NATIONAL UNIVERSITY OF SAN MARCOS

FACULTY OF MATHEMATICAL SCIENCES

SYLLABUS

1. GENERAL INFORMATION

1.1 Course name	:	General Physics
1.2 Code	:	FI101
1.3 Academic Program	:	Scientific Computing
1.4 Credits	:	5
1.5 Prerrequisites	:	MA111. Calculus I. (2^{nd} Sem)
1.6 Type of Course	:	Mandatory
1.7 Area of Studies	:	Estudios Generales
1.8 Number of Weeks	:	16
1.9 Hours per week	:	3 HT; 4 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 course includes knowledge of the fundamental principles and laws of Physics, Newtonian Classical Mechanics, Kinematics, Statics, Dynamics, Energy and Work, conservative and non-conservative forces, Energy and Momentum. It emphasizes acoustic phenomena, electromagnetic waves, and optics with applications in biological sciences.

4. GOALS

- Understand and apply Newton's laws in the analysis of motion and equilibrium of bodies.
- Apply the concepts of work, energy, and conservation in solving complex mechanical problems.
- Analyze the laws of thermodynamics, fluid behavior, and heat transfer phenomena.
- Study the principles of optics and wave phenomena to understand the nature of light and sound.

5. COMPETENCES

ABET-1) An ability to identify, formulate, and solve broadly defined technical or scientific problems by applying knowledge of mathematics and science and/or technical topics to areas relevant to the discipline. (Usage)

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

6. TOPICS

Unit 1: Particle and Rigid Body Mechanics (16 hours)	
Competences Expected: ABET-1,ABET-3	
Topics	**Learning Outcomes**
• Physical quantities, systems of units, and vectors. • Kinematics: Motion in one and two dimensions. • Dynamics: Newton's laws and their applications. • Statics and equilibrium of the rigid body.	• Describe the motion of bodies using kinematic and vector magnitudes [Familiarizarse]. • Apply Newton's laws to determine forces and accelerations in physical systems [Usar]. • Solve static equilibrium problems through the analysis of forces and torque [Evaluar].
Readings : [**Sears2013**], [**Tipler2010**]	

Unit 2: Work, Energy, and Momentum (16 hours)	
Competences Expected: ABET-1,ABET-3	
Topics	**Learning Outcomes**
• Work and kinetic energy. • Potential energy and conservation of mechanical energy. • Linear momentum and impulse. • Elastic and inelastic collisions.	• Identify forms of energy and their transformation in conservative physical processes [Familiarizarse]. • Use the work-energy theorem to analyze dynamic systems [Usar]. • Apply the conservation of momentum in solving collision problems [Evaluar].
Readings : [**Sears2013**], [**Resnick2005**]	

Unit 3: Fluid Mechanics and Thermodynamics (16 hours)	
Competences Expected: ABET-1,ABET-3	
Topics	**Learning Outcomes**
• Fluid statics and dynamics (Bernoulli and Archimedes). • Temperature, heat, and laws of thermodynamics. • Kinetic theory of gases. • Thermodynamic processes and heat engines.	• Understand the fundamental properties of fluids and heat transfer mechanisms [Familiarizarse]. • Calculate state variables in thermal processes using the laws of thermodynamics [Usar]. • Model the behavior of fluids and gases through the implementation of fundamental equations [Evaluar].
Readings : [**Sears2013**], [**Serway2018**]	

Unit 4: Waves and Optics (16 hours)	
Competences Expected: ABET-1,ABET-3	
Topics	**Learning Outcomes**
• Wave motion and acoustic phenomena. • Nature and propagation of light. • Geometric optics: Reflection and refraction. • Electromagnetic waves and interference.	• Recognize the characteristics of mechanical and electromagnetic waves in the environment [Familiarizarse]. • Analyze image formation in mirrors and lenses using ray tracing [Usar]. • Evaluate interference and diffraction phenomena based on the wave model of light [Evaluar].
Readings : [**Alonso1971**], [**Sears2009**]	

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