Earth & Space Pacing Guide (Grade: 11 &12)
By: Jaime Alexander, GCHS

Week#	***AL COS Objective***	***Labs/Activities*** *Textbook Activity	***Textbook Sections***
1	Introduction to Earth and Space; Lab Safety Video and Contract; Scientific Method; Lab Equipment	--Class Syllabus --Setting up Google Classroom/Edmodo/Remind --Lab Safety Video/Quiz/Contract --Scientific Method --Reviewing Lab Equipment --*Lab: What's Before Your Eyes? --Introduction to studying Earth and Space Science	1.1 What is Earth Science? 1.2 Science As a Process
2	COS2 Engage in argument from evidence to compare various theories for the formation and changing nature of the universe and our solar system (e.g., Big Bang Theory, Hubble's Law, Steady State Theory, light spectra, motion of distant galaxies, composition of matter in the universe). COS5 Use mathematics to explain the relationship of the seasons to the tilt of Earth's axis (e.g., zenith angle, solar angle, surface area) and its revolution about the sun, addressing intensity and distribution of sunlight on Earth's surface.	--*Inquiry Lab: A Model Telescope --*Inquiry Lab: Comet Meets Jupiter --*Internet Activity: Space Spinoffs	26.1 Viewing the Universe 26.2 Movements of the Earth
3 **&** 4	COS2 Engage in argument from evidence to compare various theories for the formation and changing nature of the universe and our solar system (e.g., Big Bang Theory, Hubble's Law,	--*Quick Lab: Water Planetesimals --*Quick Lab: Ellipses --*Making Models Lab: Crater	27.1 Formation of the Solar System 27.2 Models of the Solar System

	Steady State Theory, light spectra, motion of distant galaxies, composition of matter in the universe). COS4 Apply mathematics and computational thinking in reference to Kepler's laws, Newton's laws of motion, and Newton's gravitational laws to predict the orbital motion of natural and man-made objects in the solar system. COS6 Obtain and evaluate information about Copernicus, Galileo, Kepler, Newton, and Einstein to communicate how their findings challenged conventional thinking and allowed for academic advancements and space exploration.	Analysis --*Inquiry Lab: Probing for Information --*Internet Activity: Life on Mars?	27.3 The Inner Planets 27.4 The Outer Planets
5 & 6	COS5 Use mathematics to explain the relationship of the seasons to the tilt of Earth's axis (e.g., zenith angle, solar angle, surface area) and its revolution about the sun, addressing intensity and distribution of sunlight on Earth's surface. COS6 Obtain and evaluate information about Copernicus, Galileo, Kepler, Newton, and Einstein to communicate how their findings challenged conventional thinking and allowed for academic advancements and space exploration.	--*Quick Lab: Liquid and Solid Cores --*Making Models Lab: Crater Eraser --*Internet Activity: Lunar Timeline --*Quick Lab: Eclipses --*Inquiry Lab: Inconstant Moon --*Skills Practice Lab: Galilean Moons of Jupiter --*Internet Activity: Martian Moons --*Internet Activity: Kuiper Belt Objects	28.1 Earth's Moon 28.2 Movements of the Moon 28.3 Satellites of Other Planets 28.4 Asteroids, Comets, and Meteoroids
7	COS1 Develop and use models to illustrate the lifespan of the sun, including energy released during nuclear fusion that eventually reaches Earth through radiation.	--*Skills Practice Lab: Energy of the Sun --*Quick Lab: The Size of Our Sun	29.1 Structure of the Sun 29.2 Solar Activity

		--*Internet Activity: Solar Activity and Climate --*Internet Activity: SOHO Images	
8 & 9	COS2 Engage in argument from evidence to compare various theories for the formation and changing nature of the universe and our solar system (e.g., Big Bang Theory, Hubble's Law, Steady State Theory, light spectra, motion of distant galaxies, composition of matter in the universe). COS3 Evaluate and communicate scientific information (e.g., Hertzsprung-Russell diagram) in reference to the life cycle of stars using data of both atomic emission and absorption spectra of stars to make inferences about the presence of certain elements. COS6 Obtain and evaluate information about Copernicus, Galileo, Kepler, Newton, and Einstein to communicate how their findings challenged conventional thinking and allowed for academic advancements and space exploration.	--*Making Models Lab: Star Magnitudes --*Quick Lab: Parallax --*Internet Activity: Proper Motion of Stars --*Quick Lab: The Expanding Universe --*Inquiry Lab: Curving Space-Time MID TERM EXAM	30.1 Characteristics of Stars 30.2 Stellar Evolution 30.3 Star Groups 30.4 The Big Bang Theory
10	COS10 Construct an explanation from evidence for the processes that generate the transformation of rocks in Earth's crust, including chemical composition of minerals and characteristics of sedimentary, igneous, and metamorphic rocks.	--*Inquiry Lab: Physical Properties of Elements --*Quick Lab: Using the Periodic Table --*Internet Activity: High-Energy Physics --*Quick Lab: Compounds --*Inquiry Lab: Ionic and Covalent Conductivity	4.1 Matter 4.2 Combinations of Atoms

