National University of Engineering (UNI)
School of Computer Science
Syllabus 2024-II

1. COURSE

FI101FCCS. Physics I (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	FI101FCCS. Physics I
2.2 Semester	:	1^{st} Semester.
2.3 Credits	:	3
2.4 Horas	:	2 HT; 2 HP;
2.5 Duration of the period	:	16 weeks
2.6 Type of course	:	Mandatory
2.7 Learning modality	:	Face to face
2.8 Prerrequisites	:	None

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

Physics is essential for understanding the world around us, and its principles are fundamental in many areas of computer science, such as computer graphics, physical simulations, and robotics. This course introduces the basic concepts of classical mechanics, including kinematics, dynamics, work, and energy.

5. GOALS

- Understand the fundamental laws of classical mechanics.
- Apply these laws to solve problems of motion in one and two dimensions.
- Develop skills to analyze physical systems and model them mathematically.

6. COMPETENCES

1) Analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify solutions. (Assessment)

6) Apply computer science theory and software development fundamentals to produce computing-based solutions. (Assessment)

AG-C07) Computing Knowledge: Applies appropriate knowledge of mathematics, science, and computing. (Assessment)

AG-C09) Solution Design and Development: Designs, implements, and evaluates solutions for complex computing problems. (Assessment)

AG-C12) Applies computer science theory and software development fundamentals to produce computer-based solutions. (Assessment)

7. TOPICS

Unit 1: Kinematics (8 hours)	
Competences Expected: 1,AG-C07	
Topics	**Learning Outcomes**
• Displacement, velocity, and acceleration. • Uniform and uniformly accelerated linear motion. • Projectile motion. • Uniform circular motion.	• Define and calculate displacement, velocity, and acceleration. [Familiarizarse] • Solve problems involving linear motion and projectile motion. [Usar] • Analyze uniform circular motion. [Evaluar]
Readings : [YF18], [SJ18]	

Unit 2: Dynamics (10 hours)	
Competences Expected: 1,AG-C07,AG-C09	
Topics	**Learning Outcomes**
• Newton's laws of motion. • Forces of friction. • Work and energy. • Work-kinetic energy theorem. • Power.	• State and apply Newton's laws of motion. [Familiarizarse] • Calculate the work done by a force. [Usar] • Apply the work-kinetic energy theorem to solve dynamics problems. [Evaluar]
Readings : [YF18], [SJ18]	

Unit 3: Conservation of Energy (8 hours)	
Competences Expected: 1,AG-C07,AG-C09	
Topics	**Learning Outcomes**
• Potential energy. • Conservation of mechanical energy. • Conservative and non-conservative forces.	• Define and calculate potential energy. [Familiarizarse] • Apply the principle of conservation of mechanical energy. [Usar] • Distinguish between conservative and non-conservative forces. [Evaluar]
Readings : [YF18], [SJ18]	

Unit 4: Systems of Particles and Conservation of Linear Momentum (6 hours)	
Competences Expected: 1,AG-C07,AG-C09	
Topics	**Learning Outcomes**
• Center of mass. • Linear momentum. • Conservation of linear momentum. • Collisions.	• Calculate the center of mass of a system of particles. [Familiarizarse] • Apply the principle of conservation of linear momentum. [Usar] • Analyze elastic and inelastic collisions. [Evaluar]
Readings : [YF18], [SJ18]	

Unit 5: Rotation (8 hours)	
Competences Expected: 1,AG-C07,AG-C09	
Topics	**Learning Outcomes**
• Rotational kinematics. • Rotational dynamics. • Moment of inertia. • Torque and rotational kinetic energy.	• Describe rotational motion using angular variables. [Familiarizarse] • Calculate the moment of inertia of simple objects. [Usar] • Apply the laws of rotational dynamics. [Evaluar]
Readings : [YF18], [SJ18]	

Unit 6: Applications in Computing (8 hours)	
Competences Expected: 1,AG-C07,AG-C12	
Topics	**Learning Outcomes**
• Physical simulations. • Computer graphics. • Robotics.	• Explain how the principles of physics are used in physical simulations. [Familiarizarse] • Describe the application of physics in computer graphics. [Usar] • Analyze the use of physics in robotics. [Evaluar]
Readings : [YF18]	

8. WORKPLAN

8.1 Methodology

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

8.2 Theory Sessions

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

8.3 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.

9. EVALUATION SYSTEM

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

10. BASIC BIBLIOGRAPHY

[SJ18] Raymond A. Serway and John W. Jewett. *Physics for Scientists and Engineers with Modern Physics*. Cengage Learning, 2018.

[YF18] Hugh D. Young and Roger A. Freedman. *University Physics with Modern Physics*. Pearson, 2018.