1. Identification data:

Name of the learning unit:	**General physics**
Guided time (theory and practice):	**100 hours**
Guided time per week:	**5 hours**
Total autonomous time:	**20 hours**
Modality:	**Scholarized**
Number and type of academic period:	**1° Semester**
Type of learning unit:	**Mandatory**
Cycle:	**First**
Curricular area:	**Introductory to the profession initial training (ACFI-IP)**
UANL credits:	**4**
Elaboration date:	**16/03/21**
Responsible for elaboration:	**Dr. José Antonio Heredia Rojas** **Dr. Abraham Octavio Rodríguez de la Fuente** **M.C. Omar Heredia Rodríguez**
Date of last actualization:	**Does not apply**
Responsible for actualization:	**Does not apply**

2. Presetantion:

Physics is the fundamental discipline of the current sciences, the student will develop in the first phase the ability to recognize the physical laws that govern the forces, the movement of bodies, and identify the fundamental principles of fluid mechanics, as well as describe physical variables of biological systems. In phase 2 the student will be able to describe the wave motion, distinguish the principles of electricity and magnetism that govern living beings and their interaction with the environment, through the study of the electromagnetic spectrum and the basic concepts of electricity; in stage 3 will be able to identify the interactions of ionizing and non-ionizing radiations, including optical properties in biological systems, by analyzing photonic interaction in order to recognize the physical changes caused in matter, all the above provides sufficient tools for the student to recognize the characteristics of ionizing and non-ionizing radiations that act at this level in biological systems. Within this learning process, the student will be able to transfer the concepts of physics to the problems linked to the natural sciences, which are directly related to their professional field. The student will achieve learning through evidence that develops their logical thinking, as well as the skills acquired, which will allow them to carry out the

integrative learning product, which consists of a portfolio on the effects of physical factors on a biological system, which will finally be presented through a monograph on the suggested topic. This portfolio in addition to the monograph includes the partial products, which consist of fifteen antecedents for PPA1 and thirty antecedents for PPA2.

2. Purpose:

The purpose of the Learning Unit (UA) is that the student recognizes the laws and principles of physics, in order to interpret the interactions of the environment with the biological chemical systems of living beings, through the study of classical mechanics, fluid mechanics, electricity, magnetism, optics and modern physics, which allow him through logical and mathematical language to analyze the physical phenomena involved in biological processes.

It is related in an antecedent way with the knowledge acquired in mid-superior UAs such as Probability and statistics that is offered by the UANL, particularly with the UA of the fields 22 Physics with focus towards the Natural Sciences. Likewise, this UA is subsequently related to Physicochemistry and will be useful when identifying the basic concepts such as work, energy and pressure. This will help you address problems specific to the area that will allow decision-making during your professional development. In addition, this UA contributes to the branch of natural sciences knowledge such as the management and interpretation of functions, which are necessary to evaluate results in experiments or processes of the natural sciences.

The UA of Physics contributes to the development of the general competences of the UANL since the student knows the contexts in which the signs are immersed through the information, data, elements of the events and situations relation between the effects of the physical factors on the biological systems (2.1.2). As well as to be able to show interest in the events and problems that surround you when solving cases based on real events in your environment (10.1.1); in addition, the student through physical-mathematical thinking will generate various ideas or possible solutions to problems that he faces in his professional field (12.1.3)

This UA contributes in the development of the specific competence of the educational program of Biology, for a greater understanding of the biological phenomena, which will allow in greater knowledge when estimating the impact that may arise in the ecosystems and the species that inhabit them, to relate them with the solution of risk factors that allow to give solutions to the self-sustaining persistence of the same through the application of the knowledge of classical mechanics, fluids, electricity, and modern physics as well as with the use of function interpretation. (E2-B).

This UA contributes in the development of the specific competence of the educational program of Degree in Food Science, by properly employing the mechanical, thermal, wave, electrical and radiation physical principles, to optimize the processes involved in the

transformation of food, through the supervision and evaluation on the physical, chemical and biological characteristics of raw materials and products, working with respect for the environment to contribute to the improvement of the productivity of companies in the food industry (E2-LCA).

