

**COURSE DATA****Data Subject**

Code	36322
Name	Clinical epidemiology
Cycle	Grade
ECTS Credits	4.5
Academic year	2019 - 2020

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

OUTCOMES

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.
- Proper organisation and planning of the workload and timing in professional activities.
- Team-working skills and engaging with other people in the same line of work or different.
- 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

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.
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**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 of practices will be compulsory.

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

1. Contenidos

Se mantienen los contenidos inicialmente recogidos en la guía docente

2. Volumen de trabajo y planificación temporal de la docencia

Mantenimiento del peso de las distintas actividades que suman las horas de dedicación en créditos ECTS marcadas en la guía docente original.

3. Metodología docente



1. Subida de materiales al Aula virtual
2. Propuesta de actividades por aula virtual
3. Problemas/ejercicios resueltos (clases prácticas/laboratorios)
4. Trabajos con simuladores o paquetes de cálculo (clases prácticas/laboratorios)
12. Forum en Aula Virtual

4. Evaluación

Para la realización de exámenes, y para asegurar el rigor y equidad en las evaluaciones, siempre estamos obligados a principios éticos que todos comprendemos. En estas circunstancias excepcionales en las que estamos, se pide a los alumnos que extremen su compromiso ético para la realización del examen teórico y demás actividades evaluables.

La evaluación teórica se realizará en la fecha y hora programada e indicada por el centro (4 de junio en primera convocatoria y 2 de julio en segunda convocatoria --nota: hora pendiente de fijar; se anunciará oportunamente). Complementariamente, pedimos que se tenga en cuenta que las demás actividades programadas (y que por definición son evaluables) se llevarán a cabo según el calendario establecido, siempre en la medida de lo posible.

La calificación final se calculará a partir de la ponderación de los siguientes componentes: 60% de teoría, 15% de prácticas, 15% de seminario y 10% de evaluación continua. Se hace explícito que, para hacer media de nota, es necesario haber obtenido al menos un 5 en el examen teórico.

La Matrícula de Honor será la mejor nota superior a 9.5.

A continuación, se describe cómo se evaluarán los distintos componentes:

1.- La teoría se evaluará mediante una prueba de teoría objetiva (examen tipo test) que se desarrollará a través del Aula Virtual. Constará de, 40 preguntas tipo test con 4 opciones cada una, con una sola respuesta correcta. Por cada 4 respuestas incorrectas se restará lo equivalente a una correcta. Las preguntas en blanco no se penalizarán. Las preguntas serán realizadas por los profesores que han impartido la asignatura de forma proporcional a la docencia impartida y en el idioma impartido.

- Aquellos alumnos con circunstancias excepcionales, (discapacidad/diversidad funcional, defunción de un familiar, trabajar en el sistema sanitario, no tener acceso adecuado a internet, etc.) deben comunicarlo a la coordinadora de la asignatura lo antes posible y siempre previamente al examen para valorar las posibles alternativas.



- Aquellos alumnos que tengan problemas de acceso a internet mediante el uso de ordenador podrán realizar el examen a través del teléfono móvil habiendo comunicado previamente esta situación a la coordinadora de la asignatura.

2.- Las practicas se valorarán en función de asistencia las presenciales y por la media de la nota de los ejercicios entregados las no presenciales.

3.- Los seminarios se evaluarán, además de por asistencia y participación en las sesiones presenciales, según los registros del profesor..., por los trabajos entregados en plazo respondiendo a las preguntas planteadas en los seminarios seleccionados (ver mensajes específicos aludiendo a este tema por parte del Dr. Martin Moreno).

4.- Las actividades de evaluación continua engloban la asistencia a clase, tutorías y participación.

5. Bibliografía

La bibliografía recomendada se mantiene pues es accesible