EPIDEMIOLOGY AND BIOSTATISTICS (ML0127)

1. language

English

2. course contents

Coordinator: **Prof. ssa Stefania Boccia**
Year Course: 3
Semester: 1
UFC: 4
Modules and lecturers:
- BIOSTATISTICS (ML0128) - 1.6 cfu - ssd MED/01
Prof. Roberta Pastorino
- BIOSTATISTICS PRACTICALS (ML0016) - 0.4 cfu - ssd MED/01
Prof. Roberta Pastorino
- EPIDEMIOLOGY (ML0129) - 1.9 cfu - ssd MED/42
Prof. Stefania Boccia
- EPIDEMIOLOGY PRACTICALS (ML0130) - 0.1 cfu - ssd MED/42
Prof. Stefania Boccia

3. BIBLIOGRAPHY

Concerning Epidemiology, the students can consult one of these two texts:
Fletcher RH, Fletcher SW, Fletcher GS. Clinical Epidemiology: The Essentials. LWW; 2012. Chapters (2-5)
Rothman KJ. Epidemiology: An Introduction. Oxford University Press; 2012. Chapter (4-5-9-10)

Concerning Biostatistics, the student can consult:
Gauvreau K, Pagano M. Principles of Biostatistics. Duxbury Pr; 2011. Chapters (9-21)

Moreover, teachers will provide lecture notes.

4. LEARNING OBJECTIVES

Knowledge and understanding (Dublino 1)
At the end of the course, the student has to demonstrate:
  o to know the terminology and definitions of epidemiology (including disease (outcome) measures, measures of association, study design options, bias, confounding, and effect modification);
  o to understand the interface between biostatistics and epidemiology;

- o   to recognize the importance of data collection and its role in determining scope of inference;
- o   to demonstrate a solid understanding of interval estimation and hypothesis testing;
- o   to demonstrate an understanding of multivariable analysis for clinical research.

Applying knowledge and understanding (Dublino 2)

At the end of the course, the student has to demonstrate:

- o   to apply the terminology and definitions of epidemiology (including disease (outcome) measures, measures of association, study design options, bias, confounding, and effect modification);
- o   to calculate the appropriate epidemiologic measures for most typical designs;
- o   to choose and apply appropriate statistical methods for analyzing one or two variables;
- o   to use technology to calculate the appropriate epidemiologic measures for most typical designs;
- o   to use technology to perform descriptive and inferential data analysis for one or two variables.

Making judgements (Dublino 3)

At the end of the course, the student has to demonstrate:

- o   to interpret descriptive epidemiologic and statistical results in order to develop hypotheses about possible risk factors for a disease.

Communication skills (Dublino 4)

At the end of the course, the student has to demonstrate:

- o   to communicate epidemiological and statistical results correctly, effectively, and in context.

Learning skills (Dublino 5)

The student, based on the elements acquired, has to be able to expand his/her knowledge and update themselves by drawing on independently to texts and scientific articles.

5. prerequisites

None

6. TEACHING METHODS

The course is organized with a series of lectures that will be flanked by exercitations (with software packages for epidemiologic and biostatistical data analysis), giving the opportunity to the students to acquire both calculus and interpretative skills. In detail, concerning the different Dublino points:

Knowledge and understanding (Dublino 1):

During the lectures, the teachers will illustrate the main topics of Epidemiology and Biostatistics. The student is pushed to develop and improve their own skills of observation of the different types of studies and comparison of measures/ methods.

Applying knowledge and understanding (Dublino 2):

During the lessons, students are invited to an active participation, stimulating their ability to analyze the different types of epidemiological studies, to apply the different statistical methods and soliciting questions and discussion.

Making judgements (Dublino 3):

During the practices, the students are encouraged to analyse/ interpret the different scientific problems and to solve them using the epidemiological and biostatistical abilities acquired.

Communication skills (Dublino 4):

Students are invited to ask questions and give answers both during lectures and practices. If the language does not appear correct from the point of view of the terminology, the teacher explains the correct way to express the concept in order to develop in the student an appropriate technical / scientific language.

Learning skills (Dublino 5):
The lessons are explanatory of the main topics of the epidemiology and biostatistics. However, students are encouraged to deepen these contents using textbooks, e-learning, or other subsidies and invited to propose doubts and / or questions at the end of the lesson or requesting a personal appointment with the teachers.

7. OTHER INFORMATIONS

Teachers are available for individual interviews with the students, to be scheduled outside of class hours, aimed at clarifying problematic aspects related to the study of the theoretical program or of the exercises.

8. METHODS FOR VERIFYING LEARNING AND FOR EVALUATION

The final exam will take place at the end of the course during the Ordinary session, with questions of biostatistics and epidemiology. The vote will be expressed in thirtieths. The student will pass the exam if he/she gets at least 18. The maximum score will be awarded if all the test items will be correct. In detail, students will be challenged with test items that address issues that require: a) the knowledge of how to measure health phenomena, the study design principles, the statistical methods (Dublino 1); the application of the previous topics (Dublino 2); c) the comprehension of the aim and of the requisites for testing hypothesis in health (Dublino 3 and 5); d) the use of a correct terminology (Dublino 4).

The active participation of the student into the class activity will be incorporated in the final grade.

9. program

Epidemiology:
Introduction to epidemiology (Definition and scope of epidemiology, Epidemiology and public health);
Measures of occurrence (Main concepts: proportion and ratio, Prevalence and Incidence);
Measures of association (Absolute measures, Relative measures, Attributable and impact measures);
Causation and principles of study design: Case-control studies (aims, design and conduction, limits and strengths), Cohort studies (aims, design and conduction, limits and strengths);

Biostatistics:
Differences between descriptive and inferential statistics.
Definition and classification of variables

Measures of central tendency and variability

Graphs: pie and bar charts, histograms, box plots

Tables: one-way, two-ways and n-ways tables

Distribution and confidence intervals

Statistical tests: Classification and choice of statistical tests;
Parametric tests: t-student, ANOVA;
Non-parametric tests: Mann-Whitney and Kruskal-Wallis tests, Chi square test;
Introduction to multivariable analysis: Aim and concepts;
 Choosing the multivariable approach: Linear, logistic and survival analyses (aims and characteristics);