

## Volcanoes (VACO) CTY Course Syllabus

	WHAT	HOW
<b>DAY 1</b> (Mon)  Morning	Introduction to VACO  Students' educational and personal goals for the course  Get to know each other's names  Pretest  Writing and reflecting  Intro to Geology of Hawaii	Hand out syllabus, class/ lab rules, expectation sheets, lab safety sheets, lab write up guidelines, presentation guidelines, and journal guidelines  Students write in their journal section of their notebooks  Ice breakers  Journal topic "What did I learn this summer in VACO?"  Guest Lecture
Afternoon	Layers of Earth  Convection Currents and Density Currents  Plate Tectonics - How do plates move?  Crust: Continental and Oceanic	PowerPoint with apple or egg demonstration – students produce a diagram of Earth's layers with key facts  Demo: Density using simulator of convection currents apparatus – students take brief notes while making observations and inferences of demo  Mantle Plasticity lab  Demo: Convection Cell with wax, metal ball and hot water  PowerPoint pictures/video of convection currents in mantle  Lecture and rock samples – students create a Venn diagram comparing each type of crust
Evening	Convection Currents and Earth's Layers  Writing, and Introspective thinking  Get to know each other	Cartoon interpretation  Journal topic "3 things I need to know about them"  License plate game, What is my Hawaiian Name?, decorate the classroom wall (Oahu Island) Learner profiles

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<b>DAY 2</b> (Tues)	Convection Cells, Layers of Earth, and Crust Types	Warm up questions on the board
Morning	Ring of Fire, Plate Tectonics, Volcanoes, and Plate Boundaries	Activity: Mapping the Ring of Fire
	Plate Tectonics and Plate Boundaries	Activity: Plate Tectonic Boundary Stations
	Hot Spots	Demo: Hot spots using window screen with shaving crème – students make observations and inferences in notes
		Mapping the movement of hotspots worksheet
Afternoon	Plate Tectonics, Oceanic Islands	Activity: Mysteries of the Oceanic Islands – Plate Tectonics
	Hot Spots	Mapping the Hawaiian islands lab sheet
Evening	Reading and Discussion	Volcano article discussion
	Topic review	Complete any assignments not completed and study for tomorrow's assessment
	Reflective thinking and writing	Journal topic "Pick your own from the list on the board"
		Instructor / TA License Plate Challenge
<b>DAY 3</b> (Wed)	Hawaiian Topography, Island formation, and Island stages	Activity: Mysteries of Oceanic Islands – Island Stages
Morning	Formation of Coral Reefs - atolls, barrier reefs, fringing reefs	Island Stages Jig Saw – students create a poster about assigned stage and present to class
	Formation of Hawaiian Islands	

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Afternoon	<p>Hawaiian Topography and Land Features</p> <p>Hawaiian culture</p> <p>Island Formation (Different Types)</p> <p>Assessment of topics covered</p> <p>Reflective thinking and writing skills</p>	<p>Finish island stage presentations</p> <p>PowerPoint with pictures of Hawaiian topography and land features, focusing on Oahu and the Big Island</p> <p>Read the Pele myth explaining how the Hawaiian Islands formed</p> <p>Students use pictures to complete a graphic organizer comparing different types of islands</p> <p>Quiz/Test</p> <p>Journal topic "If you were a geologist or scientist what would you study about Hawaii and on which island?"</p>
Evening	<p>Mapping Skills, Bathymetry, and Island Formation</p>	<p>Explaining topographic maps and bathymetry maps</p> <p>Activity: Mysteries of the Oceanic Islands – Bathymetry Island Mapping</p>
<p><b>DAY 4</b> (Thurs)</p> <p>Morning</p>	<p>Silicic and Mafic Rocks</p> <p>Partial Melting/ Fractional Crystalization</p> <p>Igneous Rocks and the Rock Cycle</p> <p>Intrusive and Extrusive Rocks</p> <p>Igneous Rock Identification</p>	<p>Lecture about how to identify each type of rock – students use rock samples to complete a T-chart comparing and contrasting the two types of rock</p> <p>Demo: Partial melting and fractional crystallization – students make observations in their notebooks, followed by debriefing and lecture</p> <p>PowerPoint of the rock cycle and how igneous rocks are formed</p> <p>Animation of intrusive and extrusive rock formation – students examine samples of igneous rocks</p> <p>How to use identification keys and the various properties to identify in rocks</p>
Afternoon	<p>Igneous Rock Identification</p> <p>Experimental Design Diagram (EDD) – Nature of Science Activities</p>	<p>Igneous Rock stations – students practice with lab cards and flow charts</p> <p>Students learn the experimental design diagram process and practice making their own</p>