11	COS10 Construct an explanation from evidence for the processes that generate the transformation of rocks in Earth's crust, including chemical composition of minerals and characteristics of sedimentary, igneous, and metamorphic rocks. COS11 Obtain and communicate information about significant geologic characteristics (e.g., types of rocks and geologic ages, earthquake zones, sinkholes, caves, abundant fossil fauna, mineral and energy resources) that impact life in Alabama and the southeastern United States.	--*Quick Lab: Modeling Tetrahydra --*Internet Activity: Mining Impacts --*Skills Practice Lab: Mineral Identification --*Quick Lab: Determining Density --*Inquiry Lab: Growing Crystals	5.1 What Is a Mineral? 5.2 Identifying Minerals
12	COS13 Analyze and interpret data of interactions between the hydrologic and rock cycles to explain the mechanical impacts (e.g., stream transportation and deposition, erosion, frost-wedging) and chemical impacts (e.g., oxidation, hydrolysis, carbonation) of Earth materials by water's properties. COS7 Analyze and interpret evidence regarding the theory of plate tectonics, including geologic activity along plate boundaries and magnetic patterns in undersea rocks, to explain the ages and movements of continental and oceanic crusts. COS8 Develop a time scale model of Earth's biological and geological history to establish relative and absolute age of major events in Earth's history (e.g., radiometric dating, models of geologic cross sections, sedimentary layering, fossilization, early life forms, folding, faulting, igneous intrusions).	--*Quick Lab: Crystal Formation --*Quick Lab: Graded Bedding --*Inquiry Lab: Sorting Sediments --*Making Models Lab: Metamorphic Rocks --*Internet Activity: Identifying Sedimentary Rock Features --*Skills Practice Lab: Classification of Rocks	6.1 Rocks and the Rock Cycle 6.2 Igneous Rock 6.3 Sedimentary Rock 6.4 Metamorphic Rock

10	COS7 Analyze and interpret evidence regarding the theory of plate tectonics, including geologic activity along plate boundaries and magnetic patterns in undersea rocks, to explain the ages and movements of continental and oceanic crusts. COS8 Develop a time scale model of Earth's biological and geological history to establish relative and absolute age of major events in Earth's history (e.g., radiometric dating, models of geologic cross sections, sedimentary layering, fossilization, early life forms, folding, faulting, igneous intrusions).	--*Quick Lab: What's Your Relative Age? --*Quick Lab: Radioactive Decay and Half-Life --*Inquiry Lab: Got Fossils? --*Making Models: Types of Fossils	8.1 Determining Relative Age 8.2 Determining Absolute Age 8.3 The Fossil Record
11	COS8 Develop a time scale model of Earth's biological and geological history to establish relative and absolute age of major events in Earth's history (e.g., radiometric dating, models of geologic cross sections, sedimentary layering, fossilization, early life forms, folding, faulting, igneous intrusions).	--*Skills Practice Lab: History in the Rocks --*Quick Lab: Geologic Time Scale --*Making Models Lab: Future Earth --*Internet Activity: Extinct Organisms --*Internet Activity: Imaging Technologies --*Quick Lab: Chocolate Candy Survival --*Internet Activity: Supercontinents --*Inquiry Lab: Dinosaur Hunt --*Internet Activity: Online Museums	9.1 Geologic Time 9.2 Precambrian Time and the Paleozoic Era 9.3 The Mesozoic and Cenozoic Era
12	COS9 Obtain, evaluate, and communicate information to explain how constructive and destructive processes (e.g., weathering, erosion,	--*Making Models Lab: Sea-Floor Spreading --*Quick Lab: Making Magnets	10.1 Continental Drift 10.2 The Theory of Plate Tectonics

