Las Positas College
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Course Outline for GEOG 1

INTRO TO PHYSICAL GEOGRAPHY

Effective: Fall 2013

I. CATALOG DESCRIPTION:
GEOG 1 — INTRO TO PHYSICAL GEOGRAPHY — 3.00 units

This course is a spatial study of the Earth's dynamic physical system and processes. Topics include: Earth-sun geometry, weather, climate, water, landforms, soil, and the biosphere with emphasis on spatial characteristics, change over time, interactions between environmental components, and human-environment interactions. Tools of geographic inquiry are also beiefly covered; they include maps, remote sensing, Geographic Information Systems (GIS0 and Global Positioning Systems (GPS).

3.00 Units Lecture

Grading Methods:
Letter Grade

Discipline:

	MIN
Lecture Hours:	54.00
Total Hours:	54.00

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: 1

III. PREREQUISITE AND/OR ADVISORY SKILLS:

IV. MEASURABLE OBJECTIVES:

Upon completion of this course, the student should be able to:

1. Demonstrate an understanding of the size, shape, and movements of the Earth in space and their importance to environmental patterns and processes by examining the earth / sun relationships, seasons, maps, latitude and longtude, and using GIS and GPS technology by applying examples in real world situations.
2. Demonstrate an understanding of the atmospheric, geomorphological, and biotic processes that shape the Earth's physical enviroments by examining weather and climate issues as they pertain to physical geography by having the students understand the general concepts of weather, climate and corresponding definitions. .
3. Demonstrate an understanding of the global distribution of the world's climate, ecosystems, and physiographic (landform) features by learning the Koppen classification system.
4. Demonstrate an understanding of the basic concepts of physical geography in the analysis of real-world variations in environmental patterns by having the students learn about global warming, recent weather patterns and learning to read weather maps.
5. Demonstrate an understanding of the scientific method and practical experience using the tools and concepts of physical geography by having the students work with GIS, GPS and topographic maps.

V. CONTENT:
- A. The Essentials of Geography
  1. The Science of Geography
     - a. Geographic Analysis
     - b. The Geographic Continuum
  2. Earth Systems Concepts
     - a. Systems Theory
     - b. Earth’s Four “Spheres”
     - c. A Spherical Planet
     - d. Measuring Earth in 247 B.C.
  3. Location and Time on Earth
     - a. Latitude
     - b. Longitude
     - c. Great Circles and Small Circles
     - d. Prime Meridian and Standard Time
  4. Maps, Scales, and Projections
     - a. The Scale of Maps
     - b. Map Projections
  5. Remote Sensing and GIS
- B. Solar Energy to Earth and the Seasons
  1. The Solar System, Sun, and Earth
     - a. Solar System Formation and Structure

2. Solar Energy: From Sun to Earth
    a. Solar Activity and Solar Wind
    b. Electromagnetic Spectrum of Radiant Energy
    c. Intercepted Energy at the Top of the Atmosphere
3. The Seasons
    a. Seasonality
    b. Reasons for Seasons
    c. Annual March of the Seasons

C. Earth's Modern Atmosphere
1. Atmospheric Composition, Temperature, and Function
    a. Atmospheric Profile
    b. Atmospheric Composition Criterion
    c. Atmospheric Temperature Criterion
    d. Atmospheric Function Criterion
2. Variable Atmospheric Components
    a. Natural Sources
    b. Natural Factors That Affect Air Pollution
    c. Anthropogenic Pollution
    d. Benefits of the Clean Air

D. Atmospheric and Surface Energy Balances
1. Energy Essentials
    a. Energy Pathways and Principles
2. Energy Balance in the Troposphere
    a. The Greenhouse Effect and Atmospheric Warming
    b. Clouds and Earth's "Greenhouse"
    c. Earth-Atmosphere Radiation Balance
3. Energy Balance at Earth's Surface
    a. Daily Radiation Patterns
    b. Simplified Surface Energy Balance
    c. The Urban Environment