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Evening	<p>EDD – Crystals (Intrusive and Extrusive)</p> <p>Week 1 review</p> <p>Reflective thinking and writing skills</p>	<p>Students create an experiment and complete an EDD to test crystal size and growth</p> <p>Review Game Jeopardy Silent Card Shuffle for Island Stages</p> <p>Journal entry</p>
<b>DAY 5</b> (Fri)  Morning	<p>Crystals: Intrusive and Extrusive rocks</p> <p>Bowen's Reaction Series</p> <p>Viscosity and Volcanic Flows</p>	<p>Lab: Growing Crystals – students make intrusive and extrusive crystals</p> <p>PowerPoint lecture with diagrams, mineral samples are passed around – students complete a reading assignment and answer questions</p> <p>Lab: Viscosity – students calculate the rate of flow of fluids with a known viscosity in order to determine the viscosity of an unknown fluid</p>
Afternoon	<p>Viscosity and temperature and density</p> <p>Hawaiian Lava Flows</p> <p>EDD - Viscosity</p>	<p>Finish viscosity lab</p> <p>Students watch video clips of lava flows, look at pictures of pahoehoe and A'a lava, and take notes on characteristics of the two types of lava</p> <p>Students create an EDD for an experiment to test how temperature and other factors affect viscosity</p>
Sunday Evening	<p>Conclusion and experimental writing skills</p> <p>All topics from week 1</p> <p>Reflective thinking and writing skills</p> <p>Volcanology</p>	<p>Write conclusion for Crystal lab</p> <p>Test on Week 1 Rock Lab Practical</p> <p>Journal entry</p> <p>Students complete a KWHL on volcanoes</p>
<b>DAY 6</b> (Mon)  Morning	<p>Anatomy of a Volcano</p> <p>Volcanic Features and Formations – dikes, sills, batholiths, lava tubes</p> <p>Shield Volcanoes – their characteristics, formation, mineral and rock content, plate tectonic formation, viscosity, and volatiles</p>	<p>PowerPoint lecture – students complete diagram on anatomy of a volcano</p> <p>Demo: Gelatin formation – students make observations and inferences</p> <p>Lab: What Volcano Am I?</p>

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Afternoon	Volcanoes Composite and Shield Volcanoes	Lab: Volcanoes Movie: National Geographic
Evening	Composite and Shield Volcanoes	Students write comparative papers about composite and shield volcanoes
<b>DAY 7</b> (Tues)	Hawaiian Volcanoes, Island Stages,	Powerpoint lecture on Hawaiian volcanic features
Morning	Hawaiian volcanoes  Mount St Helens and Magma Chambers	Hawaiian Volcano student research and presentation  Lab: Magma chambers
Afternoon	Volcano Hazards, Smog, and Global Climate Change	Demo: Volcanic ash in a box  Graphing exercise: Calculating the impact of volcanic eruptions on global climate
Evening	Hawaiian Culture and Mythology	Students read various myths pertaining to volcanoes and perform them in groups  Journal topic "How has volcanology affected the people and culture of Hawaii?"
<b>DAY 8</b> (Wed)	Volcano Hazards, Smog, and Global Climate Change	Lab: Ice, Snow, and Volcano
Morning	Hazards of Hawaiian Volcanoes	Read and discuss excerpt from "Chasing Volcanoes"
Afternoon	Physical and Chemical Weathering  Erosion – different types, energy and size, examples of features formed in Hawaii  Deposition, Energy, and Particle Size	Student Performed Demo: Physical and Chemical Weathering  PowerPoint lecture – students create a diagram comparing each type of weathering  PowerPoint Lecture  Demo: Sedimentator Tubes – students make observations and discuss the process of deposition  PowerPoint presentation
Evening	Critical Thinking  Hawaiian Volcanoes	Read and discuss excerpt from "Chasing Volcanoes"  Decision Making Matrix: Which Volcano would you rather live near - Composite or Shield? Why?