General physics contributes to the development of specific competencies of the educational program of Bachelor in Genomic Biotechnology, by allowing the student to investigate experimental protocols for the conservation of environmental resources using the interpretation of the biological chemical systems of living beings (E1-LBG), as well as to make molecular diagnoses by means of mathematical formulas (E2-LBG), which help the design of strategies for detection and modification of genomes to ana 3, such as medicines and treatments that contribute to disease prevention (E4-LBG).

General physics contributes to the development of specific competencies of the educational program of Chemistry, Bacteriology and Parasitology, by allowing the student to design experimental protocols, using the knowledge of physics, for the study of biological phenomena (E1-QBP) that arise in the biomedical, agricultural, industrial or environmental area, with results validated by the implemented laboratory processes (E2-QBP) to contribute to the diagnosis of diseases (E3-QBP) complying with the systems of continuous improvement through the knowledge and measurement of physical variables related to the processes with which the organization in which he works professionally has (E4-QBP).

3. Competencies of the graduation profile:

General competences to which this learning unit contributes:

Instrumental competences:

2. Use logical, formal, mathematical, iconic, verbal and nonverbal languages according to their stage of life, to understand, interpret and express ideas, feelings, theories and currents of thought with an ecumenical approach.

Personal and social interaction skills:

10. Intervene in the face of the challenges of contemporary society locally and globally with a critical attitude and human, academic and professional commitment to contribute to consolidating general well-being and sustainable development.

Integrative competences:

12. Build innovative proposals based on holistic understanding in reality to help overcome the challenges of the interdependent global environment

Specific competences to which the learning unit contributes:

Biology

2. Estimate the ecological impact of ecosystems at the local, regional and national levels through the investigation of the biological mechanisms involved in the evolution of species and populations in relation to environmental risk factors that affect dynamic populations within ecosystems in order to ensure that conservation programs lead to their persistence as viable and self-sustaining populations in nature (Esp. 2).

Food Science

2. Optimize processes involved in food processing, by monitoring and evaluating the effect of process conditions on the physical, chemical and biological characteristics of raw materials and products, working in a multidisciplinary way, with respect for the environment to contribute to the improvement of the productivity of companies in the food industry.

Genomic Biotechnology

1. Design experimental protocols related to biological chemistry, using theoretical, methodological and instrumental knowledge, traditional and cutting-edge, of the exact sciences, biology and chemistry, which are applied in the study of natural phenomena and biodiversity, in a logical, creative and purposeful way, in order to conserve biotic resources and the environment for the benefit of society.

2. Develop molecular diagnostics through the identification of pathogenic organisms, applying traditional and cutting-edge techniques effectively, as well as the use of innovative tools in their detection, which allow the study and treatment of genetic diseases in the health, economic and social fields.

3. Design strategies for the detection, modification and selection of genomes, through the identification of genes, proteins or cellular metabolic components, following the current regulations on biosafety of Genetically Modified Organisms (GMOs) and evaluating their competitive advantage when compared to what is traditionally used, in order to develop biotechnological products, processes and services in the health sectors , agricultural, livestock, industrial and environmental.

4. Design drugs and clinical treatments, through the selection of microorganisms with productive metabolic pathways in the market of prebiotics, probiotics and additives, as well as viral genomes of biotechnological application in the agricultural, livestock, industrial and environmental sectors that allow it to develop products and processes in the prevention of diseases.

Chemistry Bacteriology and Parasitology

1. Design experimental protocols related to biological chemistry, using theoretical, methodological and instrumental knowledge, traditional and cutting-edge, of the exact sciences, biology and chemistry, which are applied in the study of natural phenomena and biodiversity, in a logical, creative and purposeful way, in order to conserve biotic resources and the environment for the benefit of society.

2. Implement analytical methodologies in chemical-biological, microbiological and biotechnological laboratories that are applied to biomedical, agricultural, industrial and/or environmental problems, to provide results supported by the validation of the processes used, for the benefit of the health and economy of the community.

