

High School Course Description for **SDC EARTH SCIENCE**

Course Title: SDC Earth Science**Curricular Area:** Science**Course Number:** SDC107/108**Length:** One year**Grade Level:** 9-12**Prerequisites:** None**Meets a UC a-g Requirement:****Meets NCAA Requirement:****Meets High School Graduation Requirement for:**
Biology Elective Credit**Course Description**

This course covers the fundamental topics associated with the formation and changes in the earth's crust, meteorology, astronomy, paleontology, materials of the earth, earth cycles, history of the earth, and earth in space.

Alignment

This course is aligned to Earth Sciences California Content Standards for California public schools.

Instructional MaterialsRequired Textbook(s)

- Earth Science California Ed.,
Prentice Hall 2007 ISBN 0-
13-166-755-6

Web Sites

<http://www.PHSchool.com>

Supplemental Materials

- Earth Science California Ed,
Guided Reading & Study
Workbook;
- Earth Science California Ed
Laboratory Manual; GEODE
- CD-ROM Student Express

Suggested Video/DVDs//Films

Eyewitness Videos:

- *Volcano*, 1996
- *Prehistoric Life*, 1996
- *Weather* – 1996
- *Jungle* – 1995
- *Rocks & Mineral* –1996
- *Planet Storm* (2003)
- *Planet Earth* (BBC) 2007
- *The Blue Planet* -2002

Exit Criteria

<u>Activities</u>	<u>Percentage</u>
Quizzes.....	15%
Homework.....	5%
Class work.....	55%
Tests	15%
Final Examination.....	10%
Total:	100%

Development Team

This Course of Study was updated in 2009 by Ben Kundert

Colton Joint Unified School District Course of Study

Pacing Guides for SDC Earth Science

First Quarter

Unit 1, Introduction to Earth Science:

Weeks: 1-3

Standards

- *Standard 1b-* Students know the evidence from Earth and moon rocks indicates that the solar system was formed from a nebular cloud of dust and gas approximately 4.6 billion years ago.
- Standards: 1f and 1g: *Investigations 1f-* Distinguish between hypothesis and theory as scientific terms.
- *Investigations 1g-* Recognize the usefulness and limitations of models and theories as scientific representations of reality

Unit 2, Historical Geology: Chapters 12 & 13

Weeks: 4-7

Standards

- *Standard 1c-* Students know the evidence from geological studies of Earth and other planets suggest that the early Earth was very different from Earth today.
- *Standard 1f-* Students know the evidence for the dramatic effects that asteroid impacts have had in shaping the surface of planets and their moons and in mass extinctions of life on Earth.
- *Standard 6c-* Students know how Earth's climate has changed over time, corresponding to changes in Earth's geography, atmospheric composition, and other factors, such as solar radiation and plate movement.
- *Standard 8b-* Students know how the composition of Earth's atmosphere has evolved over geologic time and know the effect of outgassing, the variations of carbon dioxide concentration, and the origin of atmospheric oxygen.
 - *Investigations 1g-* Recognize the usefulness and limitations of models and theories as scientific representations of reality.
 - *Investigations 1i-* 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).
 - *Investigations 1k-* Recognize the cumulative nature of scientific evidence.
 - *Investigations 1m-* Investigate a science-based societal issue by researching the literature, analyzing data, and communicating 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.

Unit 3, Matter, Minerals, and Properties of Minerals: Chapters 2-4 and Chapter 13a, sections 1&2

