1. OVERVIEW

Subject Area	OPTIONAL COMPLEMENTARY PLACEMENT III: BIOMEDICAL RESEARCH
Degree	MEDICINE
School/Faculty	BIOMEDICAL AND HEALTH SCIENCES
Ac. Year	6º
ECTS	3 PRACTICAL ECTS
Type	OPTIONAL
Language	SPANISH
Delivery Mode	ON CAMPUS
Semester	SIX-MONTHLY

2. INTRODUCTION

The Optional Complementary Placement III is an optional six-monthly subject which is worth 3 ECTS and takes place in the 6th year. It is part of the Human Clinical Training module which is worth 101 ECTS + 82 practical ECTS. Of these, 9 ECTS are optional subjects.

Research in the **field of health** and **biomedical research** aims to improve knowledge of the molecular, biochemical, cellular, genetic, pathophysiological and epidemiological mechanisms of diseases and health issues. This helps to establish strategies for their prevention and treatment. The concept of biomedical research is quite recent and encompasses different ways of performing investigation: basic or preclinical research, clinical research and epidemiological research. From these traditional types of research, a new concept has emerged – **translational research**.

The **main objective of this subject** is to train students in biomedical research from a **translational research** point of view. In this way, students will understand that knowledge deriving from basic research can be transferred and applied to clinical practice to improve diagnosis, treatment, prevention and prediction of health problems. Translational research truly attempts to fuse progress made in the laboratory with developments in clinical practice. Translational research involves applying basic knowledge to the healthcare process. As a result of this new approach, biomedical research should be able to reduce the time it takes between discoveries being made in this type of research and their implementation and use in daily clinical practice.

This subject also provides students with theoretical and practical knowledge of the main research techniques to achieve these goals. This includes proposing a hypothesis and designing experiments which enable the main clinical problems associated with patient management to be approached from a scientific and investigational point of view.

3. SKILLS AND LEARNING OUTCOMES

General and basic skills (CB and CG, as per the Spanish acronyms):

- 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 data (usually within their study area) to form opinions which include reflecting on relevant social, scientific and ethical matters.
- CB4 Students can communicate information, ideas, problems and solutions to both specialist and non-specialist audiences.
- CB5 Students have developed the learning skills necessary to undertake further study in a much more independent manner.
- CG2. Understand the importance of such principles to benefit patients, society and the profession, with particular attention paid to professional secrecy, confidentiality and intimacy.
- CG3. Know how to apply the principle of social justice to professional practice.
- CG6. Carry out professional activity with regard to other health professionals.
- CG20. Acquire sufficient clinical experience under supervision in hospital institutions, health centres or other healthcare institutions.
- 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.
- 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.
- 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):

- CE 1.2.2 Use basic laboratory techniques and materials. Interpret a normal analysis. Using macroscopic, microscopic and imaging techniques to recognise the morphology and structure of tissue, organs and systems. Performing functional tests and determining vital signs and how to interpret them. The basic physical examination.
- CE 2.4.1 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.
- CE 2.4.2 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.
- CE 2.4.5 Independently use a personal computer. Use search and biomedical data recovery systems. Understand and manage clinical documentation procedures.
- CE 2.4.6 Understand and critically interpret scientific texts. Understand the principles of the scientific method, biomedical research and clinical trials.
- CE 2.4.7 Understand and use the principles of medicine based on the (best) evidence.
- CE 2.5.1 Give an oral or written presentation to an audience of scientific work and/or professional reports.

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

- RA1 (4.1): 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 (4.2): Use search and biomedical data recovery systems.
- RA3 (4.3): Understand and critically interpret scientific texts.
- RA4 (4.4): Understand and use the principles of medicine based on the (best) scientific evidence.
- RA5 (4.5): Understand how to create and perform a research project and be able to design simple epidemiological studies.
- RA7 (4.7): 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
CG2, CG3, CG6, CG20, CB6, CG31, CT1, CT8, CT10, CE14	RA1
CB10, CG32, CG3, CT6, CT10, CE18	RA2
CB3, CG34, CT9, CT10, CE19	RA3
CB2, CB33, CG35, CT9, CT10, CE20	RA4
CB2, CG20, CG36, CG7, CT2, CT8, CT10, CE4, CE15	RA5

4. CONTENTS

UNIT 1. Animal experimentation.
UNIT 2. Biomedical research. Introduction to cellular and molecular biology.
UNIT 3. Research project and scientific article methodology.

