

1. BASIC INFORMATION

Course	Epidemiology, Public Health and Applied Biostatistics
Degree program	Dentistry
School	Facultad de Ciencias Biomédicas y de la Salud
Year	First
ECTS	6 ECTS
Credit type	Basic
Language(s)	Spanish/English
Delivery mode	Face-to-face
Semester	First Semester/second semester
Academic year	2024/2025
Coordinating professor	Bárbara González Serrano

2. PRESENTATION

This subject is located in the first year of the curriculum and is a basic subject. The main objective of this subject is learning Epidemiology and Public Health based on the scientific method and providing information related to the frequency and distribution of the disease in the population and the factors that favors or condition its development, with a particular focus on oral health.

3. COMPETENCIES AND LEARNING OUTCOMES

Core competencies:

- **CB2:** Students know how to apply their knowledge to their work or vocation in a professional way and have the skills that are usually demonstrated through the development and defense of arguments and problem solving within their area of study.
- **CB3:** Students have the ability to collect and interpret relevant data (usually within their area of study) to make judgements that include reflection on relevant social, scientific or ethical issues.
- **CB4:** Students can communicate information, ideas, problems and solutions to a specialized and non-specialized audience.

- **CB5:** Students have developed those learning skills necessary to undertake further studies with a high degree of autonomy.

Cross-curricular competencies:

- **CT1:** Autonomous learning: Process that allows the person to be the author of his or her own development, choosing the paths, strategies, tools and moments that he or she considers most effective for learning and putting into practice independently what has been learned. The freelance learner, in short, selects the best strategies to achieve his or her learning objectives.
- **CT4:** Ability of analysis and synthesis: Analysis is the method of reasoning that allows complex situations to be broken down into their constituent parts; it also allows us to evaluate other alternatives and perspectives in order to find optimal solutions. Synthesis seeks to reduce complexity in order to better understand it and/or solve problems.
- **CT5:** Ability to apply knowledge to practice: Ability to use knowledge acquired in the academic field in situations as close as possible to the reality of the profession for which they are being trained, for example, by relating theoretical foundations to their application to real problems in everyday life, by addressing problems and situations close to professional activity or by solving real issues and/or problems.

General competencies:

- **GC1:** Know the essential elements of the dentist profession, including ethical principles and legal responsibilities
- **GC3:** Know how to identify the patient's concerns and expectations, as well as communicate effectively and clearly, both orally and in writing, with patients, family members, the media, and other professionals.
- **GC8:** Learn to share information with other health professionals and learn teamwork skills.
- **GC9:** Understand the importance of maintaining and using records with patient information for subsequent analysis, preserving the confidentiality of the data
- **GC18:** Know, critically assess, and know how to use the sources of clinical and biomedical information to obtain, organize, interpret, and communicate scientific and health information.
- **GC19:** To understand the scientific method and have the critical capacity to assess established knowledge and novel information. To be able to formulate hypotheses, collect and critically evaluate information to solve problems, following the scientific method.

Specific competencies:

- **SC5:** Know the scientific method and have the critical ability to evaluate established knowledge and new information.

Learning outcomes:

- Develop interest in health science research and habit building in the management of scientific publications and the critical thinking necessary for the understanding and evaluation of published epidemiological studies.
- Develop research skills, both primary and secondary. Generate bibliographic review skills and referencing habit.
- To know the design and usefulness of the main types of descriptive, analytical and experimental epidemiological studies, as well as the different basic statistical techniques for their performance.
- To relate the influence of the environment and lifestyle on the level of health of populations.
- Understand the epidemiology of communicable diseases and methods of prevention of these diseases, especially in the dental practice.
- To know the epidemiology of chronic diseases with high prevalence and high mortality and the most frequent oral diseases.
- Raise awareness of the role of health workers in the health education of the population.
- To know the epidemiological method and to have the critical capacity to evaluate the established knowledge and the new information.
- Evaluate published clinical research and be able to integrate this training to improve patient health.
- Provide a comprehensive approach to oral care and apply the principles of health promotion and prevention of oral diseases.

The following table shows the relationship between the competencies developed during the course and the learning outcomes pursued:

Competencies	Learning outcomes
CB2, CB3, CB4, CB5, CT1, CT4, CT5, CG1, CG8, CG18, CG19, SC5	LO1: Develop interest in health science research and habit building in the management of scientific publications and the critical thinking necessary for the understanding and evaluation of published epidemiological studies.