3. Contribute to the diagnosis of autoimmune, metabolic and infectious diseases through the biochemical study of the cellular response in living beings, to contribute to the treatment that guarantees an optimal state of health.

4. Develop systems of continuous improvement and quality assurance of chemical-biological, microbiological and biotechnological processes, applying current national and international regulations through compliance with the established requirements, to determine in a rigorous and objective way the properties of the products obtained, for the good of society.

5. Phase structure:

Phase 1. Classical mechanics and fluid mechanics
Element of competence: To describe the physical variables that act in biological systems for the application of physical laws, which govern the forces and movements of bodies, and the fundamental principles of fluid mechanics for the understanding of their effects on living beings and the environment.

Evidences	Performance Criteria	Activities	Content	Resources
1. Questionnaire of classical mechanics and fluid mechanics.	Write your answers in an orderly, clear, and concise manner. Includes personally identifiable data. Present your questionnaire in a handwritten and/or resolved way on a digital platform in a timely and clean manner.	The professor introduces the UA by means of the presentation of the analytical program by commented reading. Through the expository technique by the teacher of the concepts of units and physical quantities. The teacher explains through the commented reading technique the subject of classical mechanics and answers the doubts of the students in class.	• mechanics. • Physical units and quantities. • Movements: Rectilinear, Uniformly Accelerated. • Free Fall. Newton's laws. • Work, Power and Energy. • Fluid Mechanics. • Properties of liquids and gases. Pressure and types of pressures.	1. Tippens P.E. (2020) chapters 3-5,11. 2. Giancoli D.C. (2007) chapters 2-4,6,10. 3. questionnaire 4. classroom 5. library 6. blackboard 7. projector 8. Internet 9. Plataforma Nexus 10. TEAMS Platform

	He presents his work in the format established by the teacher. It includes information about the mechanics, their units and physical quantities. It presents information on the types of physical movements: Rectilinear, Uniformly Accelerated. Includes information on the properties of liquids and gases. Attach your questionnaire on the university digital platform Nexus or MS Teams, within the delivery	The student individually elaborates a matrix of comparison of rectilinear motion, uniformly accelerated rectilinear motion, and free fall, which includes the equations, dimensional analysis, and units in the English system and the international system. Use of the expository technique by the professor on the three laws of Newton. The student will perform the group brainstorming activity on the application of Newton's three laws with applications in everyday life.	Pascal's principle. Archimedes' principle. Viscosity (Laminar and turbulent flow).	11. Nearpod 12. Physics Manual ● Franco-Garcia A. (2020).

	time. Write your answers in an orderly, clear, and concise manner. Includes personally identifiable data. Present the questionnaire in a handwritten and/or resolved way on a digital platform in a timely and clean manner. Presents their work in the format established by the teacher. It includes information about the mechanics, their units and physical quantities.	Explanation by means of the expository technique by the professor on the mechanics of fluids, properties of liquids and gases, pressure, viscosity, laminar and turbulent flow. The student solves exercises individually on fluid mechanics and the subtopics. The student individually prepares a concept map on the different types of pressures and their mode of interaction. The student research individually through books and the internet for their own updating and will		

	It presents information on the types of physical movements: Rectilinear, Uniformly Accelerated. Includes information on the properties of liquids and gases. ● Attach your questionnaire on the university digital platform Nexus or MS Teams, within the delivery time.	have more knowledge about the application of Instrumentation and fluid mechanics in natural phenomena. The professor gives an exposition an instrument of interest in biological sciences, pointing out its parts and the characteristics of the measurement. The student collaboratively solves problems in the classroom of all the topics of stage I. The student solves interactive exercises on digital platforms (e.g., MS TEAMS).		

		The student presents the 1st written partial exam: Mechanics and Mechanics of fluids (weighted activity 1.1) The student develops as a team the laboratory practices (weighted activity 1.2) on: instrumentation: • Identify the basic dimensions (Mass, Length, Time and Temperature) and derivatives (Density, Volume, Area, etc.) • Use instruments or equipment that allow to measure the basic or derived dimensions.		

