

**INSTRUCTIONAL MATERIALS ADOPTION**

*Score Sheet*

- I. Generic Evaluation Criteria \_\_\_\_\_
- II. Instructional Content Analysis \_\_\_\_\_
- III. Specific Science Criteria \_\_\_\_\_

**PUBLISHER:** Delta Education dba CPO Science  
**SUBJECT:** Science  
**COURSE:** CATS 9  
**TITLE:** Integrated Science, An Investigative Approach  
**COPYRIGHT DATE:** 2006  
**SE ISBN:** 1-58892-182-4 (vol. 1) 1-58892-183-2 (2)  
**TE ISBN:** 1-58892-184-0

**PART I GENERIC EVALUATION CRITERIA  
 GROUP V – 2006 TO 2012**

**COORDINATED AND THEMATIC SCIENCE (CATS 9)**

R-E-S-P-O-N-S-E			CRITERIA	NOTES
Yes	No	N/A		
✓ _____	_____	_____	<b>I. INTER-ETHNIC</b>  The instructional material meets the requirements of inter-ethnic: concepts, content and illustrations, as set by West Virginia Board of Education Policy (Adopted December 1970).	
✓ _____	_____	_____	<b>II. EQUAL OPPORTUNITY</b>  The instructional material meets the requirements of equal opportunity: concept, content, illustration, heritage, roles contributions, experiences and achievements of males and females in American and other cultures, as set by West Virginia Board of Education Policy (Adopted May 1975).	

**PART II – INSTRUCTIONAL CONTENT ANALYSIS  
COORDINATED AND THEMATIC SCIENCE (CATS 9)**

(Vendor/Publisher) SPECIFIC LOCATION OF CONTENT WITHIN PRODUCT	(IMR Committee) Responses							
	<i>I=In-depth 80%</i>	<i>A=Adequate 80%</i>	<i>M=Minimal 60%</i>	<i>N=Nonexistent Less than 60%</i>	<b>I</b>	<b>A</b>	<b>M</b>	<b>N</b>

**The instructional materials program presents information and opportunities in a manner that enables the student an understanding of:**

	<b>1.</b>	<b><u>History and the Nature of Science</u></b>				
		a. the instructional materials program presents information and opportunities that enable students to demonstrate an understanding that scientists formulate and test their explanations of nature using observation and experiments	✓			
	<b>2.</b>	<b><u>Science as Inquiry</u></b>				
		a. the instructional materials program presents information and opportunities that support a minimum of 50% active inquiry, investigations and hands-on activities	✓			
		b. cooperate and collaborate to ask questions, find answers, solve problem, conduct investigations to further an appreciation for scientific discovery	✓			
		c. formulate conclusions through close observations, logical reasoning, objectivity, perseverance and integrity in data collection	✓			
		d. apply skepticism, careful methods, logical reasoning and creativity in investigating the observable universe		✓		
		e. use a variety of materials and scientific instruments to conduct explorations, investigations and experiments of the natural world		✓		

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		f. demonstrate safe techniques for handling, manipulating and caring for science materials, equipment, natural specimens and living organisms				✓		
		g. utilize experimentation to demonstrate scientific processes and thinking skills			✓			
		h. construct and use charts, graphs and tables to organize, display, interpret, analyze and explain data			✓			
	3.	<b><u>Unifying Themes</u></b>						
		a. compare and contrast the relationship between the parts of a system to the whole system			✓			
		b. construct a variety of useful models of an object, event or process			✓			
		c. compare and contrast changes that occur in an object or a system to its original state				✓		
		d. identify the influence that a variation in scale will have on the way an object or system works				✓		
	4.	<b><u>Scientific Design and Application</u></b>						
		a. research everyday applications and interactions of science and technology			✓			
		b. implement engineering solutions for given tasks and measure their effectiveness				✓		
	5.	<b><u>Science in Personal and Social Perspectives</u></b>						
		a. explore the connections between science, technology, society and career opportunities				✓		
		b. analyze the positive and negative effects of technology on society and the influence of societal pressures on the direction of technological advances				✓		

**PART III - SPECIFIC CRITERIA  
COORDINATED AND THEMATIC SCIENCE (CATS 9)**

The Coordinated and Thematic Science Grade Nine (CATS 9) objectives conclude the development of foundational knowledge of biology, chemistry, physics and the earth/space sciences. Through the spiraling, inquiry-based program of study, all students will demonstrate scientific literacy across these major fields of science. The subject matter is delivered through a coordinated, integrated approach with an emphasis on the development of the major science themes of systems, changes and models. Students will engage in active inquiries, investigations and hands-on activities for a minimum of 50% of the instructional time to develop conceptual understanding and research laboratory skills. Safety instruction is integrated in all activities.

