

## Research Skills

Academic Year: ( 2024 / 2025 )

Review date: 22-04-2024

Department assigned to the subject: Bioengineering Department

Coordinating teacher: DESCO MENENDEZ, MANUEL

Type: Compulsory ECTS Credits : 3.0

Year : 1 Semester : 2

## REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

None.

## OBJECTIVES

The subject "Research Skills" aims to provide students with the necessary skills to be able to design and develop research projects in the biomedical field, as well as to adequately report their results. To this end, the student is trained in a series of skills and techniques, of an eminently practical nature, which are very necessary for field work in research, especially in the biomedical sector. This sector is characterized by a strong legal regulation of many aspects, especially those related to work with patients (clinical trials) or laboratory animals, and it is necessary to know this framework to be able to design and execute research projects in this field.

On the other hand, biomedical experimentation is characterized by a high biological variability in the results, which forces the analysis of the results to be carried out by means of biostatistical procedures, knowledge of which is absolutely necessary to be able to publish and validate results.

Another important aspect covered in the course is how to manage the innovative aspects of research work, in terms of intellectual property protection, possible entrepreneurship, etc.

Besides, the Global Goals for Sustainable Development will be introduced focusing on SDG3 (Good Health and Well-Being)

Finally, at a very practical level, it is explained how to write research projects and how to structure and write scientific articles, within the high standards currently demanded by the scientific community.

## DESCRIPTION OF CONTENTS: PROGRAMME

- Applied Biostatistics
- Experimental design and epidemiology
- Application of biostatistics concepts to artificial intelligence techniques.
- Ethics in research. Good practices.
- Design of research projects
- Innovation, intellectual property and entrepreneurship.
- Introduction to clinical trials
- Introduction to biomedical research with laboratory animals.
- Writing scientific articles and responding to reviewers.
- Workshop on academic work without plagiarism, use of artificial intelligence chatbots, etc.
- ODS: SDG3 Good Health and Well-Being

## LEARNING ACTIVITIES AND METHODOLOGY

- AF3 Theoretical practical classes
- AF5 Tutorship
- AF6 Team work
- AF7 Student individual work

## AF8 Partial and final exams

Activity code	total #hours	presence #hours	% Student Presence
AF3	19,5	19,5	100%
AF5	1	1	100%
AF6	16	0	0%
AF7	36.5	0	0%
AF8	2	2	100%
TOTAL SUBJECT	75	22.5	30%

## ASSESSMENT SYSTEM

<b>% end-of-term-examination:</b>	20
<b>% of continuous assessment (assignments, laboratory, practicals...):</b>	80

SE1	Participation in class
SE2	Individual or team works, or exams made during the course
SE3	Final exam

Evaluation system (%)	Weighting (%)
SE1	15
SE2	65
SE3	20

## BASIC BIBLIOGRAPHY

- Button KS, Ioannidis JP, Mokrysz C, Nosek BA, Flint J, Robinson ES, Munafò MR Power failure: why small sample size undermines the reliability of neuroscience, *Nat Rev Neurosci.* 2013 May;14(5):365-76, 2013
- England JR, Cheng PM Artificial Intelligence for Medical Image Analysis: A Guide for Authors and Reviewers, *AJR Am J Roentgenol.* 2019 Mar;212(3):513-519, 2019
- Esteva A, Robicquet A, Ramsundar B, Kuleshov V, DePristo M, Chou K, Cui C, Corrado G, Thrun S, Dean J A guide to deep learning in healthcare, *Nat Med.* 2019 Jan;25(1):24-29, 2019
- Ioannidis JP Why most published research findings are false. , *PLoS Med.* 2005 Aug;2(8):e124, 2005
- Mills JL. Data torturing, *N Engl J Med.* 1993 Oct 14;329(16):1196-9, 1993
- Munafò MR, Nosek BA, Bishop DVM, Button KS, Chambers CD, du Sert NP, Simonsohn U, Wagenmakers EJ, Ware JJ, Ioannidis JPA A manifesto for reproducible science, *Nat Hum Behav.* 2017 Jan 10;1:0021, 2017
- Seong Ho Park, Young-Hak Kim<sup>2</sup> Jun Young Lee<sup>3</sup> Soyoung Yoo, Chong Jai Kim Ethical challenges regarding artificial intelligence in medicine from the perspective of scientific editing and peer review, *Sci Ed* 2019; 6(2): 91-98., 2019