ANX-PR/CL/001-01

LEARNING GUIDE

SUBJECT

593000606 - Scientific Research Methodology

DEGREE PROGRAMME

59AJ - Master Universitario En Comunicaciones Inalámbricas

ACADEMIC YEAR & SEMESTER

2024/25 - Semester 1

Index

Learning guide

1. Description

1.1. Subject details

Name of the subject	593000606 - Scientific Research Methodology
No of credits	3 ECTS
Type	Compulsory
Academic year ot the programme	First year
Semester of tuition	Semester 1
Tuition period	September-January
Tuition languages	English
Degree programme	59AJ - Master Universitario en Comunicaciones Inalámbricas
Centre	59 - Escuela Tecnica Superior De Ingenieria Y Sistemas De Telecomunicacion
Academic year	2024-25

2. Faculty

2.1. Faculty members with subject teaching role

Name and surname	Office/Room	Email	Tutoring hours *
Marta Gil Barba	D8415	marta.gil.barba@upm.es	Sin horario. Meetings with prior appointment.
David Luengo Garcia (Subject coordinator)	A7011, D8201A	david.luengo@upm.es	Sin horario. Meetings with prior appointment.

* The tutoring schedule is indicative and subject to possible changes. Please check tutoring times with the faculty member in charge.

3. Skills and learning outcomes *

3.1. Skills to be learned

CEM13 - Adquirir un conocimiento instrumental mínimo que permita plantear formalmente un proyecto de investigación. / Acquire a minimun instrumental knowledge that allows to formally propose a research project.

CGI02 - Comprender el procedimiento, valor y límites del método científico, siendo capaz de identificar, localizar y obtenerdatos requeridos en un trabajo de investigación, de diseñar y guiar investigaciones analíticas, de modelado y experimentales, así como de evaluar datos de una manera crítica y extraer conclusiones. / Understand the procedure, value, and limits of the scientific method, being able to identify, locate and obtain data required in a research work, to design and guide analytical, modeling, and experimental investigations, as well as to critically evaluate data and extract conclusions.

CGI03 - Valorar la importancia de las fuentes documentales, manejarlas y buscar la información para el desarrollo de cualquier trabajo de investigación. / Assess the importance of documentary sources, manage them and search for information for the development of any research work.

CGI05 - Adquirir el conocimiento necesario sobre los mecanismos de financiación de la investigación y transferencia de la tecnología, y sobre la legislación vigente sobre protección de resultados. /Acquire the necessary knowledge about the mechanisms for financing research and technology transfer, and about current legislation on the protection of results.

UPM1 - Uso de la lengua inglesa / Use of the English language

UPM2 - Liderazgo de equipos / Team leadership

3.2. Learning outcomes

RA20 - Utilizar adecuadamente los recursos bibliográficos y bibliométricos disponibles/ Properly use of the available bibliographic and bibliometric resources

RA23 - Localizar convocatorias de ayudas para investigación y redactar adecuadamente las propuestas/ Find out calls for research grants and properly draft proposals

RA19 - Entender el proceso y las características de la actividad investigadora/ Understand the process and characteristics of the research activity

RA21 - Adquirir una actitud crítica y pragmática de las teorías sobre el conocimiento científico/ Acquire a critical and pragmatic attitude in relation to the theories about scientific knowledge

RA22 - Presentar y defender con rigor un trabajo de forma escrita y oral en inglés/ Present and rigorously defend a work in written and oral form in English

RA8 - Identificar el impacto social y económico de las comunicaciones móviles en un contexto global/ Identify the social and economic impact of mobile communications in a global context.

* The Learning Guides should reflect the Skills and Learning Outcomes in the same way as indicated in the Degree Verification Memory. For this reason, they have not been translated into English and appear in Spanish.

4. Brief description of the subject and syllabus

4.1. Brief description of the subject

This course is aimed at introducing students to concepts and practices of the scientific research methodology. During the course, students will demonstrate their understanding and competence through the development of the study design for their own research project.

4.2. Syllabus

1. Scientific research processes
    1.1. Phylosophy of science
    1.2. Scientific research method
    1.3. The research process - stages of research
2. Bibliographic resources and bibliometrics
    2.1. Research digital ID (Orcid, Scopus, WoS, etc.)
    2.2. UPM's Scientific Portal
    2.3. Ingenio and other information sources
    2.4. References and bibliographic managers
3. Communication techniques
    3.1. Scientific and technical language
    3.2. Elaboration of scientific documents
    3.3. Oratory and communication skills
4. Ethical aspects of scientific work
    4.1. The concept of ethics in research: ethical committees
    4.2. Invention, forgery and plagiarism
    4.3. Confidentiality, copyright and conflicts of interest
5. Scientific policy
    5.1. Introduction: ways of funding your research projects
    5.2. Calls for European Union funding projects
    5.3. Calls for Spanish Government funding projects
    5.4. Private research collaboration projects

5. Schedule

5.1. Subject schedule*

Week	Type 1 activities	Type 2 activities	Distant / On-line	Assessment activities
1	**Course presentation & Scientific research processes** Duration: 02:00 **Scientific research processes** Duration: 02:00			
2	**Bibliographic resources and bibliometrics** Duration: 02:00 **Bibliographic resources and bibliometrics** Duration: 02:00			**Written Exam - Scientific Research Processes** Progressive assessment and Global Examination Not Presential Duration: 00:00 **Final Work - Milestone 1 (Topic Selection)** Progressive assessment and Global Examination Not Presential Duration: 00:00
3	**Bibliographic resources and bibliometrics** Duration: 01:00 **Communication Techniques** Duration: 03:00			**Written Exam - Bibliography** Progressive assessment and Global Examination Not Presential Duration: 00:00
4	**Communication Techniques** Duration: 02:00 **Ethical Aspects of Scientific Work** Duration: 02:00			**Written Exam - Communication Techniques** Progressive assessment and Global Examination Not Presential Duration: 00:00 **Final Work - Milestone 2 (Problem Description + State of the Art)** Progressive assessment and Global Examination Not Presential Duration: 00:00

