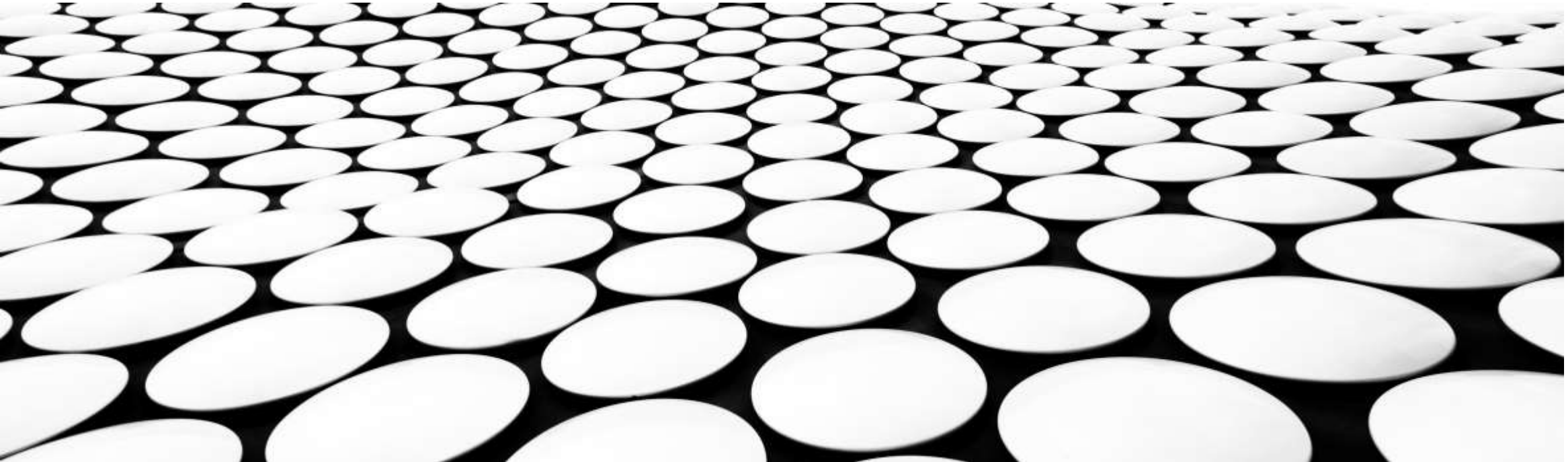

MEDICAL INFORMATICS AND BIOSTATISTICS EXAM TOPICS





DATA&INFORMATION&COMPUTERS

- Information, data, medical information, medical data
 - The architecture of computers
 - Quantifying the information
 - Internet – applications
-
- Examples
 - The hardware architecture of computer
 - The International system of units



FUNDAMENTALS OF STATISTICS

- Variables
- Population and sample
- Sampling methods

- Examples
 - Quantitative variables
 - Representative sample

DESCRIPTIVE STATISTICS

- Summarizing the data with tables
- Graphical representations
- Descriptive statistics parameters

In a sample we found the following parameters: average 100, variance 36, skewness 4,20 and kurtosis = 0,18. Interpret the level of homogeneity. Can we consider the data normal distributed?

- Examples
 - Summarizing two qualitative variables
 - Good practices for graphical representation of the data
 - Measures of the spread
 - Relative risk
 - Advantages and disadvantages of different central measures parameters
 - Problems - Interpretation

PROBABILITIES

- Events
- Classical and axiomatic definition of probability
- Independent and conditioned probabilities
- Examples
 - Operations with events
 - Quantifying the power of a diagnostic test
 - Problems – computing probabilities

Below is a 2x2 contingency table presenting data related to age and owning a cell phone.

Cell Phone?	11	12	Total
Yes	59	50	109
No	6	3	9
Total	65	53	118

Compute the probability to randomly choose from the sample a 12 year person which does not own a cell phone

REPETITIVE EVENTS

- Random variables
- The main probability distributions
- Examples
 - Normal distribution. Characteristics and properties
 - Numerical characteristics for finite random variables
 - Problems – computing probabilities based on probability distribution

We study the weight of the persons in a normal distributed representative sample and we found the average 64 kg and the standard deviation 10 kg. Provide the value (in kilograms) for which aprox. 2,5% of the persons in sample have the weight more than that. Justify your answer.

ESTIMATIONS

- Types of estimation
- Confidence intervals
- Examples
 - The characteristics of point estimation
 - Confidence intervals for means when the sample is large
 - Problems – interpretation

In order to estimate the income of the families in a rural region, a representative sample size 100 was extracted and the average income per family was 3000 lei with a standard deviation of 200 lei. Provide the estimation of the income of the families in that region with 95% of confidence

STATISTICAL TESTS

- Fundamentals
- Examples of statistical tests
- Example
 - The null and the alternative hypothesis for statistical tests
 - Tests if there are differences between two sets of quantitative data
 - Testing the existence of an association between two qualitative variables
 - Problems – Formulating hypotheses, choosing the right statistical test, interpretation

We study the effect of one substance – statins – for reducing the level of cholesterol for a sample of 25 persons. We compare the level of cholesterol before and after the administration of the drug. Data were normal distributed. On the statistical test, the result was $p=0,04$. Identify the name of the statistical test, formulate the null and the alternative hypothesis and interpret the p value.

CORRELATION AND REGRESSION

- Correlation of normal distributed variables
- Correlation of not normal distributed variables
- Linear regression
- Problems – Interpreting coefficients

We study the relationship between the total cholesterol and the value of diastolic blood pressure. Both variables are normal distributed. In a sample size 143, we compute the Pearson's coefficient of correlation and we obtain the result $r=0,75$. On statistical test, $p=0,03$. Interpret the results

EXAM

- **13 February – 8:30**
- **90 minutes, 35 MCQ**

EXAM

- **Pen/marker, calculator**
- **Any handwritten documentation**

NO!



Universitatea de Medicină și Farmacie "Iuliu Hațieganu" Cluj-Napoca

Catedra de Informatică Medicală

Facultate, an, grupă: _____

Numele: _____

Prenumele: _____

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NOTARE

- Final grade= 30% practical part + 70% theoretical part
- Conditions to pass:
 - Grade for practical part ≥ 5
 - Grade for theoretical part ≥ 5

GRADING

- 1. question with one correct answer:
 - 5 concordances = 1
 - Less than 5 conc. = 0
- 2. question with 2 correct answers:
 - 5 concordances = 1
 - 4 concordances = 0.8
 - Less than 4 conc. = 0
- 3. question with 3 or 4 correct answers:
 - 5 concordances = 1
 - 4 concordances = 0.8
 - 3 concordances = 0.3
 - Less than 3 concordances = 0

CHALLENGING THE OBTAINED SCORE

- Challenging the obtained score is done as follows:
 - Message in Microsoft Teams to the responsible for the course
 - You may ask:
 - Correcting wrong questions – these should be clearly highlighted
 - Don't ask for re-scan the answer sheet, in time we had no errors!

RECOMMENDED BIBLIOGRAPHY

- Lectures presentations
- On-line exercises
- ...



Courses

Course 02: Fundamental concepts

Course 03 - Introduction to Medical Statistics

Course 04: Descriptive statistics I

Course 05: Descriptive statistics II

Course 06: Probabilities

Course 07: Random variables & Probability distributions