[Physical Geography Study Guide](http://rauzon.com/physical-geography-study-guide/)

INTRODUCTION TO CHAPTER 1

 **Geo** meaning earth in Greek. **Graphy** meaning to write or carve.

**Geography** is the science that deals with the descriptions, distribution and interactions of the diverse physical, biological and cultural features of the landscape.

**Geography** is the basis for all human interpretation of the landscape- all human-land relationships.

**Geography** is a wide field with many specialities and increasingly important, encompassing field such as:

Climate change- a rapidly increasing carbon dioxide level raising the temperature of the planet.

Medical geography –diseases like bird flu, malaria, SARS emerge from climate change.

Demography-movement of people, life history, age, gender, income

Biogeography- invasive plant and animals changing ecosystems.

Ecomonic geography- oil-oil-oil-and it’s geo-political impact around the world.

Cartography-mapping, Geographic Information Systems, Global positioning Systems.

Physical Geography is a special discipline-

Explains the special dimension of earth dynamic processes and systems.

That’s why the text is called Geosystems.

GEOSYSTEMS-An Introduction to Physical Geography

7th Edition

R.W. Christopherson

Spacial analysis of all the physical elements and processes that make up the environment : Energy, air, water, weather, climate, plate tectonics,  landforms, rocks, soil, microorganisms/plants/animals/ecosystems and the role humans play =  Planetary Health.

Deals with the environment, and powerful earth systems that influence our lives and the many ways humans influence the earth systems:

                Duality

Physical= the stage                   vs.                      Cultural= the actors

Systems

What is a system?

A system is a related set of items and their attributes, regularly interacting, mass or matter in the physical space.

Systems are linked by energy flow, having the capacity to change or move mass or matter.

Systems are nestled in each other; there are subsets, systems within systems that just barely affect each other- A similar example is of khachakas- or Russian nesting dolls, each inside of each other.

The earth holds 193 million square miles of surface, 25,000 miles around. That’s a lot of surface of interaction of all spheres.

The book **GEOSYSTEMS** is organized into four major parts**August 5th, 2008**

[FOUR SPHERES](http://rauzon.com/four-spheres/)

**Atmosphere**- Solar energy interceptor, stratrospheric ozone, ionosphere, mix of gases into one –air.

**Hydrosphere** – 73% of earth is water- precipitation- watersheds, rivers, oceans, groundwater, weather, extreme weather.

 **Lithosphere**- the land, rocks, minerals. Earthquakes, volcanoes, plate tectonics.

 **Biosphere**- soils, ecosystems, species-interacting with all –

the ecology.

OPEN or CLOSED SYSTEMS

Systems affect each other all the time.  Systems that interact dynamically, flowing into one another in varying amounts even if periodically, are OPEN systems.

The Earth is an OPEN SYSTEM in terms of energy flow, solar energy flows out and heat seeps out a little amount into the VOID. Earth is affected by the biggest star in our solar system. Those rare planets lightly touched by the sun. Sun comes in, heat goes out.  (Or not- and that’s the problem with global warming).

 But the Earth acts more like a closed system-Spaceship Earth. Forces like gravity keep it all balled up.

 The earth’s resources are limited. Like water, the planet has all the water it’s ever going to have.

 Photosysthesis is a system that is key to life on earth –

Photo- meaning light, Synthesis- meaning  to bring together,

Sunlight is converted into carbohydrates to fuel food webs.

 Photosynthesis uses energy of the sun to fire the engine of combustion combining water with gas- CO2 – releasing Oxygen and Sugar.  CO2 + H20 = CHO+O2   …

  **Like CO2 and H2O (**carbon dioxide and water) are used by plants during photosynthesis to make  carbohydrates **=CHO carbohydrates and hydrocarbons** and 02oxygen**.**

Earth has Carbon-based life-forms. That is: The leaf matter is arranged in cells, cells with walls of a carbon form called cellulose- so plants take-up and hold on to carbon in the carbon dioxide and they release the extra oxide or oxygen. We need the carbos and oxygen to fuel our lives. We take in sugars, and Oxygen and release carbon dioxide.