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1. <b><u>The Coordinated and Thematic Science (CATS 9)</u></b>								
a. demonstrate knowledge, understanding and applications of scientific facts, concepts, principles, theories and models using the scientific method					✓			
b. demonstrate an understanding of the interconnections of biological, earth/space and physical science concepts (SC.9.4.1)						✓		
2. <b><u>The Cell and Molecular Basis for Heredity</u></b>								
a. analyze and explain the principles of genetics: (SC.9.4.2)								
• monohybrid and dihybrid crosses								
• mutations								
• genotypes								
• phenotypes								
• X and Y chromosomes								
• multiple alleles								
• DNA								
• probability								
• diversity							✓	
b. define meiosis and mitosis as relate to chromosome number in the production of sperm, egg and body cells (SC.9.4.3)						✓		

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3. <b><u>The Interdependence of Organisms</u></b>								
a. mathematically illustrate changes in populations of organisms (SC.9.4.4):								
• growth rate and curves								
• birth and mortality								✓
b. identify and describe microscopic organisms and foreign substances in the environment and their harmful effects (SV.9.4.5):								
• micro-organisms								
• mutagens and carcinogens								
• inorganic and organic pollutants							✓	
c. design an environment that demonstrates the interdependence of plants and animals, energy pyramids, adaptations of structures to obtain nutrition (SC.9.4.6)							✓	
d. explain how excretory and digestive systems work together in the human body (SC.9.4.7.)								✓
e. identify and compare the structure and function of cell, tissues and systems of different organisms (SC.9.4.8.)								✓
f. trace the transfer of matter and energy in the chemical/molecular processes of photosynthesis and respiration (SC.9.4.10)							✓	
4. <b><u>Structure and Properties of Matter</u></b>								
a. predict physical and chemical properties using the element's position on the Periodic Table (SC.9.4.11)						✓		
b. describe the characteristics of radioactivity substances including alpha particles, beta particles and gamma rays; the half-life of a radioactive isotope; a chain reaction and differentiate between fission and fusion (SC.9.4.12)						✓		

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						✓		
						✓		
	5.	<b><u>Chemical Reaction</u></b>						
		a.	write formulas and name compounds given oxidation numbers of monatomic and polyatomic ions (SC.9.4.15)			✓		
		b.	identify the various types of chemical bonds and the resulting compounds that are formed (SC.9.4.16)					
			<ul style="list-style-type: none"> <li>• ionic</li> <li>• nonpolar covalent</li> <li>• polar covalent</li> </ul>			✓		
		c.	experimentally determine the products of chemical reactions (SC.9.4.17)					
			<ul style="list-style-type: none"> <li>• write balanced chemical equations</li> <li>• classify type of reaction</li> <li>• describe energy changes</li> </ul>			✓		
	6.	<b><u>Energy</u></b>						
		a.	identify, describe and differentiate various forms of energy and energy transformations (SC.9.4.18)					
			<ul style="list-style-type: none"> <li>• kinetic energy ↔ potential energy</li> <li>• mechanical, thermal, electrical and chemical</li> </ul>			✓		
		b.	relate absorption and dissipation of heat to the composition of a material			✓		
		c.	demonstrate and diagram a magnetic field using bar magnets (SC.9.4.20)			✓		
		d.	hypothesize and experiment when different components are substituted in an electrical circuit (SC.9.4.21)			✓		
		e.	define and solve electrical problems involving ohm's law and power (SC.9.4.21)			✓		

