Doctoral School: **Biology Doctoral School**
Doctoral Program: Neuroscience and Human Biology

Subject code: **BIO/7/27**
Subject title: **Data management and modelling in human biology PR**
Teacher and Neptun code: **Dr. Zsákai Annamária (D5223E)**
Credits: 4
Class hours: 2 hours/week, practical

Aim of the course
The aim of the practice is to present the data management methodology of studies carried out on human populations (sampling, descriptive statistics, hypothesis testing, modeling). Students will also learn to apply the presented methods in practice on the data of the sample populations provided in the framework of the lesson.
Course contents
1. Statistics on growth standards. Sampling for normality, distance and velocity standards, growth standards (population, sampling design, representativeness and sample size). Creation of growth standards in SPSS, Excel, description of the prepared standards.
2. Human biological hypothesis tests. Statistical decisions, hypotheses, significance, two-sided and one-sided tests, transformation of non-normally distributed variables. Formulation and testing of hypotheses in SPSS on the provided sample population data.
3. Homogeneity tests and comparisons of typical values of groups I. Chi-square test; tests based on normal distribution (F-test, Student's t-test, D-test, analysis of variance). Homogeneity test and typical value estimation on selected variables on issued sample populations.
4. Homogeneity studies and comparisons of typical values of groups II. Non-parametric tests (sign test, Man-Whitney U-test, Kruskal-Wallis H-test, randomness test, Spearman rank correlation). Description of non-parametric tests on the selected variables on the issued sample populations.
5. Correlation and regression in human biological studies. Correlation metrics, estimation error, correlation coefficient, multiple correlation, indexing. Correlation calculation on selected variables in the sample population.
6. The practice of regression calculation in human biology. Regression equations, regression planes, multiple correlation coefficient, partial correlation. Regression calculation with selected variables in the sample population.
7. Statistics of longitudinal studies. Longitudinal data evaluation methods, curve fitting, LMS method. Curve fitting to the provided longitudinal data sets by LMS method.
8. Modeling of human growth I. Aims of mathematical modeling, types of models, mathematical models giving a quantitative description of human growth, modeling of growth processes characterizing different pre- and postnatal age periods, modeling of transitions between growth periods.
9. Modeling human growth II. Parametric models (Count model, Gompertz model, Bock triple-logistic model, Berkey – Reed model, Jenss – Bayley model, Preece-Baines model).
10. Modeling human growth III. Non-parametric models (Largo and Gasser curve-dependent model), the "switch-off" model of growth.
11. Modeling human growth IV. Qualitative models of human growth, biological models of growth, Tanner's regulatory model, disaster theory model for modeling human growth. Testing the methods used to model growth data sets.
12. Data management software in human biological studies. Spreadsheet software, use of Excel, database management software, data table, database structure, database creation.
13. Statistical analysis programs in human biological studies. Descriptive statistical analyzes in Excel, SPSS. Descriptive statistical analysis of selected variables in the provided sample population.
14. Hypothesis tests in Excel, SPSS. Probes based on normal and non-normal distributions in SPSS, correlation and regression calculations in SPSS.
Requirements
   2 written mid-terms, 1 essay on the human biological characterization of the provided sample population
   Course grade is the average of the grades obtained for the above tasks.

Literature

Bogin, B. (1991) Patterns of human growth. Cambridge University Press, Cambridge.

Bodzsár, É. (2003) Humánbiológia: Fejlődés, növekedés, érés. Egyetemi tankönyv. 2. kiadás.

Bodzsár, É., Zsákai, A. (2003) Humánbiológia. Gyakorlati kézikönyv. Egyetemi tankönyv. Eötvös Kiadó, Budapest. pp. 300.

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