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correlated to

South Carolina Science Inquiry Strand for 9-12
AP Course Description of Environmental Science
Excellence in Environmental Education Guidelines for Grades 9–12

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OBJECTIVES	PAGE REFERENCES
I. Inquiry	
Inquiry is not an isolated unit of instruction and should be embedded throughout the content areas. The nature of science and technology is incorporated within this area.	
A. Identify Questions and Concepts that Guide Scientific Investigations.	
Experimental design should demonstrate logical connections between a knowledge base and conceptual understanding.	
1. Formulate a testable hypothesis based on literary research and previous knowledge.	The opportunity to address this objective is available. See the following: SE: 35, 52, 98, 123, 135, 180, 203, 226, 273, 323, 366, 418, 473, 524, 595
2. Identify and select experimental variables (independent and dependent) and controlled conditions.	The opportunity to address this objective is available. See the following: SE: 52, 75, 98, 135, 147, 180, 226, 254, 296, 323, 346, 390, 418, 444, 498, 524
B. Design and Conduct Investigations	
Prior knowledge about major concepts, laboratory apparatus, laboratory techniques, and safety should be used in designing and conducting a scientific investigation.	
1. Design a scientific investigation based on the major concepts in the area being studied.	SE: 36, 99, 124, 158, 204, 254, 297, 348, 391, 420, 474, 500, 548, 596
2. Select and use appropriate instruments to make the observations necessary for the investigation, taking into consideration the limitations of the equipment.	This objective falls outside the scope of Glencoe/McGraw-Hill Environmental Science: A Global Concern.
3. Identify technologies that could enhance the collection of data.	The opportunity to address this objective is available. See the following pages: SE: 53, 76, 136, 181, 227, 274, 324, 367, 445, 474, 500, 525, 548, 569
4. Select the appropriate safety equipment needed to conduct an investigation (e.g., goggles, aprons, etc.).	This objective falls outside the scope of Glencoe/McGraw-Hill Environmental Science: A Global Concern.
5. Suggest safety precautions that need to be implemented for the handling of materials and equipment used in an investigation.	This objective falls outside the scope of Glencoe/McGraw-Hill Environmental Science: A Global Concern.

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OBJECTIVES	PAGE REFERENCES
6. Describe the proper response to emergency situations in the laboratory.	This objective falls outside the scope of Glencoe/McGraw-Hill Environmental Science: A Global Concern.
7. Conduct a laboratory investigation with repeated trials and systematic manipulation of variables.	This objective falls outside the scope of Glencoe/McGraw-Hill Environmental Science: A Global Concern.
8. Identify possible sources of error inherent in an experimental design.	The opportunity to address this objective is available. See the following pages: SE: 36, 99, 124, 158, 204, 254, 297, 348, 391, 420, 474, 500, 548, 596
9. Organize and display data in useable and efficient formats, such as tables, graphs, maps, and cross sections.	SE: 76, 99, 124, 136, 158, 204, 227, 254, 274, 324, 391, 420, 500, 569
10. Draw conclusions based on qualitative and quantitative data.	SE: 36, 99, 124, 158, 204, 254, 297, 348, 391, 420, 474, 500, 548, 596
11. Discuss the impact of sources of error on experimental results.	The opportunity to address this objective is available. See the following pages: SE: 36, 99, 124, 158, 204, 254, 297, 348, 391, 420, 474, 500, 548, 596
12. Communicate and defend the scientific thinking that resulted in conclusions.	SE: 35, 52, 98, 123, 135, 180, 203, 226, 273, 323, 366, 418, 473, 524, 595