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7.	<b><u>Motions and Forces</u></b>							
	a. relate the forces between charged objects to the charge on the objects and the distance between them (SC.9.4.22)					✓		
	b. examine speed-time relationships using graphs (SC.9.4.23)				✓			
	c. identify fundamental principle of dynamics by using Newton’s Laws (SC.9.4.23)					✓		
	d. list examples of simple machines and include calculations for mechanical advantage (SC.9.4.23)					✓		
	e. experiment with a pendulum to determine whether amplitude, mass and length will affect the motion of the pendulum (SC.9.4.24)					✓		
	f. investigate types of waves and their properties including interference, diffraction, refraction and resonance (SC.9.4.25)					✓		
	g. identify differences and similarities between transverse and longitudinal waves (SC.9.4.25)					✓		
	h. apply wave equation to determine the relationships among speed, wavelength and frequency (SC.9.4.25)					✓		
8.	<b><u>Energy in the Earth System</u></b>							
	a. investigate formation and destruction of landforms (SC.9.4.26)					✓		
	b. demonstrate the relationships of temperature, air pressure, wind speed, wind direction and humidity as elements of weather (SC.9.4.28)					✓		
	c. compare and analyze the characteristics of ocean tides and currents (SC.9.4.28)					✓		

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9.	<b><u>Geochemical Cycles</u></b>							
	a. employ a variety of tests to identify common rock-forming minerals (SC.9.4.29)						✓	
	b. analyze and describe common rock samples using grain size and shape and mineral composition (SC.9.4.30)						✓	
	c. use models to describe interactive cycles: (SC.9.4.31)							
	• water							
	• nitrogen					✓		
	• carbon dioxide							
10.	<b><u>Origin and Changes in the Earth Systems and Universe</u></b>							
	a. examine how scientists use seismographic evidence in determining structure and composition of the Earth’s interior (SC.9.4.32)					✓		
	b. determine the relative age of materials using time stratigraphic and bio-stratigraphic relationships (SC.9.4.33)						✓	
	c. estimate the absolute age of materials using existing radio isotopic data (SC.9.4.34)						✓	
	d. describe the effects of the movement of subsurface water (SC.9.4.35)					✓		
	e. relate changes in the Earth’s surface to the motion of lithospheric plates (SC.9.4.36)					✓		
	f. summarize and discuss the evidentiary basis for the theory of Plate Tectonics (SC.9.4.37)					✓		
	g. research and describe the life cycles of various stellar types (SC.9.4.38)					✓		
	h. interpret topographic maps, weather maps and charts and astronomical models (SC.9.4.39)						✓	

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- II. Instructional Content Analysis \_\_\_\_\_
- III. Specific Science Criteria \_\_\_\_\_

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**SUBJECT:** Science

**COURSE:** CATS 10

**TITLE:** Integrated Science, An Investigative Approach (2 vol. set)

**COPYRIGHT DATE:** 2006

**SE ISBN:** 1-58892-183-2 (Vol. 2) 1-58892-182-4 (Vol. 1)

**TE ISBN:** 1-58892-184-0

**PART I GENERIC EVALUATION CRITERIA  
GROUP V – 2006 TO 2012**

**COORDINATED AND THEMATIC SCIENCE (CATS 10)**

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Yes	No	N/A		
✓ _____	_____	_____	<b>I. INTER-ETHNIC</b>  The instructional material meets the requirements of inter-ethnic: concepts, content and illustrations, as set by West Virginia Board of Education Policy (Adopted December 1970).	
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**The instructional materials program presents information and opportunities in a manner that enables the student an understanding of:**

	1.	<b><u>History and the Nature of Science</u></b>				
		a. the instructional materials program presents information and opportunities that enable students to demonstrate an understanding that scientists formulate and test their explanations of nature using observation and experiments	✓			
	2.	<b><u>Science as Inquiry</u></b>				
		a. the instructional materials program presents information and opportunities that support a minimum of 50% active inquiry, investigations and hands-on activities	✓			
		b. cooperate and collaborate to ask questions, find answers, solve problem, conduct investigations to further an appreciation for scientific discovery	✓			
		c. formulate conclusions through close observations, logical reasoning, objectivity, perseverance and integrity in data collection	✓			
		d. apply skepticism, careful methods, logical reasoning and creativity in investigating the observable universe		✓		
		e. use a variety of materials and scientific instruments to conduct explorations, investigations and experiments of the natural world		✓		



**PART III - SPECIFIC CRITERIA  
COORDINATED AND THEMATIC SCIENCE (CATS 10)**

The Coordinated and Thematic Science Grade Ten (CATS 10) objectives conclude the development of foundational knowledge of biology, chemistry, physics and the earth/space sciences. Through the spiraling, inquiry-based program of study, all students will demonstrate scientific literacy across these major fields of science. The subject matter is delivered through a coordinated, integrated approach with an emphasis on the development of the major science themes of systems, changes and models. Students will engage in active inquiries, investigations and hands-on activities for a minimum of 50% of the instructional time to develop conceptual understanding and research laboratory skills. Safety instruction is integrated in all activities.

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1. <b><u>The Coordinated and Thematic Science CATS 10</u></b>								
_____ a. demonstrate knowledge, understanding and applications of scientific facts, concepts, principles theories and models using scientific method					✓			
_____ b. demonstrate and understanding of the interconnections of biological, earth and space and physical science concepts (SC.10.4.1)						✓		
2. <b><u>The Cell and Molecular Basis of Heredity</u></b>								
_____ a. identify and explain the structure and function of cell organelles including Golgi bodies, endoplasmic reticulum, mitochondria, chloroplasts, ribosomes, lysosomes and vacuoles (SC.10.4.2)								✓
_____ b. compare the variations in cells, tissues and organs of different organisms (SC.10.4.3)								✓
_____ c. identify the organs in: (SC.10.4.3)								
_____ • endocrine								
_____ • nervous								
_____ • digestion								
_____ • immune systems								✓



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4. **Matter, Energy, and Organization in Living Systems**

_____	a. construct diagrams showing energy flow and cycles of matter between chemical and biological systems in: (SC.10.4.12)						✓	
_____	• photosynthesis							
_____	• stored chemical energy							
_____	• decomposition							
_____	• carbon and nitrogen cycles							
_____	b. explain how the nervous, endocrine, and immune systems work together in the human body (SC.10.4.13)							✓
_____	c. review the needs of growing plants and the environments supplying those needs (SC.10.4.14)						✓	
_____	d. review factors that affect succession, populations and communities using maps, graphs, charts or tables (SC.10.4.15)							✓
_____	e. explain the role of ATP in cellular respiration process (SC.10.4.16)							✓

5. **Structure and Properties of Matter**

_____	a. investigate the properties of solutions: (SC.10.4.18)							
_____	• density							
_____	• conductivity							
_____	• solubility							
_____	• concentration							
_____	• pH							
_____	• temperature effects					✓		
_____	b. differentiate among physical, chemical and nuclear changes and reactions						✓	

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6. **Energy**

a. investigate the relationships among temperature, pressure and volume in gasses and interpret graphs that depict these relationships in Charles' Law, Boyle's Law, Gay-Lussac's Law (SC.10.4.19)

\_\_\_\_\_ ✓ \_\_\_\_\_

b. distinguish between exothermic and endothermic reactions (SC.10.4.20)

\_\_\_\_\_ ✓ \_\_\_\_\_

c. compare and contrast the characteristics and uses of waves in various parts of the electromagnetic spectrum (SC.10.4.21)

\_\_\_\_\_ ✓ \_\_\_\_\_

d. calculate the frequency of a particular wavelength (SC.10.4.21)

\_\_\_\_\_ ✓ \_\_\_\_\_

e. investigate the Doppler effect (SC.4.22)

\_\_\_\_\_ ✓ \_\_\_\_\_

f. explain qualitatively in the relationship between electricity and magnetism (SC.10.4.23)

\_\_\_\_\_ ✓ \_\_\_\_\_

g. describe how electrical components of a circuit function (SC.10.4.23)

\_\_\_\_\_ ✓ \_\_\_\_\_

h. describe qualitatively and quantitatively the conservation of energy (SC.10.4.24)

\_\_\_\_\_ ✓ \_\_\_\_\_

7. **Motions and Forces**

a. apply Newton's Laws of Motion to depict the relationship among rate, force, momentum, work and time using kinematics graph and mathematical models (SC.10.4.25)

\_\_\_\_\_ ✓ \_\_\_\_\_

b. describe and quantify how machines can provide mechanical advantages (SC.10.4.26)

\_\_\_\_\_ ✓ \_\_\_\_\_

c. determine the effect of different forces on pendulums and springs (SC.10.4.27)

\_\_\_\_\_ ✓ \_\_\_\_\_

d. demonstrate qualitative and quantitative understanding of pressure in various systems, such as water pipes and blood vessels (SC.10.4.28)

\_\_\_\_\_ ✓ \_\_\_\_\_

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8.	<b><u>Energy in the Earth System</u></b>							
	a. explain the formation of water waves as a function of wind velocity and duration (SC.10.4.29)							✓
	b. relate the cause of tides to their height and frequency (SC.10.4.30)					✓		
	c. investigate effects of geological events on weather and climate (SC.10. 4.31)					✓		
	d. observe and describe the effects of water on the earth's surface (SC.10.4.32)				✓			
	e. relate Earth's electromagnetic field to the dynamics of the magnetosphere (SC.10.4.33)					✓		
	f. discuss the causes of plate movement as illustrated by continental drift (SC.10.4.34)					✓		
9.	<b><u>Geochemical Cycles</u></b>							
	a. discuss physical and chemical relationships between minerals in rock cycle (SC.10.4.35)					✓		
10.	<b><u>Origin and Evolution in the Earth Systems and Universe</u></b>							
	a. investigate fossils as evidence for evolution and indicators of paleo-environments (SC.10.4.36)						✓	
	b. compare and contrast morphological features of fossils to present-day organisms (SC.10.4.37)							✓
	c. use fossil evidence to estimate the relative and absolute ages or rock layers (SC.10.4.38)						✓	
	d. compare and contrast the characteristics of Earth and the other planets relative to their distance from the Sun (SC.10.4.39)					✓		

## INSTRUCTIONAL MATERIALS ADOPTION

*Score Sheet*

- |      |                                |       |
|------|--------------------------------|-------|
| I.   | Generic Evaluation Criteria    | _____ |
| II.  | Instructional Content Analysis | _____ |
| III. | Specific Science Criteria      | _____ |

<b>PUBLISHER:</b>	<b>Delta Education</b>
<b>SUBJECT:</b>	<b>Science</b>
<b>COURSE:</b>	<b>Physics Technical Conceptual</b>
<b>TITLE:</b>	<b>Physics A First Course</b>
<b>COPYRIGHT DATE:</b>	<b>2005</b>
<b>SE ISBN:</b>	<b>1-58892-141-7 (vol. 1) 1-58892-152-2 (vol 2.) 1-58892-142-5 (set)</b>
<b>TE ISBN:</b>	<b>1-58892-143-3</b>

### PART I -GENERIC EVALUATION CRITERIA GROUP V – 2006 TO 2012

#### PHYSICS TECHNICAL CONCEPTUAL - GRADE 11-12

R-E-S-P-O-N-S-E			CRITERIA	NOTES
Yes	No	N/A		
✓ _____	_____ _____	_____ _____	<b>I. INTER-ETHNIC</b>  The instructional material meets the requirements of inter-ethnic: concepts, content and illustrations, as set by West Virginia Board of Education Policy (Adopted December 1970).	
✓ _____	_____ _____	_____ _____	<b>II. EQUAL OPPORTUNITY</b>  The instructional material meets the requirements of equal opportunity: concept, content, illustration, heritage, roles contributions, experiences and achievements of males and females in American and other cultures, as set by West Virginia Board of Education Policy (Adopted May 1975).	

**PART II - PHYSICS TECHNICAL CONCEPTUAL - GRADE 11-12  
Instructional Content Analysis**

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**The instructional materials program presents information and opportunities in a manner that enables the student to:**

	1.	<b><u>History and the Nature of Science</u></b>					
_____		a. formulate scientific explanations based on the student's observational and experimental evidence, accounting for variability in experimental results (PTC.1.1)	_____	_____	_____	_____	✓
_____		b. communicate that science has practical and theoretical limitations (PTC.1.2)	_____	_____	_____	_____	✓
_____		c. recognize that science is based on a set of observations in a testable framework that demonstrate basic laws that are consistent (PTC.1.3)	_____	_____	_____	_____	✓
_____		d. explore science as a blend of creativity, logic and mathematics (PTC.1.4)	_____	_____	_____	_____	✓
_____		e. trace the development of key historical concepts and principles describing their impact on modern thought and life by identifying the scientist's contributions (PTC.1.5)	_____	_____	_____	_____	✓
_____		f. integrate the history of science with cultural history to demonstrate that scientists work within their historical surroundings and are affected by them (PTC.1.6)	_____	_____	_____	_____	✓
	2.	<b><u>Science as Inquiry Objectives</u></b>					
_____		a. develop the skills, attitudes and/or values of scientific inquiry (e.g., curiosity, logic, objectivity, openness, skepticism, appreciation, diligence, integrity, ethical practice, fairness, creativity) (PTC.2.1)	_____	_____	_____	_____	✓



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4.	<b><u>Scientific Design and Application Objectives</u></b>							
	a. summarize technological advances in the biological sciences (PTC.5.1)					✓		
	b. analyze the interdependence of science and technology (PTC.5.2)				✓			
	c. relate how scientific skills and technological tools are used to design solutions that address personal and societal needs (PTC.5.3)					✓		
	d. describe the scientific concepts underlying technological innovations (PTC.5.4)					✓		
	e. integrate appropriate technology solutions to promote scientific inquiry (PTC.5.5)					✓		
5.	<b><u>Science in Personal and Social Perspectives</u></b>							
	a. describe the impact of cultural, technological and economic influences on the evolving nature of scientific thought and knowledge (PTC.6.4)					✓		
	b. describe occupational opportunities in science and technology (PTC.6.5)						✓	
	c. make decisions to resolve science-technology-society issues (PTC.6.6)						✓	

**PART III – SPECIFIC CRITERIA**  
**Physics Technical Conceptual**

**Physics-Conceptual is an alternative to the traditional mathematical approach to physics. Emphasis will be on the concepts which underlie the natural laws of the universe. Mathematics will be de-emphasized. Laboratory work will require traditional physics measurements to be made. Students in Physics-Technical or Physics-Conceptual will engage in active inquiries, investigations and hands-on activities for a minimum of 50% of the instructional time to develop conceptual understanding and research/laboratory skills. Safety instruction is integrated into all activities.**

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1. <b><u>Mechanics</u></b>								
a. qualitatively and quantitatively analyze mechanical systems (PTC.4.1.6)					✓			
b. calculate displacement, velocity and acceleration (PTC.4.2)					✓			
c. draw free body diagrams to illustrate the forces acting on objects (PTC.4.3)						✓		
d. apply graphical and algebraic solutions to vector problems (PTC.4.4)							✓	
e. recognize how the conservation of energy applies to (PTC.4.5):								
• Gravitational systems								
• Elastic systems								
• Simple harmonic motion						✓		
f. construct models involving mechanical systems that illustrate the utilization of technology (PTC.4.7)						✓		
2. <b><u>Fluids</u></b>								
a. qualitatively and quantitatively analyze fluid systems (PTC.4.8)						✓		
b. identify and apply the properties of solids, liquids and gases to explain their behavior at different pressures and temperatures (PTC.4.9)							✓	



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5.	<b><u>Electricity and Magnetism</u></b>							
	a. qualitatively and quantitatively analyze electrical systems (PTC.4.22)					✓		
	b. investigate properties of electricity and magnetism (PTC.4.23)							
	<ul style="list-style-type: none"> <li>• nature of electrical and magnetic fields</li> <li>• properties of electrical charge</li> <li>• conductors and insulators</li> </ul>					✓		
	c. investigate and analyze electrical circuits by (PTC.4.24):							
	<ul style="list-style-type: none"> <li>• drawing and constructing electrical circuits</li> <li>• applying Ohm’s law</li> </ul>					✓		
	d. construct models involving the use of electricity that illustrate applications of technology (PTC.4.25)					✓		
6.	<b><u>Modern Physics</u></b>							
	a. recognize and distinguish between Einstein’s General and Special Theories of Relativity (PTC.4.26)				✓			
	b. recognize the products of nuclear decay and write decay chain equations (PTC.4.27)					✓		

**INSTRUCTIONAL MATERIALS ADOPTION**

*Score Sheet*

- I. Generic Evaluation Criteria \_\_\_\_\_
- II. Instructional Content Analysis \_\_\_\_\_
- III. Specific Science Criteria \_\_\_\_\_