 Photosynthesis and Respiration- are the opposite cycles from each other. Photosynthesis uses CO2 and releases Oxygen and respiration uses Oxygen and releases CO2

Without sunlight, the Photosynthesis system reverse flows and begins to respirate. Just like us.

 We burn fossil fuels, What is coal, gas, oil, made from anyway?

Ancient plant cells or sugars. That CO2 is building up in the atmosphere. Because we have a closed system, it does not drift out in outer space, LA smog drifts over to Phoenix, SF smog drifts to Fresno.

What is your Carbon Footprint? The average American is responsible for using 20 tons of Carbon Dioxide per year. See [www.footprintnetwork.org](http://www.footprintnetwork.org/)

Nothing stays the same… Change is a constant…Time is always moving into the fourth dimension. What are the three dimensions? Height, width, depth, and the fourth is time.  Inside the system, there are cycles based on feedback.

  Pg. 7 shows 2 kinds of feedback:

Positive feedback –

See global warming, increasing gases= Increasing temperatures. Melting glaciers and ice caps, creates more dark areas that can absorb more heat and melt ice. More melting occurs faster = positive feedback

Negative feedback –

-           Take the price of gasoline- What will rising gas prices do to your driving? More money=less miles driven

Steady-State- minimal fluxuation- constant or recur. A steady average.

i.e. Coral reefs at 21 degrees North latitiude for 60 million years.

Called Darwin Point, after that great scientist.

 Dynamic Equilibrium, resists abrupt changes.  Pressure force to reach threshold, then shifts. What happens next??

 Predicting what happens next falls into the realm of models.

What is a model?

  Idealized, simplified mathematical perspective –

Only as good as assumptions, accuracy

Or as they say-Garbage in- Garbage out.

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WHAT IS SCIENTIFIC THINKING?

 Or the scientific method.

 What do we want to know?=Question

What data is needed?=Observation

Compare to real experience=Reasoning

Generalize data=Hypothesis

Test drive=Predict

Test and confirm= general theory, law

Let talk about this application of common sense in an organized and objective manner.

1-       observations

2-       hypothesis

3-       experiments

4-        theory

5-       scientific laws.

6-       what is a theory? extensively tested hypothesis

7-       what is a hypothesis?

8-       broad general principals

9-       -like gravity

chaos theory-verses steady state- vs. social and political judgments- creationism vs. evolution, but it’s a theory… like gravity is a theory, a universal law but called a theory.

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LOCATION –LOCATION- LOCATION

 The cardinal directions. North South East West.

 This is not a new science but ever since humans evolved, there has been geographers. Which way to the cave? Earth Wind Fire Air  Where on Earth is the classroom?

Courtyard, street, city, state, country, continent, biome,

Room A266, Laney College, Oak St. Oakland, CA, 94704. Ecotopia, North America, Western Hemisphere,

TIME AND PLACE

Two fundamentals geography has addressed. And we’ll address in this course lecture and lab.

**Non-geometric** – by Lake Merritt, 2 blocks south of Bart,

Hawaii has two directions, mauka and makai, mountains and sea. Buckminster Fuller says there are no norths and souths only in and out.

**Metric** means for location- Laney = **37º N X 122º W**

Coordinated grid system imposed over the earth. Globe.  And other planets as well (e.g. Moon)

Universal coordinates allows method of accurately measuring and locating place and distance.

 Pg. 16.

 Ptolemy Ancient Babylonian= Iraq in  90 AD  divided the circle into 360 degrees each degree into 60 minutes, each minute into seconds. (Not Time Units)

Latitude, and longitude measured degrees, minutes and seconds.  Isn’t that interesting the place and time are measured with similar named units?

Parallels of **Latitude**-

0º to 90º  equator to the poles. Equal on both hemispheres of globe

 describe half of global.- Latitude is a circle,  belt,  band.

 Equal space between latitude lines –equidistant and parallel.

  The map is flat- the globe is round,  more precisely a spheroid, bulging along the middle caused by gravity.