		Fluid mechanics: • Identify the instruments used to measure the pressure and viscosity of liquids and gases • Measure the gauge and absolute pressure of a system and represent them in different systems of units. ● The student delivers the (PPA1) which consists of the delivery of fifteen antecedents with their respective literatures cited.		

Phase 2. Wave movement, electricity and magnetism
Element of competence: Examine the physical variables of wave motion, the principles of electricity and magnetism to determine the effect they have on living things and the environment.

Evidences	Performance Criteria	Activities	Content	Resources
2. Problemario de ondas, electricidad y magnetismo	• Includes personally identifiable data.	• The teacher through the expository	• Wave Movement • Characteristics of a wave in a plane.	• Tippens P.E. (2020) chapters 9,18-22.

	• He presents his work in the format established by the teacher. • It presents its procedures and results in an orderly, clear and concise manner. • Deliver your exercise laboratory in a handwritten and/or resolved manner on a digital platform in a timely manner and cleanly. • It presents correctly solved all the exercises provided in the problem. • It includes all the operations necessary to arrive at the answer in each of the exercises.	technique addresses the subject of waves. • The student draws up a comparison table between the AM and FM radio waves. • The student makes an outline of the electromagnetic spectrum, indicating the separation of radiation into ionizing and non-ionizing, and also, relating them to their wavelength and frequency. • The teacher applies the brainstorming technique to get into the topics of electricity and magnetism. • The student prepares a form with the equations that govern the electrical and magnetic phenomena,	Types of waves (Transverse and longitudinal). Mechanical waves (Sound, infrasound and ultrasound). electromagnetic spectrum. • Electricity and Magnetism • Electrostatics (charge, conductors and insulators, Coulomb's law). Electrodynamics (basic concepts and Ohm's law). electromagnetism.	• Giancoli D.C. (2007) chapters 12,16-18. • Questionnaire • classroom • library • blackboard • projector • Internet • Plataforma Nexus • TEAMS Platform • Nearpod • Physics Manual • Franco-Garcia A. (2020).

	• Identify the right formula to solve the exercises. • Attach your questionnaire on the university digital platform Nexus or MS Teams, within the delivery time. • Includes information about wave movement. • Identifies wave types. • It presents the functions of electricity and magnetism. • Includes information on electrostatics, electrodynamics, electromagnetism.	identifying the physical meaning of each variable and parameter, as well as their respective units. • The student as a team will make a power point presentation to explain electrical and magnetic phenomena in biology. • Students solve problems in the classroom about electricity and magnetism. • The student presents the 2 second. written midterm exam: Waves and Electricity and Magnetism (weighted activity 2.1). • The students will develop as a team the laboratory practices		

		(weighted activity 2.2) on: • Wave movement: • Identify the concepts of a wave, frequency, amplitude • Identifies instruments or equipment that allow measuring the characteristics of a wave and its applications. • Electricity and magnetism: • Identify the differences between electricity and magnetism and how electricity is produced through magnetism		

		and vice versa. • The student delivers the (PPA2) which consists of the delivery of thirty antecedents with their respective literatures cited.		

Phase 3. Light, optics and modern physics
Element of competence: To identify the interactions of ionizing and non-ionizing radiations in biological systems, through the analysis of photonic interaction in order to recognize the physical changes caused in matter.

