Florida Department of Education
Adult General Education
Curriculum Frameworks

GED® SCIENCE	
Program Title	GED® Preparation
Program Number	9900130
Course Title	GED® Science
Course Number	9900133
CIP Number	1532020207
Grade Equivalent	9.0-12.9
Grade Level	30, 31
Program Length	Varies (See Program Structure)

Purpose

Adult General Education Program: The Florida Department of Education administers the Adult General Education Program under the authority of Florida Statute 1004.93, F.S. and the Workforce Investment and Opportunity Act (WIOA), 2014. The AGE Program has multiple purposes. Primarily, it provides instruction in reading and language and mathematics to students seeking to obtain a high school diploma or its recognized equivalent. Another purpose is to supports parents to become full partners in the educational development of their children and to improve the economic opportunities of their family. Finally, the AGE Program helps learners transition to postsecondary education and training and obtain employment.

GED® Preparation Program: The purpose of the GED® Preparation program is to prepare students to pass the four subtests of the official GED® Test: Reasoning through Language Arts, Mathematical Reasoning, Science, and Social Studies.

GED® Science Course: The purpose of the Science course of the GED® program is to prepare students to pass the GED® Science subtest. The framework includes science practices and content standards. Science practices are described as skills that are important to scientific reasoning in both textual and quantitative contexts.

STUDENTS

Students eligible to enroll in the GED® Science course are those who:

- Are beyond compulsory school age (16 years)*
- Are no longer enrolled in a K-12 school
- Score at or above the National Reporting System (NRS) Educational Functioning Level (EFL) 5 and the Grade Equivalent 9.0 – 9.9 as measured by FDOE-approved assessments.

* See s. Florida Statute 1003.435(4), F.S., "A candidate for a high school equivalency diploma shall be at least 18 years of age on the date of the examination, except that in extraordinary circumstances, as provided for in rules of the district school board, a candidate may take the examination after reaching the age of 16."

EDUCATIONAL FUNCTIONING LEVELS

The Workforce Investment and Opportunity Act defines the term Educational Functioning Level as "the ABE, ASE and ESL literacy levels, as provided in the NRS Guidelines, that describe a set of skills and competencies that students demonstrate in the skill areas of the National Reporting System." (Code of Federal Regulations Title 34 Subtitle B Chapter IV Part 462).

Table 1 shows the NRS EFLs of the GED® Science course, as provided in the NRS Guidelines. It also shows the corresponding Grade Equivalent levels.

Table 1: NRS EFLs and Grade Equivalents for the GED® Science Course

Course Title	NRS Educational Functioning Levels	Grade Equivalent
GED® Science	ABE Level 5	9.0 – 10.9
GED® Science	ABE Level 6	11.0 – 12.9

PROGRAM LENGTH

Table 2 illustrates the recommended maximum number of instructional hours for each level. It is understood, however, that each student learns at their individual pace and there will be students who successfully complete the program or attain their educational goals in fewer (or more) than the recommended maximum hours noted.

Table 2: Recommended Maximum Number of Hours by Educational Functioning Level

Course Title	NRS Educational Functioning Levels	Recommended Maximum Hours
GED® Science	ABE Level 5	250
GED® Science	ABE Level 6	250

CURRICULUM AND INSTRUCTION

The GED® Science curriculum framework provides instructors with the anchor standards in science that the adult learner needs. With framework being the operative word, it is the basis for designing curriculum and to assisting programs and teachers with selecting or creating instructional materials, techniques, and ongoing assessment. Additional information on the GED® test standards is based on the GED® Testing Service Assessment Guide for Educators.

The Florida DOE provides the GED® Science curriculum framework to local programs across the state in order that local program personnel can design a curriculum that will serve the unique needs of their students and instructors. A fully developed curriculum at the local program will include the following elements, at a minimum. Program staff may contact the Florida DOE Bureau of Adult Education for additional information on developing an in-house curriculum.