5	**Ethical Aspects of Scientific Work** Duration: 02:00			
6	**Scientific Policy** Duration: 02:00 **Scientific Policy** Duration: 02:00			**Written Exam - Ethics** Progressive assessment and Global Examination Not Presential Duration: 00:00 **Final Work - Milestone 3 (Ethical Aspects & Budget)** Progressive assessment and Global Examination Not Presential Duration: 00:00
7	**Final works presentation** Duration: 02:00			**Submission of Final Work's Memory** Progressive assessment and Global Examination Not Presential Duration: 00:00 **Presentation of Final Works** Group presentation in the classroom Progressive assessment and Global Examination Presential Duration: 02:00
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				**Global Written Exam (only for students failing the progressive evaluation)** Global examination Presential Duration: 01:00

Depending on the programme study plan, total values will be calculated according to the ECTS credit unit as 26/27 hours of student face-to-face contact and independent study time.

6. Activities and assessment criteria

6.1. Assessment activities

6.1.1. Assessment

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
2	Written Exam - Scientific Research Processes		No Presential	00:00	7.5%	4 / 10	CGI02 CGI03 UPM1
2	Final Work - Milestone 1 (Topic Selection)		No Presential	00:00	5%	/ 10	UPM1 UPM2 CEM13
3	Written Exam - Bibliography		No Presential	00:00	7.5%	4 / 10	UPM1 UPM2
4	Written Exam - Communication Techniques		No Presential	00:00	7.5%	4 / 10	CGI02 CGI03 CGI05 UPM1 UPM2 CEM13
4	Final Work - Milestone 2 (Problem Description + State of the Art)		No Presential	00:00	10%	/ 10	CGI02 CGI03 UPM1 UPM2 CEM13
6	Written Exam - Ethics		No Presential	00:00	7.5%	4 / 10	CGI02 UPM1
6	Final Work - Milestone 3 (Ethical Aspects & Budget)		No Presential	00:00	5%	/ 10	CGI02 CGI03 UPM1 UPM2 CEM13
7	Submission of Final Work's Memory		No Presential	00:00	20%	4 / 10	
7	Presentation of Final Works	Group presentation in the classroom	Face-to-face	02:00	30%	4 / 10	CGI02 CGI03 CGI05 UPM1 UPM2 CEM13

6.1.2. Global examination

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
2	Written Exam - Scientific Research Processes		No Presential	00:00	7.5%	4 / 10	CGI02 CGI03 UPM1
2	Final Work - Milestone 1 (Topic Selection)		No Presential	00:00	5%	/ 10	UPM1 UPM2 CEM13
3	Written Exam - Bibliography		No Presential	00:00	7.5%	4 / 10	UPM1 UPM2
4	Written Exam - Communication Techniques		No Presential	00:00	7.5%	4 / 10	CGI02 CGI03 CGI05 UPM1 UPM2 CEM13
4	Final Work - Milestone 2 (Problem Description + State of the Art)		No Presential	00:00	10%	/ 10	CGI02 CGI03 UPM1 UPM2 CEM13
6	Written Exam - Ethics		No Presential	00:00	7.5%	4 / 10	CGI02 UPM1
6	Final Work - Milestone 3 (Ethical Aspects & Budget)		No Presential	00:00	5%	/ 10	CGI02 CGI03 UPM1 UPM2 CEM13
7	Submission of Final Work's Memory		No Presential	00:00	20%	4 / 10	
7	Presentation of Final Works	Group presentation in the classroom	Face-to-face	02:00	30%	4 / 10	CGI02 CGI03 CGI05 UPM1 UPM2 CEM13
17	Global Written Exam (only for students failing the progressive evaluation)		Face-to-face	01:00	30%	/ 10	CGI02 CGI03 CGI05 UPM1 CEM13

6.1.3. Referred (re-sit) examination

No se ha definido la evaluación extraordinaria.

6.2. Assessment criteria

The progressive evaluation will consist of two parts:

1) Written exams at the end of each of the first 4 units of the course (7.5% per unit).

2) A work to be delivered and presented at the end of the course (70%). Depending on the number of students enrolled in the course this work will be either individual or in groups of 2-3 students.

The first part can be recovered in the final and/or extraordinary exam by students failing to pass the course through a global written exam (30%) that will include questions from the first 4 units of the course. The second part is not recoverable and MUST be done during the course.

7. Teaching resources

7.1. Teaching resources for the subject

Name	Type	Notes
Carl J. Sindermann, "Winning the games scientists play: strategies for enhancing your career in science", Perseus Publishing, 2001	Bibliography	
Leslie A. Olsen and Thomas N. Hucklin, "Technical writing and professional communication", McGraw-Hill, 1991 (2nd Ed).	Bibliography	
C. George Thomas, "Research Methodology and Scientific Writing", Springer, 2021 (2nd Ed).	Bibliography	
E. B. Wilson, "An Introduction to Scientific Research", Dover Publications, 2012.	Bibliography	

Uwem Essia, "Lecture Notes on Research Methodology (Books 1-5)", 2022	Bibliography	
On-Line Resources	Web resource	Journal and conference papers, scientific reports, on-line bibliographic resources, websites of different calls for projects, etc.