Chapter 1: Foundations of Geography

Essentials of Geography

- The Science of Geography
- Earth Systems Concepts
- Location and Time on Earth
- Maps, Scales, and Projections
- Remote Sensing and GIS

The Science of Geography

- Geography – from geo “Earth” and graphein “to write”
- Geography is
  - a method, not a body of knowledge
  - holistic
  - eclectic
- Geographers use spatial analysis
- Geographers use Earth systems science
Geography is

The science that studies the relationships among

- natural systems,
- geographic areas,
- society,
- cultural activities,
- and the interdependence of all of these over space.

Geographic Themes

- Location
- Region
- Place
- Movement
- Human-Earth Relationships

Figure 1.1 in textbook has explanations of geographic themes.

Location
Location identifies a specific address or absolute and relative position on Earth. Mount Cook is the highest point in New Zealand, located at 43°35' S latitude and 170°8' E longitude.
Place
No two places on Earth are exactly alike. Place describes the characteristics – both human and physical – of a location. Untracked powder attracts skiers in the backcountry near Mount Hutt.

Region
A region is an area defined by uniform physical or human characteristics. The West Coast region, between the Southern Alps and the Tasman Sea, is dominated by a marine west coast climate, cool and moist.

Movement
New Zealand receives 2.5 million international visitors each year; Milford Sound is a major attraction, Mitre Peak in background. Communication, migration, and diffusion across Earth’s surface represent movement in our interdependent world.
Physical Geography is

- The spatial analysis of all the physical elements and processes that make up the environment.
Scientific Method

A theory is an explanation of some kind of environmental phenomenon. A theory also allows scientists to formulate predictions about things not yet known.

Example: Newton's theory of gravity helps explain why humans do not fly like Superman, and allows us to predict what will happen if a human jumps out of an airplane.

Earth Systems Concepts

- Systems: Inputs, Actions, Outputs
- Open systems: freedom of movement
- Closed systems: restricted movement
- System feedback:
  - Positive Feedback
  - Negative Feedback
- System equilibrium: steady-state to steady-state
Leaf as a System

Photosynthesis process
Respiration process

Earth’s
Four Spheres

Location and Time on Earth
- Latitude
- Longitude
- Geographic Grid
- Great circles, Small circles
- Prime Meridian and standard time
Measuring Earth in 247 B.C.

Measurement: 28,738 miles
Reality: 24,860 miles

Earth’s dimensions

Equatorial circumference 40,075 km (24,902 mi)
Polar circumference 40,008 km (24,860 mi)

Lines of latitude are all parallel to one another
Lines of longitude (meridians) converge or join at each pole.

Get familiar with these names and general locations on the planet...
Great Circles and Small Circles

- Each line of meridians forms a great circle.
- All other parallels form small circles.
- A line intersecting the globe along a great circle divides the earth into two equal hemispheres, each passing through its center.

Global Positioning System

- GPS satellite #1 range
- GPS satellite #2 range
- GPS satellite #3 range
- Location of GPS receiver
- Location rejected

Prime Meridian and Standard Time

- Monday
- Sunday
- Add a day
- Subtract a day
- Non-standard time
Maps, Scales, and Projections

- Map – a generalized view of an area, as seen from above and reduced in size
- Scale – ratio of map units to ground units
- Projection – process of transforming reality of Earth into a flat map

Map Scales

Representative fraction
1:250,000 or \( \frac{1}{250,000} \)

Graphic scale

4 3 2 1 0 4 8
miles

5 4 3 2 1 0 5 10
kilometers

Written scale
One inch equals four miles (English units in U.S.)

Geographic Scales

"Scales" used in this course:

a) local: smallest piece of landscape; Moscow, Idaho
b) regional: intermediate piece of landscape; Pacific Northwest
c) global: largest piece of landscape; Terra
Process of Map Projection

- Equivalent: equal area; preserves surface areas
- Conformal: true shape; preserves the shapes
- Azimuthal: true direction; preserves compass directions
- Equidistant: true distance; preserves distances

All map projections are compromises between these four properties.

Map Projection Properties

A single map property can be perfectly preserved on a map projection, but the other three will be distorted. There is no perfect projection...

Classes of Projections: Cylindrical

Figure 1.19
Classes of Projections: Planar

![Planar projection](image)

Classes of Projections: Conic

![Conic projection](image)

Classes of Projections: Oval

![Oval projection](image)
Modern remote sensing is conducted from a wide variety of sensor platforms, transmitted to ground stations, and the resulting images can be manipulated on the common personal computer… if you have the proper software…

The UI Geography program emphasizes skills in computer mapping, geographic information systems, and remote sensing software packages.

Nearly 100% placement of graduates in jobs utilizing geographic information systems and remote sensing.
Geographic Information Systems (GIS)

- GIS systems combine spatial and attribute data
- “Maps” can contain multiple data layers:
  - Physical features
  - Cultural features
- Layers can be added to create composite overlay

GIS System

Computer programs that can depict or analyze single maps or “layers” just like a printed map... but can also combine different layers into a composite “overlay” map.

Terms come from map printing techniques which “sandwiched” layers of photographic negatives to produce a final map.
For the remainder of the course, we will be studying many different systems of our planet through a geographic perspective... examining the atmosphere, hydrosphere, lithosphere, and biosphere that together form the geosystems of Terra.