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OBJECTIVES	PAGE REFERENCES
C. Use Technology and Mathematics to Improve Investigations and Communications.	
Scientific investigations can be improved through the use of technology and mathematics. While it is acknowledged that the SI system is the accepted measurement system in science, opportunities to use the English System are encouraged.	
1. Select and use appropriate technologies (e.g., computers, calculators, CBL's) to enhance the precision and accuracy of data collection, analysis, and display.	SE: 76, 99, 124, 136, 158, 204, 227, 254, 274, 324, 391, 420, 500, 569
2. Discriminate between data that may be valid or anomalous.	The opportunity to address this objective is available. See the following pages: SE: 36, 99, 124, 158, 204, 254, 297, 348, 391, 420, 474, 500, 548, 596
3. Select and use mathematical formulas and calculations to extend the usefulness of laboratory measurements.	This objective falls outside the scope of Glencoe/McGraw-Hill Environmental Science: A Global Concern.
4. Draw a "best fit" curve through data points.	This objective falls outside the scope of Glencoe/McGraw-Hill Environmental Science: A Global Concern.
5. Calculate the slope of the curve and use correct units for the value of the slope for linear relationships.	This objective falls outside the scope of Glencoe/McGraw-Hill Environmental Science: A Global Concern.
6. Calculate interpolated and predict extrapolated data points.	This objective falls outside the scope of Glencoe/McGraw-Hill Environmental Science: A Global Concern.
7. Perform dimensional analysis calculations.	This objective falls outside the scope of Glencoe/McGraw-Hill Environmental Science: A Global Concern.

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OBJECTIVES	PAGE REFERENCES
D. Formulate and Revise Scientific Explanations and Models Using Logic and Evidence	
Scientific explanations and models are developed and revised through discussion and debate.	
1. Construct experimental explanations or models through discussion, debate, logic, and experimental evidence.	SE: 35, 52, 98, 123, 135, 180, 203, 226, 273, 323, 366, 418, 473, 524, 595
2. Develop explanations and models that eliminate bias and demonstrate the use of ethical principles. (P)	The opportunity to address this objective is available. See the following pages: SE: 52, 98, 123, 135, 180, 204, 254, 297, 348, 391, 420, 474, 500, 548, 596
3. Revise explanations or models after review.	The opportunity to address this objective is available. See the following pages: SE: 35, 52, 98, 123, 135, 180, 204, 254, 297, 348, 391, 420, 474, 500, 548, 596
E. Recognize and Analyze Alternative Explanations and Models	
Scientific criteria are used to discriminate among plausible explanations.	
1. Compare current scientific models with experimental results.	The opportunity to address this objective is available. See the following pages: SE: 56–58, 62–63, 68–70, 80–82, 126–130, 167–168, 350–352, 380–383, 387–389, 422–425, 427–428, 466–468, 487–493, 510–512
2. Select and defend, based on scientific criteria, the most plausible explanation or model.	SE: 35, 52, 98, 123, 135, 180, 203, 226, 273, 323, 366, 418, 473, 524, 595
F. Communicate and Defend a Scientific Argument	
Experimental processes, data, and conclusions should be communicated in a clear and logical manner.	
1. Develop a set of laboratory instructions that someone else can follow.	This objective falls outside the scope of Glencoe/McGraw-Hill Environmental Science: A Global Concern.
2. Develop a presentation to communicate the process and conclusion of a scientific investigation.	SE: 36, 99, 124, 158, 204, 254, 297, 348, 391, 420, 474, 500, 548, 596

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OBJECTIVES	PAGE REFERENCES
G. Understandings about Scientific and Technological Inquiry	
Historical scientific knowledge, current research, technology, mathematics and logic should be the basis for conducting investigations and drawing conclusions.	
1. Analyze how science and technology explain and predict relationships.	
a. Defend the idea that conceptual principles and knowledge guide scientific and technological inquiry.	SE: 47–53
b. Explain how historical and current scientific knowledge influences the design, interpretation, and evaluations of investigations.	
1. Discuss the reasons scientists and engineers conduct investigations.	SE: 47–53
2. Defend the use of technology as a method for enhancing data collection, data manipulation, and advancing the fields of science and technology.	The opportunity to address this objective is available. See the following pages: SE: 76, 99, 124, 136, 158, 204, 227, 254, 274, 324, 391, 420, 500, 569
3. Explain how mathematics is important to scientific and technological inquiry.	This objective falls outside the scope of Glencoe/McGraw-Hill Environmental Science: A Global Concern.
4. Explain why scientific models and explanations need to be based on historical and current scientific knowledge.	SE: 47–53
5. Understand that scientific explanations must be logical, supported by the evidence, and open to revision.	SE: 56–58, 68–70, 80–82, 126–130, 167–168, 350–352, 380–383, 387–389, 422–425, 427–428, 466–468, 510–512

