2015-2016

Global Health Leadership and Administration Program
286.4706 – Biostatistics & SPSS
Spring Semester

Time: Mondays 12:15-13:45

Room: Main Bldg., Class 565 (Computer Lab)

Instructor: Ruchama Elad-Yarum

Office Hours: By appointment

Course Type: Lecture & Tutorial

Course Level: MA

Pre-Requisites: No prior knowledge is required.

Course Overview: The course focuses on acquiring basic knowledge of how to conduct empirical research and use basic statistical methods for analyzing data and making statistical conclusions, with the emphasis on medical research. The course will include computer exercises performed in the computer classroom. In these tutorials, use of SPSS software will be demonstrated, and students will practice using the software by statistical processing of data files.

Topics:

1. **Descriptive Statistics**:
    1.1. Variable classification, scales of measurement
    1.2. Contingency tables
    1.3. Measures of central location (mean, median, mode)
    1.4. Measures of dispersion (range, interquartile range, sample variance, sample standard deviation)
    1.5. Percentiles, standard scores
    1.6. Histogram, box-plot

2. **Statistical Inference**

2.1. Population and sample, parameter and sample statistic

2.2. Normal distribution

2.3. Binomial distribution

2.4. Poisson distribution

2.5. Introduction to inference, sampling distribution of the mean, central limit theorem

2.6. Estimating the mean of a distribution (one sample, known variance) – point estimation and confidence interval estimation, hypothesis testing, the p-value concept, the relationship between hypothesis testing and confidence intervals

2.7. Estimating the mean of a distribution (one sample, unknown variance) – *t* distribution, point estimation and confidence interval estimation of the mean, hypothesis testing

2.8. Paired *t* test, confidence interval estimation for the comparison of means from two paired samples

2.9. Two-sample *t* test for independent samples, confidence interval estimation for the comparison of means from two independent samples

2.10. Chi-square test for independence of two categorical variables

2.11. Pearson coefficient, linear regression

At the end of the course, students will be able to: **[Learning Outcomes]**

1. Understand the concept of a research design and the limitations of inferences based on it

2. Recognize types of data and scales of measurement and identify statistical methods relevant to their description (descriptive statistics)

3. Conduct a number of statistical tests using a parametric approach (statistical inference)

4. Read results published in the media and professional journals with critical understanding

5. Execute the above using SPSS software.

Requirements & Grading:

- There will **assigned reading material** for each topic. Students should be prepared to discuss the material in class.

- **Submission of tutorial exercises** – required, 25% of the final mark
  Oral presentation in class & submission of a written paper – required, 25% of the final mark

  Students will be assigned a research paper from a medical research journal. During the last two weeks of the semester, students will present the paper's research question, the statistical method used in the paper and the results (15-20 minutes). The purpose of this presentation is for students to share the results of a selected research paper with other class participants, and to practice formally presenting statistical findings.

  Students will present the research project both orally and as a written paper.

- **Final examination** – 50% of the final mark

Website: Moodle

Reading List:

1. Fundamentals of Biostatistics. (2006). B. Rosner.
2. Statistical Research Methods in the Life Sciences. (1998). P.V. Rao.
3. Principles of Biostatistics. (1993). M. Pagano and K. Gauvreau.

* subject to changes