

Topics and references

**Associate Professor, rank (position) 73,
Discipline of Medical Informatics and Biostatistics**

Medical Informatics and Biostatistics

Lecture topics:

1. Introduction: the object of study of medical informatics; objectives and organization of the course. Applications for professional documentation and communication.
2. Information theory. Medical information. Organized data structures. Data Vs. information. Data files. Databases.
3. Complex data structures: biosignals. Sampling and quantization concepts. Basics of digital signal processing, with examples applied on the ECG. Other biosignals.
4. Classification systems: ICD-10; ATC. Data collected, processed and reported in the Healthcare System in Romania - DRG, SIUI.
5. Medical processes optimization through eHealth solutions. Telemedicine.
6. Medical computer systems (Hospital computer system).
7. Probabilities. The notion of probability. Probability field. Types of events: independent, incompatible, etc. Conditional, unconditional probabilities. Bayes' rule.
8. Data description. Measures of central tendency: average, median, mode. Measures of dispersion: standard deviation, standard error of the mean. Measures of dispersion for ordinal and nominal variables.
9. Statistical tests. Significant, insignificant differences. Zero hypothesis, alternative hypotheses. Significance threshold. Type 1 and 2 errors.
10. Statistical tests: concept, decision, statistical errors. Basic statistical tests: paired and unpaired t tests, ANOVA tests and the Chi-square test.
11. Correlation analysis. Dependent and independent variables. Linear correlation. Correlation coefficient. Least squares method. Regression line.
12. Risk analysis. Risk factors. Contingency tables. Indices: ODD, absolute risk, relative risk. Study methods in epidemiology: cross-sectional studies, cohort studies, case-control studies.
13. Classification analysis. Estimating the quality of classifiers. Sensitivity and specificity. Predictive values, accuracy, classification error rate.
14. Clinical trials: the role of the studies, the types of studies, the principles of designing a clinical trial and the format for gathering information.

Recommended bibliography:

1. Mihalas GI, Lungeanu D: Informatică Medicală și Biostatistică. Timișoara: Ed. Victor Babeș, 2009. Reprint 2011. (eBook pe site-ul UMFT).
2. Vernic CV, Frandes M, Tudor A, Apostol SA, Voicu A, Serban C, Muntean C, Timar B, Lungeanu D. Prelucrarea datelor biomedicale. Aplicatii practice. Editura Eurostampa, ISBN 978-606-32-0574-3, Colectia Derzelas, 2018:1-350.
3. Rosner B. *Fundamentals of Biostatistics* (8th Edition). Boston: Brooks/Cole, Cengage Learning, 2016.
4. Knapp RG, Clinton Miller M: Clinical epidemiology and biostatistics. Williams & Wilkins, Baltimore, 1992
5. Wikipedia: Handbook of Biomedical Informatics (open access).
http://en.wikipedia.org/wiki/Book:Handbook_of_Biomedical_Informatics

Chair of Discipline,
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