

High School Course Description for **Physical Geology w/Lab**

Course Title: Physical Geology w/Lab

Curricular Area: Science

Course Number: SCIT001/SCIT002

Length: One year

Grade Level: 9-12

Prerequisites: 1 year of Earth Science w/ C or better Preferred

Meets a UC a-g Requirement: Yes

Meets NCAA Requirement: Yes

Meets High School Graduation Requirement for:
Laboratory Physical Science

Course Description

A “D” Lab course, Physical Geology is an in-depth study of how the earth is constructed and the processes that have formed the earth and continue to change the Earth’s surface. Topics will include: the understanding of the formation and identification of rocks and minerals; the types of volcanoes and how and why they erupt; the weathering of rocks and their effects on Earth’s surface and human populations; rivers and groundwater and the ecological impacts of humans on water sources; glaciers, deserts, beaches, and the ocean floor; earthquakes and their relationships to plate tectonics and the effects on humans; how mountains form; and fossils and their relationships to Earth’s past.

Labs will cover the scientific properties and lab procedures for

- measuring earth materials and processes,
- identifying minerals and rocks and their property factors,
- identifying the movement in plate tectonics,
- identifying and analyzing fossil formation,
- using topographic and geologic maps, and analyzing their structure,
- identifying stream processes, landscapes, mass wastage and flood hazards, ground water processes, glacial landforms, dryland forms, coastal processes, and earthquake hazards and dynamics.

Alignment: This course is aligned with the California State Content Standards for Earth Science

Instructional Materials

Required Textbook(s)

1. **Essentials of Geology, 10th Edition.** Lutgens & Tarbuck. Pearson/Prentice Hall
ISBN: 978-0-13-813084-8
2. **Laboratory Manual in Physical Geology, 8th Edition.** Busch & Tasa. Pearson/Prentice Hall
ISBN: 978-013-600771-5

Supplemental Materials

1. Essentials of Geology, Geode
2. Instructor’s resource Center on DVD
3. Geoscience Animation Library
4. Instructor’s Manual with Tests
5. GeoBlox Models

Web Sites

Companion Website:
www.prenhall.com/lutgens

Grading Criteria

<u>Activities</u>	<u>Percentage</u>
Homework/ Classwork.....	50%
Labs.....	20%
Tests/ Quiz	20%
Final Examination.....	10%
Total:	100%

Development Team: This course of study was written and updated by Dara DeVicariis, Colton High School.

High School Pacing Guide for **Physical Geology w/Lab**

Pacing Guide for Physical Geology with Lab

Fall Semester 1

Week(s)	Chapter(s)	California State Standards	Objectives
Week 1, 2	Intro to Geology; Geologic theories, geologic time, scientific inquiry, Earth's systems, rock cycle, earth's evolution Lab: Scientific Methods, lab processes and procedures, Investigation using Inquiry, rock cycle	Investigation and Experimentation 1a: Select and use appropriate tools and technology to perform tests, collect data, analyze relationships and display data 1b: Identify and communicate sources of unavoidable experimental error 1c: Identify possible reason for inconsistent results 1d: Formulate explanations by using logic and evidence 1f: distinguish between hypothesis and theory as scientific terms	To understand: <ul style="list-style-type: none"> • What constitutes physical geology • Uniformitarianism vs. catastrophism • Principles Relative dating • Scientific hypothesis vs. scientific theory • Earth's major spheres • The rock cycle • Origins of earth and the planets • Major features of the continents and ocean floor • Plate tectonics and plate boundaries
Week 3, 4	Minerals; definition of..., Atoms and Bonding, Identification properties, types of minerals, mineral resources Lab: #3 Mineral Properties, uses and Identification	9a.: know the resources of major economic importance in California and their relationship to California's geology Investigation and Experimentation 1g.: recognize the usefulness and limitations of models and theories as scientific representations of reality 1i: Analyze the locations, sequences or time intervals that are characteristic of natural species 1k.: Recognize the cumulative nature of scientific evidence	To understand: <ul style="list-style-type: none"> • Differences between minerals and rocks • The basic structure of atoms and atomic bonds • Isotopes and radioactivity • The physical and chemical properties of minerals and to use those properties to identify individual minerals • Important non-silicate minerals • Term "ore" used to reference a mineral • What mineral resources are used by humans and which are common to California
Week 5, 6	Igneous Rock; magma, textures and composition, classification, evolution of magma, igneous processes, resources Lab: #4 rock forming properties, Rock cycle #5 Part A: Igneous Processes and Rocks Part B: Descriptions/Interpretation of Igneous rock samples	9a.: know the resources of major economic importance in California and their relationship to California's geology 3c.: know how to explain the properties of rocks based on the physical and chemical conditions in which they formed, including plate tectonics processes Investigation and Experimentation 1i: Analyze the locations, sequences or time intervals that are characteristic of natural species	To Understand: <ul style="list-style-type: none"> • How igneous rocks form • The properties of magma verses lava • Criteria used to classify igneous rocks • The rate of cooling in relationship to crystal size • Mineral composition of igneous rock and the Bowen's reaction series • Granitic rocks verses basaltic rocks • Economic deposits of igneous resources, especially those related to California and