**PUBLISHER:** Delta Education

**SUBJECT:** Science

**COURSE:** Advanced Physics

**TITLE:** Foundations of Physics

**COPYRIGHT DATE:** 2004

**SE ISBN:** 1-58892-057-7 (vol. 1) 1-58892-058-5 (vol. 2) 1-58892-146-8 (vols. 1 and 2)

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**PART I -GENERIC EVALUATION CRITERIA  
GROUP V – 2006 TO 2012**

**ADVANCED PHYSICS - GRADE 11-12**

R-E-S-P-O-N-S-E			CRITERIA	NOTES
Yes	No	N/A		
✓ _____	_____	_____	<b>I. INTER-ETHNIC</b>  The instructional material meets the requirements of inter-ethnic: concepts, content and illustrations, as set by West Virginia Board of Education Policy (Adopted December 1970).	
✓ _____	_____	_____	<b>II. EQUAL OPPORTUNITY</b>  The instructional material meets the requirements of equal opportunity: concept, content, illustration, heritage, roles contributions, experiences and achievements of males and females in American and other cultures, as set by West Virginia Board of Education Policy (Adopted May 1975).	

**PART II - ADVANCED PHYSICS GRADE 11-12  
Instructional Content Analysis**

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**The instructional materials program presents information and opportunities in a manner that enables the student to:**

	1.	<b><u>History and the Nature of Science</u></b>				
_____		a. formulate scientific explanations based on the student's observational and experimental evidence, accounting for variability in experimental results (AP.1.1)	_____	_____	_____	✓
_____		b. communicate that science has practical and theoretical limitations (AP.1.2)	_____	_____	_____	✓
_____		c. recognize that science is based on a set of observations in a testable framework that demonstrate basic laws that are consistent (AP.1.3)	_____	_____	_____	✓
_____		d. explore science as a blend of creativity, logic and mathematics (AP.1.4)	_____	_____	_____	✓
_____		e. trace the development of key historical concepts and principles describing their impact on modern thought and life by identifying the scientist's contributions (AP.1.5)	_____	_____	_____	✓
_____		f. integrate the history of science with cultural history to demonstrate that scientists work within their historical surroundings and are affected by them (AP.1.6)	_____	_____	_____	✓

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2. **Science as Inquiry Objectives**

_____	a. develop the skills, attitudes and/or values of scientific inquiry (e.g., curiosity, logic, objectivity, openness, skepticism, appreciation, diligence, integrity, ethical practice, fairness, creativity) (AP.2.1)	_____	✓	_____	_____	_____	_____	_____
_____	b. discuss ethical practices for science (e.g., established research protocol, accurate record keeping, replication of results and peer review) (AP.2.2)	✓	_____	_____	_____	_____	_____	_____
_____	c. apply scientific approaches to seek solutions for personal and societal issues (AP.2.3)	_____	✓	_____	_____	_____	_____	_____
_____	d. properly and safety manipulate equipment, materials, chemicals, organisms and models (AP.2.4)	_____	✓	_____	_____	_____	_____	_____
_____	e. explore a variety of environments (e.g., laboratories, museums, libraries, parks and other outdoors locations) (AP.2.5)	_____	✓	_____	_____	_____	_____	_____
_____	f. use computers and other electronic technologies in an investigative context (AP.2.6)	✓	_____	_____	_____	_____	_____	_____
_____	g. engage in scientific problem solving and critical thinking (AP.2.7)	_____	✓	_____	_____	_____	_____	_____
_____	h. design, conduct, evaluate and revise experiments (AP.2.8)	_____	✓	_____	_____	_____	_____	_____

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3.	<b><u>Unifying Themes Objectives</u></b>							
	a. relate biological or technical systems to the natural and designed world (AP.3.1)					✓		
	b. use models to make predictions about interactions and changes in systems (AP.3.2)					✓		
	c. use graphs and equations relating changes in systems to rate, scale, patterns, trends and cycles (AP.3.3)					✓		
	d. cite examples of different characteristics, properties or relationships within a system that might change as its dimensions change (AP.3.4)						✓	
4.	<b><u>Scientific Design and Application Objectives</u></b>							
	a. summarize technological advances in the biological sciences (AP.5.1)					✓		
	b. analyze the interdependence of science and technology (AP.5.2)					✓		
	c. relate how scientific skills and technological tools are used to design solutions that address personal and societal needs (AP.5.3)					✓		
	d. describe the scientific concepts underlying technological innovations (AP.5.4)					✓		
	e. integrate appropriate technology solutions to promote scientific inquiry (AP.5.5)					✓		