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OBJECTIVES	PAGE REFERENCES
Advanced Placement Program	
I. Interdependence of Earth's Systems: Fundamental Principles and Concepts (25%)	
A. The Flow of Energy	
1. forms and quality of energy	SE: 22–24, 59–63, 66–68, 374, 388, 478, 480–487, 502, 507, 513–515, 517–518, 520–522
2. energy units and measurements	SE: 62–63, 477, 503–506, 513–515
3. sources and sinks, conversions	SE: 480–481, 482–485, 486–487, 501–502, 503–505, 507–508, 509–512, 513–514, 515–517, 518–524
B. The Cycling of Matter	
1. water	SE: 423–424
2. carbon	SE: 68–70
3. major nutrients	
a. nitrogen	SE: 70–72
b. phosphorus	SE: 72–73
4. differences between cycling of major and trace elements	The opportunity to address this objective is available. See the following page: SE: 68
C. The Solid Earth	
1. Earth history and the geologic time scale	The opportunity to address this objective is available. See the following pages: SE: 80–82, 350–353
2. Earth dynamics: plate tectonics, volcanism, the rock cycle, soil formation.	SE: 236–239, 350–353, 363–364

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OBJECTIVES	PAGE REFERENCES
D. The Atmosphere	
1. atmospheric history: origin, evolution, composition, and structure	SE: 370–374
2. atmospheric dynamics weather, climate	SE: 69–70, 370–375, 380–382
E. The Biosphere	
1. organisms: adaptations to their environments	SE: 79–83
2. populations and communities: exponential growth, carrying capacity	SE: 90–93, 94–96, 126–130
3. ecosystems and change: biomass, energy transfer, succession	SE: 61–63, 66–69, 112–114
4. evolution of life: natural selection, extinction	SE: 80–83
II. Human Population Dynamics (10%)	
A. History and Global Distribution	
1. numbers	SE: 143–150
2. demographics, such as birth and death rates	SE: 143–150
3. patterns of resource utilization	SE: 152–153, 165–167, 169–173
B. Carrying Capacity – Local, Regional, Global	SE: 130–131, 167–168
C. Cultural and Economic Influences	SE: 130, 164, 166–169, 173–174, 280–281
III. Renewable and Nonrenewable Resources: Distribution, Ownership, Use, Degradation (15%)	
A. Water	
1. fresh: agricultural, industrial, domestic	SE: 243, 427–428, 430–435, 440, 442
2. oceans: fisheries, industrial	SE: 230, 276, 283–285, 435–439, 462–464
B. Minerals	SE: 352–353, 354–360, 361–362

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OBJECTIVES	PAGE REFERENCES
C. Soils	
1. soil types	SE: 238–239
2. erosion and conservation	SE: 240–243, 249–250, 308–309
D. Biological	
1. natural areas	SE: 336–341
2. genetic diversity	SE: 277, 292–293
3. food and other agricultural products	SE: 244–246, 250–253
E. Energy	
1. conventional sources	SE: 478–479, 480–481, 483–484, 486–487, 518–520
2. alternative sources	SE: 478, 501–502, 508–509, 510–513, 520–522, 532–533
F. Land	
1. residential and commercial	SE: 306, 320–322, 565–566
2. agricultural and forestry	SE: 239–240, 242–243, 302–303, 304–306, 314–315
3. recreational and wilderness	SE: 310–311, 313, 334, 337–339
IV. Environmental Quality (20–25%)	
A. Air/Water/Soil	
1. Major pollutants	
a. types, such as SO_2, NO_X, and pesticides	SE: 259, 264–265, 360, 364, 396–398, 399–403, 408–409, 412–413, 458, 462
b. thermal pollution	SE: 455–457
c. measurement and units of measure such as ppm, pH, µg/L	SE: 199–200, 408, 451
d. point and nonpoint sources (domestic, industrial, agricultural)	SE: 449, 464–466