- A description of educational outcomes that students will be expected to have achieved upon completion of the course
- A set of core instructional materials (print and digital) aligned to the educational outcomes that students will be expected to have achieved upon completion of the course
- A series of needs assessment tools for teachers that helps them prioritize which standards are most relevant to the learning needs and educational goals of their students
- Supplementary textbooks on grammar, pronunciation, vocabulary in the context of employment and life skills
- Pacing guides and matrices that display the scope and sequence of the curriculum
- A list of recommended websites, films, dictionaries available for teachers to select from
- An overview of the content to be covered in the course
- A description of learning activities that may be used on a regular basis for reinforcement
- Academic vocabulary (such as Averill's Academic Word List)
- Grammar and the conventions of standard English for each level of the course

Note: Instructors are not required to progress through the standards sequentially. The unique needs of each cohort of students can drive instruction and instructors may modify the sequence of teaching the standards.

ASSESSMENT

The Florida DOE has approved the following tests for pre-testing students for enrollment into the GED® Science course and for post-testing students to measure progress and completion of the course:

- CASAS GOALS Reading 900 Series
- TABE 11&12 Language
- TABE 11&12 Reading

References for Assessment and Reporting: For complete information regarding assessment procedures and policies, see the Florida DOE Assessment Technical Assistance Paper. For guidelines on the procedures for reporting data related to student test results, see the Florida DOE Division of Career and Adult Education (DCAE) Office of Research and Evaluation.

Pre-testing: Federal and state policies require local adult education agencies to pre-test all new students within the first 12 hours of enrollment activity. The Florida DOE defines a new student as one who is not found as having been enrolled at the local agency at any point during the current program year and/or the previous program year. All new GED® Science course students are required to pre-test in reading and/or language, and obtain a score at or above NRS EFL 5. The agency shall report the pre-test results to the Florida DOE per the guidelines of the DCAE Office of Research and Evaluation.

Post-testing: Agencies are not required to post-test students enrolled in the GED® Science course for NRS reporting purposes, however, students will benefit from a variety of assessments to gauge their knowledge and skills. The GED® Ready test is an appropriate tool for determining when the student is likely to be able to pass the GED® test.

Course Completion: Students complete the GED® Science course when they pass the GED® Science subtest.

GED® 2014 Assessment: For complete information on the GED® 2014 Assessment and the performance targets and content topics see the GED® Testing Service Assessment Guide for Educators.

The GED® Science subtest items are based on assessment targets derived from the Florida State Standards and similar career-and-college readiness standards.

Webb's Depth of Knowledge (DOK) Model

The GED Testing Service® is using Webb's Depth of Knowledge model to guide test item development for the GED® 2014 assessment. Unlike the Bloom's Taxonomy system that was used for the GED® 2002 Test Series, the DOK levels are not a taxonomical tool that uses verbs to classify the level of each cognitive demand. The DOK is the cognitive demand required to correctly answer test questions. The DOK level describes the kind of thinking involved in the task. A greater DOK level requires greater conceptual understanding and cognitive processing by the students. The DOK model includes 4 levels: (1) recall, (2) basic application of skill/concept, (3) strategic thinking, and (4) extended thinking. Roughly 80 percent of the items across all four tests will be written to DOK levels two and three, and roughly 20 percent will require test-takers to engage level one DOK skills. Level four entails skills required to successfully complete long-term research projects. Therefore, DOK level four is beyond the scope of this assessment.

ACCOMMODATIONS

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Adult students with disabilities must self-identify, provide documentation, and request such services. Students with disabilities may need accommodations in areas such as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology, and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

ADULT EDUCATION INSTRUCTOR CERTIFICATION REQUIREMENTS

As per section 1012.39 (1)(b), F.S., each school district shall establish the minimal qualifications for part-time and full-time teachers in adult education programs.

INTEGRATED EDUCATION AND TRAINING (IET)

The Florida DOE Division of Career and Adult Education (DCAE) promotes the planning, development, and implementation of an integrated education and training (IET) service approach that provides concurrent and contextualized adult education and literacy activities in combination with workforce preparation activities and workforce training for a specific occupation or occupational cluster for the purpose of educational and career advancement.

