Course guide
200650 - EPIGEN - Genetic Epidemiology

Unit in charge: School of Mathematics and Statistics
Teaching unit: 1004 - UB - (ENG)Universitat de Barcelona.
Degree: MASTER'S DEGREE IN STATISTICS AND OPERATIONS RESEARCH (Syllabus 2013). (Optional subject).
Academic year: 2022  ECTS Credits: 5.0  Languages: English

LECTURER
Coordinating lecturer: JOSEP LLUIS CARRASCO JORDAN
Others: Primer quadrimestre:
JOSEP LLUIS CARRASCO JORDAN - A
GUILLEM CLOT RAZQUIN - A
CRISTINA LOPERA GONZALEZ - A

PRIOR SKILLS
Knowledge of basic statistical inference and generalized linear regression models.
Basic knowledge of the use of the R analysis program.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
MESIO-CE1. CE-1. Ability to design and manage the collection of information and coding, handling, storing and processing it.
MESIO-CE2. CE-2. Ability to master the proper terminology in a field that is necessary to apply statistical or operations research models and methods to solve real problems.
MESIO-CE3. CE-3. Ability to formulate, analyze and validate models applicable to practical problems. Ability to select the method and / or statistical or operations research technique more appropriate to apply this model to the situation or problem.
MESIO-CE4. CE-4. Ability to use different inference procedures to answer questions, identifying the properties of different estimation methods and their advantages and disadvantages, tailored to a specific situation and a specific context.
MESIO-CE5. CE-5. Ability to formulate and solve real problems of decision-making in different application areas being able to choose the statistical method and the optimization algorithm more suitable in every occasion.

Translate to english
MESIO-CE6. CE-6. Ability to use appropriate software to perform the necessary calculations in solving a problem.

Transversal:
CT3. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

CT4. EFFECTIVE USE OF INFORMATION RESOURCES: Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.

CT5. FOREIGN LANGUAGE: Achieving a level of spoken and written proficiency in a foreign language, preferably English, that meets the needs of the profession and the labour market.
TEACHING METHODOLOGY

There will be sessions where the main concepts of each topic will be explained, which will be illustrated with examples of real data. Additionally, the student will have material with which he will be able to complement the concepts treated in the theoretical classes.

LEARNING OBJECTIVES OF THE SUBJECT

- Knowledge of the type of inheritance, susceptibility and linkage disequilibrium to be able to choose the most appropriate analyzes to develop epidemiological studies.
- Knowledge of statistical analysis techniques to investigate the relationships between genes and diseases.
- Knowledge of statistical analysis techniques to calculate the influence of the environment and the gene-gene association.
- Treatment of data with appropriate structure to be used depending on the type of study. Elaboration of genealogical trees.
- Knowledge of statistical methods of analysis of genetic data.
- Use of the necessary software to carry out the appropriate statistical analyzes

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours large group</td>
<td>30,0</td>
<td>24.00</td>
</tr>
<tr>
<td>Self study</td>
<td>80,0</td>
<td>64.00</td>
</tr>
<tr>
<td>Hours small group</td>
<td>15,0</td>
<td>12.00</td>
</tr>
</tbody>
</table>

Total learning time: 125 h

CONTENTS

1. Introduction to genetic epidemiology

Description:

Full-or-part-time: 30h
Theory classes: 7h 12m
Practical classes: 3h 36m
Self study: 19h 12m

2. Classic studies

Description:

Full-or-part-time: 30h
Theory classes: 7h 12m
Practical classes: 3h 36m
Self study: 19h 12m
3. Genetic association studies

**Description:**
Association in family designs. Association in unrelated subject designs. Association with haplotypes or multiple markers. Environment and interactions.

**Full-or-part-time:** 30h
- Theory classes: 7h 12m
- Practical classes: 3h 36m
- Self study: 19h 12m

4. Genome-wide association studies (GWAS)

**Description:**

**Full-or-part-time:** 35h
- Theory classes: 8h 24m
- Practical classes: 4h 12m
- Self study: 22h 24m

**GRADING SYSTEM**

Continuous assessment
At the end of each of the blocks that make up the subject, an in-person test will be carried out in which theoretical questions must be answered and data analysed. The tests will be scored between 0 and 10, and the average of these scores will be the mark of the continuous evaluation of the subject (NC). If the student makes less than 75% of the NC tests, the qualification of the subject will be that of not presented.

If students want to modify the NC qualification, an optional test will be scheduled at the end of the course that will include the entire syllabus. The test may contain theory questions and data analysis. Only students who are considered presented in the continuous evaluation may take this optional test. The qualification of this test (NR) will be from 0 to 10.

The final grade of the course will be:
- NC for students who have only done continuous assessment.
- NR for students who take the additional test at the end of the course.

Single evaluation
Those students who want to benefit from the single assessment will have to notify the course coordinator during the first 15 school days of the course.

The single evaluation will consist of a synthesis test that will include the entire syllabus of the subject. The synthesis test will receive a score between 0 and 10 and will correspond to the final grade for the subject. The course will be considered approved if the final grade is higher than 5.
BIBLIOGRAPHY

Basic: