



Universidad Nacional Mayor de San Marcos
School of Computer Science
Syllabus of Course
Academic Period 2018-II

1. **Code and Name:** ME0019. Physics I (Mandatory)
2. **Credits:** 4
3. **Hours of theory and Lab:** 4 HT; (15 weeks)
4. **Professor(s)**

Meetings after coordination with the professor

5. Bibliography

- [AF95] Marcelo Alonso and Edward Finn. *Física*. Addison Wesley Iberoamericana, 1995. ISBN: 0-201-62565-2.
- [SB02] Raymond Serway and Robert Beichner. *Física, para Ciencias e Ingenierias*. Mc Graw Hill, 2002. ISBN: 970-10-3581-X.

6. Information about the course

- (a) **Brief description about the course** This course is useful in this career so that the student learns to show a high degree of mastery of the laws of the movement of General Physics.
- (b) **Prerequisites:** None
- (c) **Type of Course:** Mandatory
- (d) **Modality:** Face to face

7. Specific goals of the Course

- Train and present to the student the basic principles of Physics as a natural science encompassing its most important topics and their relation with everyday problems.

8. Contribution to Outcomes

- a) An ability to apply knowledge of mathematics, science. (**Usage**)
- i) An ability to use the techniques, skills, and modern computing tools necessary for computing practice. (**Usage**)
- j) Apply the mathematical basis, principles of algorithms and the theory of Computer Science in the modeling and design of computational systems in such a way as to demonstrate understanding of the equilibrium points involved in the chosen option. (**Usage**)

9. Competences (IEEE)

- C1.** An intellectual understanding and the ability to apply mathematical foundations and computer science theory.⇒ **Outcome a**
- C20.** Ability to connect theory and skills learned in academia to real-world occurrences explaining their relevance and utility.⇒ **Outcome i,j**

10. List of topics

1. FI1. Introducción
2. FI2. Movimiento de partículas en una dimensión
3. FI3. Movimiento de partículas en dos y tres dimensiones

4. FI4. Leyes del movimiento
5. FI5. Trabajo y Energía
6. FI6. Momento lineal
7. FI7. Rotación de cuerpos rígidos
8. FI8. Dinámica del movimiento de rotación

11. Methodology and Evaluation

Methodology:

Theory Sessions:

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

Lab Sessions:

In order to verify their competences, several activities including active learning and roleplay will be developed during lab sessions.

Oral Presentations:

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

Reading:

Throughout the course different readings are provided, which are evaluated. The average of the notes in the readings is considered as the mark of a qualified practice. The use of the UTEC Online virtual campus allows each student to access the course information, and interact outside the classroom with the teacher and with the other students.

Evaluation System:

12. Content

Unit 1: FI1. Introducción (4)	
Competences Expected: C1,C20	
Learning Outcomes	Topics
<ul style="list-style-type: none"> • Understand and work with the physical magnitudes of the SI. • Abstracting the rigorous physical concepts of nature and represent them in vector models. • Understand and apply vector concepts to real physical problems. 	<ul style="list-style-type: none"> • Scientific research. The scientific method. • Concept of Chemistry. Chemistry today • Matter. Classification and physical, chemical, intensive and extensive properties. • Idealized model. • Physical magnitudes. • Properties of vectors • Components of a vector and unit vectors. • Vector product. • Exercises and problems.
Readings : [SB02], [AF95]	

Unit 2: FI2. Movimiento de partículas en una dimensión (2)	
Competences Expected: C1,C20	
Learning Outcomes	Topics
<ul style="list-style-type: none"> • Describe mathematically the mechanical motion of a one-dimensional particle as a body of negligible dimensions • Know and apply concepts of kinematic magnitudes. • Describe the particle motion behavior, theoretically and graphically • Knowing one-dimensional vector representations of these movements. • Solve problems. 	<ul style="list-style-type: none"> • Displacement, Velocity, Speed. • Instant velocity • Medium and Instant Acceleration. • Movement with constant acceleration • Free fall of bodies • Exercises and problems.
Readings : [SB02], [AF95]	