The IET service approach provides all levels of adult education students the opportunity to acquire the skills needed to:

- Transition to and complete postsecondary education and training programs
- Obtain and advance in employment leading to economic self-sufficiency
- Exercise the rights and responsibilities of citizenship

All IET programs must include the following three components:

- Adult education and literacy activities (§463.30)
- Workforce preparation activities (§463.34)
- Workforce training for a specific occupation or occupation cluster which can be any one of the training services defined in section 134(c)(3)(D), of WIOA

In order to meet the “integrated” requirement of IET, all services must include the following:

- Adult education and literacy activities run concurrently and contextually with workforce preparation activities and workforce training for a specific occupation or occupational cluster for the purpose of educational and career advancement
- Activities are of sufficient intensity and quality, and based on the most rigorous research available, particularly with respect to improving reading, writing, mathematics, and English proficiency of eligible individuals
- Occur simultaneously
- Use occupational relevant instructional materials

The integrated education and training program must have a single set of learning objectives that identifies specific adult education content, workforce preparation activities, and workforce training competencies, and the program activities function cooperatively.

GED® Science Preparation

The purpose of the Science course of the GED® Preparation program is to prepare students to pass the GED® Science subtest. The framework includes science practices and content standards. Science practices are described as skills that are important to scientific reasoning in both textual and quantitative contexts.

This test will focus on the fundamentals of science reasoning, striking a balance of deeper conceptual understanding, procedural skill and fluency, and the ability to apply these fundamentals in realistic situations. Three major content domains will be addressed: life science, physical science and Earth and space science. The test will include items that test textual analysis and understanding, data representation and inference skills, as well as problem solving with science content. Approximately 50 percent of the items will be presented in item scenarios, in which a single stimulus (which may be textual, graphic or a combination of both) serves to inform two to three items. The rest of the items will be standalone items.

Instruction on Science Content Topics: The content topics are designed to provide context for measuring the skills defined in the science practices listed in this framework.

As in the previous version of the GED® Science Assessment Targets, the science practices maintain a close relationship with the science content topics. More specifically, the primary focus of the GED® science test continues to be the measurement of essential reasoning skills applied in scientific context. However, test-takers should still be broadly and generally familiar with each of the basic concepts enumerated in the science content topics and subtopics, and they should be able to recognize and understand, in context, each of the terms listed there. Rather, the stimuli about which each question pertains will provide necessary details about scientific figures, formulas, and other key principles. For example, a question may include answer options and stimuli that contain specific terms drawn from the content subtopics; however, test-takers will never be asked to formulate their own definition of a term without the item providing sufficient contextual support for such a task.

Science Content Topics Matrix: The Science Content Topics Matrix below identifies the major topics in science and shows the relationship between each content topic and each focusing theme. The percentage of test questions on each content topic is listed.

Science Content Topics			
Focusing Themes	Life Science (L) 40%	Physical Science (P) 40%	Earth & Space Science (ES) 20%
Human and Health Living Systems	a. Human body and health b. Organization of life (structure and function of life) c. Molecular basis for heredity d. Evolution	a. Chemical properties and reactions related to human systems	a. Interactions between Earth's systems and living things
Energy & Related Systems	a. Relationships between life functions and energy intake b. Energy flows in ecologic networks (ecosystems)	a. conservation, transformation, and flow of energy b. Work, motion, and forces	a. Earth and its system components and interactions b. Structure and organization of the cosmos

Science Practices
SP.1 Comprehending Scientific Presentations SP.1.a. Understand and explain textual scientific presentations Sp.1.b. Determine the meaning of symbols, terms and phrases as they are used in scientific presentations. SP.l.c. Understand and explain a non-textual scientific presentations