CB2, CB3, CB4, CB5, CT1, CT4, CT5, CG9, CG18, CG19, SC5	LO2: Develop research skills, both primary and secondary. Generate bibliographic review skills and referencing habit.
CB2, CB3, CB4, CB5, CT1, CT4, CT5, CG18, CG19, SC5	LO3: To know the design and usefulness of the main types of descriptive, analytical and experimental epidemiological studies, as well as the different basic statistical techniques for their performance.
CB2, CB3, CB4, CB5, CT1, CT4, CT5, CG3, CG8, CG19, SC5	LO4: To relate the influence of the environment and lifestyle on the level of health of populations.
CB2, CB3, CB4, CB5, CT1, CT4, CT5, CG1, CG3, CG8	LO5: Understand the epidemiology of communicable diseases and methods of prevention of these diseases, especially in the dental practice.
CB2, CB3, CB4, CB5, CT1, CT4, CT5, CG1, CG3, CG8, CG18	LO6: To know the epidemiology of chronic diseases with high prevalence and high mortality and the most frequent oral diseases.
CB2, CB3, CB4, CB5, CT1, CT4, CT5, CG1, CG3, CG8, CG9	LO7: Raise awareness of the role of health workers in the health education of the population.
CB2, CB3, CB4, CB5, CT1, CT4, CT5, CG3, CG8, CG9, CG18, CG19, SC5	LO8: To know the epidemiological method and to have the critical capacity to evaluate the established knowledge and the new information.
CB2, CB3, CB4, CB5, CT1, CT4, CT5, CG1, CG3, CG8, CG9, CG18, CG19, SC5	LO9: Evaluate published clinical research and be able to integrate this training to improve patient health.
CB2, CB3, CB4, CB5, CT1, CT4, CT5, CG1, CG3, CG8, CG18, CG9	LO10: Provide a comprehensive approach to oral care and apply the principles of health promotion and prevention of oral diseases.

4. CONTENT

PART I: FUNDAMENTALS OF GENERAL STATISTICS

Unit 1. Basic concepts in statistics:

Concept of population and sample.

Concept of estimation. Confidence interval.

Concept of variable and types of variables.

Validity and reliability in statistical studies.

Types of errors.

Unit 2. Frequency measures

Most used frequency measures.

Absolute values and values relative to population size.

Tabulation and graphical representation.

Unit 3. Comparative frequency measures

Measures of central tendency: mean, median and mode.

Measures of dispersion: range, mean deviation, variance, standard deviation, and coefficient of variation.

Measures of position: percentiles, quartiles, and deciles.

Unit 4. Applications of Probability. Sensitivity and specificity

Concept of probability.

Random event.

Operations with events.

Conditional probability, Probability of the union and intersection of events.

Bayes' theorem

Sensitivity and specificity Implications for prevalence estimation and screening.

Unit 5. Probability distributions.

Probability distributions: normal distribution: characteristics, typical normal distribution, central limit theorem. Binomial distribution.

Parameter estimation: point estimation, properties of point estimators.

Unit 6. Hypothesis testing.

Unit 7. Tests of conformity, homogeneity and test of independence.

(Chi square)

PART II. PUBLIC HEALTH. CONCEPTS OF EPIDEMIOLOGY, HEALTH PROTECTION AND HEALTH PROMOTION.

Unit 8. Epidemiology. Basic concepts.

Concept of epidemiology.

Utility of epidemiology.

The epidemiological method.

Descriptive and analytical or inferential epidemiology.

Incidence and prevalence.

Usefulness of frequency measures in epidemiology.

Unit 9. Risk factors and causality in epidemiology.

Risk factors, markers, and indicators

Association and independence in epidemiology

Types of association. Statistical significance.

Causality and causal models

Unit 10. Types of epidemiological studies.

Cross-sectional studies. Usefulness, advantages, and disadvantages

Cohort studies. Usefulness, advantages and disadvantages

Case-control studies. Usefulness, advantages and disadvantages

Experimental studies. Clinical trials

Unit 11. Concept of health and health determinants.

Concepts of public health and community health. Spanish health system.

Unit 12. Health demography.
 Concept of demography and its usefulness in public health.
 Static demography and dynamic demography.
 Birth rate, fertility, mortality, life expectancy.
 Demography and population health indicators.

Unit 13. Epidemiology and prevention of communicable diseases
 General epidemiology of communicable diseases
 Prevention of communicable diseases
 Methods of sanitary sanitation
 Active immunization and passive immunization. Immunization programs

Unit 14. Epidemiology and prevention of diseases with high prevalence and mortality.
 General characteristics of chronic diseases
 Epidemiology and prevention of cardiovascular diseases.
 Epidemiology and prevention of cancer
 Epidemiology and prevention of chronic respiratory diseases.

Unit 15. Epidemiology and prevention of the most common dental diseases.
 Epidemiology of caries
 Epidemiology of periodontal diseases.

Unit 16. Lifestyle and health.