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		1k.: Recognize the cumulative nature of scientific evidence	California history
Week 7, 8	Volcanoes and other Igneous activity; Volcanic eruptions, lava flows, pyroclastic materials, outgassing, types of volcanoes and volcanic landforms, intrusive igneous activity, plate tectonics and volcanic activity. Lab: #5, Part C Volcanic Hazards and Human risks	3e.: Know there are 2 kinds of volcanoes, one kind with violent eruptions producing steep slopes and the other kind with voluminous lava flows producing gentle slopes 9b.: Know the natural hazards in different California regions and the geologic basis of those hazards	To understand: <ul style="list-style-type: none"> • Factors that determine volcanic eruptions and the relationship to magmatic viscosity • Materials associated with a volcanic eruption • Eruptive patterns and the characteristics of the 3 types of volcanoes • Criteria and features used to classify intrusive igneous bodies • Relationship between volcanic activity and plate tectonics
Week 9, 10	Weathering and soils; mechanical and chemical weathering, rates of weathering, soils and classifying soils, soil erosion, soil erosion, ore deposits Lab: Finding evidence of weathering and erosion on campus	9a.: know the resources of major economic importance in California and their relationship to California's geology 7c.: know the movement of matter among reservoirs is driven by earth's internal and external sources of energy Investigation and Experimentation 1a: Select and use appropriate tools and technology to perform tests, collect data, analyze relationships and display data	To understand: <ul style="list-style-type: none"> • The external processes and the roles they play in the rock cycle • Two main categories of weathering and how they differ • The factors that determine the rate of weathering • Features of soil • The factors that control soil formation • Factors that influence natural rates of erosion • The impact of weathering and erosion on humans
Week 11, 12	Sedimentary Rocks; Origins of..., Detrital and chemical sedimentary rocks, diagenesis and lithification, classification, sediments and historical environments, resources from sedimentary rocks, the carbon cycle Lab: #6 Sedimentary Rocks, Processes and Environments	Investigation and Experimentation 1h.: Read and interpret topographic and geologic maps. 1i: Analyze the locations, sequences or time intervals that are characteristic of natural species 1k.: Recognize the cumulative nature of scientific evidence 3c.: know how to explain the properties of rocks based on the physical and chemical conditions in which they formed, including plate tectonics processes	To understand: <ul style="list-style-type: none"> • The features that distinguish sedimentary rock • Processes that transform sediments into sedimentary rock • The two general types of sedimentary rock and how each forms • Primary basis for distinguishing the types of detrital sedimentary rocks • Sedimentary rock structures and their usefulness to geologists • The two groups of nonmetallic mineral resources