SP.2 Investigation Design (Experimental and Observational) SP.2.a. Identify possible sources of error and alter the design of an investigation to ameliorate that error SP.2.b. Identify and refine hypotheses for scientific investigations SP.2.c. Identify the strength and weaknesses of one or more scientific investigation (i, e, experimental or observational) designs SP.2.d. Design a scientific investigation SP.2.e. Identify and interpret independent and dependent variables in scientific investigations
SP.3 Reasoning from Data SP.3.a. Cite specific textual evidence to support a finding or conclusion. SP.3.b. Reason from data or evidence to a conclusion. SP.3.c. Make a prediction based upon data or evidence. SP.3.d. Using sampling techniques to answer scientific questions.
SP.4 Evaluating Conclusions with Evidence SP.4.a. Evaluate whether a conclusion or theory is supported or challenged by particular data or evidence.
SP.5 Working with Findings SP.5.a. Reconcile multiple findings, conclusions or theories.
SP.6 Expressing Scientific Information SP.6.a. Express scientific information or findings visually. SP.6.b. Express scientific information or findings numerically or symbolically. SP.6.c. Express scientific information or findings verbally.
SP.7 Scientific Theories SP.7.a. Understand and apply scientific models, theories and processes. SP.7.b. Apply formulas from scientific theories.
SP.8 Probability & Statistics SP.8.a. Describe a data set statistically. SP.8.b. Use counting and permutations to solve scientific problems. SP.8.c. Determine the probability of events.

STANDARDS AND CONTENT TOPICS

Listed below are the standards and content topics for the GED® Preparation program . The content topics are designed to provide context for measuring the skills defined in the science practices listed in the preceding table. Each item on the science test will be aligned to one science practice and one content topic.

LIFE SCIENCE STANDARDS	
L.1	**Describe systems and functions of the human body systems and how to keep healthy.** L.1.a. Body systems (e.g., muscular, endocrine, nervous systems) and how they work together to perform a function (e.g., muscular and skeletal work to move the body). L.1.b. Homeostasis feedback methods that maintain homeostasis (e.g., sweating to maintain internal temperature) and effects of changes in the external environment on living things (e.g., hypothermia, injury). L.1.c. Sources of nutrients (e.g., foods, symbiotic organisms) and concepts in nutrition (e.g., calories, vitamins, minerals). L.1.d. Transmission of disease and pathogens (e.g., airborne, blood borne), the effects of disease or pathogens on populations (e.g., demographics change, extinction), and disease prevention methods (e.g., vaccination, sanitation).

L.2	**Explain the relationship between life functions and energy intake.** L.2.a. Energy for life functions (e.g., photosynthesis, respiration, fermentation).
L.3	**Explain the flow of energy in ecological networks (ecosystems).** L.3.a. Flow of energy in ecosystems (e.g., energy pyramids), conversation of energy in an ecosystem (e.g., energy lost as heat, energy passed on to other organisms) and sources of energy (e.g., sunlight, producers, lower level consumer). L.3.b. Flow of matter in ecosystems (e.g., food webs and chains, positions of organisms in the web or chain) and the effects of change in communities or environment on food webs. L.3.c. Carrying capacity, changes in carrying capacity based on changes in populations and environmental effects and limiting resources necessary for growth. L.3.d. Symbiosis (e.g., mutualism, parasitism, commensalism) and predator/prey relationships (e.g., changes in one population affecting another population). L.3.e. Disruption of ecosystems (e.g., invasive species, flooding, habitat destruction, and desertification) and extinction (e.g., causes [human and natural] and effects).
L.4	**Explain organization of life by structure and function of life.** L.4.a. Essential functions of life (e.g., chemical reactions, reproduction, and metabolism) and cellular components that assist the functions of life (e.g., cell membranes, enzymes, energy). L.4.b. Cell theory (e.g., cells come from cells, cells are the smallest unit of living things), specialized cells and tissues (e.g., muscles, nerve, etc.) and cellular levels of organization (e.g., cells, tissues, organs, systems). L.4.c. Mitosis, meiosis (e.g. process and purpose).
L.5	**Describe the molecular basis for heredity.** L.5.a. Relationship of DNA, genes, and chromosomes (e.g. description, chromosome splitting during meiosis) in heredity. L.5.b. Genotypes, phenotypes and the probability of traits in close relatives (e.g., Punnett squares, pedigree charts). L.5.c. New alleles, assortment of alleles (e.g., mutations, crossing over), environmental altering of traits, and expression of traits (e.g., epigenetics, color points of Siamese cats).
L.6	**Describe the scientific theories of evolution.** L.6.a. Common ancestry (e.g., evidence) and cladograms (e.g., drawing, creating, interpreting). L.6.b. Selection (e.g., natural selection, artificial selection, evidence) and the requirements for selection (e.g., variation in traits, differential survivability). L.6.c. Adaptation, selection pressure, and speciation.
PHYSICAL SCIENCE STANDARDS	
P.1	**Explain conservation, transformation, and flow of energy.** P.1.a. Heat, temperature, the flow of heat results in work and the transfer of heat (e.g., conduction, convection). P.1.b. Endothermic and exothermic reactions. P.1.c. Types of energy (e.g., kinetic, chemical, mechanical) and transformations between types of energy (e.g., chemical energy [sugar] to kinetic energy [motion of a body]). P.1.d. Sources of energy (e.g., sun, fossil fuels, nuclear) and the relationships between different sources (e.g., levels of pollutions, amount of energy produced). P.1.e. Types of waves, parts of waves (e.g. frequency, wavelength), types of electromagnetic radiation, transfer of energy by waves, and the uses and dangers of electromagnetic radiation (e.g. radio transmission, UV light and sunburns).
P.2	**Explain the relationship of work, motion, and forces.** P.2.a. Speed, velocity, acceleration, momentum, and collisions (e.g., inertia in a car accident, momentum transfer between two objects).

