Florida Department of Education
Adult General Education
Curriculum Frameworks

GED® SCIENCE	
Program Title	GED® Preparation Program
Program Number	9900130
Program Length	Varies
Course Title	GED® Science
Course Number	9900133
CIP Number	1532.010207
Grade Equivalent	9.0-12.9
Grade Level	30, 31
Recommended Length	Varies (See Program Structure)

PURPOSE
The GED® Preparation Program consists of four content-area assessments: Reasoning through Language Arts, Mathematics Reasoning, Science, and Social Studies. The purpose of the program is to prepare students to obtain the knowledge and skills necessary to pass the Official GED® Tests and be awarded a State of Florida High School Diploma. An additional performance level will certify that the student is career and college ready. This program strives to motivate students not only to obtain a GED® diploma, but to continue their education to earn a postsecondary degree, certificate, or industry certification.

The purpose of the Science course of the GED® program is to prepare students to pass the GED® Science test. 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. The science practices are based on skills included in the Florida Standards for Literacy in Science and Technical Subjects and practices from *A Framework for K-12 Science Education*, found at http://www7.nationalacademies.org/bose/Standards_Framework_Homepage.html.

THE GED® 2014 ASSESSMENT
Information on the GED® 2014 Assessment and the performance targets and content topics are derived from the Assessment Guide for Educators provided by GED Testing Service®. The manual can be downloaded at http://gedtestingservice.org.

The standards in this framework are based on the knowledge and skills that will be measured on the new assessment launched in January, 2014. 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 discrete.

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	**e.** Relationships between life functions and energy intake **f.** Energy flows in ecologic networks (ecosystems)	b. conservation, transformation, and flow of energy c. Work, motion, and forces	b. Earth and its system components and interactions c. Structure and organization of the cosmos

Webb's Depth of Knowledge (DOK) Model

Bloom's Taxonomy was used to guide the development of test items for the GED® 2002 series. The GED Testing Service® is using Webb's Depth of Knowledge model to guide test item development for the GED® assessment. In Bloom's Taxonomy, different verbs represent six levels of cognitive processes. However, unlike Bloom's system, 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.

PROGRAM STRUCTURE
The GED® program is non-graded and characterized by open-entry/open-exit and/or managed enrollment, self-paced instructional modules, differentiated instruction, flexible schedules, and performance-based evaluation. Agencies are awarded one LCP (V-Y) per test passed by the student.

Program procedures include the following:

A. Determining eligibility for enrollment:
    1. Must be 16 years of age or older.
    2. Legal withdrawal from the elementary or secondary school with the exceptions noted in Rule 6A-6.014, FAC.
    3. Student does not have a State of Florida diploma.
    4. Student must be functioning at or above a 9.0 grade level
B. Diagnosing learning difficulties as necessary.
C. Prescribing individualized instruction.
D. Managing learning activities.
E. Evaluating student progress.

Note: F.S. 1003.435 (4) states that " 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."

Course Number	Course Title	Recommended Length*	LCP Level
9900133	GED ® Prep Science	Varies*	X

**Recommended Length: A maximum of 1300 hours may be funded (state) per each reportable year for an adult education student. However, this should not prevent students from receiving instruction beyond the 1300 hours if needed. For example, you may report 1500 instructional hours but only 1300 hours will be used in the funding calculation*

Special Notes:

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 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.

Florida Department of Education
Adult General Education
Curriculum Frameworks

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.

Career and Education Planning

The following career development standards are designed to be integrated into the GED® frameworks to assist students with career exploration and planning. Students can access Florida's career information delivery system or a comparable system for career exploration and development of a career plan.

Standards:

CP. GED.01	Develop skills to locate, evaluate, and interpret career information.
CP. GED.02	Identify interests, skills, and personal preferences that influence career and education choices.
CP.GED.03	Identify career cluster and related pathways that match career and education goals.
CP.GED.04	Develop and manage a career and education plan.

Digital Literacy (Technology)

Computer skills have become essential in today's world. Students use a variety of technology tools such as calculators, cell phones, and computers for multiple uses; communicate with friends and family, apply for work, classroom instruction, testing, and in the workplace. Technology standards are designed to integrated in the GED®instruction

Standards:

DL.GED.01	Develop basic keyboarding and numerical keypad skills.
DL.GED.02	Produce a variety of documents such as research papers, resumes, charts, and tables using word processing programs.
DL.GED.03	Use Internet search engines such as Google, Bing, or Yahoo to collect data and information.
DL.GED.04	Practice safe, legal, and responsible sharing of information, data, and opinions online.

Workforce Preparation Activities

The term "workforce preparation activities" means activities, programs, or services designed to help an individual acquire a combination of basic academic skills, critical thinking skills, digital literacy skills, and self-management skills, including competencies in utilizing resources, using information, working with others, understanding systems, and obtaining skills necessary for successful transition into and completion of postsecondary education or training, or employment. (Workforce Innovation and Opportunity Act (WIOA), 2014).

Florida Department of Education
Adult General Education
Curriculum Frameworks

The following activities should be integrated into the classroom instruction:

Critical Thinking	All students will make decisions and solve problems by specifying goals, identifying resources and constraints, generating alternatives, considering impacts, choosing appropriate alternatives, implementing plans of action, and evaluating results.
Teamwork	All students will learn to work cooperatively with people with diverse backgrounds and abilities. Students will identify with the group's goals and values, learn to exercise leadership, teach others new skills, serve clients or customers, and contribute with ideas, suggestions, and work efforts.
Employment	All students will develop job search skills for employment such as completing an application, resume, cover letter, thank you letter, and interviewing techniques.
Self-Management	All students should display personal qualities such as responsibility, self-management, self-confidence, ethical behavior, and respect for self and others.
Utilizing Resources	All students will learn to identify, organize, plan, and allocate resources (such as time, money, material, and human resources) efficiently and effectively.
Using Information	All students will acquire, organize, interpret, and evaluate information in post-secondary, training, or work situations.
Understanding Systems	All students will learn to understand, monitor, and improve complex systems, including social, technical, and mechanical systems, and work with and maintain a variety of technologies.

SCIENCE PRACTICES

The science practices are derived from the from the National Research Council's *A Framework for K-12 Science Education* which identifies eight key practices that students should learn, such as asking questions and defining problems, analyzing and interpreting data, and constructing explanations and designing solutions. These practices should be integrated with study of the content topics included in this framework. Each item on the science test will be aligned to one science practice and one content topic.

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.1.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.

Practices 1-8, however, are drawn from the scientific practices in *A Framework for K-12 Science Education*.

STANDARDS AND CONTENT TOPICS

Listed below are the standards and content topics used by GED® Testing Service to develop test items. 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,

	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, 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 alleses (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.

Notes:
- Information on the GED® tests is based on the *Assessment Guide for Educators*, GED Testing Service®.
- The GED® Science Content Topics are informed by the National Research Council's *A Framework for K-12 Science Education: Practices, Crosscutting Concepts and Core Ideas*, 2011.