Weeks: 8-10

Standards

- *Standard 3c-* Students know how to explain the properties of rocks based on the physical and chemical conditions in which they formed, including plate tectonic processes.
- *Standard 4a-* Students know the relative amount of incoming solar energy compared with Earth's internal energy and the energy used by society.
- *Standard 4c* – Students know the different atmospheric gases that absorb the Earth's thermal radiation and the mechanism and significance of the greenhouse effect.
- *Standard 7a-* Students know the carbon cycle of photosynthesis and respiration and the nitrogen cycle.
- *Standard 7b-* Students know the global carbon cycle: the different physical and chemical forms of carbon in the atmosphere, oceans, biomass, fossil fuels, and the movement of carbon among these reservoirs.
- *Standard 7c* - Students know the movement of matter among reservoirs is driven by Earth's internal and external sources of energy.
- *Standard 7d* - Students know the relative residence times and flow characteristics of carbon in and out of its different reservoirs.
- *Standard 8c-* Students know the location of the ozone layer in the upper atmosphere, its role in absorbing ultraviolet radiation, and the way in which this layer varies both naturally and in response to human activities.
- *Standard 9a* - Students know the resources of major economic importance in California and their relation to California's geology.
 - *Investigations 1d-* Formulate explanations by using logic and evidence.
 - *Investigations 1f-* Distinguish between hypothesis and theory as scientific terms.

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- *Investigations 1g*- Recognize the usefulness and limitations of models and theories as scientific representations of reality.
- *Investigations 1k*- Recognize the cumulative nature of scientific evidence.
- *Investigations 1l*- Analyze situations and solve problems that require combining and applying concepts from more than one area of science.

Second Quarter

Unit 4, Plate Tectonics: Chapter 9

Weeks: 11-12

Standards

- *Standard 3a*- Students know features of the ocean floor (magnetic patterns, age, and sea-floor topography) provide evidence of plate tectonics.
- *Standard 3b*- Students know the principal structures that form at the three different kinds of plate boundaries.
- *Standard 3d*- Students know why and how earthquakes occur and the scales used to measure their intensity and magnitude.
- *Standard 3f*- * Students know the explanation for the location and properties of volcanoes that are due to hot spots and the explanation for those that are due to subduction.
 - *Investigations 1i*- 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).
 - *Investigations 1k*- Recognize the cumulative nature of scientific evidence.

Unit 5, Earthquakes and California Hazards: Chapter 5 (selections) 8, & 13 (selections)

Chapter 5.3 (Mass Movement/ CA Hazards)

Weeks: 13-14

Chapter 13a, section 3

Standards

- *Standard 3d*- Students know why and how earthquakes occur and the scales used to measure their intensity and magnitude.
- *Standard 9b*- Students know the principal natural hazards in different California regions and the geologic basis of those hazards.
- *Standard 9d*-* Students know how to analyze published geologic hazard maps of California and know how to use the map's information to identify evidence of geologic events of the past and predict geologic changes in the future.
 - *Investigations 1d*- Formulate explanations by using logic and evidence.
 - *Investigations 1m* - Investigate a science-based societal issue by researching the literature, analyzing data, and communicating 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.

Unit 6, Atmosphere and Climate Chapters 17, 21.1, 21.3

Weeks: 15-18

Standards

- Standard 4b-Students know the relative amount of incoming solar energy compared with Earth's internal energy and the energy used by society.
- Standard 5a- Students know how differential heating of Earth results in circulation patterns in the atmosphere and oceans that globally distribute the heat.
- Standard 6a -Students know weather (in the short run) and climate (in the long run) involve the transfer of energy into and out of the atmosphere.
- Standard 6b -Students know the effects on climate of latitude, elevation, topography, and proximity to large bodies of water and cold or warm ocean currents.
- Standard 6c- Students know how Earth's climate has changed over time, corresponding to changes in Earth's geography, atmospheric composition, and other factors, such as solar radiation and plate movement.
- Standard 6d- * Students know how computer models are used to predict the effects of the increase in greenhouse gases on climate for the planet as a whole and for specific regions.
- Standard 8a- Students know the thermal structure and chemical composition of the atmosphere.

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- Standard 8c- Students know the location of the ozone layer in the upper atmosphere, its role in absorbing ultraviolet radiation, and the way in which this layer varies both naturally and in response to human activities.
- Investigations 1d – Formulate explanations by using logic and evidence.
- Investigations 1g –Recognize the usefulness and limitations of models and theories as scientific representations of reality.
- Investigations 1i - 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).
- Investigations 1m - Investigate a science-based societal issue by researching the literature, analyzing data, and communicating 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.

