Name of the module: Intoduction to Biostatistics

Number of module - (47181079)

BGU Credits: 2.5

ECTS credits:

Academic year: 1-st year

Semester: Fall semester

Hours of instruction:

TBA (Lectures)

Lectures 26 hours

TBA(practice)

Practice 13 hours

Location of instruction:

Specific building and classroom numbers are indicated in the schedule.

Language of instruction: Hebrew

Cycle: MD(B.Med.Sci.)

Position: Obligatory module intended for 1-st year MD students

Field of Education: Biostatistics .

Responsible department: Department of Public Health, Faculty of Health Sciences Ben Gurion University of the Negev.

General prerequisites:

none

Grading scale: Successful passing of the MCQ exam (score 65 or higher)

Course Description

1.The course includes descriptive statistics: methods of quantitative and graphical representation of empiric data;
2. Introduction to Probability Theory: definition of probability, its meaning, main rules and formulas, definition and meaning of random variable(discrete and continuous).
3. Estimation: Principles, methods and properties of point and interval estimation.
4. Test of hypotheses: Hypotheses and tests. Types of tests (One-sided and two-sided tests).Level of significance. P-value. Type of errors (Type I error, Type II error).
5. Statistical association between two variables: Correlation and linear regression.

Aims of the module: The course will provide students with knowledge in descriptive statistics and probability theory as well as knowledge in statistical inference, in particular with statistical estimation methods, hypothesis testing and statistical associations.

Objectives of the module:
to enable students to obtain basic principals in biostatistics: descriptive statistics and statistical inference.

Learning outcomes of the module: On successful completion of the course, the student should be able to:

Biostatistics:

1. Know type of variables and recognize given variables by types
2. Know how to represent different types of variables by the tables and by graphs.
3. Know how to represent different types of variables by graphs(Pie, bar diagram histograms, boxplots) .
4. Know the term "probability" and it' properties.
5. Get familiar with terms 'conditional probability", Independent random event" and know to solve problem related to this terms using
6. Get familiar with general definition random variable.
7. Get familiar with normal and know to solve related problems.
8. Get familiar with terms Point and Interval Estimation, estimate and estimator.
9. Know to perform interval estimation by confidence interval for different type of the variables and in different situation (known variance, unknown variance).
10. Know to calculate sample size based on confidence interval.
11. Get familiar with terms hypothesis, P-value, errors in hypothesis testing, power.
12. Know to test hypothesis for one sample.
13. Know to calculate P-value, to recognize errors to calculate sample size.
14. Know to test hypothesis for two samples(independent and dependent)
15. Know to compare nominal variables (Chi^2-tests, Exact Fisher test, McNemar test).
16. Get familiar with principle of regression and correlation.
17. Know to calculate correlation coefficients and regression coefficients.

Attendance regulation: Attendance in the oral lectures is not mandatory. Participation in exercises is mandatory.

Teaching arrangement and method of instruction: Instruction in the module is based on frontal oral lectures and practice.

Lecturer: Prof. Michael Friger
Contact details:
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Module evaluation: at the end of the semester the students will evaluate the module, in order to draw conclusions, and for the university's internal needs

Confirmation: 2013 (academic year)
Last update: 09/2015

Assessment:
Students will be assessed in the module by passing an exam with a score of 65 or higher. The final exam will be **100%** of the final mark.

Work and assignments: The class will be divided into practicing groups. Each exercise session student will get home exercises that he must submit to instructor at next exercise session.
In order to get access to final exam student must submit at least 80% of home tasks

Time required for individual work: 2 hours weekly.

Module Content

Introduction to biostatistics

1.	Introduction. *Descriptive statistics*. Main definitions. Population and sample. Types of sampling. Variables classification.	1.(5-13);2 (15-16)
2.	Numerical and graphical methods for describing variables and data: statistical tables, frequencies, frequencies types, graphical representation (Pie diagram, Bar diagram, Histogram, Polygon).	1.(17-47); 2.(16-25)
3.	Measures of central tendency: Mode, Median, Mean.	1.(47-68); 2.(25-30)
4.	Measures of dispersion (variation): Range, Quintile range, Variance, Standard Deviation. Box-plot	1.(83-90;98-110);2(31-39)
5.	*Introduction to Probability Theory*. Basic terms of theory of probability. Random experiment, sample space, events, events operations, complementary events. Definition of probability of event for symmetric sample space. Basic formulas for calculation probabilities of events. Conditional probability, Bayes' rule. Independent events. Random variables. Discrete and continuous random variables.	1.(193-236;239-248); 2.(83-87; 96-110; 113-123)
6.	Normal distribution. Main properties of normal distribution.	1.(143-154;251-253); 2.(139-146)
7.	*Statistical inference*. Introduction. What is statistical inference? Estimation. Point estimation. Sampling distribution. The sampling distribution of means. Central limit theorem.	1.(265-292); 2.(146-148; 182-184)
8.	Interval estimation. Idea of interval estimation. Estimation by confidence interval. Confidence interval for mean for known variance. Meaning of confidence interval. Properties of confidence interval. Confidence interval for proportion. Confidence interval for mean for unknown variance. T-distribution. Calculation sample size for given confidence interval	1.(283-291; 323-332; 341-349) 2.(182-184;191-196)
9.	Testing hypotheses. General problem of statistical tests of hypotheses. Hypotheses and tests . Types of tests(One-sided and two-sided tests).Level of significance. Rejection region. P-value. Type of errors(Type I error, Type II error), power of test. One sample test of mean for known variance. Calculation of errors and power. Calculation sample size.	1. (295-321) 2.(180-190)
10.	One sample test of proportion. Calculation of errors and power. Calculation sample size. One sample test of mean for unknown variance. Calculation of P-value.	1.(332-341; 349-359) 2. (192-194;196-201)
11.	Comparison of two samples. Testing hypotheses about difference between two populations means for independent samples (known variances, unknown but equal variances, unknown and unequal variances). Testing hypotheses about difference between two populations means for dependent samples.	1.(369-387;401-409);2. (207-217)
12.	*Comparison of nominal variables.* Non parametric tests. Analysis of frequencies tables. $\chi 2$ – test for independence. Fisher exact test, McNenar test.	1.(360-362); 2.(238-240)
13.	*Statistical association between two variables*. Correlation coefficient. Linear regression. Percent of explained variance.	1.(163-192); 2.(59-82)

Required reading: Students are expected to read the lectures as presented as ppt or PDF presentations.

Additional literature:

. 1996-øåðéú àéæðáê, ñèèéñèé÷ä ì"ìà ñèèéñèé÷àéí", çì÷ à', "à÷ãîåï",1988.1
.1996-ùåìä éùøàìéú, ñèèéñèé÷ä äìëä ìîòùä, "ìåâé÷", 1993 .2

*All learning material will be available to the students on the module's website (high-learn)/ library/ electronic documents available to BGU students