Next Generation Science Standards:Physical Science 8th Grade

CI 200 Integrated Science II

This is a ***required course for all 8th grade students*** in both the Mexican and/or U.S. diploma program. It is a comprehensive introduction to chemistry, physics, earth systems, and astronomy. The overarching goal of the course is to build a foundational paradigm within students for understanding the natural world as a network of interlocking systems, where changes in one system affect all others. As a result, this course features several studies of real-world ecological issues and problems that are directly related to and integrated within the major content areas. Labs, reflective discussions, and persuasive writing exercises frequently supplement more traditional, lecture-based pedagogy to achieve authentic student learning. Upon completion of this course, students will not only have the content knowledge necessary to enter higher-level, content-specific science courses (e.g., chemistry, physics), but they will also view the natural world as a systems-thinker.

Textbooks:
Frank, D. V., Little, J. G., & Miller, S. (2011). *Prentice hall science explorer: Chemical interactions.* Boston, MA: Pearson.
Jenner, J., & Wellnitz, T. R. (2011). *Prentice Hall science explorer: Earth's waters.* Boston, MA: Pearson.
Jones, T. G. (2011). *Prentice Hall science explorer: Motion, forces, and energy.* Boston, MA: Pearson.
Pasachoff, J. M. (2011). *Prentice Hall science explorer: Astronomy.* Boston, MA: Pearson.
Vogel, C. G., & Wysession, M. (2011). *Prentice Hall science explorer: Inside earth.* Boston, MA: Pearson.

Prerequisite: None

Strand 1: Structure and Properties of Matter
Strand 2: Chemical Reactions
Strand 3: Forces and Interactions
Strand 4: Energy
Strand 5: Waves and Electromagnetic Radiation
Strand 6: Engineering Design

Strand 1: Structure and Properties of Matter

Standard 1: Structure and Properties of Matter

Benchmark Code	Benchmark
MS-PS1-1	The student will develop models to describe the atomic composition of simple molecules and extended structures.
MS-PS1-3 Repeat	The student will gather and make sense of information to describe that synthetic materials come from natural resources and impact society. (also in Strand 2)
MS-PS1-4 Repeat	The student will develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.

Strand 2: Chemical Reactions	
Standard 1: Chemical Reactions	
Benchmark Code	Benchmark
MS-PS1-2 Repeat	The student will analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. (also in Strand 1)
MS-PS1-5	The student will develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.
MS-PS1-6	The student will undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.
Strand 3: Forces and Interactions	
Standard 1: Forces and Matter	
Benchmark Code	Benchmark
MS-PS2-1	The student will apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.
MS-PS2-2	The student will plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.
Standard 2: Types of Interactions	
MS-PS2-3	The student will ask questions about data to determine the factors that affect the strength of electric and magnetic forces.
MS-PS2-4	The student will construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.
MS-PS2-5	The student will conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.
Strand 4: Energy	
Standard 1: Definitions of Energy/Conservation of Energy and Energy Transfer	
Benchmark Code	Benchmark
MS-PS3-1	The student will construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.
MS-PS3-2 Repeat	The student will develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.

MS-PS3-3 Repeat	The student will apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.
MS-PS3-4	The student will plan an investigation to determine the relationships among the energy transfer.
Standard 2: Relationship Between Energy and Forces	
Benchmark Code	Benchmark
MS-PS3-5	The student will construct, use, and present arguments to support the claim that when the motion energy of an object changes, energy is transferred to or from the object. (also in Strand 3 Standard 1)
Strand 4: Waves and Electromagnetic Radiation	
Standard 1: Wave Properties	
Benchmark Code	Benchmark
MS-PS4-1	The student will use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.
Standard 2: Electromagnetic Energy	
Benchmark Code	Benchmark
MS-PS4-2	The student will develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials. (also in Strand 4 Standard 1)
Standard 3: Information Technologies and Instrumentation	
Benchmark Code	Benchmark
MS-PS3-3	The student will integrate qualitative scientific and technical information to support the claim that digitized signals (sent as wave pulses) are a more reliable way to encode and transmit information.
Strand 5: Engineering Design	
Benchmark Code	Benchmark
MS-ETS1-1 Repeat	The student will define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
MS-ETS1-2	The student will evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

MS-ETS1-3	The student will analyze from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
MS-ETS1-4	The student will develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.