E. Global Temperatures
1. Temperature Concepts and Measurement
    a. Temperature Scales
    b. Measuring Temperature
2. Principal Temperature Control
    a. Latitude
    b. Altitude
    c. Cloud Cover
    d. Land-Water Heating Differences
3. Earth's Temperature Patterns
    a. January Temperature Map
    b. July Temperature Map
    c. Annual Temperature Range Map

F. Atmospheric and Oceanic Circulations
1. Wind Essentials
    a. Air Pressure and Its Measurement
    b. Wind: Description and Measurement
    c. Global Winds
2. Driving Forces Within the Atmosphere
    a. Pressure Gradient Force
    b. Coriolis Force
    c. Friction Force
3. Atmospheric Patterns of Motion
    a. Primary High-Pressure and Low-Pressure Areas
    b. Upper Atmospheric Circulation
    c. Local Winds
    d. Monsoonal Winds
4. Oceanic Currents
    a. Surface Currents
    b. Deep Currents

G. The Water, Weather, and Climate Systems
1. Water on Earth
    a. Worldwide Equilibrium
    b. Distribution of Earth's Water Today
2. Unique Properties of Water
    a. Heat Properties
    b. Heat Properties of Water in Nature
3. Humidity
    a. Relative Humidity
    b. Expressions of Relative Humidity
4. Atmospheric Stability
    a. Adiabatic Processes
    b. Stable and Unstable Atmospheric Conditions
5. Clouds and Fog
    a. Cloud Formation and Processes
    b. Cloud Types and Identification
    c. Fog

H. Weather
1. Air Masses
    a. Air Masses Affecting North America
    b. Air Mass Modification
2. Atmospheric Lifting Mechanisms
    a. Convergent Lifting
    b. Convectional Lifting
    c. Orographic Lifting
    d. Frontal Lifting (Cold and Warm Fronts)
3. Midlatitude Cyclonic Systems
    a. Life Cycle of a Midlatitude Cyclone
    b. Analysis of Daily Weather Maps – Forecasting
4. Violent Weather

a. Thunderstorms
b. Tornadoes
c. Tropical Cyclones

I. Water Resources
1. The Hydrologic Cycle
a. A Hydrologic Cycle Model
b. Surface Water
2. Soil-Water-Budget Concept
a. The Soil-Water-Balance Equation
b. Sample Water Budgets
c. Water Budget and Water Resources
3. Groundwater Resources
a. Groundwater Profile and Movement
b. Aquifers, Wells, and Springs
c. Overuse of Groundwater
d. Pollution of Groundwater
4. Our Water Supply
a. Water Supply in the United States
b. Instream, Nonconsumptive, and Consumptive Uses
c. Future Considerations

J. Global Climate Systems
1. Earth's Climate System and Its Classification
a. Climate Components: Insolation, Temperature, Pressure, Air Masses, and Precipitation
b. Classification of Climatic Regions
c. The Köppen Climate Classification System
d. Global Climate Patterns
2. Global Climate Change
a. Global Warming
b. Climate Models and Future Temperatures
c. Consequences of Global Warming
d. Political Action to Slow Global Warming

K. The Dynamic Planet
1. The Pace of Change
2. Earth's Structure and Internal Energy
a. Earth's Core
b. Earth's Mantle
c. Earth's Lithosphere and Crust
3. The Geologic Cycle
a. The Rock Cycle
b. Igneous Processes
c. Sedimentary Processes
d. Metamorphic Processes
4. Plate Tectonics
a. A Brief History
b. Sea-Floor Spreading and Production of New Crust
c. Subduction of the Crust
d. The Formation and Breakup of Pangaea
e. Plate Boundaries
f. Earthquake and Volcanic Activity
g. Hot Spots