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5. **Science in Personal and Social Perspectives**

	a. describe the impact of cultural, technological and economic influences on the evolving nature of scientific thought and knowledge (AP.6.4)	_____	_____	_____	_____	_____	_____	_____	_____
	b. describe occupational opportunities in science and technology (AP.6.5)	_____	_____	_____	_____	_____	_____	_____	_____
	c. make decisions to resolve science-technology-society issues (AP.6.6)	_____	_____	_____	_____	_____	_____	_____	_____

**PART III – SPECIFIC CRITERIA  
Advanced Physics**

**An advanced level course designed for students who have completed Coordinated and Thematic Science Ten (CATS 10) and desire a broader, in-depth study of the content found in the science field of physics. This course is designed to build upon and extend the Physics concepts, skills, and knowledge from the CATS 7-10 program. Students will engage in active inquiries, investigations and hands-on activities for a minimum of 50% of the instructional time to develop conceptual understanding and research/laboratory skills.**

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1. **Electricity and Magnetism**

_____	a. investigate electric and magnetic fields by (AP.4.19):							
	• drawing field lines				✓			
	• describing applications							
_____	b. use the properties of electrical charge and Coulombs Law to (AP4.20):							
	• explain charging by induction and conduction							
	• differentiate between conductors and insulators							
	• calculate electrostatic forces					✓		
_____	c. investigate and analyze electrical circuits by (AP.4.21, 4.22):							
	• constructing electrical circuits							
	• using Ohms Law							
	• calculating power and energy electrical systems				✓			
_____								

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2.	<b><u>Astronomy and Modern Physics</u></b>							
	a. investigate planetary motions by applying (AP.4.23, 4.24):							
	• Kepler’s Laws							
	• Newton’s Law of Universal Gravitation						✓	
	b. research and evaluate evidence of (AP.4.25, 4.26):							
	• the Big Bang model of the universe							
	• Einstein’s special theory of relativity					✓		
	c. describe nuclear reactions and discuss applications of nuclear energy (AP.4.27)					✓		
3.	<b><u>Mechanics</u></b>							
	a. review and apply Newton’s Laws of Motion (AP.4.1, 4.3)				✓			
	b. calculate displacement, velocity and acceleration (AP.4.2, 4.3)					✓		
	c. apply graphical and mathematical methods to (AP.4.4):							
	• find resultant of two or more vectors							
	• resolve a vector into components					✓		
	d. apply the concepts of energy conservation to (AP.4.5):							
	• analyze the motion of objects in free-fall and projectile motion							
	• analyze the motion of an object in simple harmonic motion							
	• analyze the motion of colliding objects						✓	
	e. apply the law of conservation of momentum (AP.4.5)					✓		
	f. investigate and calculate the work, energy, power, mechanical advantage, and efficiency of simple machines (AP.4.6)					✓		

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4.	<b><u>Fluids</u></b>					✓		
	a.	use the concepts of density and buoyancy to explain why an object would float or sink (AP.4.7)				✓		
	b.	relate the pressure exerted by a fluid to its depth (AP.4.8)				✓		
	c.	apply Bernoulli's Principle to fluid motion (AP.4.9)					✓	
	d.	apply the Ideal Gas Law to predict the properties of an ideal gas under different conditions (AP.4.10)						
5.	<b><u>Thermodynamics</u></b>							
	a.	distinguish between temperature and heat (AP.4.11)		✓				
	b.	investigate and perform calculations using specific heat and heats of fusion and vaporization (AP.4.12)				✓		
6.	<b><u>Waves, Sound and Optics</u></b>							
	a.	investigate and apply properties of waves to study mechanical and electromagnetic waves (AP.4.13)				✓		
	b.	investigate the relationship among the wavelength, velocity and frequency of waves (AP.4.14)				✓		
	c.	analyze the properties of sound waves and relate the physical properties of sound waves to the way sound is perceived (AP.4.15)				✓		
	d.	define and identify applications of the Doppler Effect (AP.4.16)				✓		
	e.	investigate image formation by the use of lenses and mirrors (AP.4.17):					✓	
		• ray diagrams						
		• mathematics				✓		
	f.	investigate and analyze optical applications in technology (AP.4.18)						