Week: 19 **Semester Exams**

Third Quarter

Unit 7, Water in the Atmosphere Chapters 18 (selections) & 19

Weeks: 20-23

18.1-Air Pressure/Wind,

18.3- Cloud Types/Precipitation,

Standards

- *Standard 5a-* Students know how differential heating of Earth results in circulation patterns in the atmosphere and oceans that globally distribute the heat.
- *Standard 5b-* Students know weather (in the short run) and climate (in the long run) involve the transfer of energy into and out of the atmosphere.
- *Standard 5c-* Students know the origin and effects of temperature inversions.
- *Standard 5e-* Students know rain forests and deserts on Earth are distributed in bands at specific latitudes.
- *Standard 5f- ** Students know the interaction of wind patterns, ocean currents, and mountain ranges results in the global pattern of latitudinal bands of rain forests and deserts.
- *Standard 5g- ** Students know features of the ENSO (El Niño southern oscillation) cycle in terms of sea-surface and air temperature variations across the Pacific and some climatic results of this cycle.
- *Standard 6b-* Students know the effects on climate of latitude, elevation, topography, and proximity to large bodies of water and cold or warm ocean currents.
 - *Investigations 1d* – Formulate explanations by using logic and evidence.
 - *Investigations 1g* –Recognize the usefulness and limitations of models and theories as scientific representations of reality.

Unit 8 Weather Patterns and Severe Storms: Chapter 20

Weeks: 24-25

Standards

- Standard 1d- Students know the evidence indicating that the planets are much closer to Earth than the stars are.

Unit 9, Mountain Building: Chapter 5 and 6 Selections

Weeks: 26-27

5.2 Nitrogen Cycle/erosion,

6.1 Water Cycle,

6.3 Hot springs/geysers/caverns,

Carbon Cycle, p.85

Standards

- *Standard 3b-* Students know the principal structures that form at the three different kinds of plate boundaries.
- *Standard 3c-* Students know how to explain the properties of rocks based on the physical and chemical conditions in which they formed, including plate tectonic processes.
- *Standard 9b-* Students know the principal natural hazards in different California regions and the geologic basis of those hazards.

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- *Investigations 1i* - 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).
- *Standard 7a*- Students know the carbon cycle of photosynthesis and respiration and the nitrogen cycle.
- *Standard 9c*- Students know the importance of water to society, the origins of California's fresh water, and the relationship between supply and need.
 - *Investigations 1b* - Identify and communicate sources of unavoidable experimental error.
 - *Investigations 1c* - Identify possible reasons for inconsistent results, such as sources of error or uncontrolled conditions.
 - *Investigations 1d* – Formulate explanations by using logic and evidence.
 - *Investigations 1m* - Investigate a science-based societal issue by researching the literature, analyzing data, and communicating 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.

Fourth Quarter

Unit 10, The Solar System: Chapters 22-23

Week: 28-30

Standards:

- *Standard 1a*- Students know how the differences and similarities among the sun, the terrestrial planets, and the gas planets may have been established during the formation of the solar system.
- *Standard 1b* Students know the evidence from Earth and moon rocks indicates that the solar system was formed from a nebular cloud of dust and gas approximately 4.6 billion years ago.
- *Standard 1d*- Students know the evidence indicating that the planets are much closer to Earth than the stars are.
- *Standard 1f*- Students know the evidence for the dramatic effects that asteroid impacts have had in shaping the surface of planets and their moons and in mass extinctions of life on Earth.
- *Standard 4d*- * Students know the differing greenhouse conditions on Earth, Mars, and Venus; the origins of those conditions; and the climatic consequences of each.
 - *Investigations 1g* - Recognize the usefulness and limitations of models and theories as scientific representations of reality.
 - *Investigations 1i* - 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).
 - *Investigations 1n* - 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).

