:

Inglês