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<b>DAY 9</b> (Thurs)  Morning	Water Erosion  Wave action on beaches  Longshore Transport, Groins, and other engineered structures  Experimental methods – erosion, deposition, waves, longshore transport, groins	Video animation of waves  Complete “Parts of a wave” worksheet  Demo: Wave – calculating wave length and wave height  Lecture and students complete longshore transport worksheet  Students develop their own experiment. Ideas suggested by instructor (sediment erosion amount based on particle size or energy of water, effects of groins on longshore transport and energy)  Proposals and EDD are written prior to afternoon session
Afternoon	Erosion, Deposition, Groins, and Longshore Transport	Lab: Stream tables used to demonstrate erosion, deposition, and long shore transport
Evening	Reflective thinking and writing skills	Journal topic “Should groins and other engineered structures continued to be used at Waikiki Beach and other beaches on the islands? Why or Why not? Use Decision Making Matrix  Debate the issue
<b>DAY 10</b> (Fri)  Morning	Weathering and Erosion  Hawaiian Beaches – Sediments and Sediment Identification	PowerPoint with statistics about erosion, wind patterns, and seasonal differences observed on Oahu  Sediment identification keys are explained and demonstrated  Students examine pictures from various beaches on Oahu to make predictions about type and source
Afternoon	Sediments – formation, size, sorting, mineral composition, and angularity	Lab: Sediments – identifying various sediment samples from the islands and why they are shaped as they are and where they would be located
Sunday Evening	All topics	Geology Test on week 1-2 and  Movie and Journal entry

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<b>DAY 11</b> (Mon)  Morning	Plant and Animal Dispersal  Adaptations of Hawaiian Plants and Animals  Native and Local Plants	Lecture  Activity: Albatross  Tour of plants on campus and discussion of form and function
Afternoon	Ecosystems of Hawaii	Video and pictures from different ecosystems around Hawaii  Activity: Ecosystem Jig Saw – groups are assigned different ecosystems to research and present to class
Evening	Reflective thinking and writing skills	Journal entry
<b>DAY 12</b> (Tues) Morning	Natural Selection and Evolution of the Islands and Its Species   Honey Creeper  Adaptive radiation	Natural Selection Interactive Game – students answer questions after completion  Discussion on evolution and natural selection  Reading assignment on Honey Creepers and discussion questions  Adaptive radiation lecture and student assessment of pictures of Honey creeper and the Hawaiian Islands (Adaptive Radiation Worksheet)
Afternoon	Species (invasive, endemic, endangered, and extinct) and Anthropogenic Influences	Discussion of invasive, endemic, endangered, extinct, and keystone species – students create a list of characteristics for each type of species  Students are given animal biographies and must determine what species category they fall under  Movie: “Strangers in Paradise”
Evening	Species (invasive, endemic, endangered, and extinct) and Anthropogenic Influences	Finish Paper on “Strangers in Paradise” Movie  Field Trip Preparation and assignment
<b>DAY 13</b> (Wed) Morning	All Day Field Trip to Big Island	
Afternoon	All Day Field Trip to Big Island	
Evening	Field Trip Debriefing	Journal entry and discussion of observations made on field trip

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<b>DAY 14</b> (Thurs) morning	Final Projects – Field Guides	Students create a field guide for their assigned topic based on observations and findings during our field trip
Afternoon	Final Project Post test	Final Project Presentations
Evening	No session	
<b>DAY 15</b> (Fri) Morning	Goodbyes	
Afternoon		