Universidad de Alcalá

COURSE SYLLABUS

Epidemiology

Degree in Health Biology
Universidad de Alcalá

Academic year 2026/2027
2nd Year– 2nd Semester

Aprobada en Junta de Facultad 13/05/2026

COURSE SYLLABUS

Name:	**EPIDEMIOLOGY**
Code:	**651004**
Degree:	**DEGREE IN HEALTH BIOLOGY**
Department and knowledge area:	**SURGERY, MEDICAL AND SOCIAL SCIENCES (DEPARTMENT). PREVENTIVE MEDICINE AND PUBLIC HEALTH (AREA)**
Type:	**OBLIGATORY**
ECTS credits:	**6**
Year and semester:	**2nd year, 2nd semester**
Lecturers/Professors:	**Julia Díez**
Tutorial schedule:	**Previous appointment**
Language:	**English**

1. COUSE DESCRIPTION

Epidemiology can be defined as the science that studies the frequency and distribution of health problems in the population, as well as its determinants. Epidemiology, unlike clinical medicine, studies the population as a whole and not only the health status of specific individuals. The quantitative nature of epidemiology is also evident, and it is represented in both a descriptive and analytical nature.

Epidemiology is the fundamental discipline of public health, since it offers the scientific foundations on which prevention and health promotion strategies are based, both fundamental characteristics of public health. Therefore, its coordination with the other subjects in this degree (e.g. public health) is essential.

One of the fundamental competences of the graduates in Health Biology is to produce and evaluate information related to health and the environment. Epidemiology constitutes, precisely, the fundamental methodological link between both health and the environment. Epidemiology methodology will allow students to become familiar with the methods for measuring community health problems, as well as with the main epidemiological study designs that they will use to obtain and analyze information. In addition, knowledge of epidemiological methodology will make students acquire a critical attitude that allows them to assess the scientific foundations of the information that they will face in the future.

Prerequisites and recommendations

Basic knowledge of statistics.

2. COMPETENCIES

General competencies:

1. Comprehensive reading ability, analysis, and synthesis of epidemiological studies.
2. Development of skills to search for information, selection of documentation in databases and academic search engines related to Epidemiology.

3. Initiation in the capacity of argumentation with the support of the textbooks and other references provided in the subject.
4. Ability to communicate ideas and express oneself correctly orally and in writing.
5. Strengthen the ability of autonomous learning and teamwork.

Specific learning outcomes:

1. Theoretical or conceptual knowledge

- Concept of epidemiology and its applications to health
- Describe population-level demographic characteristics
- Main epidemiological designs, both observational and experimental
- Main measures in epidemiology
- Validity and precision in epidemiological studies, with emphasis on the different types of biases
- Difference between statistical significance and public health significance
- Causality in epidemiological studies

2. Practical or procedural knowledge

- Calculate, analyze, and interpret demographic indicators and measures.
- Calculate, analyze, and interpret measures of frequency, association, and impact
- Discuss and critically analyze the characteristics of epidemiological studies
- Simple analysis and interpretation of the results of an epidemiological study in terms of the magnitude of the association, statistical significance, and precision.
- Discuss possible biases (e.g., selection, information) in an epidemiological study.
- Calculate, analyze, and interpreting diagnostic test accuracy

3. Contextualized and reflective knowledge

- Analyze the applications of epidemiology in public health practice and biomedical research.
- Describe the demographic characteristics of human populations, calculating and interpreting both demographic and health and disease indicators and measures.
- Identify the main epidemiological and clinical research designs, analyze, and interpret the results.
- Apply epidemiological methods to assess the quality of tests.
- Critically analyze original articles and assess the applicability of the results to health practice.
- Apply research results to decision making.

3. COURSE CONTENT

The subject is distributed approximately 50% between theoretical and practical contents. The theoretical contents are taught as indicated below. Also, students learn the basic principles of epidemiology to apply them to understand more complex studies. It is intended that students acquire a critical attitude allowing them to assess the scientific soundness of the information to which they will be exposed in the future. The acquisition of the appropriate knowledge and skills in epidemiological methods will allow them to practice this critical appraisal systematically. To achieve this, theoretical sessions will be followed by related practical sessions.

Seminars will be dedicated to the preparation of an epidemiological research project in small groups.

Practical sessions are held once the essential concepts have been introduced in theoretical sessions. Theory consists of sessions devoted to basic principles of epidemiology, followed by topics on epidemiological methods, applications of epidemiology in public health practice, and critical reading of scientific articles. Practical sessions consist of the application of theoretical knowledge to the resolution of cases. Therefore, students will solve cases in the field of epidemiology, clinical medicine, or public health, and finally critically review scientific articles.

Blocks of contents

MODULE I

1. Course introduction.
2. Introduction and history of epidemiology
3. Demographics and health

MODULE II

4. Measures of disease frequency
5. Relative measures of association
6. Absolute measures of association
7. Measures of potential impact

MODULE III

8. Cross-sectional & Ecological studies
9. Case-control studies
10. Cohort studies
11. Experimental studies

MODULE IV

12. Selection and information bias
13. Diagnostic test metrics
14. Confounding and effect modification
15. Causation

MODULE V

16. Outbreak investigation
17. Epidemiology of infectious diseases
18. Chronic disease epidemiology
19. Strategies of prevention
20. Screening
21. Epidemiology of tobacco control
22. Nutritional epidemiology
23. Spatial epidemiology
24. Social epidemiology

Practical sessions

- **Lab 1**. Measures of disease frequency – prevalence, incidence, mortality
- **Lab 2**. Measures of association and measures of potential impact.
- **Lab 3.** Epidemiological studies: cross-sectional and ecological studies
- **Lab 4.** Epidemiological studies: case-control and cohort studies