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		7a.: Know the carbon cycle of photosynthesis and respiration and the nitrogen cycle 7b.: 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 9a.: know the resources of major economic importance in California and their relationship to California's geology	<ul style="list-style-type: none"> • Energy sources associated with sedimentary rocks, especially in California
Week 13,14	Metamorphic rocks: mechanisms of metamorphism, textures and common metamorphic rocks, metamorphic environments, metamorphic zones Lab: #7, Metamorphic rocks . Processes and resources	Investigation and Experimentation 1h.: Read and interpret topographic and geologic maps. 1i: Analyze the locations, sequences or time intervals that are characteristic of natural species 1k.: Recognize the cumulative nature of scientific evidence 3c.: know how to explain the properties of rocks based on the physical and chemical conditions in which they formed, including plate Processes 9a.: know the resources of major economic importance in California and their relationship to California's geology	To understand: <ul style="list-style-type: none"> • The definition of metamorphic rock and how they form • The three geologic settings associated with metamorphic rock formation • The agents of metamorphism • The two textural divisions of metamorphic rocks and the conditions of occurrence • The names, textures and compositions of common metamorphic rocks • The intensity of metamorphism that is reflected in the texture and mineralogy of metamorphic rocks
Week 15,16	Mass Wasting: Landslides as Natural disasters, mass wasting and landform development, controls and triggers, classification, types of mass wasting. Lab: #11E, Stream erosion and Mass wasting at Niagara Falls	7c.: Know the movement of matter among reservoirs is driven by earth's internal and external sources of energy. 9a.: know the resources of major economic importance in California and their relationship to California's geology 9b.: know the principle hazards in different California regions and the geologic basis of those hazards	To understand: <ul style="list-style-type: none"> • The process of mass wasting • How mass wasting plays a role in the development of valleys • The controls and triggers of mass wasting • The criteria used to divide and describe the types of mass wasting • The general characteristics of slump, rockslide, debris flow, earth flow and creep

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Week 17,18	Crustal Deformation and Mountain Building: rock deformation, folds, faults, joints, mountain building, mountain building at subduction zones, collisional mountain building, fault-block mountains, vertical crust movement Lab: #9, Topographic Maps, Aerial Photographs and satellite images Lab: #10, Geologic Structures, Maps and Block diagrams	Investigation and Experimentation 1h.: Read and interpret topographic and geologic maps. 1i: Analyze the locations, sequences or time intervals that are characteristic of natural species 3b.: Know the principle structures that form at the three different kinds of plate boundaries 9b.: know the principle hazards in different California regions and the geologic basis of those hazards 7c.: know the movement of matter among reservoirs is driven by Earth's internal and external sources of energy.	To understand: <ul style="list-style-type: none"> • The two basic types of rock deformation and the influences associated with deformation • The common types of folds and faults and how each forms • Continental accretion and mountain building

Spring Semester 2

Week(s)	Chapters	California State Standards	Objectives
Week 19,20	Running water: Hydrologic cycle, streams and rivers, work of running water, types of streams and rivers, shaping stream valleys, depositional landforms, drainage patterns, floods and flood control. Lab: #11A, B, C, D,F, Stream processes, landscapes and flood hazards	Investigation and Experimentation 1h.: Read and interpret topographic and geologic maps. 1i: Analyze the locations, sequences or time intervals that are characteristic of natural species 7c.: Know the movement of matter among reservoirs is driven by earth's internal and external sources of energy. 9b.: know the principle hazards in different California regions and the geologic basis of those hazards 9c.: know the important of water to society, the origins of California's fresh water and the relationship between supply and need.	To Understand: <ul style="list-style-type: none"> • The hydrologic cycle and sources of energy that powers the cycle • The factors that determine the velocity of water in a stream • Base levels and stream erosion • The three that cause work in a stream • The two general types of stream valleys and their features • The common drainage patterns of stream • The causes of flooding and the hazards and controls of flooding
Weeks 21, 22	Ground Water: importance and distribution of ground water, the water table, factors influencing storage and movement, springs, wells, artesian	1i: Analyze the locations, sequences or time intervals that are characteristic of natural species	To understand: <ul style="list-style-type: none"> • The importance of groundwater as a resource and a geologic agent, especially in California