	volcanism, orogeny, plate tectonics, tectonic uplift) shape Earth's land features (e.g., mountains, valleys, plateaus) and sea features (e.g., trenches, ridges, seamounts).	--*Quick Lab: Tectonic Plate Boundaries --*Inquiry Lab: Where Do Earthquakes Happen? --*Making Models Lab: Eggshell Tectonics --*Internet Activity: Earthquakes --*Internet Activity: The Heimaey Eruption --*Internet Activity: The Paleomap Project	10.3 The Changing Continents
13	COS9 Obtain, evaluate, and communicate information to explain how constructive and destructive processes (e.g., weathering, erosion, volcanism, orogeny, plate tectonics, tectonic uplift) shape Earth's land features (e.g., mountains, valleys, plateaus) and sea features (e.g., trenches, ridges, seamounts).	--*Quick Lab: Modeling Isostasy --*Quick Lab: Modeling Stress and Strain --*Inquiry Lab: Rock Deformation --*Making Models Lab: Continental Collision --*Internet Activity: "Dead" Grabens	11.1 How Rock Deforms 11.2 How Mountains Form
14	COS9 Obtain, evaluate, and communicate information to explain how constructive and destructive processes (e.g., weathering, erosion, volcanism, orogeny, plate tectonics, tectonic uplift) shape Earth's land features (e.g., mountains, valleys, plateaus) and sea features (e.g., trenches, ridges, seamounts).	--*Inquiry Lab: Simulating Earthquakes --*Internet Activity: Distribution Patterns --*Skills Practice Lab: Finding an Epicenter --*Quick Lab: Seismographic Record --*Quick Lab: Earthquake-Safe Buildings --*Internet Activity: Hazards in the Americans	12.1 How and Where Earthquakes Happen 12.2 Studying Earthquakes 12.3 Earthquakes and Society

15	COS9 Obtain, evaluate, and communicate information to explain how constructive and destructive processes (e.g., weathering, erosion, volcanism, orogeny, plate tectonics, tectonic uplift) shape Earth's land features (e.g., mountains, valleys, plateaus) and sea features (e.g., trenches, ridges, seamounts).	--*Quick Lab: Changing Melting Point --*Making Models Lab: Magma in Earth's Crust --*Quick Lab: Volcanic Cones --*Inquiry Lab: Lava Flows --*Making Models Lab: Volcano Verdict --*Internet Activity: The Carbon Cycle	13.1 Volcanoes and Plate Tectonics 13.2 Volcanic Eruptions
16	COS9 Obtain, evaluate, and communicate information to explain how constructive and destructive processes (e.g., weathering, erosion, volcanism, orogeny, plate tectonics, tectonic uplift) shape Earth's land features (e.g., mountains, valleys, plateaus) and sea features (e.g., trenches, ridges, seamounts).	--*Quick Lab: Mechanical Weathering --*Quick Lab: Surface Areas --*Internet Activity: National Parks --*Skills Practice Lab: Soil Chemistry --*Inquiry Lab: Acid Rain and Soils --*Making Models Lab: Soil Profiles	14.1 Weathering Processes 14.2 Rates of Weathering 14.3 Soil 14.4 Erosion
17	COS15 Obtain, evaluate, and communicate information to verify that weather (e.g., temperature, relative humidity, air pressure, dew point, adiabatic cooling, condensation, precipitation, winds, ocean currents, barometric pressure, wind velocity) is influenced by energy transfer within and among the atmosphere, lithosphere, biosphere, and hydrosphere. COS15a Analyze patterns in weather data to predict various systems, including fronts and severe	--*Quick Lab: Barometric Pressure --*Quick Lab: Light and Latitude --*Inquiry Lab: Energy Absorption and Reflection --*Inquiry Lab: Ultraviolet Protection --*Internet Activity: Global Warming --*Making Models Lab: Global Air Movement	19.1 Characteristics of the Atmosphere 19.2 Solar Energy and the Atmosphere 19.3 Atmospheric Circulation 20.1 Atmospheric Moisture 20.2 Clouds and Fog 20.3 Precipitation

	storms. COS15b Use maps and other visualizations to analyze large data sets that illustrate the frequency, magnitude, and resulting damage from severe weather events in order to predict the likelihood and severity of future events.	--*Internet Activity: Harnessing Wind --*Skills Practice: Relative Humidity --*Quick Lab: Dew Point --*Quick Lab: Cloud Formation --*Internet Lab: Latent Heat and Thunderstorms --*Inquiry Lab: How Big is a Raindrop? --*Making Models Lab: What is the Shape of a Raindrop --*Internet Activity: Climate and Precipitation	
18	COS14 Construct explanations from evidence to describe how changes in the flow of energy through Earth's systems (e.g., volcanic eruptions, solar output, ocean circulation, surface temperatures, precipitation patterns, glacial ice volumes, sea levels, Coriolis effect) impact the climate.	--*Quick Lab: Wind Chill --*Inquiry Lab: Building a Weather Station --*Internet Activity: Weather Images --*Skills Practice Lab: Weather Map Interpretation --*Inquiry Lab: Factors That Affect Climate --*Quick Lab: Evaporation --*Quick Lab: Hot Stuff --*Inquiry Lab: Particulates in the Atmosphere --*Internet Activity: Climate Models FINAL EXAM	21.1 Air Masses 21.2 Fronts 21.3 Weather Instruments 22.1 Factors That Affect Climate 22.2 Climate Zones 22.3 Climate Change