

# Course Outline

REVISED: July/2006



## Course Description:

This competency-based course provides students with an introduction to the following scientific concepts and applications: scientific method, stability of ecosystems and population dynamics, evolution, genetics and inheritance, atoms, molecules, elements and bonding, chemical bonding reactions, acids and bases, and kinetic molecular theory and thermodynamics. This course will give students an opportunity to develop skills using scientific equipment to collect, store, and analyze data. This course has been approved to satisfy the "g" (elective) subject area of the UC/CSU "a-g" requirements for freshman admission.

## Program:

Adult Literacy/High School Diploma

## Course of Study:

High School Diploma

## Course:

1:2003 Science

**36-09-51**

## General Science/Integrated 1

**Credits:** 5

**Hours:** 60

## Prerequisites:

1. A minimum reading level of 9.0 as measured by the TABE D7/8 reading comprehension test
2. Recommendation of an instructor and/or a counselor

After a student has completed this course, he/she may not be allowed to re-enroll in the course.

## *A MESSAGE to COMPETENCY-BASED COURSE OUTLINE USERS*

This competency-based course outline is for use by students, teachers, counselors and school administrators, advisory committees, and all others having interest in the course.

Before enrolling, students can read the course competencies listed to help them (students) decide whether or not the course will meet their needs. After enrolling, a copy of the competencies can help a student track his/her progress through the course.

Teachers can use competency-based areas and statements to gain an overview of the course. The competencies can be used to develop lesson plans and teaching strategies. The Instructional Materials and Other Resources page provides teachers with instructional support in the form of textbook titles, media and technology options, as well as the names of advisory personnel. Many course outlines provide sample lesson plans written by experienced teachers of the course.

Counselors can use the course outline to explain course purpose, goals and content to students. Sharing competency lists with students will make the students aware of the minimal skills and knowledge they need to demonstrate after taking the course. This process can identify potential candidates for a course.

Principals can scan the competency-areas and statements to decide if the content of a course should be offered at their school in order to meet the needs of the community which it serves.

Competencies can be used to generate relevant questions and items for tests. The writing of individualized instructional contracts also needs to reflect the competency-based course outline components.

Clearly defined competency-based areas, statements, and minimal competencies are the points upon which curriculum, instruction, and assessment focus.

## *THE DEVELOPMENT of a COMPETENCY-BASED COURSE OUTLINE*

Every approved CBE course outline is written by Los Angeles Unified School teachers who teach the course. All teacher/writers have been inserviced and certified by the Adult Curriculum Office to learn about competency-based education and the outline format.

New courses and course revisions are initiated by school and/or central office subject area departments. The schools and the subject area departments share the responsibility for approving the subject content, hours, credits, etc. Teacher/writers submit their first draft to the appropriate central office subject area supervisor, specialist, consultant or adviser.

Course outline draft copies are next submitted to the curriculum office. There information required by the District and the State is verified. The outlines are edited and entered into the course outline computer data base. One formatted copy of an outline, with every page stamped "Draft Copy Only", is either approved by the curriculum office or returned for clarification or improvement.

Once signed off by the curriculum office an outline is routed back to the department that submitted it. When approved there, it is routed to the office of the Director of Instructional Services and finally to the Division's Assistant Superintendent for approval. The curriculum office then requests the required approvals by the LAUSD Board of Education.

The curriculum office sends master file copies of every approved CBE outline to principals of all Community Adult Schools and Employment Preparation Centers. These masters are used to reproduce copies for counselors and teachers. Students, community members, and other interested parties may also request copies. The curriculum office maintains a limited inventory of all outlines for additional distribution.

Changing needs are reflected in the constant development and revision of course outlines. It is an ongoing process designed to support the various demands of students, teachers, and the communities we serve.

TOM CALDERON  
Adult Curriculum Office  
Instructional and Counseling Services

## *CBE* *COMPETENCY BASED EDUCATION*

### Course Outline Competency-Based Component Definitions

Course descriptions state the major emphasis and content of the course.

Competency areas are units of instruction based on related competencies.

Competency statements are competency area goals that together define the framework and purpose of the course.

Competencies fall on a continuum between goals and performance objectives and denote outcome of instruction.

### Competency-Based Philosophy Overview

Competency-based instruction tells a student before instruction what skills, or knowledge he/she will demonstrate after instruction.

A competency is stated as a minimum. This is the least a student has to demonstrate or know to be judged as competent. Stating competencies as minimums does not mean minimum instruction. Activities and opportunities should be provided for students to achieve maximum potential.

Competency-based education provides instruction that enables each student to attain individual goals as measured against pre-stated standards.

CBE instruction provides immediate and continual repetition and remediation. A student repeats tasks until achieving competence.

In competency-based education the curriculum, instruction, and assessment share common characteristics based on clearly stated competencies.

Curriculum, instruction and assessment in CBE are: explicit, known, agreed upon, integrated, performance-oriented, and adaptive.

## *COURSE OUTLINE COMPETENCY-BASED COMPONENTS*

A course outline reflects the essential intent and content of the course described. Acceptable course outlines have six components. (Education Code Section 52506). Course outlines for all apportionment classes, including those in jails, state hospitals, and convalescent hospitals, contain the six required elements:

(EC 52504; 5CCR 10508 [b]; Adult Education Handbook for California [1977], Section 100)

Course Outline Components Location

GOALS AND PURPOSES Cover

*The educational goals or purposes of every course are clearly stated and the class periods are devoted to instruction. The course should be broad enough in scope and should have sufficient educational worth to justify the expenditure of public funds.*

The goals and purpose of a course are stated in the COURSE DESCRIPTION. Course descriptions state the major emphasis and content of a course, and are written to be understandable by a prospective student.

PERFORMANCE OBJECTIVES OR COMPETENCIES pp. 7-10

*Objectives should be delineated and described in terms of measurable results for the student and include the possible ways in which the objectives contribute to the student's acquisition of skills and competencies.*

Performance Objectives are sequentially listed in the COMPETENCY-BASED COMPONENTS section of the course outline. Competency Areas are units of instruction based on related competencies. Competency Statements are competency area goals that together define the framework and purpose of a course. Competencies fall on a continuum between goals and performance objectives and denote the outcome of instruction.

Competency-based instruction tells a student before instruction what skills or knowledge they will demonstrate after instruction. Competency-based education provides instruction which enables each student to attain individual goals as measured against pre-stated standards.

Competency-based instruction provides immediate and continual repetition and in competency-based education the curriculum, instruction, and assessment share common characteristics based on clearly stated competencies. Curriculum, instruction and assessment in competency-based education are: explicit, known, agreed upon, integrated, performance oriented, and adaptive.

*COURSE OUTLINE COMPETENCY-BASED COMPONENTS  
(continued)*

Course Outline Components Location

INSTRUCTIONAL STRATEGIES p. 15

*Instructional techniques or methods could include laboratory techniques, lecture method, small-group discussion, grouping plans, and other strategies used in the classroom.*

Instructional strategies for this course are listed in the TEACHING STRATEGIES AND EVALUATION section of the course outline. Instructional strategies and activities for a course should be selected so that the overall teaching approach takes into account the instructional standards of a particular program, i.e., English as a Second Language, Programs for Older Adults, Programs for Adults with Disabilities.

UNITS OF STUDY, WITH APPROXIMATE HOURS ALLOTTED FOR EACH UNIT Cover

*The approximate time devoted to each instructional unit within the course, as well as the total hours for the course, is indicated. The time in class is consistent with the needs of the student, and the length of the class should be that it ensures the student will/earn at an optimum level.* pp. 7-10

Units of study, with approximate hours allotted for each unit are listed in the COMPETENCY AREA STATEMENT(S) of the course outline. The total hours of the course, including work-based learning hours (community classroom and cooperative vocational education) is listed on the cover of every CBE course outline. Each Competency Area listed within a CBE outline is assigned hours of instruction per unit.

EVALUATION PROCEDURES p. 15

*The evaluation describes measurable evaluation criteria clearly within the reach of the student. The evaluation indicates anticipated improvement in performances as well as anticipated skills and competencies to be achieved.*

Evaluation procedures are detailed in the TEACHING STRATEGIES AND EVALUATION section of the course outline. Instructors monitor students' progress on a continuing basis, assessing students on attainment of objectives identified in the course outline through a variety of formal and informal tests (applied performance procedures, observations, simulations), paper and pencil exams, and standardized tests.

REPETITION POLICY THAT PREVENTS PERPETUATION OF STUDENT ENROLLMENT Cover

*After a student has completed all the objectives of the course, he or she should not be allowed to reenroll in the course. There is, therefore, a need for a statement about the conditions for possible repetition of a course to prevent perpetuation of students in a particular program for an indefinite period of time.*

## *ACKNOWLEDGMENTS*

Acknowledgement is given to DUANE COBB for revising this course outline.

Thanks to TOM CALDERON for editing and preparing this course outline as competency-based.

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*CALIFORNIA SCIENCE CONTENT STANDARDS  
for the General Science/Integrated 1 Course*

INVESTIGATION AND EXPERIMENTATION:

- 1.0 Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing this content in the other four strands, students should develop their own questions and perform investigations.  
(a, b, c, d, e, f, g, h, i, j, k, l, m, n)

CHEMISTRY:

Atomic and Molecular structure

- 1.0 The periodic table displays the elements in increasing atomic number and shows how the periodicity of the physical and chemical properties of the elements relates to atomic structure.  
(a, b, c, d, e)

Chemical Bonds

- 2.0 Biological, chemical, and Physical Properties of matter result from the ability of atoms to form bonds from electrostatic forces between electrons and protons and between atoms and molecules.  
(a, b, c, d, e)

Conservation of Matter and Stoichiometry

- 3.0 The conservation of atoms in chemical reactions leads to the principle of conservation of matter and the ability to calculate the mass of products and reactants. (b, c, d)

Gases and their Properties

- 4.0 The kinetic molecular theory describes the motion of atoms and molecules and explains the properties of gases. (a, b, d, e, f)

Acids and Bases

- 5.0 Acids, bases and salts are three classes of compounds that form ions in water solutions. (a, b, c, d)

Chemical Thermodynamics

- 7.0 Energy is exchanged or transformed in all chemical reactions and physical changes of matter.  
(a, b, c, d)

BIOLOGY/LIFE SCIENCES:

Ecology

- 6.0 Stability in an ecosystem is a balance between competing effects. (a, b, c, d, e, f)

Evolution

- 7.0 The frequency of an allele in a gene pool of a population depends on many factors and may be stable or unstable over time. (a, b, c)
- 8.0 Evolution is the result of genetic changes that occur in constantly changing environments.  
(a, b, c, d, e)



*CBE*  
*Competency-Based Education*

**COMPETENCY-BASED COMPONENTS**  
*for the General Science/Integrated 1 Course*

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES
<p>A. INTRODUCTION</p> <p>Understand how personal skill development-including positive attitude, honesty, self-confidence, time management, and other positive traits-contribute to academic success.</p> <p>(1 hour)</p>	<ol style="list-style-type: none"> <li>1. Demonstrate an understanding of classroom policies and procedures.</li> <li>2. Discuss competency area and minimal competencies for the course.</li> <li>3. Discuss assignment grading and scoring policy.</li> <li>4. Discuss importance of the following personal skills in the classroom/lab environment:               <ol style="list-style-type: none"> <li>a. positive attitude</li> <li>b. self-confidence</li> <li>c. honesty</li> <li>d. self-management/work ethic</li> <li>e. pride in product/work</li> <li>f. dependability</li> </ol> </li> <li>5. Prioritize tasks and meet deadlines.</li> <li>6. Describe the importance of initiative and leadership.</li> </ol> <p>COMPETENCIES</p> <p>Resources: Allocates Time</p> <p>Interpersonal: Participates as Member of a Team</p> <p>Information: Acquires and Evaluates Information/ Organizes and Maintains Information</p> <p>FOUNDATION</p> <p>Basic Skills: Reading/ Listening/ Speaking</p> <p>Thinking Skills: Knowing How to Learn</p> <p>Personal Qualities: Self-Management</p>

**B. THE SCIENTIFIC METHOD  
(INVESTIGATION AND  
EXPERIMENTATION 1.0)**

Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other four strands, students should develop their own questions and perform investigations.

(5 hours)

1. Select and use appropriate tools and technology (such as computer-linked probes, spreadsheets, and graphing calculators) to perform tests, collect data, analyze relationships, and display data. (1a)
2. Identify and communicate sources of unavoidable experimental error. (1b)
3. Identify possible reasons for inconsistent results, such as sources of error or uncontrolled conditions. (1c)
4. Formulate explanations by using logic and evidence. (1d)
5. Solve scientific problems by using quadratic equations and simple trigonometric, exponential, and logarithmic functions. (1e)
6. Distinguish between hypothesis and theory as scientific terms. (1f)
7. Recognize the usefulness and limitations of model and theories as scientific representations of reality. (1g)
8. Read and interpret topographic and geological maps. (1h)
9. Analyze the locations, sequences, or time intervals that are characteristic of natural phenomena (e.g., relative ages of rocks, locations of planets over time, and succession of species in an ecosystem) (1i)
10. Recognize the issues of statistical variability and the need for controlled tests. (1j)
11. Recognize the cumulative nature of scientific evidence. (1k)
12. Analyze situations and solve problems that require combining and applying concepts from more than one area of science. (1l)
13. Investigate a science-based societal issue by researching the literature, analyze data, and communicate the findings. Examples of issues include irradiation of food, cloning of animals by somatic cell nuclear transfer, choice of energy sources, and land and water use decisions in California. (1m)
14. Know that when an observation does not agree with an accepted scientific theory, the observation is sometimes mistaken or fraudulent (e.g., the Piltdown Man fossil or unidentified flying objects) and that the theory is sometimes wrong (e.g., the Ptolemaic model of the movement of the Sun, Moon, and planets). (1n)

<p>C. STABILITY OF ECOSYSTEMS/ POPULATION DYNAMICS (BIOLOGY/LIFE SCIENCES: Ecology 6.0)</p> <p>Understand that stability in an ecosystem is a balance between competing effects.</p> <p>(10 hours)</p>	<ol style="list-style-type: none"> <li>1. Know that biodiversity is the sum total of different kinds of organisms and is affected by alterations of habitats. (6a)</li> <li>2. Know how to analyze changes in an ecosystem resulting from changes in climate, human activity, introduction of nonnative species, or changes in population size. (6b)</li> <li>3. Know how fluctuations in population size in an ecosystem are determined by the relative rates of birth, immigration, emigration, and death. (6c)</li> <li>4. Know how water, carbon, and nitrogen cycle between abiotic resources and organic matter in the ecosystem and how oxygen cycles through photosynthesis and respiration. (6d)</li> <li>5. Know that a vital part of an ecosystem is the stability of its producers and decomposers. (6e)</li> <li>6. Know that at each link in a food web some energy is stored in newly made structures but much energy is dissipated into the environment as heat. This dissipation may be represented in an energy pyramid. (6f)</li> </ol>
<p>D. EVOLUTION, GENETICS, AND INHERITANCE (BIOLOGY/LIFE SCIENCES: Evolution 7.0, 8.0)</p> <p>Understand the frequency of an allele in a gene pool of a population depends on many factors and may be stable or unstable over time.</p> <p>Understand that evolution is the result of genetic changes that occur in populations in constantly changing environments.</p> <p>(6 hours)</p>	<ol style="list-style-type: none"> <li>1. Know that why natural selection acts on the phenotype rather than the genotype of an organism. (?a)</li> <li>2. Know why alleles that are lethal in a homozygous individual may be carried in a heterozygote and thus maintained in a gene pool. (?b)</li> <li>3. Know that new mutations are constantly being generated in a gene pool. (?c)</li> <li>4. Know how natural selection determines the differential survival of groups of organisms. (8a)</li> <li>5. Know that a great diversity of species increases the chance that at least some organisms survive major changes in the environment. (8b)</li> <li>6. Know that the effects of genetic drift on the diversity of organisms in a population. (Be)</li> <li>7. Know that reproductive or geographic isolation affects speciation. (8d)</li> <li>8. Know how to analyze fossil evidence with regard to biological diversity, episodic speciation, and mass extinction. (8e)</li> </ol>

