COURSE DATA

Data Subject	
Code	36322
Name	Clinical epidemiology
Cycle	Grade
ECTS Credits	4.5
Academic year	2021 - 2022

Study (s)

Degree	Center	Acad. year	Period
1204 - Degree in Medicine	Faculty of Medicine and Odontology	3	Second term

Subject-matter

Degree	Subject-matter	Character
1204 - Degree in Medicine	18 - Optional subjects	Optional

Coordination

Name	Department
MORALES SUAREZ-VARELA, MARIA MANUELA	265 - Prev. Medicine, Public Health, Food Sc.,Toxic. and For. Med.

SUMMARY

Knowing the Evidence-Based Medicine and its application in clinical practice. Assess the level of evidence of different types of studies in clinical epidemiology and able to analyze and discuss measures of association and impact. Analyze the impact of systematic and random errors in clinical epidemiology and its application to risk estimation and forecasting
Synthesizing qualitative and quantitative methodologies by different meta-analysis and discuss its clinical application.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

Epidemiology and Preventive Medicine

COMPETENCES (RD 1393/2007) // LEARNING OUTCOMES (RD 822/2021)

1204 - Degree in Medicine

- Students must be able to apply their knowledge to their work or vocation in a professional manner and have acquired the competences required for the preparation and defence of arguments and for problem solving in their field of study.
- Students must have the ability to gather and interpret relevant data (usually in their field of study) to make judgements that take relevant social, scientific or ethical issues into consideration.
- Recognise health determinants in population, such as genetic ones, dependent on sex, lifestyle, demographic, environmental, social, economic, psychological and cultural.
- Obtain and use epidemiological data and evaluate tendencies and risks influencing health decision-making.
- Organizar y planificar adecuadamente la carga de trabajo y el tiempo en las actividades profesionales.
- Capacidad para trabajar en equipo y para relacionarse con otras personas del mismo o distinto ámbito profesional.
- Criticism and self-criticism skills.
- Capacity for communicating with professional circles from other domains.
- Acknowledge diversity and multiculturality.
- Consideration of ethics as a fundamental value in the professional practise.
- Working capacity to function in an international context.

LEARNING OUTCOMES (RD 1393/2007) // NO CONTENT (RD 822/2021)

1. Clinical epidemiology: basic concepts and tools
• 2. Assessment of the Scientific Evidence. Evidence Based Medicine and its application in clinical practice
• 3. Types of epidemiological studies and their application to the evaluation of scientific evidence.
• 3. Level of evidence from clinical trials. Randomization, blinding, choice of control group, versus parallelism crossing. Advantages, limitations and alternatives.
• 4. Level of evidence of the results of cohort studies. Design alternatives, analysis and interpretation of data, limitations and applications.
• 5. Level of evidence from case-control studies. Design alternatives to increase the level of evidence. Data analysis and advantages and limitations.

• 6. Level of evidence from cross-sectional studies, ecological studies and epidemiological studies. Design, data analysis, applications, advantages and limitations.
• 7. Estimation of the association and impact on different types of epidemiological studies. Interpretation of the measurements obtained and critical analysis of its meaning. Association statistically significant versus clinically relevant association.
• 8. Influence of random errors in the evidence from epidemiological studies. Relevance of the number of patients studied. Criteria to reduce Type I errors and Type II. Impact of multiple comparisons in these errors.
• 9. Major systematic errors in epidemiological studies. Selection bias, information bias and confounding. Impact of differential misclassification and differential in the level of evidence.
• 11. Internal validity and external validity. Its impact on the prevention and treatment of disease.
• 12. Overall assessment of the evidence available: classic review, systematic review and meta-analysis. Meta-analysis of qualitative and quantitative meta-analysis. Calculation of global media estimates of the association: fixed effects, random effects model, Bayesian model. Analysis of heterogeneity. Meta-regression. Subgroup analyzes and sensitivity.
• 13. Difference between risk factors and prognostic factors. Analysis of clinical decisions.
• 14. Criteria for selection of diagnostic tests. Screening tests. Tests for population screening. Interpretation and limitations of the analysis of sensitivity, specificity and predictive value. Quantitative evaluation by ROC curves.
• 15. Epidemiology and molecular genetics. Design studies. Analysis of gene-environment interactions and gene-gene analysis. Bioinformatics tools applied. Interpretation and Application of Genome-Wide Association Studies and Genome-Wide Interaction Studies.
• 16. Middle environmental epidemiology. Questionnaire design and validation of environmental exposure to new information technologies. Risk-exposure matrices. Air pollution. Time series of mortality and morbidity.

The student must be able to perform:

• 1. Discussion of the concept of evidence-based medicine: historical evolution and future prospects.
• 2. Design and analysis of a clinical trial. Discussion of advantages and limitations
• 3. Design and analysis of a cohort. Advantages and limitations.
• 4. Design and analysis of a case-control study. Advantages and limitations.
• 5. Management of random errors. Sample size, number of patients needed to treat and multiple comparisons.
• 6. Detection of systematic errors in different studies. Effect on the estimation of measures of association
• 7. Application of the selection criteria of diagnostic tests in different clinical situations.
• 8. Application of quantitative meta-analysis to estimate global parameters and discussion of the degree of heterogeneity.
• 9. Design and analysis of a genomic epidemiology study to evaluate gene-environment interactions

DESCRIPTION OF CONTENTS

1. Theory I

1. Clinical epidemiology: Concepts and basic tools.

2. Evaluation of the Scientific Evidence. Evidence-Based Medicine and its application in clinical practice.

3. Stages of the research process: Variables.

4. Clinical Epidemiology: Sample size, Error and .

5. Frequency measures in epidemiology.

6. Types of epidemiological studies and their application for the evaluation of scientific evidence.

7. Level of evidence from cross-sectional studies, ecological studies and other epidemiological studies. Design, data analysis, applications, advantages and limitations.