Evidences	Performance Criteria	Activities	Content	Resources
3. Synoptic table of Optics and modern physics.	• Includes personally identifiable data. • Presents the work in the format established by the teacher. • Presents its procedures and results in an orderly, clear and concise manner. • Deliver the exercise laboratory in a handwritten and/or resolved manner on a digital platform in a	• Through the expository technique the professor of the subjects of Light and optics. • The student elaborates a table of comparison of the properties of the light: Refraction and reflection. • The student makes a mind map of the properties of light and applications in biology.	• Light and Optics • Laws of refraction and reflection of Light, scattering, interference and diffraction. • General lenses and microscopes. • polarization. • Modern Physics • Particles and fundamental forces. Radioactivity and radioactive decay. Effect of ionizing and	• Tippens P.E. (2020) chapters 17-28-32. • Giancoli D.C. (2007) chapter 23. • classroom • library • blackboard • projector • Internet • Plataforma Nexus • TEAMS Platform • Nearpod • Physics Manual

	timely manner and cleanly. • Identification of keywords. • Identification of main concepts. • Establishes relationships between words, ideas, concepts, and expresses in writing the relationship found • Includes information about optics and its laws • Includes information about lenses and microscopes • Identifies the effects of ionizing and non-ionizing radiation on living things • It presents information about modern physics, its particles and fundamental forces.	• The student elaborates a classification matrix of optical properties and their application in lenses and microscopes. • The student prepares a report (maximum of 4 quartiles) on the various types of microscopes and their applications. • Through the method of case exposure, the professor addresses modern physics. • Student group activity on brainstorming on the application of modern physics in biology. • Students in groups solve problems in the classroom. • The student presents the 3rd written partial exam: Optics and	non-ionizing radiation on living beings.	• Franco-Garcia A. (2020).

		Modern Physics (weighted activity 3.1)
		• The students will develop as a team the laboratory practices (weighted activity 3.2) on:
		  • optics:
		  • Identify the different types of lenses and their application in microscopes, polarized light.
		  • Modern physics:
		  ○ Applications of modern physics in a biological system, analysis of an X-ray, nuclear magnetic resonance.		

6. Evaluación de los aprendizajes:

Phase		Ponderación
1	**Evidence 1. Questionnaire of mechanics and fluids.**	**5%**
	Weighted activity 1.1 Theoretical partial examination of multiple choice.	**15%**
	Weighted activity 1.2 Laboratory report	**6%**
	Partial learning output 1 (PPA 1)	**5%**
2	**Evidence 2. Problem of wave motion, electricity and magnetism.**	**5%**
	Weighted activity 2.1 Theoretical partial examination of open questions.	**15%**
	Weighted activity 2.2 Laboratory report	**7%**
	Weighted activity 2.2 Laboratory report	**5%**
3	**Evidence 3. Synoptic picture of wave motion, electricity and magnetism.**	**5%**
	Weighted activity 3.1 Theoretical partial examination of open questions.	**15%**
	Weighted activity 3.2 Laboratory report	**7%**
	Integrated learning product (PIA)	**20%***
	Total:	**100%**

***** It is evaluated progressively during the Phases, so its partial value is already found added in each Phase. This value includes the extra 10 pts of the monograph that is elaborated at the end of the UA. So not the 20pts but the 10pts will be added at the end, to give a total of 100 pts in the AU evaluation.

7. Integrative learning product:

Portfolio on the effects of physical factors on a biological system, which will eventually be presented through a monograph on the suggested topic. This portfolio in addition to the monograph includes the partial products, which consist of fifteen antecedents for ASP1 and thirty antecedents for ASP2.

8. Literature:

Douglas C. Giancoli. 2007. Física. Quinta Edición. Editorial Prentice Hall.
Tippens P.E. (2020). Física-Conceptos y Aplicaciones. Octava edición. Editorial McGraw-Hill.
University of Colorado. (2020) Software Interactive Simulations. http://phet.colorado.edu/pt_BR/simulation/the-ramp
Franco-García A. (2020). Física con ordenador. Obtenido de http://www.sc.ehu.es/sbweb/fisica/
Soto-Pedraza, P. J. (2020). Manifestación de la Energía Cinética y Potencial. *Vida Científica Boletín Científico de la Escuela Preparatoria No. 4*, *8*(16), 43-44.
Wilfrido Trujillo Naranjo, A., Toledo, V. L., & Ramírez Aguirre, S. G. (2017). Conceptual Basis of Physics in the Teaching-Learning Process. *Opuntia Brava*, *9*, 1008.