<p>E. ATOMS, MOLECULES, ELEMENTS, AND BONDING (CHEMISTRY: Atomic and Molecular Structure 1.0, Conservation of Matter and Stoichiometry 3.0)</p> <p>Understand that the periodic table displays the elements in increasing atomic number and shows how periodicity of the physical and chemical properties of the elements relates to atomic structure.</p> <p>The conservation of atoms in chemical reactions leads to the principle of conservation of matter and the ability to calculate the mass of products and reactants.</p> <p>(10 hours)</p>	<ol style="list-style-type: none"> <li>1. Know how to relate the position of an element in the periodic table to its atomic number and atomic mass. (1a)</li> <li>2. Know how to use the periodic table to identify metals, semimetals, nonmetals, and halogens. (1b)</li> <li>3. Know how to use the periodic table to identify alkali metals, alkaline earth metals and transition metals, trends in ionization energy, electronegativity, and the relative sizes of ions and atoms. (1c)</li> <li>4. Know how to use the periodic table to determine the number of electrons available for bonding. (1d)</li> <li>5. Know that the nucleus of the atom is much smaller than the atom yet contains most of its mass. (1e)</li> <li>6. Know that the quantity one mole is set by defining one mole of carbon 12 atoms to have a mass of exactly 12 grams. (3b)</li> <li>7. Know that one mole equals <math>6.02 \times 10^{23}</math> particles (atoms or molecules). (3c)</li> <li>8. Know how to determine the molar mass of a molecule from its chemical formula and a table of atomic masses and how to convert the mass of a molecular substance to moles, number of particles, or volume of gas at standard temperature and pressure. (3d)</li> </ol>
<p>F. CHEMICAL BONDING REACTION (CHEMISTRY: Chemical Bonds 2.1)</p> <p>Understand that the biological, chemical, and physical properties of matter result from the ability of atoms to form bonds based on electrostatic forces between electrons and protons, and between atoms and molecules.</p> <p>(10 hours)</p>	<ol style="list-style-type: none"> <li>1. Know that atoms combine to form molecules by sharing electrons to form covalent or metallic bonds or by exchanging electrons to form ionic bonds. (2a)</li> <li>2. Know that chemical bonds between atoms in molecules such as <math>H_2</math>, <math>CH_4</math>, <math>NH_3</math>, <math>H_2CCH_2</math>, <math>N_2</math>, <math>Cl_2</math>, and many large biological molecules are covalent. (2b)</li> <li>3. Know that salt crystals, such as <math>NaCl</math>, are repeating patterns of positive and negative ions held together by electrostatic attraction. (2c)</li> <li>4. Know that the atoms and molecules in liquids move in a random pattern relative to one another because the intermolecular forces are too weak to hold the atoms or molecules in a solid form. (2d)</li> <li>5. Know how to draw Lewis dot structures. (2e)</li> </ol>