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OBJECTIVES	PAGE REFERENCES
2. effects of pollutants on :	
a. aquatic systems	SE: 243, 451–455, 460–462, 464–466, 469–470, 554–556
b. vegetation	SE: 240, 286, 408–410
c. natural features, building and structures	SE: 409–410
d. wildlife	SE: 286–287
3. pollution reduction, remediation, and control	SE: 119–120, 466–470, 545–546
B. Solid Waste	
1. types, sources, and amounts	SE: 529–531
2. current disposal methods and their limitations	SE: 529–533
3. alternative practices in solid waste management	SE: 533–539
C. Impact on Human Health	
1. agents: chemical and biological	SE: 190–193, 194–195, 264–265, 400–402, 452–455, 471–472, 482, 532–533
2. effects: acute and chronic, dose-response relationships	SE: 198–199
3. relative risks: evaluation and response	SE: 200–202
V. Global Changes and Their Consequences (15–20%)	
A. First-order Effects (changes)	
1. atmosphere: CO_2, CH_4, stratospheric O_3	SE: 69–70, 371–372, 383–384, 387–388, 404–406, 518
2. oceans: surface temperatures, currents	SE: 382–383, 386, 431
3. biota: habitat destruction, introduced exotics, overharvesting	SE: 95, 164, 236, 311–313
B. Higher-order Interactions (consequences)	

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OBJECTIVES	PAGE REFERENCES
1. atmospheric: global warming, increasing ultraviolet radiation	SE: 22, 62, 372, 387–388, 404–405
2. oceans: increasing sea level, long-term climate change, impact on El Niño	SE: 380–383, 385–387
3. biota: loss of biodiversity	SE: 278–282, 283–284, 286–287
VI. Environment and Society: Trade-Offs and Decision Making (10%)	
A. Economic Forces	
1. cost-benefit analysis	SE: 171–172
2. marginal costs	SE: 162
3. ownership and externalized costs	SE: 173–174
B. Cultural and Aesthetic Considerations	SE: 164, 280–281, 400
C. Environmental Ethics	SE: 38–51, 175–179
D. Environmental Laws and Regulations (International, National, and Regional)	SE: 209–218, 219–221, 222–225
E. Issues and options (conservation, preservation, restoration, remediation, sustainability, mitigation)	SE: 17–21, 115–117, 160, 168–169, 249–250, 309–310, 361–362, 440–442, 469–470, 502–507, 586
Excellence in Environmental Education – Guidelines for Learning (9–12)	
Identify several plants and animals common to local ecosystems. Describe concepts such as succession, competition, predator/prey relationships, and parasitism.	SE: 85–88, 118, 286–288
Evaluate sources of nonpoint source pollution of local bodies of water, including sources that are not local.	SE: 449, 464–466
Investigate short- and long-term environmental changes in a local watershed, and aquifer, or in air quality. Or document changes in land use and their environmental effects	The opportunity to address this objective is available. See the following: SE: 240–243, 301, 306, 314–315, 316–317, 560–562

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OBJECTIVES	PAGE REFERENCES
Research population trends for a locally threatened species. Describe changes, activities, and other factors that seem to affect the population trends.	The opportunity to address this objective is available. See the following: SE: 126–134, 167–168, 283–285, 290–291, 293–295
Calculate the potential for generating wind or solar power on a particular site.	The opportunity to address this objective is available. See the following: SE: 501–502, 509–513, 520–522
Trace human population trends for their region and make projections, based on research findings, for the future.	SE: 131–134

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Atlantic Southeast Region
6510 Jimmy Carter Boulevard
Norcross, GA 30071
770/613–0281
800/731–2365