L. Tectonics, Earthquakes, and Volcanism
1. Earth's Surface Relief Features
a. Crustal Orders of Relief
b. Earth's Topographical Regions
2. Crustal Formation Processes
a. Continental Shields
b. Building Continental Crust and Terranes
3. Crustal Deformation Processes
a. Folding and Broad Warping
b. Faulting
4. Orogenesis (Mountain Building)
a. Types of Orogenies
b. The Grand Tetons and the Sierra Nevada
c. The Appalachian Mountains
d. World Structural Regions
5. Earthquakes
a. Expected Quakes and Those of Deadly Surprise
b. Focus, Epicenter, Foreshock, and Aftershock
c. Earthquake Intensity and Magnitude
d. The Nature of Faulting
6. Earthquakes and the San Andreas Fault
a. Los Angeles Region
b. Earthquake Forecasting and Planning
7. Volcanism
a. Volcanic Features
b. Location and Types of Volcanic Activity
c. Effusive Eruptions
d. Explosive Eruptions
e. Volcano Forecasting and Planning

M. Weathering, Karst Landscapes, and Mass Movement
1. Landmass Denudation
a. Geomorphic Models of Landform Development
b. Dynamic Equilibrium View of Landforms
2. Weathering Processes
a. Factors Influencing Weathering Processes
b. Physical Weathering Processes
c. Chemical Weathering Processes
3. Karst Topography and Landscapes
a. Formation of Karst
b. Lands Covered with Sinkholes

c. Caves and Caverns
4. Mass Movement Processes
a. Mass Movement Mechanics
b. Classes of Mass Movements
c. Human-Induced Mass Movements (Scarification)

N. River Systems and Landforms
1. Fluvial Processes and Landscapes
a. Base Level of Streams
b. Drainage Basins
c. Drainage Density and Patterns
2. Streamflow Characteristics
a. Exotic Streams
b. Stream Erosion
c. Stream Transport
d. Flow and Channel Characteristics
e. Stream Gradient
f. Stream Deposition
3. Floods and River Management
a. Rating Floodplain Risk
b. Streamflow Measurement

O. Eolian Processes and Arid Landscapes
1. The Work of Wind
a. Eolian Erosion
b. Eolian Transportation
c. Eolian Depositional Landforms
d. Loess Deposits

P. Overview of Desert Landscapes
1.
a. Desert Climates
b. Desert Fluvial Processes
c. Desert Landscapes
d. Basin and Range Province
e. Desertification

Q. The Oceans, Coastal Processes, and Landforms
1. Global Oceans and Seas
a. Chemical Composition of Seawater
b. Physical Structure of the Ocean
2. Coastal System Components
a. Inputs to the Coastal System
b. The Coastal Environment and Sea Level
3. Coastal System Actions
a. Tides
b. Waves
4. Coastal System Outputs
a. Erosional Coastal Processes and Landforms
b. Depositional Coastal Processes and Landforms
c. Biological Processes: Coral Formations
5. Wetlands, Salt Marshes, and Mangrove Swamps
6. Human Impact on Coastal Environments

R. Glacial and Periglacial Processes and Landforms
1. Rivers of Ice
a. Alpine Glaciers
b. Continental Glaciers
2. Glacial Processes
a. Formation of Glacial Ice
b. Glacial Mass Balance
c. Glacial Movement
d. Glacial Landforms
e. Erosional Landforms Created by Alpine Glaciation
f. Depositional Landforms Created by Alpine Glaciation
3. Erosional and Depositional Landforms Created by Continental Glaciation

S. The Geography of Soils
1. Soil Characteristics
a. Soil Profiles
b. Soil Horizons
2. Soil Properties
a. Soil Color
b. Soil Texture
c. Soil Structure
d. Soil Consistence
e. Soil Porosity
f. Soil Moisture
g. Soil Chemistry
h. Soil Acidity and Alkalinity
3. Soil Formation Factors and Management
a. Natural Factors
b. The Human Factor
4. Soil Classification
a. Soil Taxonomy
b. Diagnostic Soil Horizons
c. The 12 Soil Orders of the Soil Taxonomy