- **Lab 5**. Validity and bias – selection, information bias, and confounding. Diagnostic test metrics.
- **Lab 6**. Communication of a epidemiological research project

	Total number of classes, credits or hours
MODULE I	5h (classes) + 2h (lab)
MODULE II	5h (classes) + 2h (lab)
MODULE III	5h (classes) + 4h (lab)
MODULE IV	5h (classes) + 2h (lab)
MODULE V	9h (classes) + 2h (lab)

4. TEACHING-LEARNING METHODOLOGY

4.1. Distribution of credits (specify in hours)

Number of contact hours	Classes (big group): 29 h Classes (small groups): 9 h Practical sessions: 12 h
Number of hours of individual student work	Individual study, work assignments, preparation for exams, online activities 100 h
Total number of hours	150 h

4.2. Teaching methods, materials and resources.

Theoretical classes	Classes where the professor will teach the basic knowledge of each topic, as well as the different methods used to attain that knowledge. On the other hand, diverse questions will be raised up to ponder on and discuss the relationships between the different concepts that were taught in class.

Seminars and problem-solving classes	These seminars will be coordinated with the theoretical classes. In these seminars, students will apply the theoretical concepts and develop (in groups) a research project from scratch. Thereby, seminars will reinforce concepts covered in the theoretical classes. These research projects will be prepared and presented orally by the students.
Autonomous work	• Readings. • Activities: practical exercises, search of epidemiology texts and manuscripts.
Individual and Group tutoring	• Individual and Group sessions in order to carry out an adequate follow-up of all students and the course.

Materials and resources

• PowerPoint presentations: All the theoretical classes will available to the students on Blackboard.

• Scientific texts for the practical classes will be available in advance on Blackboard.

• Computer room available for practical classes.

5. EVALUATION: Procedures, evaluation and qualification criteria

According to the norm regulating the evaluation of the learning process, approved by the UAH Governing Council on May 5, 2016, in each academic year, the student has the right to two evaluation calls: an ordinary call and an extraordinary call.

Evaluation Procedure

Ordinary call. It is based on a continuous evaluation, except in those cases contemplated in the UAH evaluation norm, in which the student has the right to a final evaluation procedure. In this case, the student must hand in a written request to the Dean or Director of the Center in the first two weeks of classes, explaining the reasons that do not allow him to follow the continuous evaluation system.

Continuous evaluation will be based on the collection of evidence by means of diverse strategies related to the teaching-learning process. The following will be evaluated: class attendance, student participation in the different classroom-based activities, student work in the seminars, the results of partial exams, an overall final exam and other activities.

The exceptional option of a final evaluation will consist of an exam covering all the course contents. The evaluation of the skills and knowledge acquired during the practical classes will be carried out by an exam. Those students who have not attended the practical sessions cannot pass the course in this ordinary call.

Extraordinary call. An exam on the course contents will be carried out, provided that the student has attended the practical sessions. Those students who have not attended the practical sessions or have not completed them successfully must do an exam to pass the course in this extraordinary call.

Evaluation criteria

- Understanding and assimilation of the course contents
- Active participation, attitude and aptitudes demonstrated in the proposed activities.
- Capacity to apply the acquired knowledge.
- Interpretation of the results and question- as well as problem-solving.
- Argument of ideas and demonstration of critical thinking.

Qualification criteria

Ordinary call.

In the continuous evaluation system, the learning of each student will be evaluated using objective data obtained from:

- During theoretical-practical seminars. All questions and exercises of practical exercises, as well as participation and a final practical exam will be evaluated. 20% of the final grade

- Group work. Individual oral examination of the work. Written and oral presentation of a research protocol. 40% of the final grade

- Final test. 40% of the final grade

In order to pass it is necessary to obtain at least 50% on the final test. No exceptions will be made.

The exceptional option of a **final evaluation** will consist of a final exam that will account for 85% of the final grade. This exam will contain questions, problems and exercises that will allow the professor to evaluate the acquisition by the student of the competencies described in the course syllabus. Those students who did not attend the practical sessions cannot pass the course in this ordinary call.

Extraordinary call. The exam will make up 90% of the final grade. This exam will consist of questions, problems and exercises that will allow the professor to evaluate the acquisition by the student of the competencies indicated in the course syllabus.

Those students who have attended the practical sessions or have not completed them successfully must pass a specific exam in order to pass the course in this call. This exam will make up 10% of the final grade.

Qualifications:
• Outstanding: excellent knowledge of basic concepts, high level of reflection or application, elaboration of own ideas, fulfillment of all tasks, teamwork, search for complementary materials.
• Notable: masters knowledge, medium level of reflection,….
• Failure: low level of understanding and application, lack of task involvement, does not participate in the group….

According to R.D 1125/2003 that regulates the Supplement to the Title, the grades must follow the scale of adoption of numerical grades with a decimal and a qualitative grade:
0.0 - 4.9 SUSPENSION (SS)
5.0 - 6.9 PASSED (AP)
7.0 - 8.9 NOTABLE (NT)
9.0 - 10 OUTSTANDING (SB)
9.0 - 10 HONORS (limited to 5% of all students)

During the development of the evaluation tests, the guidelines established in the Regulations that establish the Code of Conduct of the University of Alcalá must be followed, as well as the possible implications of any irregularities committed during these tests, including the consequences of academic fraud according to the Student Disciplinary Regulations of the University of Alcalá.

6. BIBLIOGRAPHY

Basic Bibliography

- Gordis L. Epidemiology. 7ª ed, Elsevier, 2024
- Basic Epidemiology, Bonita, Beaglehole, 2005, WHO (pdf freely available)

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