University of Engineering and Technology
School of Computer Science
Syllabus of Course – Academic Period 2017-I

1. Code and Name: CF142. Physics II
2. Credits: 4
3. Hours of theory and Lab: 4 HT;
4. Professor(s)
Meetings after coordination with the professor
5. Bibliography

[EL98] Robert Eisberg and Lawrence Lerner. *Física: Fundamentos y Aplicaciones*. Vol. 1. Mc Graw Hill, 1998.

[Gia84] Douglas C. Giancoli. *General Physics*. Prentice Hall, Inc., 1984.

[Ray98] Serway Raymond. *Física*. Vol. 1. Mc Graw Hill, 1998.

[RH98] Robert Resnick and David Halliday. *Física para Estudiantes de Ciencias e Ingeniería*. John Wiley, 1998.

[Sea98] Francis Sears. *Física Universitaria*. Addison Wesley-Longman, 1998.

[Tip98] Paul Tipler. *Física*. 3rd ed. Editorial Reverte, 1998.

6. Information about the course

(a) **Brief description about the course** Show a high degree of mastery of the laws of wave motion, the nature of fluids, and thermodynamics. Using properly the concepts of wave movement, fluids and thermodynamics in solving problems of daily life. Possess ability and ability in the interpretation of wave, fluid and thermodynamic phenomena, which contribute to the development of efficient and useful solutions in different areas of computer science.

(b) **Prerrequisites:** CF141. Física I. (2^{do} Sem)

(c) **Type of Course:** Mandatory

7. Competences

- That the student learn and master fluent principles static and moving.
- That the student learn and master the principles of MAS, particularly the wave movement.
- Thar the student learn and master the principles of thermodynamics.
- That the student learn to apply principles of the Physics of fluids, waves and thermodynamics to develop computational models

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. Elasticidad
2. FI2. Fluidos
3. FI3. Movimiento Periódico
4. FI4. Ondas
5. FI5. Temperatura y Teoría Cinética
6. FI6. Calor y primera Ley de la Termodinámica
7. FI7. Máquinas térmicas, entropía y la segunda ley de la Termodinámica

11. Methodology and Evaluation
Methodology:

Theory Sessions:
The development of the theoretical sessions is focused on the student, through his active participation, solving problems related to the course with the individual contributions and discussing real cases of the industry. The students will develop throughout the course a project of application of the tools received in a company.

Lab Sessions:
Practical sessions are held in the laboratory. Laboratory practices are performed in teams to strengthen their communication. At the beginning of each laboratory the development of the practice is explained and at the end the main conclusions of the activity in group form are highlighted.

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:

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12. Content

<table>
<tr><td colspan="2">Unit 1: FI1. Elasticidad (4)</td></tr>
<tr><td colspan="2">Competences Expected: C1,C20</td></tr>
<tr><td>Learning Outcomes</td><td>Topics</td></tr>
<tr><td>Understand and characterize the processes of elasticity
Solve problems</td><td>Effort and unit deformation
Young's Module
Poisson Module and Coefficient
Stiffness Module
Module and coefficient of compressibility</td></tr>
<tr><td colspan="2">Readings : [Sea98], [EL98]</td></tr>
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Unit 2: FI2. Fluidos (8)	
Competences Expected: C1,C20	
Learning Outcomes	**Topics**
• Explain, analyze and characterize fluid pressure • Understand, characterize and apply the principle of Archimedes • Understand, characterize and apply the Bernoulli principle • Explain, analyze and characterize surface tension and capillarity	• Density and specific gravity • Pressure in fluids. Atmospheric pressure and gauge pressure • Principle of Pascal. Pressure measurement: manometer and barometer • Buoyancy and Principle of Archimedes • Flowing Fluids: Flow and Continuity Equation • Bernoulli equation. Applications of the Bernoulli principle: Torricelli's theorem, the ventura tube • Surface tension and capillarity
Readings : [Ray98], [Tip98]	

Unit 3: FI3. Movimiento Periódico (8)	
Competences Expected: C1,C20	
Learning Outcomes	**Topics**
• Explain, analyze and characterize the oscillatory movement from the MAS. • Solve problems.	• Introduction .Elastic modulus of a Spring • Simple harmonic motion. Energy in simple harmonic oscillator • Reference circle: the period and the sinusoidal nature of simple harmonic motion • Simple pendulum. • Cushioned harmonic motion. • Forced oscillations: resonance.
Readings : [Sea98], [Ray98]	

Unit 4: FI4. Ondas (8)	
Competences Expected: C1,C20	
Learning Outcomes	**Topics**
• Explain, find and characterized through problems of the daily life the undulatory movement, as well as, the reflection and transmission of waves in the space. • Solve problems	• Wave motion. Types of waves. One-dimensional traveling waves • Wave Overlay and Interference • Velocity of the waves in a tight rope. Reflection and transmission of waves • Sine waves. Energy transmitted by sinusoidal waves in strings • Stationary waves on a rope. Sound waves. Speed of sound waves • Periodic sound waves. Intensity of periodic sound waves • Sources of sound: vibratory strings and vibrating air columns • Doppler Effect
Readings : [EL98], [RH98], [Gia84]	

Unit 5: FI5. Temperatura y Teoría Cinética (12)	
Competences Expected: C1,C20	
Learning Outcomes	**Topics**
• Explain, analyze and characterize the concept of Temperature and the thermal expansion of solids and liquids • Understanding the ideal gas law and the isothermal and adiabatic processes for an ideal gas • Understand the zero law of thermodynamics • Solve problems	• Atoms. Temperature. Thermometers and temperature scales • Thermal expansion of solids and liquids. Coefficients of linear, surface and cubic expansion • Laws of gases and absolute temperature. The ideal gas law in molecular terms: Avogadro's number • Kinetic theory and molecular interpretation of temperature. Distribution of molecular velocities • Isothermal and adiabatic processes for an ideal gas. The equipartition of energy • Termodinámica. Tipos de sistemas que estudia la Termodinámica • Zero Law of Thermodynamics • The constant-volume gas thermometer and the Kelvin scale • Punto triple del agua
Readings : [EL98], [RH98]	

Unit 6: FI6. Calor y primera Ley de la Termodinámica (8)	
Competences Expected: C1,C20	
Learning Outcomes	**Topics**
• Understand the concept of heat and internal energy of an ideal gas • Explain, analyze and characterize the first law of thermodynamics • Solve problems	• Heat as energy transfer • Heat capacity and specific heat • Internal energy of an ideal gas • Specific heat of an ideal gas • Phase changes. Latent heat of fusion and vaporization • Calorimetry. Work and heat in thermodynamic processes • The first law of thermodynamics • Some applications of the first law of thermodynamics • Transmission of heat by conduction, convection and radiation
Readings : [EL98], [RH98]	

Unit 7: FI7. Máquinas térmicas, entropía y la segunda ley de la Termodinámica (8)	
Competences Expected: C1,C20	
Learning Outcomes	**Topics**
• Explain, analyze and characterize the first law of thermodynamics • Explain, analyze and characterize the Carnot machine • Solve problems	• Thermal Machines and the Second Law of Thermodynamics • Reversible and irreversible processes. The Carnot Machine • Absolute temperature range.Chillers • Entropy. Entropy changes in irreversible processes
Readings : [EL98], [RH98]	