Unit 3: FI3. Movimiento de partículas en dos y tres dimensiones (4)	
Competences Expected: C1,C20	
Learning Outcomes	Topics
<ul style="list-style-type: none"> • Describe mathematically the mechanical motion of a particle in two and three dimensions as a body of negligible dimensions. • Know and apply concepts of vector kinematic quantities in two and three dimensions. • Describe the behavior of particle motion theoretically and graphically in two and three dimensions • Know and apply circular movement concepts. • Solve problems. 	<ul style="list-style-type: none"> • Displacement and Velocity. • The vector acceleration • Parabolic movement. • Circular movement • Tangential and radial acceleration components. • Exercises and problems.
Readings : [SB02], [AF95]	

Unit 4: FI4. Leyes del movimiento (6)	
Competences Expected: C1,C20	
Learning Outcomes	Topics
<ul style="list-style-type: none"> • Know the concepts of force. • know the most important interactions of nature and to represent them in a free-body diagram • Know the concepts of static equilibrium. • know and apply the laws of motion and to characterize them vectorially. • Know and apply Newton's laws. • Solve problems. 	<ul style="list-style-type: none"> • Force and interactions. • Newton's First Law • Inertial mass. • Newton's Second Law • Weight. • Free Body Diagrams. • Newton's Third Law • Friction forces. • Dynamics of circular motion • Exercises and problems.
Readings : [SB02], [AF95]	

Unit 5: FI5. Trabajo y Energía (4)	
Competences Expected: C1,C20	
Learning Outcomes	Topics
<ul style="list-style-type: none"> • Establish the concepts of physical energy. (Classical Physics) • Know some forms of energy. • Establish the relation between work and energy • Know and apply the concepts of energy conservation • Solve problems. 	<ul style="list-style-type: none"> • Trabajo realizado por una fuerza constante. • Trabajo realizado por fuerzas variables. • Work and kinetic energy. • Potency • Gravitational potential energy • Elastic potential energy • Conservative and non-conservative forces • Principles of energy conservation • Exercises and problems
Readings : [SB02], [AF95]	

Unit 6: FI6. Momento lineal (3)	
Competences Expected: C1,C20	
Learning Outcomes	Topics
<ul style="list-style-type: none"> • Establish the concepts of linear momentum. • Know the concepts of conservation of linear momentum • Know the movement of a system of particles • Solve problems. 	<ul style="list-style-type: none"> • Linear momentum. • Conservation of linear momentum • Mass and gravity center • Movement of a particle system • Exercises and problems.
Readings : [SB02], [AF95]	

Unit 7: FI7. Rotación de cuerpos rígidos (4)	
Competences Expected: C1,C20	
Learning Outcomes	Topics
<ul style="list-style-type: none"> • Know the basic concepts of rigid body. • Know and apply concepts of rigid body rotation. • Know torsion concepts. • Apply energy concepts to the rotating motion. • Solve problems. 	<ul style="list-style-type: none"> • Velocity and angular accelerations. • Rotation with constant angular acceleration. • Relation between linear and angular kinematics • Energía en el movimiento de rotación. • Torsional moment. • Relationship between torsional moment and angular acceleration. • Exercises and problems.
Readings : [SB02], [AF95]	

Unit 8: FI8. Dinámica del movimiento de rotación (3)	
Competences Expected: C1,C20	
Learning Outcomes	Topics
<ul style="list-style-type: none"> • Understand basic concepts of rotation dynamics. • Know and apply torsion concepts. • Understanding angular momentum and its conservation • Solve problems. 	<ul style="list-style-type: none"> • Moment of torsion and angular acceleration of a rigid body • Rotation of a rigid body on a movable axis. • Work and potency in the rotation movement • Angular momentum. • Conservation of angular momentum • Exercises and problems.
Readings : [SB02], [AF95]	