T. Ecosystem Essentials
1. Ecosystem Components and Cycles
a. Communities
b. Plants: The Essential Biotic Component
c. Photosynthesis and Respiration
d. Abiotic Ecosystem Components
e. Elemental Cycles
f. Limiting Factors
2. Biotic Ecosystem Operations

a. Producers, Consumers, and Decomposers
b. Examples of Complex Food Webs
c. Efficiency in a Food Web
d. Ecological Relations
e. Concentration of Pollution in Food Chains

3. Ecosystems and Succession
   a. Ecosystem and Stability and Diversity
   b. Ecological Succession
   c. Terrestrial Succession
   d. Aquatic Succession

U. Terrestrial Biomes
1. Biogeographic Realms
   a. Transition Zones
   b. Terrestrial Ecosystems
2. Earth's Major Terrestrial Biomes
   a. Equatorial and Tropical Rain Forest
   b. Deforestation of the Tropics
   c. Tropical Seasonal Forest and Scrub
   d. Tropical Savanna
   e. Midlatitude Broadleaf and Mixed Forest
   f. Needleleaf Forest and Montane Forest
   g. Temperate Rain Forest
   h. Mediterranean Shrubland
   i. Midlatitude Grasslands
   j. Deserts
   k. Arctic and Alpine Tundra

V. Earth and the Human Denominator
1. The Human Count and the Future
2. An Oily Bird
3. The Need for International Cooperation
4. Who Speaks for the Earth?

VI. METHODS OF INSTRUCTION:

A. **Lecture** - 1. Chalkboard (Whiteboard) Presentation 2. PowerPoint Presentations 3. Slides
B. Assignments: 1. Weekly Homework Assignments from Textbook a. Answer numbered questions 1-5, 7-9, 11, 12, and 16 as an example.
C. Online discussion boards (for online class) 1. Relevant News Stories a. Policy Associated with Global Warming b. Acid Rain 2. Applications of Lecture Topics a. Drainage Basins b. Pressure Systems 3. Applications of Science to the World a. El Niño b. Natural Hazards
D. **Discussion** - Discussion within groups and discussion boards over important pertinent topics related to physical geography - example a discussion on what causes global warming
E. Web-Based Resources 1. Earthquake data for US and Ca: http://quake.wr.usgs.gov/
F. Web-Based Assignments 1. Example – located your house on the web map of earthquake damage potential to see if you house can withstand a major earthquake in the bay area.
G. CD-ROM 1. McKnight / Hess Student Animations CD 2. TASA Graphic Arts, Inc., Introduction to Topographic Maps 3. TASA Graphic Arts, Inc., The Theory of Plate Tectonics

VII. TYPICAL ASSIGNMENTS:

A. Weekly Homework assignments from the textbook – end of the chapter questions. B. GPS assignments – students would locate items using GPS equipment C. One page paper on topics such as earthquake activity, global warming, etc.

VIII. EVALUATION:

A. **Methods**

1. Exams/Tests
2. Quizzes
3. Research Projects
4. Projects
5. Home Work
6. Other:
   a. Methods
      1. Homework (to be graded at instructor's discretion)
      2. Student Projects
      3. Quizzes/Exams (online or in the classroom)
      4. Final Exam (online or in the classroom)

B. **Frequency**

1. Frequency
   a. Weekly Homework Assignments
   b. Recommend bi-weekly or tri-weekly quizzes (or) two or three midterm (unit) exams and final exam.
   c. Student Projects and/or Research Paper to be assigned at the discretion of the instructor

IX. TYPICAL TEXTS:

1. Christopherson, Robert W (2013). *Elemental Geosystems* (6th ed.). Upper Saddle River, New Jersey: Pearson Higher Education.
2. Hess, D (2013). *Physical Geography: A Landscape Appreciation* (11 ed.). Upper Saddle River, New Jersey: Pearson Higher Education .

X. OTHER MATERIALS REQUIRED OF STUDENTS:

A. USGS Topographic Quadrangles – Livermore, Dublin and Altamont
B. Campus Print Card
C. 12" Ruler, preferably clear plastic
D. Computer and Internet access