# **Biostatistics and methodology - syllabus**

### 3rd Medical Faculty, 2nd year, 1st term

# **LECTURES**

#### 1. Statistical concepts and terms

Historical remarks, statistics in medical sciences Logic of statistical reasoning (observations vs. hypotheses) Important steps in the application of statistics Types of variables Descriptive statistics (location, variability) Probability, distribution Population - sample, sampling techniques Representativity of the sample Point and interval estimation, standard error Confidence interval

#### 2. Statistical inference and testing (continuous variables)

Principles of statistical testing Statistical hypothesis and significance level One-sided and two-sided hypotheses One-sample, two-sample, and paired tests Parametrical and non-parametrical tests Testing hypotheses concerning the mean (t-test, Wilcoxon test) Introduction to multivariate methods, analysis of variance (ANOVA) Interpretation of results of statistical procedures

#### 3. Statistical concepts used in epidemiology (categorical variables)

Contingency and 2-by-2 tables and methods for comparison of proportions Chi-square test, Fisher and McNemar tests, test for trend Basic types of studies used in epidemiology and related statistical models for their evaluation Vital statistics, rates and ratios Odds ratio, relative risk, attributable risk for cross-sectional, cohort, and case-control study Confounding, bias, precision Methods of standardization and stratification, Mantel-Haenszel technique Evaluation of diagnostic and screening tests (sensitivity and specificity, cut-off point)

# 4. Advanced statistical methods

Association between two variables: correlation, regression Advanced statistical methods in epidemiology logistic regression censored data survival analysis Mathematical tools for planning surveys and experiments, sample size determination

# PRACTICALS

- 1. <u>Statistical concepts</u>: types of variables, probability distribution (binomial, Poisson, normal), population and sample, sampling methods, characteristics of location and variability, standard error, histogram, point and interval estimation, confidence interval
- 2. <u>Statistical inference</u>: testing statistical hypotheses, p-value, significance level <u>Statistical tests for continuous variables</u>: t-test and Wilcoxon test (one-sample, two-sample, paired), analysis of variance (ANOVA), F-test
- 3. <u>Statistical tests for categorical variables</u>: contingency table, chi-square test, McNemar test <u>Statistical methods in epidemiology</u>: epidemiological measures of risk and corresponding confidence intervals, interpretation
- 4. <u>Statistical association</u>: correlation, linear regression, multiple regression, logistic regression, test for trend <u>Survival analysis</u>: Kaplan-Meier curve, log-rank test, proportional hazard, Cox regression
- 5. <u>Planning surveys</u>: power of statistical test, sample size determination for categorical and continuous endpoints, randomization in clinical trials
- 6. <u>Practical use of statistics</u>: statistics in published medical papers, discussion on statistical methods