1. OVERVIEW

Subject Area	Research Methodology
Degree	Bachelor's Degree in Medicine
School/Faculty	School of Biomedical and Health Sciences
Ac. Year	5
ECTS	6 ECTS
Type	Compulsory
Language(s)	Spanish
Delivery Mode	On campus
Semester	Six-monthly

2. INTRODUCTION

Research Methodology is a subject which belongs to the Social Medicine, Communication Skills and Introduction to Research module. This module is vertically integrated throughout the six years of learning. It is worth a total of 32 ECTS. Students will mainly acquire skills associated with professional values and ethical behaviour, communication skills, public health and health systems, data handling, critical analysis and research.

3. SKILLS AND LEARNING OUTCOMES

Basic Skills (MECES) (CB by the acronym in Spanish)

CB1. Students have demonstrated possession and understanding of knowledge in a study area that builds on general secondary education, and is typically at a level that, while supported by advanced textbooks, also includes aspects that involve knowledge from the forefront of their field of study.
CB2. Students can apply their knowledge to their work professionally and possess the necessary skills, usually demonstrated by forming and defending opinions, as well as resolving problems within their study area.
CB3. Students have the ability to gather and interpret relevant information (usually within their study area) to form opinions which include reflecting on relevant social, scientific or ethical matters.
CB4. Students can communicate information, ideas, problems and solutions to both specialist and non-specialist audiences
CB5. Students will develop the learning capacity required to undertake subsequent study with a high degree of autonomy.

General skills (order ECI 332/2008, of 13 February, which establishes the official requirements for validating official university degrees to be able to work professionally as a doctor):

A. Professional values, Attitudes and Ethical Behaviour:

CG1. Recognise the essential parts of being a medical professional, including ethical principles and legal responsibilities, together with how to provide a patient-centred service.

CG2. Understand the importance of such principles to benefit patients, society and the profession, with particular attention paid to professional secrecy, confidentiality and intimacy.1

CG3. Know how to apply the principle of social justice to professional practice.

CG4. Develop professional practice taking into account patient autonomy, beliefs and culture.

CG5. Be aware of the need to maintain and update professional skills, paying special attention to continuous self-learning of emerging knowledge and to discover new products and techniques with the aim of improving quality.

CG6. Carry out professional activity with regard to other health professionals.

CG30. Have basic understanding of the National Health System and health legislation.

F. Data Handling:

CG31. Understand, critically assess and know how to use clinical and biomedical information sources to obtain, organise, interpret and communicate scientific and health information.

CG32. Know how to use information and communication technology in clinical, therapeutic, preventative and research activity.

CG33. Maintain and use patient information records for subsequent analysis while always maintaining data confidentiality.

G. Critical Analysis and Research:

CG34. In professional practice, maintain a critical, creative, constructively-sceptical and research-minded approach.

CG35. Understand the importance and limitations of scientific thinking in the study, prevention and management of diseases.

CG36. Be able to formulate hypotheses, gather information and critically evaluate information to solve problems following the scientific method.

CG37. Acquire basic training in research activity.

Cross-curricular skills (CT, by the acronym in Spanish)

CT1. Communication: ability to engage in active listening, ask questions and respond in a clear and concise way, as well as to effectively express ideas and concepts. This includes concise and clear written communication.

CT2. Leadership: ability to offer ideas, approaches and interpretations through strategies which offer solutions to real-life problems.

CT3. Teamwork: ability to integrate and collaborate actively with other people, areas and/or organisations to reach common goals, evaluate and integrate contributions from the rest of the group members and create a good working environment.

CT4. Adaptability: ability to detect, interpret and respond to a changing environment. Ability to equip themselves and work effectively in different situations and/or with different groups or individuals. This means adapting to change depending on circumstances or needs. It involves the confidence to take on crucial challenges on a personal or group level, maintaining good physical and mental health to allow effective work to be carried out.

CT5. Initiative: ability to undertake difficult or risky actions with resolve.

CT6. Problem solving: ability to solve an unclear or complex issue or situation which has no established solution and requires skill to reach a conclusion.

CT7. Decision making: ability to choose between different options or methods to effectively solve different problems or situations.

CT8. Planning and organization: ability to set objectives and choose the right means to fulfil them through the efficient use of time and resources.

CT9. Ability to put knowledge into practice, using the skills acquired in the classroom to mock situations based on real life experiences that occur in the relevant profession.
CT10. Independent learning: the ability to govern your own development by choosing the most effective lines of action, strategies, tools and opportunities to independently learn and apply knowledge to practice.

Specific Skills (CE, by the acronym in Spanish)
CE5. Understand the legal aspects of the medical profession. Informed consent. Confidentiality.
CE10. Understand the principles of medical ethics. Bioethics. Solve ethical conflicts. Apply professional values of excellence, altruism, sense of duty, responsibility, integrity and honesty while undertaking the profession.
CE11. Recognise the need to maintain professional skills. Know how to develop professional practice taking into account patient autonomy, beliefs and culture.
CE12. Understand the principles of preventative medicine and apply its methods to public health. Disease risk and prevention factors. Recognise determining factors in the population's health. Health indicators. Plan, program and evaluate health programmes. Prevention and protection against diseases, injuries and accidents.
CE14. Understand, critically assess and know how to use clinical and biomedical information technology and sources to obtain, organise, interpret and communicate clinical, scientific and health information.
CE15. Know the basic concepts of biostatistics and how they are applied to medical sciences. Be able to design and carry out simple studies using computer programs and interpret the results.
CE16. Understand and interpret statistical data in medical literature.
C18. Independently use a personal computer. Use search and biomedical data recovery systems. Understand and manage clinical documentation procedures.
CE19. Understand and critically interpret scientific texts. Understand the principles of the scientific method, biomedical research and clinical trials. Understand the basics of telehealth.
CE20. Understand and use the principles of medicine based on the (best) evidence.