8. Level of evidence in case-control studies. Design alternatives to increase the level of evidence. Analysis of data and advantages and limitations.

9. Influence of random errors in the evidence from epidemiological studies. Relevance of the number of patients studied. Criteria to reduce Type I errors and Type II. Impact of multiple comparisons in these errors.

10. Major systematic errors in epidemiological studies. Selection bias, information bias and confounding. Impact of differential misclassification and differential in the level of evidence.

11. Internal validity and external validity. Its impact on the prevention and treatment of disease.

2. Theory II

12. Overall assessment of the evidence available: classic review, systematic review and meta-analysis. Meta-analysis of qualitative and quantitative meta-analysis. Calculation of global media estimates of the association: fixed effects, random effects model, Bayesian model. Analysis of heterogeneity. Meta-regression. Subgroup analyzes and sensitivity.

13. Difference between risk factors and prognostic factors. Analysis of clinical decisions.

14. Criteria for selection of diagnostic tests. Screening tests. Tests for population screening. Interpretation and limitations of the analysis of sensitivity, specificity and predictive value. Quantitative evaluation by ROC curves.

15. Epidemiology and molecular genetics. Design studies. Analysis of gene-environment interactions and gene-gene analysis. Bioinformatics tools applied. Interpretation and Application of Genome-Wide Association Studies and Genome-Wide Interaction Studies.

16. Middle environmental epidemiology. Questionnaire design and validation of environmental exposure to new information technologies. Risk-exposure matrices. Air pollution. Time series of mortality and morbidity.

3. Practice

Seven seminars of two hours each one and six computer practical sessions of two hours each one, they will be given them

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	19,00	100
Seminars	14,00	100
Computer classroom practice	12,00	100
Development of individual work	7,50	0
Study and independent work	30,00	0
Readings supplementary material	30,00	0
TOTAL	**112,50**	

TEACHING METHODOLOGY

The theoretical contents will be given across lessons composed in a dialogue with the students promoting the participation of the student across questions.

These theoretical meetings will have the complement of the tutorships and virtual tutorships.

In the practical meetings, methodology based on learning by resolution of problems and the learning for project will be used. The pupils will have to develop along almost the whole course and parallel to the develop of the theoretical contents, a project of investigation that will allow them to acquire knowledge, attitudes and skills in a real situation. The work will be promoted in group that will allow the development of capacities of communication and oral coherent and logical expression.

EVALUATION

a) Theoretical evaluation: 50% of the final score. It will be done through a written test which will consist of content regarding the theoretical programme and which will have knowledge acquisition as an objective. The test will comprise multiple choice questions or an essay.

b) Practical evaluation: 50% of the total score (25% seminar, and the other 25% regarding computer programming practise). Students will be assessed taking into account their participation in different activities (20%) and by taking a test which will be able to evaluate students' acquisition of skills regarding both general and specific competencies (30%). The test will consist of responding multiple choice questions and solving a case study.

Students can pass the subject if they obtain 5 as a mark or superior, having a minimum of 2.5 in the theoretical part, and 2.5 in the practical one.

In case of short-answer questions in the exam, 3 incorrect answers will lead to subtract 1 correct one. Blank answers do not penalise.

In this subject, students will not be allowed to write their test (or even take it before the agreed date) if they have not completed their training (internship).

In order to access to an advance on the call of this subject, it is a requirement that the student has coursed all his/her practices.

Attendance to practical sessions is mandatory. Unjustified non-attendance to more than 20% of the sessions will make it impossible to pass the course.

REFERENCES

Basic

- Martínez-González MA, Sánchez-Villegas A, Faulín Fajardo J. Bioestadística amigable. Díaz de Santos: Madrid, 2006
- Sierra López A, Saénz González MC, Fernández-Créhuet Navajas J, Salleras Sanmartí L, Cueto Espinar A, Gestal Otero J, Domínguez Rojas V, Delgado Rodríguez M, Bolumar Montrull F, Herruzo Cabrera R, Serra Majem L (dirs.). Medicina Preventiva y Salud pública. 11ª ed. Barcelona: Elsevier-Masson, 2008.

ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

Siguiendo las recomendaciones del Ministerio, la Consellería y el Rectorado de nuestra Universidad, para el período de la "nueva normalidad", la organización de la docencia para el segundo cuatrimestre del curso 2021-22, seguirá un modelo híbrido, donde tanto la docencia teórica como práctica se ajustará a los horarios aprobados por la CAT pero siguiendo un modelo de Presencialidad / No presencialidad en la medida en que las circunstancias sanitarias y la normativa lo permitan y teniendo en cuenta el aforo de las aulas y laboratorios docentes. Se procurará la máxima presencialidad posible y la modalidad no presencial se podrá realizar mediante videoconferencia cuando el número de estudiantes supere el coeficiente de ocupación requerido por las medidas sanitarias. De manera rotatoria y equilibrada los estudiantes que no puedan entrar en las aulas por las limitaciones de aforo asistirán a las clases de manera

no presencial mediante la transmisión de las mismas de manera síncrona/asíncrona via “on line”.