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	wells, environmental factors associated with ground water, hot springs and geysers, geothermal energy, caves and caverns formation. Lab: #12, Groundwater Processes, resources and risks	7c.: Know the movement of matter among reservoirs is driven by earth's internal and external sources of energy. 9b.: know the principle hazards in different California regions and the geologic basis of those hazards 9c.: know the important of water to society, the origins of California's fresh water and the relationship between supply and need. 3e.: know how to explain the properties of rocks based on the physical and chemical conditions in which they formed.	<ul style="list-style-type: none"> • The factors that affect the movement of groundwater • The formation of springs, geysers, wells and artesian systems • Environmental issues associated with groundwater in California • The geologic features produced by geologic work
Week 23,24	Glaciers and Glaciation: part of two basic cycles, formation and movement, erosion, landforms created by erosion, glacial deposits, other effects, ice age glaciers, causes of glaciation Lab: #13, Glacial Processes, Landforms and Indicators of climate change	1h.: Read and interpret topographic and geologic maps. 1i.: analyze the locations, sequences or time intervals that are characteristic of natural phenomena. 1m.: Investigate a science-based societal issue by researching the literature, analyzing data and communicating the findings. 7c.: Know the movement of matter among reservoirs is driven by earth's internal and external sources of energy 9c.: know the important of water to society, the origins of California's fresh water and the relationship between supply and need.	<p>To understand:</p> <ul style="list-style-type: none"> • The definition of a glacier • The types of glaciers • The location of glaciers • Glacial movement and erosion associated with movement • The features formed by glacial erosion and deposition • The material involved in depositional features • The evidence present for the ice ages • The indirect effects of the Ice age glaciers
Week 25,26	Deserts and Winds: Distribution and causes of drylands, Geologic Processes in Arid climates, Basin and range configurations, transportation of sediments, wind erosion, wind deposits Lab: #14, Dryland landforms, Hazards and Risks	1h.: Read and interpret topographic and geologic maps. 1i.: analyze the locations, sequences or time intervals that are characteristic of natural phenomena. 1m.: Investigate a science-based societal issue by researching the literature, analyzing data and communicating the findings. 7c.: Know the movement of matter among reservoirs is driven by earth's internal and external sources of energy	<p>To understand:</p> <ul style="list-style-type: none"> • The causes of deserts in the lower and mid-latitudes • The roles of weathering, water and wind in arid and semi-arid regions • The landscapes of dry Basin and range regions in the United States • Mechanisms of wind erosion • The depositional features produced by wind