	P.2.b. Force, Newton's Laws, gravity, acceleration due to Gravity (e.g., freefall, law of gravitational attraction), mass and weight. P.2.c. Work, simple machines (types and functions), mechanical advantages (forces, distance, and simple machines), and power.
P.3	**Describe the chemical properties and reactions related to living systems.** P.3.a. Structure of matter. P.3.b. Physical and chemical properties, changes of state, and density. P.3.c. Balancing chemical equations and different types of chemical equations, conservation of mass in balanced chemical equations and limiting reactants. P.3.c. Parts in solutions, general rules of solubility (e.g., hotter solvents allow more solute to dissolve), saturation and the differences between weak and strong solutions.
EARTH AND SPACE SCIENCE STANDARDS	
ES.1	**Describe Interactions between earth's systems and living things.** ES.1.a. Interactions of matter between living and nonliving things (e.g., cycles of matter) and the location, uses and dangers of fossil fuels. ES.1.b. Natural Hazards (e.g., earthquakes, hurricanes, etc.) their effects (e.g., frequency, severity, and short- and long-term effects), and mitigation thereof (e.g., dikes, storm shelters, building practices). ES.1c. Extraction and use of natural resources, renewable vs. nonrenewable resources and sustainability.
ES.2	**Describe Earth and its System Components and Interactions.** ES.2.a. Characteristics of the atmosphere, including its layers, gases and their effects on the Earth and its organisms, include climate change. ES.2.b. Characteristics of the oceans (e.g., salt water, currents, coral reefs) and their effects on Earth and organisms. ES.2.c. Interactions between Earth's systems (e.g., weathering caused by wind or water on rock, wind caused by high/low pressure and Earth rotation, etc.). ES.2.d. Interior structure of the Earth (e.g., core, mantle, crust, tectonic plates) and its effects (e.g., volcanoes, earth quakes, etc.) and major landforms of the Earth (e.g., mountains, ocean basins, continental shelves, etc.).
ES.3	**Describe the structures and organization of the Cosmos.** ES.3.a. Structures in the universe (e.g., galaxies, stars, constellations, solar systems), the age and development of the universe, and the age and development of Stars (e.g., main sequence, stellar development, deaths of stars [black hole, white dwarf]). ES.3.b. Sun, planets, and moons (e.g., types of planets, comets, asteroids), the motion of the Earth's motion and the interactions within the Earth's solar system (e.g., tides, eclipses). ES.3.c. The age of the Earth, including radiometrics, fossils, and landforms.