<p>G. ACIDS AND BASES (CHEMISTRY: Acids and Basis 5.0)</p> <p>Understand that acids, bases, and salts are three classes of compounds that form ions in water solutions.</p> <p>Understand that solutions are homogenous mixtures of two or more substances.</p> <p>(8 hours)</p>	<ol style="list-style-type: none"> <li>1. Know that the observable properties of acids, bases, and salt solutions. (Sa)</li> <li>2. Know that acids are hydrogen-ion-donating and bases are hydrogen-ionaccepting substances. (Sb)</li> <li>3. Know strong acids and bases fully dissociate and weak acids and bases partially dissociate. (Sc)</li> <li>4. Know how to use the pH scale to characterize acid and base solutions. (Sd)</li> </ol>
<p>H. KINETIC MOLECULAR THEORY AND THERMODYNAMICS (CHEMISTRY: Gases and Their Properties 4.0, Chemical Thermodynamics 7.0)</p> <p>Understand that the kinetic molecular theory describes the motion of atoms and molecules and explains the properties of gases.</p> <p>Understand that energy is exchanged or transformed in all chemical reactions and physical changes of matter.</p> <p>(10 hours)</p>	<ol style="list-style-type: none"> <li>1. Know that the random motion of molecules and their collisions with a surface create the observable pressure on that surface. (4a)</li> <li>2. Know that the random motion of molecules explains the diffusion of gases. (4b)</li> <li>3. Know that the values and meanings of standard temperature and pressure (STP). (4d)</li> <li>4. Know how to convert between the Celsius and Kelvin temperature scales. (4e)</li> <li>5. Know that there is no temperature lower than 0 Kelvin. (4f)</li> <li>6. Know how to describe temperature and heat flow in terms of the motion of molecules (or atoms). (7a)</li> <li>7. Know that chemical processes can either release (exothermic) or absorb (endothermic) thermal energy. (7b)</li> <li>8. Know that energy is released when a material condenses or freezes and is absorbed when a material evaporates or melts. (7c)</li> <li>9. Know how to solve problems involving heat flow and temperature changes, using known values of specific heat and latent heat of phase change. (7d)</li> </ol>

## *DEFINITIONS of SCANS COMPETENCIES and FOUNDATION SKILLS*

- Resources
- Allocates Time: Selects goal-related tasks; prioritizes tasks; schedules work to meet deadlines.
  - Allocates Money: Uses or prepares budgets; forecasts costs; keeps records to track budget performance.
  - Allocates Material and Facility Resources: Acquires, stores, and distributes materials, supplies, equipment, parts, or products.
  - Allocates Human Resources: Assesses knowledge and skills and distributes work accordingly; evaluates performance; provides feedback.
- Information
- Acquires and Evaluates Information: Identifies need for data, acquires data or creates data sources, and evaluates relevance of information.
  - Organizes and Maintains Information: Organizes, processes, and maintains written or computerized records; sorts, classifies or reformats information.
  - Interprets and Communicates Information: Selects and analyzes information; communicates the results to others using oral, written, graphic, or multi-media.
  - Uses Computers to Process Information: Uses computers to acquire, analyze, organize, and communicate information, including entering, modifying, storing, retrieving, and verifying data.
- Interpersonal
- Participates as a Member of a Team: Works cooperatively with others; contributes ideas, suggestions and effort; encourages team members; listens and responds to contributions of others; resolves differences for the benefit of the team; takes responsibility for achieving goals and for doing own share of the work.
  - Teaches Others: Helps others learn by coaching or other means; conveys job information to others; provides constructive feedback.
  - Serves Clients/Customers: Works and communicates with clients and customers to satisfy their expectations; listens actively to determine needs; communicates in a positive manner; obtains additional resources to satisfy client or customer needs.
  - Exercises Leadership: Communicates to justify a position; encourages, persuades or motivates others; establishes credibility through competence and integrity; takes minority viewpoints into consideration.
  - Negotiates to Arrive at a Decision: Works toward agreement; clarifies problems and resolves conflicts; proposes and examines options; sets realistic goals; resolves divergent interests.
  - Works with Cultural Diversity: Works well with men and women and with a variety of ethnic and social groups; respects the rights of others; bases impressions on individual performance, not on stereotypes.
- Systems
- Understands Systems: Knows how social, organizational, and technological systems work and operates effectively within them; knows who to ask for information and how to get resources.
  - Monitors and Corrects Performance: Monitors how procedures are working; predicts trends; diagnoses problems; takes action to maintain system performance.
  - Improves and Designs Systems: Makes suggestions for improving products or services; recommends alternatives; responsibly challenges the status quo.