Learning outcomes (RA, by the acronym in Spanish):

- RA1. Understand and know how to use clinical and biomedical information technology and sources to obtain, organise, interpret and communicate clinical, scientific and health information.
- RA2. Use search and biomedical data recovery systems.
- RA3. Understand and critically interpret scientific texts.
- RA4. Understand and use the principles of medicine based on the (best) scientific evidence.
- RA5. Understand how to create and perform a research project and be able to design simple epidemiological studies.
- RA6. Be able to perform simple statistical analysis using computer programs.
- RA7. Give an oral or written presentation to an audience of scientific work and/or professional reports.

The following table shows how the skills developed in the subject area match up with the intended learning outcomes:

Skills	Learning outcomes
CB6, CG31, CT1,CT8, CT10, CE14	**RA1.** Understand and know how to use clinical and biomedical information technology and sources to obtain, organise, interpret and communicate clinical, scientific and health information.
CB10, CG32, CG3, CT6, CT10, CE18	**RA2.** Use search and biomedical data recovery systems.
CB3, CG34, CT9, CT10, CE19	**RA3.** Understand and critically interpret scientific texts.
CB2, CB33, CG35, CT9, CT10, CE20	**RA4.** Understand and use the principles of medicine based on the (best) scientific evidence.
CB2, CG36, CG7, CT2, CT8, CT10, CE15	**RA5.** Understand how to create and perform a research project and be able to design simple epidemiological studies.
CB10, CG37, CT6, CT7, CT10, CE15	**RA6.** Be able to perform simple statistical analysis using computer programs.
CB4, CT1, CT10	**RA7.** Give an oral or written presentation to an audience of scientific work and/or professional reports.

4. CONTENTS

The subject area is divided into six learning units, which are then divided into topics (four to five topics depending on the unit):

Unit 1. Research protocol

- Qualification
- Introduction
- Hypothesis and objectives
- Methodology
- Limitations and bias
- Legal and ethical matters
- Annexes

Unit 2. Handling data in the investigative process

- Databases: MEDLINE, PubMed, Scopus…
- Web of Science (WOS).
- Bibliographic managers.
- Dulce Chacón library resources (UEM Library)

Unit 3. Study design

- Types of study design
- Limitations and bias of each type of study

Unit 4. Research question

- The research process: Why should we research?
- Viability, ethics and relevance
- How to pose a research question

Unit 5. Choice, gathering of variables and study sample

- Types of variables
- Graphical representation of variables
- Sampling and calculating the sample size

Unit 6. Statistical analysis

- Descriptive statistics
- Inferential statistics
- Measures of association
- Diagnostic tests

Unit 7. Communication of outcomes

- Scientific communications
- Scientific poster
- How to present the project in public.

Unit 8 Evidence-based medicine Systematic Review Meta Analysis

- Evidence-based medicine
- Systematic review
- Meta Analysis

5. TEACHING/LEARNING METHODS

The types of teaching/learning methods are as follows:

- Lecture.
- Case studies.
- Project-based learning.

6. LEARNING ACTIVITIES

The types of learning activities, plus the amount of time spent on each activity, are as follows:

On campus:

Learning activity	Number of hours
AF1: On-campus theory/practical activities	68
AF2: Directed learning activities	17
AF3: Independent working	45
AF4: Tutorials	18
AF5: Knowledge tests	2
	150 h

7. ASSESSMENT

The assessment methods, plus their weighting in the final grade for the subject area, are as follows:

Assessment system	Weighting
Objective knowledge test I: *Types of designs and research question*	5%
Objective knowledge test II: *Statistics and sample size*	5%
Final knowledge test	40%
Research protocol I: *Drawing up the protocol – prior submission*	15%
Research protocol II: *Drawing up the protocol – final submission*	25%
Research protocol III: *Presentation and advocacy*	10%

8. BIBLIOGRAPHY

The reference work for the follow-up of the subject is:

- Josep M.A. Argimón Pallás y Josep Jiménez Villa; "Métodos de investigación clínica y epidemiológica". ELSEVIER ESPAÑA, 2012. ISBN: 9788480869416

A continuación, se indica bibliografía recomendada:

- Ricardo Luis Macchi "Introducción a la estadística en Ciencias de la Salud". Editorial Médica Panamericana. EAN: 9789500606042
- M. Harris and G. Taylor "Medical Statistics Made Easy". ISBN-13: 978-1907904035
- Miguel Angel Martínez González "Bioestadística Amigable". Editorial Elsevier. ISBN 978-84-9022-500-4
- Electronic Resources:

https://es.slideshare.net/703069056/manual-cto-8-estadistica-y-epidemiologia-planificacion-y-gestion

- Free electronic resources published by the Autonomous Community of Murcia"Atención sanitaria basada en la evidencia: su aplicación a la práctica clínica", "Metodología de la investigación y la práctica clínica basada en la evidencia. Programa transversal y complementario del residente (PTCR)" http://www.murciasalud.es/publicaciones.php?op=mostrar&tipo=descriptores&id=2303&idsec=88
- Fisterra: http://www.fisterra.com/formacion/metodologia-investigacion/
- Unidad de Bioestadística Clínica Hospital Ramón y Cajal: http://www.hrc.es/investigacion/bioest/M_docente.htm