NATIONAL UNIVERSITY OF SAN MARCOS

FACULTY OF MATHEMATICAL SCIENCES

SYLLABUS

1. GENERAL INFORMATION

1.1 Course name	:	Fundamentals of Scientific Research
1.2 Code	:	FG140
1.3 Academic Program	:	Scientific Computing
1.4 Credits	:	3
1.5 Prerrequisites	:	None
1.6 Type of Course	:	Mandatory
1.7 Area of Studies	:	Estudios Generales
1.8 Number of Weeks	:	16
1.9 Hours per week	:	2 HT; 2 HP;
1.10 Cycle	:	I
1.11 Learning modality	:	Face to face
1.12 Academic Period	:	2026-I
1.13 Semester Start Date	:	
1.14 Semester End Date	:	

2. PROFESSORS

Meetings after coordination with the professor

3. INTRODUCTION TO THE COURSE

The Fundamentals of Scientific Research course provides the student with the basic knowledge and tools for the development of high-quality scientific research. The course addresses the problematization of reality, theoretical foundation, methodology, and ethics in research. It seeks to develop in the student the capacity for critical observation, academic rigor, and intellectual honesty necessary to produce new knowledge that contributes to the advancement of science and technology.

4. GOALS

- Understand the concept of science, the scientific method, and the stages of the research process.
- Identify and pose relevant research problems based on the observation of reality.
- Apply techniques for searching and managing scientific information in specialized databases.
- Know the standards for scientific writing and the ethical principles governing the publication of results.

5. COMPETENCES

ABET-3) An ability to develop and conduct experiments or test hypotheses, analyze and interpret data, and use scientific judgment to draw conclusions. (Familiarity)

6. TOPICS

Unit 1: Science and Scientific Method (12 hours)	
Competences Expected: ABET-3	
Topics	**Learning Outcomes**
• Scientific knowledge: Characteristics and levels. • Science: Classification and objectives. • The scientific method: Stages and application. • Ethics in research and best practices.	• Differentiate scientific knowledge from empirical or everyday knowledge [Familiarizarse]. • Sequentially apply the stages of the scientific method in practical cases [Usar]. • Evaluate the importance of ethics and scientific integrity in project development [Evaluar].
Readings : [**Bunge2014**], [**Hernandez2014**]	

Unit 2: Scientific Information Management (12 hours)	
Competences Expected: ABET-3	
Topics	**Learning Outcomes**
• Information search: Strategies and databases. • Bibliographic management tools (Mendeley, Zotero). • Critical reading of scientific articles. • Citation and reference standards (APA, Vancouver, IEEE).	• Identify reliable information sources and high-impact academic databases [Familiarizarse]. • Use bibliographic managers to organize and cite sources in an academic document [Usar]. • Write a coherent and well-founded literature review on a specific topic [Evaluar].
Readings : [**Martinez2013**], [**SÃąnchez2011**]	

Unit 3: Research Project Planning (12 hours)	
Competences Expected: ABET-3	
Topics	**Learning Outcomes**
• Identification and delimitation of the research problem. • Formulation of the research question and objectives. • Justification and feasibility of the research. • Hypothesis formulation and definition of variables.	• Recognize the fundamental components of a scientific research problem [Familiarizarse]. • Formulate mathematical or logical hypotheses that can be experimentally tested [Usar]. • Design the preliminary methodological framework for a rigorous scientific study [Evaluar].
Readings : [**Hernandez2014**], [**Kothari2009**]	

Unit 4: Scientific Writing and Communication (12 hours)	
Competences Expected: ABET-3	
Topics	**Learning Outcomes**
• Structure of the scientific article (IMRaD). • Technical writing: Clarity, precision, and brevity. • Tables, figures, and data representation. • The publication process and peer review.	• Understand the standard structure of scientific reports and communications [Familiarizarse]. • Prepare effective reports using technical language and appropriate visual representations [Usar]. • Present and orally defend research results in an inclusive manner [Evaluar].
Readings : [**Olson2014**], [**Russey2006**]	

7. WORKPLAN

7.1 Methodology

Individual and team participation is encouraged to present their ideas, motivating them with additional points in the different stages of the course evaluation.

7.2 Theory Sessions

The theory sessions are held in master classes with activities including active learning and roleplay to allow students to internalize the concepts.

7.3 Practical Sessions

The practical sessions are held in class where a series of exercises and/or practical concepts are developed through problem solving, problem solving, specific exercises and/or in application contexts.

8. EVALUATION SYSTEM

********* EVALUATION MISSING ********

9. BASIC BIBLIOGRAPHY