*DEFINITIONS of SCANS COMPETENCIES and FOUNDATION SKILLS*  
*(continued)*

- Technology
- Selects Technology: Chooses procedures, equipment, or computer programs to produce desired results.
  - Applies Technology to Task: Understands purpose and procedures for setting up and operating machines, including computers and their programs.
  - Maintains and Troubleshoots Technology: Prevents, identifies, or solves problems in machines, computers, and other technologies.

Definitions of SCANS Foundation Skills

- Basic Skills
- Reading: Locates, understands, and interprets written information in prose and documents - including manuals, graphs, and schedules- to perform tasks.
  - Writing: Communicates thoughts, ideas, information, and messages in writing; records information completely and accurately; checks, edits, and revises written material.
  - Arithmetic: Performs computations; uses numerical concepts in practical situations; uses tables, graphs, and diagrams to obtain or convey numerical information.
  - Mathematics: Approaches practical problems by choosing from a variety of mathematical techniques.
  - Listening: Receives, attends to, interprets, and responds to verbal and non-verbal messages.
  - Speaking: Organizes ideas and communicates oral messages appropriately in conversation, discussion, and group presentations; asks questions when needed.
- Thinking Skills
- Creative Thinking: Uses imagination; combines ideas or information in new ways; reshapes goals in ways that that reveal new possibilities.
  - Decision Making: Specifies goals and constraints, generates alternatives, considers risks, evaluates and chooses best alternative.
  - Problem Solving: Recognizes that a problem exists, devises and implements a plan to resolve it, evaluates and monitors progress, and revises plan as needed.
  - Seeing Things in the Mind's Eye: Organizes and processes symbols, pictures, graphs; visualizes outcomes from blueprints, diagrams, flow charts, recipes, etc.
  - Knowing How to Learn: Can use learning techniques to apply and adapt new knowledge and skills in both familiar and changing situations.
  - Reasoning: Uses underlying principles to solve problems; uses logic to draw conclusions.

## *SUGGESTED INSTRUCTIONAL MATERIALS and OTHER RESOURCES*

### TEXTBOOKS

Biggs, Alton, et al. Biology: The Dynamics of Life, New York, New York: Glencoe McGraw-Hill Publishing Company, 2000. (Student text and teacher's wrap-around edition)

Biggs, Alton, et al. Biology: The Dynamics of Life/Chapter Assessments, New York, New York: Glencoe McGraw-Hill Publishing Company, 2000.

Dobson, Ken, et al. Holt Science Spectrum: A Physical Approach. Austin, Texas: Holt, Rhinehart and Winston Publishing Company, 2001. (Student text and annotated teacher's edition).

Dobson, Ken, et al. Holt Science Spectrum: A Physical Approach/Basic Skills Worksheets. Austin, Texas: Holt, Rhinehart and Winston Publishing Company, 2001.

Dobson, Ken, et al. Holt Science Spectrum: A Physical Approach/Basic Skills and Integration Resources Answer Key. Austin, Texas: Holt, Rhinehart and Winston Publishing Company, 2001.

Assessments and Answer Keys – Adult Secondary Education Catalog #36-09-51.AK

Worksheets and Answer Keys- Adult Secondary Education Catalog #36-09-51.WSK

### MEDIA AND TECHNOLOGY

Video- Shoestring Biotechnology: Making the Connection.

### RESOURCE PERSONS

Academic Supervisor

Subject area advisors

Mentor teachers



## *TEACHING STRATEGIES and EVALUATION*

### **METHODS AND PROCEDURES**

- A. Lecture
- B. Group discussion
- C. Class readings
- D. Independent reading/research
- E. Laboratory observation/experiment
- F. Written assignments
- G. Written/oral class reports
- H. Films
- I. Field trips
- J. Individualized instruction
- K. Simulated laboratory experiments

### **EVALUATION**

- A. Oral/written assignments
- B. Teacher observation
- C. Group/individual report
- D. Teacher/Division-made tests or quizzes developed from the competencies in this course outline

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### Statement for Civil Rights

All educational and vocational opportunities are offered without regard to race, color, national origin, gender, or physical disability.

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