NATIONAL UNIVERSITY OF SAN MARCOS

FACULTY OF MATHEMATICAL SCIENCES

SYLLABUS

1. GENERAL INFORMATION

1.1 Course name	:	Environment and Sustainable Development
1.2 Code	:	FG109
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 Environment and Sustainable Development course is theoretical and practical in nature, aiming to raise student awareness regarding the importance of ecosystem conservation. The course covers the principles of ecology, the impact of human activities on the biosphere, and global strategies to achieve development that balances economic growth, social equity, and environmental protection. This knowledge is crucial for computer science professionals to design technological solutions with a focus on environmental responsibility and sustainability.

4. GOALS

- Understand the fundamental concepts of ecology and the functioning of biogeochemical cycles.
- Analyze the causes and consequences of major global environmental problems, such as climate change.
- Evaluate the national and international regulatory framework oriented towards environmental management and sustainability.
- Apply sustainability indicators in the evaluation of scientific and technological projects.

5. COMPETENCES

ABET-5) An ability to understand ethical and professional responsibilities and the impact of technical and/or scientific solutions in global, economic, environmental, and societal contexts. (Familiarity)

6. TOPICS

Unit 1: Ecology and Biodiversity (16 hours)	
Competences Expected: ABET-5	
Topics	**Learning Outcomes**
• Ecology: Basic concepts, ecosystems, and biomes. • Energy flow and biogeochemical cycles in nature. • Biodiversity: Importance, levels, and current threats. • Ecosystem services and valuation of natural capital.	• Identify the components of an ecosystem and the interdependence relationships among living beings [Familiarizarse]. • Explain the impact of biodiversity loss on the stability of natural systems [Usar]. • Evaluate the health of a local ecosystem using biological indicators and physicochemical parameters [Evaluar].
Readings : [**Miller2012**], [**Smith2001**]	

Unit 2: Environmental Impact and Climate Change (16 hours)	
Competences Expected: ABET-5	
Topics	**Learning Outcomes**
• Environmental pollution: Air, water, soil, and waste. • The greenhouse effect and global warming. • Impact of industrial and technological activities. • Ecological footprint and carbon footprint: Measurement and reduction.	• Recognize the main sources of pollution and their effects on public health and the climate [Familiarizarse]. • Calculate personal and institutional carbon footprints to propose mitigation measures [Usar]. • Critically analyze the environmental impact of data centers and technological infrastructure [Evaluar].
Readings : [**Miller2012**], [**Star2004**]	

Unit 3: Environmental Management and Regulations (16 hours)	
Competences Expected: ABET-5	
Topics	**Learning Outcomes**
• Environmental legal framework in Peru and the Ministry of Environment. • Environmental Impact Assessment (EIA) and certifications. • Natural resource management: Water, energy, and protected areas. • Environmental ethics and corporate social responsibility.	• Describe the functions of environmental regulatory bodies at the national level [Familiarizarse]. • Apply ethical and legal principles in the design of environmental management plans for projects [Usar]. • Argue for the importance of transparency and citizen participation in environmental issues [Evaluar].
Readings : [**Strange2012**], [**Primack1993**]	

Unit 4: Strategies for Sustainable Development (16 hours)	
Competences Expected: ABET-5	
Topics	**Learning Outcomes**
	• Recognize the 17 Sustainable Development Goals and their relationship with scientific computing [Familiarizarse]. • Integrate sustainability criteria and circular economy into the software life cycle [Usar]. • Propose innovative technological solutions to solve contemporary socio-environmental challenges [Evaluar].
Readings : [**Strange2012**], [**Miller2012**]	

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