Unit 11, Stars and the Universe: Chapters 24-25

Weeks: 31-34

Standards:

- *Standard 1d*- Students know the evidence indicating that the planets are much closer to Earth than the stars are.
- *Standard 1e* -Students know the Sun is a typical star and is powered by nuclear reactions, primarily the fusion of hydrogen to form helium.
- *Standard 1g* -* Students know the evidence for the existence of planets orbiting other stars.
- *Standard 2a*- Students know the solar system is located in an outer edge of the disc-shaped Milky Way galaxy, which spans 100,000 light years.
- *Standard 2b*- Students know galaxies are made of billions of stars and comprise most of the visible mass of the universe.
- *Standard 2c* Students know the evidence indicating that all elements with an atomic number greater than that of lithium have been formed by nuclear fusion in stars. -
- *Standard 2d*- Students know that stars differ in their life cycles and that visual, radio, and X-ray telescopes may be used to collect data that reveal those differences.
- *Standard 2e*- * Students know accelerators boost subatomic particles to energy levels that simulate conditions in the stars and in the early history of the universe before stars formed.
- *Standard 2f* -* Students know the evidence indicating that the color, brightness, and evolution of a star are determined by a balance between gravitational collapse and nuclear fusion.

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- *Standard 2g*- * Students know how the red-shift from distant galaxies and the cosmic background radiation provide evidence for the "big bang" model that suggests that the universe has been expanding for 10 to 20 billion years.
 - *Investigations 1d* – Formulate explanations by using logic and evidence.
 - *Investigations 1i* - 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).
 - *Investigations 1n* - 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).

Unit 12, Oceanography: Chapters 14, 15, 16 Selections

Weeks: 35-36

14.1- Sea floor mapping,
14.2- Review, 15,
15.2- all,
16.

Standards:

- *Standard 3a*- Students know features of the ocean floor (magnetic patterns, age, and sea-floor topography) provide evidence of plate tectonics.
- *Standard 5a*- Students know how differential heating of Earth results in circulation patterns in the atmosphere and oceans that globally distribute the heat.
- *Standard 5b*- Students know the relationship between the rotation of Earth and the circular motions of ocean currents and air in pressure centers.
- *Standard 5d*- Students know properties of ocean water, such as temperature and salinity, can be used to explain the layered structure of the oceans, the generation of horizontal and vertical ocean currents, and the geographic distribution of marine organisms.

Unit 13, Volcanoes: Chapter 10

Weeks: 37-38

Standards:

- Standards: *Standard 3e*- Students know there are two kinds of volcanoes: one kind with violent eruptions producing steep slopes and the other kind with voluminous lava flows producing gentle slopes.
- *Standard 3f*- * Students know the explanation for the location and properties of volcanoes that are due to hot spots and the explanation for those that are due to subduction.
 - *Investigations 1d*- Formulate explanations by using logic and evidence.
 - *Investigations 1g*- Recognize the usefulness and limitations of models and theories as scientific representations of reality.

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Learning Experiences and Instruction:

Teachers utilize the Direct Interactive Instruction model to introduce new skills and concepts that are essential to the CAHSEE standards, then reinforce and develop those skills each quarter with the goal of bringing students to mastery by the end of the fourth quarter. All instruction will be based on the “I do, We do, You do” scaffolding model with an emphasis on individual differentiation as needed. Teachers will use a variety of the following:

- Inquiry-based learning
- Engaged reading opportunities
- Think-pair-share
- Reciprocal teaching
- Cloze reading & writing
- Guided reading & writing
- Cognitive modeling
- Questioning strategies
- Graphic organizers/concept attainment
- Student-led groups/ peer pairing
- Metacognitive learning: self-regulation, goal-setting, self-monitoring, and self-questioning

Support for English Language Learners:

SDAIE strategies
Flexible grouping
Peer pairing
Realia
Texts/materials in first language
Instructional Aide

Support for Special Education Students:

As this is an SDC class, it is designed to meet the needs of the class and of individuals. All students’ IEP goals and accommodations will be addressed using a combination of the following:

- Instructional Aide
- Audio & visual aids
- Modified texts
- Flexible grouping
- Testing accommodations
- Tutoring (peer & teacher)
- Computer-Guided instruction

Stretching the Lesson for GATE Students:

Independent study supplemented with mentoring/tutoring
Depth & Complexity icons
Enriched materials and learning experiences

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