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		9b.: know the principle hazards in different California regions and the geologic basis of those hazards 5e.: Know that rain forests and deserts on Earth are distributed in bands at specific latitudes 6b.: know the effects on climate of latitude, topography and the proximity to large bodies of water and cold or warm ocean currents.	
Week 27, 28	Earthquakes and Earth's Interior: What is an earthquake, active earthquake zones, seismology, locating an earthquake, destruction, earthquake prediction, using earthquake to "see" the earth's interior. Lab: #16 Earthquake Hazards and Human Risks	1h.: Read and interpret topographic and geologic maps. 1i.: analyze the locations, sequences or time intervals that are characteristic of natural phenomena. 1m.: Investigate a science-based societal issue by researching the literature, analyzing data and communicating the findings. 9b.: know the principle hazards in different California regions and the geologic basis of those hazards 3d.: Know why and how earthquakes occur and the scales used to measure their intensity and magnitude.	To understand: <ul style="list-style-type: none"> • The definition of an earthquake • The types of earthquake waves • Processes for determining the epicenter of an earthquake • The principle earthquake zones • The expression of earthquake strength • The preparation necessary for surviving during and after an earthquake
Week 29, 30	Plate Tectonics: continental drift, evolution of plate tectonics, divergent boundaries, convergent boundaries, transform fault boundaries, Pangaea, measuring plate movement, mechanisms of plate movement, testing plate tectonics model. Lab: demonstrating the Break-up of Pangaea using various plate boundaries. Modeling subduction zones	1m.: Investigate a science-based societal issue by researching the literature, analyzing data and communicating the findings. 3b.: know the principal structures that form at the three different kinds of plate boundaries.	To understand: <ul style="list-style-type: none"> • The evidence that supports the plate tectonic theory • The differences between plate tectonic theory and continental drift theory • The models proposed to explain the driving mechanism for plate motion
Week 31, 32	Ocean floor and shorelines: Deep-Ocean basins, ocean ridges and seafloor spreading, oceanic crust, waves, wave erosion, sand movement, shoreline features Lab: #15, Coastal Processes, landforms, Hazards and risks	1m.: Investigate a science-based societal issue by researching the literature, analyzing data and communicating the findings 5d.: know the properties of ocean waters, such as temperature and salinity, can be used to explain the layered structure of the oceans.	To understand: <ul style="list-style-type: none"> • The shoreline as a dynamic entity • The basic parts of the coastal zone • The basics of wave activity and coastal erosion, especially in California • Emergent and submergent coasts • Mapping the ocean floor

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			<ul style="list-style-type: none"> • The three major topographic provinces of the ocean floor and the associated features • The nature and origin of the oceanic ridge system and their relationship to plate tectonics
Week 33, 34	<p>Geologic Time: Relative dating, correlation of rock layers, fossils as evidence of past life, radiometric dating, Geologic time scale, difficulties in dating the geologic time scale, Precambrian history, Phanerozoic history, Mesozoic history, Cenozoic history</p> <p>Lab:#8 Identifying fossils remains, dating of Rocks, fossils and geologic events.</p>	<p>1m.: Investigate a science-based societal issue by researching the literature, analyzing data and communicating the findings.</p> <p>1c.: know the evidence from geological studies of earth and other planets suggests that early earth was very different from earth today.</p> <p>9a.: know the resources of major economic importance in California and their relation to California's geology.</p>	<p>To understand:</p> <ul style="list-style-type: none"> • The two types of dates use by geologists to interpret earth's history • The laws, principles and techniques used to establish relative dates • The definition of a fossil • Conditions necessary for fossil preservation • Using fossils to correlate rocks of similar ages in different places • Radioactivity and radiometric dating • The geologic time scale and its subdivisions • The difficulties and limitations of assigning numerical dates to samples of sedimentary rocks

Colton Joint Unified School District Course of Study
Instructional Guide for Physical Geology w/Lab

Learning Experiences and Instruction:

Teachers utilize the Direct Interactive Instruction model to introduce new skills and concepts that are essential to the grade level content 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:

Extra time or modified versions of assignments will be given. The District will provide a language assistant. Additional strategies will be developed through the Response to Intervention plans –such as:

- SDAIE strategies
- Texts/materials in first language.
- Flexible grouping
- Structured engagement
- Peer pairing
- Academic vocabulary development
- Realia

Support for Special Education Students:

Extra time or modified versions of assignments will be given. The District will provide an instructional assistant. Additional strategies will be developed through the Individual Education Plan process – such as:

- Realia
- Texts/materials in first language
- SDAIE strategies
- Flexible grouping
- Peer pairing
- Audio & visual aids
- Individualized academic instruction
- Modified assignments
- Modified texts
- Testing accommodations
- Tutoring (peer & teacher)

Stretching the Lesson for GATE Students:

Differentiated curriculum will be provided to challenge the student and provide the student with opportunities to develop their identified talent. Teachers will use a variety of the following:

- Independent study supplemented with mentoring/tutoring
- Compacting
- Acceleration
- Depth & Complexity icons
- Modified texts
- Modified assignments
- Flexible grouping
- Inquiry-based Learning
- Enriched materials and learning experiences