Learning Outcomes	Learning Activity		Type of Activity	Contents
RA1 RA2 RA3 RA4 RA5 RA7	Activity 1	Seminar: Animal experimentation.	AF1 Theory/practical learning activities on-campus	UNIT 1. Animal experimentation.
RA1 RA2 RA3 RA4 RA5 RA7	Activity 2	Workshop: Animal handling	AF1 Theory/practical learning activities on-campus	
RA1 RA2 RA3 RA4 RA5 RA7	Activity 3:	Laboratory work: Experiments on animals in research.	AF1 Theory/practical learning activities on-campus	
RA1 RA2 RA3 RA4 RA5 RA7	Activity 4	Seminar: Introduction to biomedical research.	Theory/practical learning activities on-campus	BLOQUE 2: Biomedical research. Molecular and cellular biology.
RA1 RA2 RA3 RA4 RA5 RA7	Activity 5	Workshop: Cell cultures I	Theory/practical learning activities on-campus	
RA1 RA2 RA3 RA4 RA5 RA7	Activity 6	Seminar: Cell cultures II	Theory/practical learning activities on-campus	
RA1 RA2 RA3 RA4 RA5 RA7	Activity 8	Practical work: Tissue engineering I	Theory/practical learning activities on-campus	
RA1 RA2 RA3 RA4 RA5 RA7	Activity 9	Practical work: Tissue engineering II	Theory/practical learning activities on-campus	
RA1 RA2 RA3 RA4 RA5 RA7	Activity 10	Practical work: Cell cultures. Culture strains and experiment design on cells.	Theory/practical learning activities on-campus	
RA1 RA2 RA3 RA4 RA5 RA7	Activity 11	Laboratory work: Determining total proteins.	Theory/practical learning activities on-campus	
RA1 RA2 RA3 RA4 RA5 RA7	Activity 12	Seminar: Introduction to Molecular Biology techniques.	Theory/practical learning activities on-campus	
RA1 RA2 RA3 RA4 RA5 RA7	Activity 14	Laboratory work: Western Blot technique I.	Theory/practical learning activities on-campus	
RA1 RA2 RA3 RA4 RA5 RA7	Activity 15	Laboratory work: Western Blot technique II.	Theory/practical learning activities on-campus	

RA1 RA2 RA3 RA4 RA5 RA7	Activity 16	Evaluation of practical record	AF 7- independent working	
RA1 RA2 RA3 RA4 RA5 RA7	Activity 17	Workshop: Research project and scientific article methodology.	Theory/practical learning activities on-campus	UNIT 3 Research project and scientific article methodology.
RA1 RA2 RA3 RA4 RA5 RA7	Activity 18	Practical work: Directed work for scientific article.	AF 2- Directed work activities.	
RA1 RA2 RA3 RA4 RA5 RA7	Activity 19	Preparation of a scientific article.	AF 7- independent working	
RA1 RA2 RA3 RA4 RA5 RA7	Activity 20	Submission and oral presentation of scientific article.	AF 2- Directed work activities.	
RA1 RA2 RA3 RA4 RA5 RA7	Activity 21	Knowledge test	AF 2- Directed work activities.	
RA1 RA2 RA3 RA4 RA5 RA7	Activity 22	Submission and review of practical record.	AF 2- Directed work activities.	

- In the Virtual Campus, when you access the subject area, you will be able to see in detail the list of activities that you will have to perform, as well as the procedure and delivery date for each of them.

5. TEACHING/LEARNING METHODS

The types of teaching/learning methods are as follows:

- Problem-based learning geared towards clinical reasoning: Presentation of problems, reorganising into small groups, literature analysis, analysis of scientific texts and documents, symposiums and presentations, directed debates, specialised individual and collective tutorials, and reaching a consensus.

6. LEARNING ACTIVITIES

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

Learning activity	Number of hours	Attendance mode
Theory/practical learning activities	30	100
Directed learning activities	23	20
Independent working	20	0
Tutorials	1	100
Knowledge tests	1	100

7. ASSESSMENT

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

Assessment system	Weighting
Attitude during the on-campus assessment activities, according to the rubric	10%
Laboratory work and practical workshops: exam (30%), scientific article (30%) and practical record (40%)	50%
Evaluation of scientific article	16%
Short-question knowledge test	12%
Evaluation of practical record	12%

On the Virtual Campus, when you open the subject area, you can see all the details of your assessment activities and the deadlines and assessment procedures for each activity.

8. BIBLIOGRAPHY

BIOLOGÍA MOLECULAR DE LA CÉLULA 6ª EDICIÓN. Bruce Alberts. Omega, 2016.

The resources for the completion and evaluation of the subject will be published on the virtual campus:

1. Contents of the topics corresponding to the syllabus of the subject
2. Simulation sheets: workshops and clinical cases
3. Workshop and seminar documentation