Applied Biostatistics (m62116p)

Instructor: N. DEMIRIS

Core Course, 3rd semester, 5 ECTS units

Course level: Graduate (MSc)

Language: Greek (or English if foreign students attend)

Course Description

The course discusses different medical/ epidemiological study designs and a comparative approach to them with an emphasis on differences/similarities, advantages/disadvantages. Measures of risk and relative risk: the relationship between them, as appropriate for the type of study and the theory of their estimation interspersed with examples. Confounding effects: definition, implications for estimating the relationship between exposure and disease, accounting for confounders (standardization, stratification, Mantel Haenzel estimator, modifying effects, McNemar). Diagnostic tests: sensitivity and specificity, overall accuracy, positive and negative predictive value, ROC curves.

Regression models to investigate the relationship between exposure and disease: logistic regression, relationship of logistic regression to contingency tables, estimation and prediction, interactions, application of logistic regression models to case-control studies, matching, conditional logistic regression.

Analysis of person-time data: incidence rate and cumulative incidence, one- and two-sample inference, incidence rate ratio, inference for stratified data, introduction to survival analysis (the concept of censoring, types of censoring, survival function, hazard function and cumulative hazard function, life table, Kaplan Meier and Nelson Aalen methods to estimate the survival function, log-rank and Wilcoxon tests to compare two groups).

Using the R CRAN statistical software to implement the taught methods.

Prerequisites

Probability, Statistics and computational methods.

Target Learning Outcomes

At the end of the course each student will become familiar with the basic types of medical study and the appropriate method of statistical analysis by study, including their practical application.

Recommended Bibliography

- Lecture notes
- Armitage, P., Berry, G., Matthews, J.N.S. Statistical Methods in Medical Research, Wiley: Hoboken, NJ, USA, 2002.
- Clayton, D., Hills, M. Statistical Models in Epidemiology, Oxford University Press: Oxford, UK, 2013.
- Hosmer, D.W. Jr., Lemeshow, S., May, S. Applied Survival Analysis: Regression Modeling of Time to Event Data, 2nd Edition. Wiley Series in Probability and Statistics, 2008.
- Rosner, B. Fundamentals of Biostatistics. 8th ed. Boston MA: Cengage Learning, 2016.

- Rothman, K.J., Greenland, S., Lash, T.L. Modern Epidemiology, Third Edition, Lippincott Williams & Wilkins, 2012.

Teaching and Learning Activities
Weekly lectures and exercises.

Assessment and Grading Methods
Written exam and assignment.