**Latitude is a North-South measure with a midpoint at  90º at each end. Per hemisphere. Half of the global. Equal to each other.**

**EG. North hemisphere, – the developed world.**

**South hemi- the lesser developed world.**

**Equator**

**Tropic of Cancer- the crab- @ 23.5 N**

**The topic of Capricorn @ 23.5–0S.**

**The most extremes from the equator that experience  the sun directly overhead (perpendicular)  on the first day of summer June 21, at noon.**

**Arctic Circle-@ 66.N**

**Antarctic circle at 66ºS.**

**Poles @90º.**

**Walk around the world in 10 steps.**

**For example in the locator grid Laney College is**

**37º 45’ 10” N X 122º**

**Latitude was really a consistently measured point for early mariners.**

**Determined by observing a fixed object in the sky.**

**E.g. Polaris, the North Star- in the north, Southern Cross in the south.**

**The Hokule’a in Hawaii. The guiding star guided sailing canoes.**

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**Pg. 17 LONGITUDE-**

**Eastern-western direction**

**Prime Meridan- Greenwich (Royal Astromical Observatory)**

**0-180º É and W, each hemisphere,**

**Longitudes converge at the pole, like orange slices, while Latitude are watermelon slices.**

**Meridian mean meri=middle**

**Diem=day= noon.**

**All points on a meridian are the same time, because they all have the same rotation with the sun.**

**Leads into Time Zone-Sun question, sun rotation day and night needed a standard.**

**Unlike latitude the rotation made longitude itself hard to pin point. – see page 20.**

**Modern technology has literally taken the solution to the problem to new highs.**

**Satellites rotate with the earth and beam back our positions via triangulation.**

**International date line and Prime meridian 0 and 180**

**As the Earth rotates eastward on its axis, Time sweeps westward.**

**24 time zones, roughly 15º  of longitude apart.**

**The west side is a day ahead of the east side. One day ahead west the date line. International travel can rally throw you off. Imagine flying west at 500 miles per hour as the world rotates under the plane.**

**GREENWICH MEAN TIME (GMT) and atomic clocks.**

**What is time? does anyone know what time it really is?**

**Daylight Savings time.**

**In the years since Jesus Died. I wonder how this got started?**

**Global Position Systems. Used in cars and in lab**

**MAPPING-**

**Cartography. Generalizing an area graphically**

**Depict location and space, landforms and networks.**

**How much info to pack in?**

**A Map is a scale model of a place. It tells us where something is in relation to another place. Portrays the size and shape of landforms.**

**Elevation or vertical relief steepness via contour lines= topographic map.**

**Contour intervals, lines, the steeper the terrain the tighter the lines, with a designated space between lines.**

**A selective minaturization.**

**Chart- is a nautical or aeronautical map.**

**Planametric vertically correct verses**

**Photogrammetry extremely accurate**

**The written scale is the map legend. Usually in the corner. It is the relation of a map measure and a corresponding earth measure. A ratio is determined.**

**For example one inch to one mile = a representative fraction.**

**With a common denominator.**

**1:24000 inches/12 in a foot= 2000 ft**

**See Table 1/3 on page 24.**

**In order to keep that relationship constant as copies of models are reduced in scale, a Graphic scale is used.**

**To unify scales, convert 1-to 1 Will cover this in lab.**

**Small scale maps mean the amount of land on the map surface. Actually it’s counter intuitive, just think of it as the bigger the number, the smaller the scale.**

**Large scale map- 1’’-2000’ more details recorded.**

**1 in = 25,000 miles- earth circumphrance-1/15,840,000**

**Another problem of scale is mapping a fat globe to a skinny piece of paper.**

**A globe is the only true representation of distance, direction, area shape and proximity.**

**But it is too difficult to work with so a representative portion is mapped or projected but the distortion must be accounted, if the maps are to be any use.**

**1- Parallel will be parallel,**

**2- Meridians converge at poles**

**3 -Parallel and meridian hit at right angle.**

**Mercator Projection. Around a cyclinder  has a standard line at the equator, But the first two are achieved.**

**Everywhere else is blown up – distorted- toward the edges. See Antarctica- as big as Asia and Africa combined- NOT**

**But lines of constant direction- rhumb lines are straight and help plot true courses. But in reality they are curves and the Great Circle is a straight line.**