5. TEACHING-LEARNING METHODOLOGIES

The types of teaching-learning methodologies used are indicated below:

- Case Method
- Cooperative learning
- Problem-based learning
- Master class

6. LEARNING ACTIVITIES

Listed below are the types of learning activities and the number of hours the student will spend on each one:

Campus-based mode:

Learning activity	Number of hours
Tutorials	7 h
Master classes	30h
Virtual master classes	12 h
Case analysis	20 h
Troubleshooting	14h
Research	2

Analysis of scientific articles	10
Knowledge tests.	3 h
Study and Autonomous Work	52 h
TOTAL	150

7. ASSESSMENT

Listed below are the assessment systems used and the weight each one carries towards the final course grade:

Campus-based mode:

Assessment system	Weight
Knowledge tests	40%
Test problems	20%
Learning folder (analysis of an article)	20%
Case/problem	20%

When you access the course on the *Campus Virtual*, you'll find a description of the assessment activities you have to complete, as well as the delivery deadline and assessment procedure for each one.

7.1. First exam period

To pass the course in the first exam period, you must obtain a final course grade of at least 5 out of 10 (weighted average).

In any case, you will need to obtain a grade of at 5.0 in the final exam in order for it to count towards the final grade along with all the grades corresponding to the other activities.

7.2. Second exam period

To pass the course in the second exam period, you must obtain a final grade of at least 5 out of 10 (weighted average).

In any case, you will need to obtain a grade of at 5.0 in the final exam in order for it to count towards the final grade along with all the grades corresponding to the other activities.

The student must deliver the activities not successfully completed in the first exam period after having received the corresponding corrections from the professor, or those that were not delivered in the first place.

8. SCHEDULE

This table shows the delivery deadline for each assessable activity in the course:

Assessable activities	Deadline
Activity Statistical analysis article	Week 11-12
Objective test type test - intermediate	Week 8-10
Objective test: problems	Week 8-10
Analysis of the epidemiological case	Week 12-14
Epidemiological case presentation	Week 15
Second objective test	Week 18-19

This schedule may be subject to changes for logistical reasons relating to the activities. The student will be notified of any change as and when appropriate.

9. BIBLIOGRAPHY

The main reference work for this subject is:

- GORDIS, I. Epidemiology 5^a ed., 2015. Elsevier/Saunders.

The recommended Bibliography is:

- HERNÁNDEZ AGUADO, Manual de Epidemiología y salud pública para licenciaturas y diplomaturas en ciencias de la salud, 2005.
- RUIZ MORALES, Epidemiología Clínica: investigación clínica aplicada, 2004.
- DAWSON, BETH. TRAPP, ROBERT G. Bioestadística Médica, 4^a edición. Editorial Manual Moderno, 2005.
- FLETCHER, Epidemiología Clínica: aspectos fundamentales, 2003.
- M. GOLDBERG, La Epidemiología sin esfuerzo, 1994.
- Unidad de Bioestadística Médica del Hospital Ramón y Cajal. Material docente. http://www.hrc.es/bioest/M_docente.html
- NORDNESS R. Epidemiology and Biostatistics Secrets. Mosby, 2006.
- G. PIEDROLA GIL, Medicina Preventiva y Salud Pública, 11^a edición, 2008.
- HERNANDEZ AGUADO, Manual de Epidemiología y Salud Pública, 2^a edición, 2013.
- A. FRIAS OSUNA, Salud pública y educación para la salud, 1^a edición, 3^a reimpresión, 2006.
- REMINGTON PL, BROWNSON RC, WEGNER MV. Chronic disease epidemiology and control, 3rd ed. American Public Health Association, 2010 [libro electrónico disponible: imprescindible registrarse para acceder al recurso electrónico]
<http://eds.a.ebscohost.com.ezproxy.universidadeuropea.es/eds/ebookviewer/ebook?sid=0d161525-7022-46a4-a4bc-f43cbd385c70%40sessionmgr4006&vid=0&format=EB>

10. EDUCATIONAL GUIDANCE AND DIVERSITY UNIT

From the Educational Guidance and Diversity Unit we offer support to our students throughout their university life to help them reach their academic achievements. Other main actions are the students inclusions with specific educational needs, universal accessibility on the different campuses of the university and equal opportunities.

From this unit we offer to our students:

1. Accompaniment and follow-up by means of counselling and personalized plans for students who need to improve their academic performance.
2. In terms of attention to diversity, non-significant curricular adjustments are made in terms of methodology and assessment for those students with specific educational needs, pursuing an equal opportunities for all students.
3. We offer students different extracurricular resources to develop different competences that will encourage their personal and professional development.
4. Vocational guidance through the provision of tools and counselling to students with vocational doubts or who believe they have made a mistake in their choice of degree.

Students in need of educational support can write to us at:

orientacioneducativa@universidadeuropea.es

11. ONLINE SURVEYS

Your opinion matters!

The Universidad Europea encourages you to participate in several surveys which help identify the strengths and areas we need to improve regarding professors, degree programs and the teaching-learning process.

The surveys will be made available in the “surveys” section in virtual campus or via e-mail.

Your assessment is necessary for us to improve.

Thank you very much for your participation.