68403 - Medical research models

Syllabus Information

Academic Year: 2020/21

Subject: 68403 - Medical research models

Faculty / School: 104 - Facultad de Medicina

Degree: 530 - Master's in Introduction to Medical Research

ECTS: 6.0

Year: 1

Semester: First semester

Subject Type: Compulsory

Module: ---

1.General information

1.1.Aims of the course

Every researcher must follow the scientific method in his work. For this, it is essential to have a broad knowledge of the available research models, and to understand the usefulness and difficulty of each one in order to make the right choice when proposing the materials and methods in their research project. This subject offers an overview of the models used in both basic (laboratory) and applied (clinical trials), focusing on the aspects that make the transition between both possible. It is oriented in an eminently practical way so that at the end of it the student is able to outline a research project or clinical trial, including the definition of the hypothesis, the choice of the most appropriate methodology, the identification of potential ethical problems and of funding sources.

1.2.Context and importance of this course in the degree

Within the general objective of the Master to initiate biomedical research to the student, this subject offers the possibility of entering into contact with the general bases of basic and clinical research, and of exposing oneself to the practical development of the scientific method, learning to design research projects in biomedicine. These capacities will be fundamental in his future work as a researcher in any of the disciplines and specialties to which he dedicates himself later.

1.3.Recommendations to take this course

Many of the materials used are in English, so a good level of English is recommended.

2.Learning goals

2.1.Competences

Upon passing the course, the student will be more competent to:
-Identify the research hypothesis and the methodology that best fits the question posed.
-Analyze the methodological aspects of a research project
-Write a small research project that includes at least Background, Hypothesis and Objectives, Utility and Methodology.

2.2.Learning goals

The student, to pass this subject, must demonstrate the following results:
-Will be able to list, classify and describe the research models used in the laboratory for the
research in biomedicine and may describe specific applications.
-Will be able to list, describe and categorize the research models used in clinical research, and
may describe specific applications.
-Will know the basic ethical rules regarding experimentation in humans and animals.
-Will be able to design biomedical research projects or clinical trials, at the initiate level.

2.3.Importance of learning goals

One of the main conditions for the success of a research work is to know correctly identify the most appropriate methodology to the problem and the particular context in which an investigation is developed. In the same way, the researcher must be able to analyze the methodology used in scientific works, to assess their validity.

3.Assessment (1st and 2nd call)

3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

The student must demonstrate that he has achieved the anticipated learning outcomes through the following assessment activities.
To evaluate the learning outcomes of this module we use three assessment tools:
- Teacher's report, assessing the attendance, attitude and participation of the student: 30% of the final grade.
- Review of short answers: 40% of the final grade.
- Individual directed work (Drafting of a research project): 30% of the final grade

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

The methodology followed in this course is oriented towards achievement of the learning objectives. It is based on the description and categorization of clinical and basic research models. A wide range of teaching and learning tasks are implemented, such as:

- Lectures where these models are explained and students learn the different characteristics of each model.
- Seminars by experts, which work as the practical application of the theoretical contents.
- Small research project: students will choose a scientific hypothesis and the most suitable methodology for each topic.

4.2.Learning tasks

The course includes the following learning tasks:

- Lectures.
- Seminars by experts.
- Scientific research project. The student must design a research project containing the following points:

  - Background: historical review of the literature and studies on the issue. Description of the methods used in the past to identify the causes and pathophysiological mechanisms of that disease.
  - Current status of the topic: description of the problem. Unresolved issues. Description of the methods that are being used in the most recent work investigating the causes or pathophysiological mechanisms of that disease.
  - Hypothesis and research objectives.
  - Proposed Method or experiment that could solve outstanding issues on the chosen disease. Writing the Materials and Methods sections of the research project.
  - List the cited sources according to the standard rules for scientific publication.
  - Informatic tools will be provided from the University of Zaragoza library.

4.3.Syllabus

The course will address the following topics:

Lectures

Section 1. From Basic research to clinical research in medicine

- Types of study in medical research in Medicine. Which is the most appropriated method to every research?
- Experimental animal models. legal and ethical considerations.
- Ex-vivo models of research: isolated organs and tissues.
- Cell cultures. Methodology. Primary cultures. Continuous cell lines. Advantages and disadvantages of experimentation based on cell cultures.
- Genetic analysis: direct and indirect techniques. Addressing complex pathologies.
- The molecular revolution recombinant DNA technology.
- High performance techniques: genomics, transcriptomics, proteomics, metabolomics and phosphoproteomics.
- Expression systems of Heterologous protein.
- Genetically modified organisms for biomedical research.
- Antibodies; production and applications in biomedical research.
- Integration models. Bioinformatics. Systems biology.

Section 2. Clinical Research Models

- The clinical trial as a model of medical research.
- Ethics in clinical trial.
- Research models of evidence-based therapeutic.

- Models of post-authorization studies.

Section 3. Design of a research project
- I have a question / idea I would like to investigate.
- What means do I have to develop this project?
- How do I managed to adquire help for my project.
- How do I budget my project?
- How do I design / submit my project?

Seminars
Section 1. From Basic research to clinical research in medicine
- Animal models in oncology research.
- Models on aging research.
- Lange Syndrome Research as a model for rare diseases.
- Utilities of flow cytometry in Medical Research.
- Molecular basis of hypertension.

4.4.Course planning and calendar

Timetable
- Hours: Monday to Thursday / From 16 to 20 H .
- Days: 11th, 12th, 16th, 17th, 18th, 19th, 23th, 24th, 25th of November.

Assessment
- Presentation of the project draft before November 28th
- Short answer exam on November 25th.

Resources
- Online course on the virtual platform Moodle of the University of Zaragoza. This website will include detailed information about the course (objectives, program and evaluation system), a communication system between students and teachers, and and an easy way to submit the summative activities of the course.

4.5.Bibliography and recommended resources

Conn, P. Michael.. Totowa, N.J Sourcebook of Models for Biomedical Research

Springer Science & Business Media, 2008

ISBN: 1597452858, 9781597452854

Argimón JM, Jimenez J. Métodos para la investigación clinica y epidemiologica. 3ª ed. Elsevier España; 2004.

Crawford, R.L.; Allen, T.. In: Sourcebook of models for biomedical research / edited by P. Michael Conn; Totowa, N.J. : London : Humana Press ; Springer [distributor], 2008.,