BIOSTATISTICS

Division of Biomathematics

Subject: **BIOSTATISTICS**
Year, Semester: 1st year/2nd semester
Number of teaching hours:
Lecture: **14**

4th week:
Lecture: 1. Set theory, Venn diagrams. Probability, conditional probability. Independent events. Descriptive statistics (measures of central tendency and spread; percentiles, quartiles). Histograms, box and whisker plot.

5th week:
Lecture: 2. Discrete random variables. Characterization and graphical representation of discrete distributions (probability distribution and cumulative distribution function). Binomial and Poisson-distribution.

6th week:
Lecture: 3. Continuous random variables; probability density function. Normal and standard normal distribution. Sampling. Biased and unbiased estimation. Central limit theorem. Standard error of the mean.

7th week:
Lecture: 4. Basics of hypothesis testing: null and alternative hypothesis, level of significance, one and two-tailed tests. Type I and type II error. z-test and one sample t-test.

8th week:
Lecture: 5. Statistical tests: paired t-test, F-test, unpaired t-test.

9th week:
Lecture: 6. Clinical implications of conditional probability, screening tests (specificity, sensitivity, positive- and negative predictive value). ROC curve. Epidemiologic investigations: odds ratio and relative risk. Kaplan-Meier curve.

12th week:
Lecture: 7. Biostatistics grade offering test.

Requirements

1. The aim of the course:

The aim of the subject is to give an introduction to biostatistical methods, which can be used in different branches of medicine to solve biostatistical problems and to evaluate experimental results. In addition, providing a solid theoretical foundation the course will also introduce the students to the art and science of performing the simplest calculations.

2. Short description of the subject:

Set theory, probability, conditional probability. Descriptive statistics (determination of mean, median, mode, standard deviation from data set; construction of histograms, box and whisker plot). Discrete and continuous random variables; cumulative distribution function and density function. Binomial, Poisson, normal, and standard normal distribution. Sampling techniques and characterization of samples, biased and unbiased estimate, the central limit theorem. Hypothesis testing (z, t, and F tests). Screening tests and epidemiologic investigations in medicine.

3. Type of the exam:

Colloquium (written).

4. Requirements for the Biostatistics course

4.1. Lectures:

Attendance to classes is mandatory. Students must not miss more than two classes. No certificates, including a medical certificate, are accepted for the absences. Making up for missed classes is not possible.

4.2. Requirements for signing the lecture book

Signing of the lecture book is denied if there are more than two absences from groupwise classes.

4.3. Grade-offering course test and final exam:

Students will write a grade-offering course test on week 12. Writing the grade-offering course test is not compulsory but strongly recommended. The grade-offering test does not count as an A chance exam. Writing the grade-offering test is only possible at the appointed time and there will not be any alternative appointment for writing it. The structure of this test will be identical to that of the final exam. A grade of pass (2) or better achieved on the grade-offering test is valid for the final exam.

Students must take a written exam. Exams will be held once per two weeks during the exam period. The exam is written.

Structure and evaluation of the grade-offering test and the final exam:

The structure of the final exam: theoretical questions (true or false questions, multiple choice questions, fill-in questions etc.), graphs and calculations. A maximum 100 points can be obtained in the test. Based on the final score (FS) of the exam the following grades are offered:

FS<55   fail (1)
55≤FS<65   pass (2)
65≤FS<75   satisfactory (3)
75≤FS<85   good (4)
85>=FS   excellent (5)

Evaluation of the grade-offering test and the final exam is identical.
A grade of 2 (pass) or better achieved on the grade-offering test is valid for the final exam.

4.4. Rules for C chance exams:

Evaluation of C-chance exams is performed according to the following table:

	Outcome of the exam
Result of the test is a pass ($\geq$ 55p)	exam grade is according to the result of the test (see section 4.3)
Result of the test is a fail, but at least 40% ($\geq$40 p)	oral exam
Result of the test is less than 40% (<40 p)	final exam grade: FAIL

5. Compulsory reading material:
Educational material published on the eLearning platform of the course can be downloaded as pdf format (elearning.med.unideb.hu – Department of Biophysics and Cell Biology/English Courses/2nd semester/Biostatistics (MB_E)

6. Recommended reading material:
- Wayne W. Daniel: Biostatistics, A foundation for Analysis in the Health Sciences, John Wiley&Sons
- Practice problems in biostatistics (editors: Zoltán Varga and Tibor G. Szántó). University of Debrecen, Department of Biophysics and Cell Biology, Division of Biomathematics, 2022, ISBN 978-963-490-459-5.

7. Exemptions:
Applications for exemption from the biostatistics course must be turned in to the Credit Transfer Committee. Such requests cannot be directly turned in to the Biomathematics Division or the Department of Biophysics and Cell Biology.

8. Information for repeaters:
For repeaters the attendance on lectures is not compulsory. Students repeating the course are subject to the same rules and requirements as those taking the course for the first time.

9. Rules for calculators:
Rules for calculator usage during course tests and the final examination. To ensure a fair evaluation, to avoid disturbances in the testing room, and to protect the security of the test material the following types of calculators are NOT permitted:
- calculators with built-in computer algebra systems (capable of simplifying algebraic expressions)
- pocket organizers, handheld or laptop computers
- any device capable of storing text. Calculators with a typewriter keypad (so-called QWERTY devices), electronic writing pads and pen-input devices are not allowed either. Calculators with letters on the keys (e.g., for entering hexadecimal numbers or variable names) are permitted if the keys are not arranged in QWERTY format.
- calculators or other devices capable of communicating with other devices
- calculators built into wireless phones
- calculators with paper tape or models that make noise

In general, students may use any four-function, scientific or graphing calculator except as specified above. Sharing calculators during tests is not allowed, and the test proctor will not provide a calculator.